

INVITATION TO BID
CITY OF NAPLES
PURCHASING DIVISION
CITY HALL, 735 8TH STREET SOUTH
NAPLES, FL 34102
PH: 239-213-7100 FX: 239-213-7105

NOTIFICATION DATE: 12/31/13	TITLE Port Royal Pump Station Improvements	NUMBER: 14-015	OPENING DATE & TIME: 02/04/14 2:00 PM
PRE-BID DATE, TIME AND LOCATION: Non-mandatory Pre-Bid Meeting in be held January 14, 2014 at 10:00 AM local time; 295 Riverside Circle, Naples FL, 34102			

NAME OF PARTNERSHIP, CORPORATION OR INDIVIDUAL:	
MAILING ADDRESS:	
CITY-STATE-ZIP:	
PH:	EMAIL:
FX:	WEB ADDRESS:

I certify that this bid is made without prior understanding, agreement, or connection with any corporation, firm, or person submitting a bid for the same materials, supplies, or equipment and is in all respects fair and without collusion or fraud. I agree to abide by all conditions of this bid and certify that I am authorized to sign this bid for the bidder. In submitting a bid to the City of Naples the bidder offers and agrees that if the bid is accepted, the bidder will convey, sell, assign or transfer to the City of Naples all rights, title, and interest in and to all causes of action it may now or hereafter acquire under the Anti-trust laws of the United States and the State of FL for price fixing relating to the particular commodities or services purchased or acquired by the City of Naples. At the City's discretion, such assignment shall be made and become effective at the time the City tenders final payment to the bidder.

FEI/EIN Number _____

AUTHORIZED SIGNATURE	DATE	PRINTED NAME/TITLE
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Please initial by all that apply
I acknowledge receipt / review of the following addendum

____ Addendum #1 ____ Addendum #2 ____ Addendum #3 ____ Addendum #4

PLEASE NOTE THE FOLLOWING:

- > **This page must be completed and returned with your bid.**
- > **Bids must be submitted in a sealed envelope, marked with bid number & closing date.**
- > **Bids received after the above closing date and time will not be accepted.**
- > **If you do not have an email address and you want a copy of the Bid Tab, please enclose a stamped, self-addressed envelope with your bid.**

PROJECT MANUAL
CITY OF NAPLES
PORT ROYAL PUMPING STATION IMPROVEMENTS



BID # 14-015

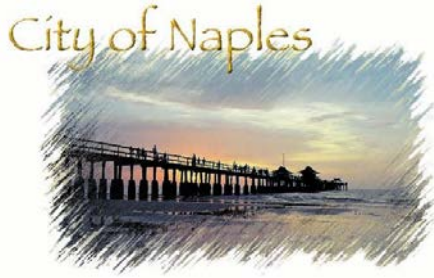
Project Manager: Dawn Jakiela, P.E.
Project Director: Ronald Cavalieri, P.E.
Project Engineer: John Reed, P.E.

December 2013

AECOM Technical Services, Inc.

ISSUED FOR BIDDING

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GENERAL CONDITIONS

TO INSURE ACCEPTANCE OF THE BID, PLEASE FOLLOW THESE INSTRUCTIONS. ANY AND ALL SPECIAL CONDITIONS, ATTACHED HERETO, HAVE PRECEDENCE.

- 1. SEALED BID:** All bids must be submitted in a sealed envelope. The face of the envelope shall contain the bid name and bid number. Bids not submitted on attached bid form shall be rejected. All bids are subject to the conditions specified herein. Those which do not comply with these conditions are subject to rejection.
- 2. EXECUTION OF BID:** Bid must contain a manual signature of authorized representative in the proposal section. Bid must be typed or printed in ink. Use of erasable ink is not permitted. All corrections made by bidder to his bid must be initialed.
- 3. NO BID:** If not submitting a bid, respond by returning the Statement of No Bid and explain the reason in the spaces provided. Failure to respond 3 times in succession without justification shall be cause for removal of the supplier's name from the bid mailing list. NOTE: To qualify as a respondent, bidder must submit a "NO BID," and it must be received no later than the stated bid opening date and hour.
- 4. BID OPENING:** Shall be public, on the date and at the time specified on the bid form. It is the bidder's responsibility to assure that his bid is delivered at the proper time and place of the bid opening. Bids which for any reason are not so delivered will not be considered. Offers by telegram, telephone; or fax are not acceptable. Bid files may be examined during normal working hours.
- 5. WITHDRAWAL OF BIDS:** Withdrawal of a bid within sixty (60) days after the opening of bids is subject to suspension or debarment in accordance with Section 2-668 of the City Code for up to three years.
- 6. PRICES, TERMS and PAYMENT:** Firm Prices include all packing, handling, shipping charges and delivery to the destination shown herein. Bidder is encouraged to offer cash discount for prompt invoice payment. Terms of less than 20 days will not be considered.

 - A. TAXES:** The City of Naples does not pay Federal Excise and Sales taxes on direct purchases of tangible personal property. See exemption number on face of purchase order. This exemption does not apply to purchases of tangible personal property made by contractors who use the tangible personal property in the performance of contracts for the improvement of City-owned real property.
 - B. MISTAKES:** Bidders are expected to examine the specifications, delivery schedule, bid prices, extensions, and all instructions pertaining to supplies and services. Failure to do so will be at bidder's risk. In case of mistake in extension, the unit price will govern.
 - C. CONDITION AND PACKAGING:** It is understood and agreed that any item offered or shipped as a result of this bid shall be a new, current standard production model available at the time of this bid. All containers shall be suitable for storage or shipment, and all prices shall include standard commercial packaging.
 - D. SAFETY STANDARDS:** Unless otherwise stipulated in the bid, all manufactured items and fabricated assemblies shall comply with applicable requirements of Occupational Safety and Health Act and any standards there under.
 - E. UNDERWRITERS' LABORATORIES:** Unless otherwise stipulated in the bid, all manufactured items and fabricated assemblies shall carry U.L. approval and re-examination listing where such has been established.
 - F. PAYMENT:** Payment will be made by the buyer after the items awarded to a vendor have been received, inspected, and found to comply with award specifications, free of damage or defect and properly invoiced. All invoices shall bear the purchase order number. Payment for partial shipments shall not be made unless specified in the bid. Failure to follow these instructions may result in delay in processing invoices for payment. In addition, the purchase order number must appear on bills of lading, packages, cases, delivery lists and correspondence.
- 7. DELIVERY:** Unless actual date of delivery is specified (or if specified delivery cannot be met), show number of days required to make delivery after receipt of purchase order in space provided. Delivery time may become a basis for making an award (see Special Conditions). Delivery shall be within the normal working hours of the user, Monday through Friday, unless otherwise specified.

8. MANUFACTURERS' NAMES AND APPROVED EQUIVALENTS: Any manufacturers' names, trade names, brand names, information and/or catalog numbers listed in a specification are for information and not intended to limit competition. The bidder may offer any brand for which he is an authorized representative, which meets or exceeds the specification for any item(s). If bids are based on equivalent products, indicate on the bid form the manufacturer's name and number. Bidder shall submit with his proposal, cuts, sketches, and descriptive literature, and/or complete specifications. Reference to literature submitted with a previous bid will not satisfy this provision. The bidder shall also explain in detail the reason(s) why the proposed equivalent will meet the specifications and not be considered an exception thereto. Bids which do not comply with these requirements are subject to rejection. Bids lacking any written indication of intent to quote an alternate brand will be received and considered in complete compliance with the specifications as listed on the bid form.

9. INTERPRETATIONS: Any questions concerning conditions and specifications shall be directed in writing to this office for receipt no later than ten (10) days prior to the bid opening. Inquiries must reference the date of bid opening and bid number. Failure to comply with this condition will result in bidder waiving his right to dispute the bid.

10. CONFLICT OF INTEREST: All bid awards are subject to Section 2-973 Conflict of Interest, City of Naples Code of Ordinances, which states: *"No public officer or employee shall have or hold any employment or contractual relationship with any business entity or any agency which is subject to the regulation of or is doing business with the city; nor shall an officer or employee have or hold any employment or contractual relationship that will create a continuing or frequently recurring conflict between his private interests and the performance of his public duties or that would impede the full and faithful discharge of his public duties. Any member of the city council or any city officer or employee who willfully violates this section shall be guilty of malfeasance in office or position and shall forfeit his office or position. Violation of this section with the knowledge, express or implied, of the person or corporation contracting with or making a sale to the city shall render the contract or sale voidable by the city manager or the city council."*

11. AWARDS: As the best interest of the City may require, the right is reserved to make award(s) by individual item, group of items, all or none, or a combination thereof; to reject any and all bids or waive any minor irregularity or technicality in bids received.

12. ADDITIONAL QUANTITIES: For a period not exceeding ninety (90) days from the date of acceptance of this offer by the buyer, the right is reserved to acquire additional quantities up to but not exceeding those shown on bid at the prices bid in this invitation. If additional quantities are not acceptable, the bid sheets must be noted "BID IS FOR SPECIFIED QUANTITY ONLY." (THIS PARAGRAPH DOES NOT APPLY FOR A TERM CONTRACT.)

13. SERVICE AND WARRANTY: Unless otherwise specified, the bidder shall define any warranty service and replacements that will be provided during and subsequent to this contract. Bidders must explain on an attached sheet to what extent warranty and service facilities are provided.

14. SAMPLES: Samples of items, when called for, must be furnished free of expense, on or before bid opening time and date, and if not destroyed may, upon request, be returned at the bidder's expense. Each individual sample must be labeled with bidder's name, manufacturer's brand name and number, bid number and item reference. Request for return of samples shall be accompanied by instructions which include shipping authorization and name of carrier and must be received with your bid. If instructions are not received within this time, the commodities shall be disposed of by the City of Naples.

15. BID PROTEST: The city has formal bid protest procedures that are available on request.

16. INSPECTION, ACCEPTANCE AND TITLE: Inspection and acceptance will be at destination unless otherwise provided. Title and risk of loss or damage to all items shall be the responsibility of the contract supplier until accepted by the ordering agency, unless loss or damage results from negligence by the ordering

17. DISPUTES: In case of any doubt or difference of opinion as to the items to be furnished hereunder, the decision of the buyer shall be final and binding on both parties.

18. GOVERNMENTAL RESTRICTIONS: In the event any governmental restrictions may be imposed which would necessitate alteration of the material, quality, workmanship or performance of the items offered on this proposal prior to their delivery, it shall be the responsibility of the successful bidder to notify the buyer at once, indicating in his letter the specific regulation which required an alteration. The City reserves the right to accept any such alteration, including any price adjustments occasioned thereby, or to cancel the contract at no expense to the City.

19. LEGAL REQUIREMENTS: Applicable provision of all Federal, State, county and local laws, and of all ordinances, rules, and regulations shall govern development submittal and evaluation of all bids received in response hereto and shall govern any and all claims and disputes which may arise between person(s) submitting a bid response hereto and the City of Naples by and through its officers, employees and authorized representatives, or any other person, natural or otherwise; and lack of knowledge by any bidder shall not constitute a cognizable defense against the legal effect thereof.

20. PATENTS AND ROYALTIES: The bidder, without exception, shall indemnify and save harmless the City of Naples and its employees from liability of any nature or kind, including cost and expenses for or on account of any copyrighted, patented, or unpatented invention, process, or article manufactured or used in the performance of the contract, including its use by the City of Naples. If the bidder uses any design, device, or materials covered by letters, patent or copyright, it is mutually agreed and understood without exception that the bid prices shall include all royalties or cost arising from the use of such design, device, or materials in any way involved in the work.

21. ADVERTISING: In submitting a bid, bidder agrees not to use the results there from as a part of any commercial advertising.

22. ASSIGNMENT: Any Purchase Order issued pursuant to this bid invitation and the monies which may become due hereunder are not assignable except with the prior written approval of the buyer.

23. LIABILITY: The supplier shall hold and save the City of Naples, its officers, agents, and employees harmless from liability of any kind in the performance of this contract.

24. PUBLIC ENTITY CRIMES: 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, for CATEGORY TWO for a period of 36 months from the date of being placed on the convicted vendor list.

25. DISCRIMINATION: An entity or affiliate who has been placed on the discriminatory vendor list may not submit a bid on a contract to provide goods or services to a public entity, may not submit a bid on a contract with a public entity for the construction or repair of a public building or public work, may not submit bids on leases of real property to a public entity, may not award or perform work as a contractor, supplier, subcontractor, or consultant under contract with any public entity, and may not transact business with any public entity.

26. COUNTY TAXES: No proposal shall be accepted from and no contract will be awarded to any person, firm or corporation that is in arrears to the government of Collier County, Florida.

27. OFFER EXTENDED TO OTHER GOVERNMENTAL ENTITIES: The City of Naples encourages and agrees to the successful bidder/proposer extending the pricing, terms and conditions of this solicitation or resultant contract to other governmental entities at the discretion of the successful bidder/proposer.

IF THIS BID IS FOR A TERM CONTRACT, THE FOLLOWING CONDITIONS SHALL ALSO APPLY

28. ELIGIBLE USERS: All departments of the City of Naples are eligible to use this term contract. Such purchases shall be exempt from the competitive bid requirements otherwise applying to their purchases.

29. PRICE ADJUSTMENTS: Any price decrease effectuated during the contract period by reason of market change shall be passed on to City of Naples. Price increases are not acceptable.

30. CANCELLATION: All contract obligations shall prevail for at least one hundred eighty (180) days after effective date of contract. After that period, for the protection of both parties, this contract may be cancelled in whole or in part by either party by giving thirty (30) days prior written notice to the other party.

31. RENEWAL: The City of Naples reserves the option to renew the period of this contract, or any portion thereof for up to two (2) additional periods. Renewal of the contract period shall be by mutual agreement in writing.

32. ABNORMAL QUANTITIES: While it is not anticipated, should any unusual or abnormal requirements arise, the City reserves the right to solicit separate bids thereon.

33. FISCAL NON-FUNDING CLAUSE: In the event sufficient funds are not budgeted for a new fiscal period, the City shall notify the contractor of such occurrence and the contract shall terminate on the last day of the current fiscal year without penalty or expense to the City.

IF THIS BID IS FOR PERFORMING A SERVICE, THE FOLLOWING CONDITIONS SHALL ALSO APPLY

34. ALTERNATIVE BIDS: Bidders offering service delivery methods other than those permitted by the scope of work may submit a separate envelope clearly marked "ALTERNATIVE BID". Alternative bids will be deemed non-responsive and will not be considered for award. All such responses will, however, be examined prior to award. Such examination may result in cancellation of all bids received to permit rewriting the scope of work to include the alternative method, or the alternative method may be considered for future requirements of the City of Naples.

35. ANTITRUST: By entering into a contract, the contractor conveys, sells, assigns and transfers to the City of Naples all rights, titles and interest it may now have or hereafter acquire under the antitrust laws of the United States and the State of Florida that relate to the particular goods or services purchased or acquired by the City of Naples under said contract.

36. BIDDER INVESTIGATIONS: Before submitting a bid, each bidder shall make all investigations and examinations necessary to ascertain all site conditions and requirements affecting the full performance of the contract and to verify any representations made by the City of Naples upon which the bidder will rely. If the bidder receives an award as a result of its bid submission, failure to have made such investigations and examinations will in no way relieve the bidder from its obligation to comply in every detail with all provisions and requirements of the contract documents, nor will a plea of ignorance of such conditions and requirements be accepted as a basis for any claim whatsoever by the contractor for additional compensation.

37. CERTIFICATES AND LICENSES: The Contractor, at time of proposal, shall possess the correct occupational licenses, all professional licenses or other authorizations necessary to carry out and perform the work required by the City of Naples and Collier County for this project pursuant to all applicable Federal, State and Local Laws, Statutes, Ordinances, and rules and regulations of any kind.

38. CHANGE IN SCOPE OF WORK: The City of Naples may order changes in the work consisting of additions, deletions or other revisions within the general scope of the contract. No claims may be made by the contractor that the scope of the project or of the contractor's services has been changed, requiring changes to the amount of compensation to the contractor or other adjustments to the contract unless such changes or adjustments have been made by written amendment to the contract signed by the City of Naples and the contractor. If the contractor believes that any particular work is not within the scope of the project, is a material change, or will otherwise require more compensation to the contractor, the contractor must immediately notify the City in writing of this belief. If the City believes that the particular work is within the scope of the contract as written, the contractor will be ordered to and shall continue with the work as changed and at the cost stated for the work within the scope.

39. CONTRACTOR PERSONNEL: The City of Naples shall, throughout the life of the contract, have the right of reasonable rejection and approval of staff or subcontractors assigned to the work by the contractor. If the City

reasonably rejects staff or subcontractors, the contractor must provide replacement staff or subcontractors satisfactory to the City in a timely manner and at no additional cost to the City. The day-to-day supervision and control of the contractor's employees and sub-contractors is the responsibility solely of the contractor.

40. COST REIMBURSEMENT: The contractor agrees that all incidental costs, including allowances for profit and tools of the trade, must be included in the bid proposal rates. If an arrangement is made between the contractor and the City to reimburse the contractor for the cost of materials provided in the performance of the work, the contractor shall be reimbursed in the following manner: The City shall reimburse the contractor on completion and acceptance of each assigned job, only for those materials actually used in the performance of the work that is supported by invoices issued by the suppliers of the contractor describing the quantity and cost of the materials purchased. No surcharge shall be added to the supplier's invoices or included in the contractor's invoice submitted to the City that would increase the dollar amount indicated on the supplier's invoice for the materials purchased for the assigned job.

41. EXCEPTIONS: Bidders taking exception to any part or section of the solicitation shall indicate such exceptions on the bid form. Failure to indicate any exception will be interpreted as the bidder's intent to comply fully with the requirements as written. Conditional or qualified bids, unless specifically allowed, shall be subject to rejection in whole or in part.

42. FAILURE TO DELIVER: In the event of the contractor to fail to deliver services in accordance with the contract terms and conditions, the City, after due oral or written notice, may procure the services from other sources and hold the contractor responsible for any resulting purchase and administrative costs. This remedy shall be in addition to any other remedies that the City may have.

43. FAILURE TO ENFORCE: Failure by the City at any time to enforce the provisions of the contract shall not be construed as a waiver of any such provisions. Such failure to enforce shall not affect the validity of the contract or any part thereof or the right of the City to enforce any provision at any time in accordance with its terms.

44. FORCE MAJEURE: The contractor shall not be held responsible for failure to perform the duties and responsibilities imposed by the contract due to legal strikes, fires, riots, rebellions and acts of God beyond the control of the contractor, unless otherwise specified in the contract.

45. INDEPENDENT CONTRACTOR: The contractor shall be legally considered an independent contractor and neither the contractor nor its employees shall, under any circumstances, be considered servants or agents of the City of Naples and the City of Naples shall be at no time legally responsible for any negligence or any wrongdoing by the contractor, its servants or agents. The City of Naples shall not withhold from the contract payments to the contractor any federal income taxes, Social Security tax, or any other amounts for benefits to the contractor. Further, the City shall not provide to the contractor any insurance coverage or other benefits, including Workers' Compensation normally provided by the City for its employees.

46. ORAL STATEMENTS: No oral statement of any person shall modify or otherwise affect the terms, conditions or specifications stated in this contract. All modifications to the contract must be made in writing by the City of Naples.

47. QUALIFICATIONS OF BIDDERS: The bidder may be required, before the award of any contract, to show to the complete satisfaction of the City of Naples that it has the necessary facilities, ability, and financial resources to provide the service specified therein in a satisfactory manner. The bidder may also be required to give a past history and references in order to satisfy the City in regard to the bidder's qualifications. The City may make reasonable investigations deemed necessary and proper to determine the ability of the bidder to perform the work, and the bidder shall furnish to the City all information for this purpose that may be requested. The City reserves the right to reject any bid if the evidence submitted by, or investigation of, the bidder fails to satisfy the City that the bidder is properly qualified to carry out the obligations of the contract and to complete the work described therein. Evaluation of the bidder's qualifications shall include:

- > The ability, capacity, skill and financial resources to perform the work or service.
- > The ability to perform the work service promptly or within the time specified, without delay.
- > The character, integrity, reputation, judgment, experience, and efficiency of the bidder.

> The quality of performance of previous contracts or services.

48. QUALITY CONTROL: The contractor shall institute and maintain throughout the contract period a properly documented quality control program designed to ensure that the services are provided at all times and in all respects in accordance with the contract. The program shall include providing daily supervision and conducting frequent inspections of the contractor's staff and ensuring that accurate records are maintained describing the disposition of all complaints. The records so created shall be open to inspection by the City.

49. RECOVERY OF MONEY: Whenever, under the contract, any sum of money shall be recoverable from or payable by the contractor to the City, the same amount may be deducted from any sum due to the contractor under the contract or under any other contract between the contractor and the City. The rights of the City are in addition and without prejudice to any other right the City may have to claim the amount of any loss or damage suffered by the City on account of the acts or omissions of the contractor.

50. REQUIREMENTS CONTRACT: During the period of the contract, the contractor shall provide all the services described in the contract. The contractor understands and agrees that this is a requirements contract and that the City shall have no obligation to the contractor if no services are required. Any quantities that are included in the scope of work reflect the current expectations of the City for the period of the contract. The amount is only an estimate and the contractor understands and agrees that the City is under no obligation to the contractor to buy any amount of services as a result of having provided this estimate or of having any typical or measurable requirement in the past. The contractor further understands and agrees that the City may require services in excess of the estimated annual contract amount and that the quantity actually used whether in excess of, or less than, the estimated annual contract amount and that the quantity actually used shall not give rise to any claim for compensation other than the total of the unit prices in the contract for the quantity actually used.

51. TERMINATION FOR CONVENIENCE: The performance of work under the contract may be terminated by the City in whole or in part whenever the City determines that termination is in the City's best interest. Any such termination shall be effected by the delivery to the contractor of a written notice of termination of at least seven (7) days before the date of termination, specifying the extent to which performance of the work under the contract is terminated and the date upon which such termination becomes effective. After receipt of a notice of termination, except as otherwise directed, the contractor shall stop work on the date of the receipt of the notice or other date specified in the notice; place no further orders or subcontracts for materials, services or facilities except as necessary for completion of such portion of the work not terminated; terminate all vendors and subcontracts; and settle all outstanding liabilities and claims.

52. TERMINATION FOR DEFAULT: The City of Naples reserves the right to terminate the contract if the City determines that the contractor has failed to perform satisfactorily the work required, as determined by the City. In the event the City decides to terminate the contract for failure to perform satisfactorily, the City shall give to the contractor at least seven (7) days written notice before the termination takes effect. The seven-day period will begin upon the mailing of notice by the City. If the contractor fails to cure the default within the seven (7) days specified in the notice and the contract is terminated for failure to perform satisfactorily, the contractor shall be entitled to receive compensation for all reasonable, allocable and allowable contract services satisfactorily performed by the contractor up to the date of termination that were accepted by the City prior to the termination. In the event the City terminates the contract because of the default of the contractor, the contractor shall be liable for all excess costs that the City is required to expend to complete the work under contract.

53. STATE AND FEDERAL EMPLOYMENT LAWS: Contractors providing service to the City are required to comply with all state and federal employment laws. This includes, but is not limited to, laws resulting from the Immigration and Reform and Control Act of 1986, wherein all employers are required to verify the identity and employment eligibility of all employees. The Department of Homeland Security, U.S. Citizenship and Immigration Services require employees and employers to complete Form I-9 and the employer must examine evidence of identity and employment eligibility within three business days of the date employment begins. Non compliant contractors will be subject to contract sanctions, up to and including contract termination.

54. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY, AND VOLUNTARY EXCLUSION: The contractor agrees to comply with Executive Order 12549 "Debarment and

Suspension” and 2 CFR 180 “OMB Guidelines to Agencies on Government wide Debarment and Suspension.” These rules require all contractors using federal funds not be debarred or suspended from doing business with the Federal Government. This includes sub-recipients and lower tier participant for covered transactions. Signing and submitting this document certified the organization and its principals are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any federal department or agency, and further have not within the preceding three-year period been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction .

THE CITY OF NAPLES IS AN EQUAL OPPORTUNITY EMPLOYER

GENERAL INSURANCE REQUIREMENTS

The Contractor shall not commence work until he has obtained all the insurance required under this heading, and until such insurance has been approved by the Owner, nor shall the Contractor allow any subcontractor to commence work until all similar insurance required of the subcontractor has also been obtained and approved by the Owner.

Certificates of insurance must be issued by an authorized representative of the insurance company at the request and direction of the policyholder and must include sufficient information so as to identify the coverage and the contract for Owner's improvements for which they are issued. Certificates of insurance must be issued by a nationally recognized insurance company with a Best's Rating of no less than B+VII, satisfactory to the Owner, and duly licensed to do business in the state of said Contract.

The Contractor shall procure and maintain, during the life of this Contract, Worker's Compensation Insurance for all of his employees to be engaged in work under this Contract, and he shall require any subcontractor similarly to provide Worker's Compensation Insurance for all of the latter's employees to be engaged in such work, unless such employees are covered by the protection afforded by the Contractor's insurance. In case any employees are to be engaged in hazardous work under this Contract, and are not protected under this Worker's Compensation statute, the Contractor shall provide, and shall cause each subcontractor to provide, adequate coverage for the protection of such employees. It is acceptable to use a State-approved Worker's Compensation Self-Insurance fund.

The Contractor shall take out and maintain during the life of this Contract, Public Liability and Property Damage and shall include Contractual Liability, Personal Injury, Libel, Slander, False Arrest, Malicious Prosecution, Wrongful Entry or Eviction, Broad Form Property Damage, Products, Completed Operations and XCU Coverage to be included on an occurrence basis, and to the full extent of the Contract to protect him, the Owner, and any subcontractor performing work covered by this Contract from damages for personal injury, including accidental death, as well as from claims for property damage, which may arise from operations under this contract, whether such operations be by himself or by a subcontractor, or by anyone directly or indirectly employed by either of them. The Contractor shall also maintain automobile liability insurance including "non-owned and hired" coverage. The entire cost of this insurance shall be borne by the Contractor.

The amount of such insurance shall be no less than \$1,000,000 annual aggregate for bodily injury and property damage combined per occurrence.

The City of Naples must be named as Additional Insured on the insurance certificate and the following must also be stated on the certificate. "This coverage is primary to all other coverage the City possesses for this contract only." The City of Naples shall be named as the Certificate Holder. The Certificate Holder shall read as follows:

The City of Naples
735 Eighth Street South
Naples, Florida 34102

No City Division, Department, or individual name should appear on the Certificate.

No other format will be acceptable.

The Certificate must state the proposal number and title.

When using the "Accord"- 25 Certificate of Insurance only the most current version will be accepted.

The City of Naples requires a copy of a cancellation notice in the event the policy is cancelled. The City of Naples shall be expressly endorsed onto the policy as a cancellation notice recipient.

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STATEMENT OF NO BID

If you will not be bidding on this product/service, please help us by completing and returning only this page to:

City of Naples, Purchasing Division
City Hall, 735 8th Street South
Naples, FL 34102
Fax 239-213-7105

Bid # _____ and Description: _____

We, the undersigned, decline to proposal on the above project for the following reason(s):

- ___ We are not able to respond to the Invitation to Bid or Request for Proposals by the specified deadline.
- ___ Our Company does not offer this product or service.
- ___ Our current work schedule will not permit us to perform the required services.
- ___ Specifications are incomplete or information is unclear
(Please explain below).

___ Other (Please specify below)

Company Name _____ PH _____

Email _____

Name and Title of individual completing this form:

(Printed Name) (Title)

(Signature) (Date)

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REFERENCES

THIS SHEET MUST BE COMPLETED AND RETURNED WITH BID

PROVIDE AT LEAST THREE REFERENCES FOR WHOM YOUR COMPANY HAS PROVIDED SAME OR SIMILAR SERVICES WITHIN THE LAST 2 YEARS.

COMPANY NAME: _____

ADDRESS: _____

TELEPHONE: _____

CONTACT PERSON: _____

CONTACT E-MAIL ADDRESS: _____

COMPANY NAME: _____

ADDRESS: _____

TELEPHONE: _____

CONTACT PERSON: _____

CONTACT E-MAIL ADDRESS: _____

COMPANY NAME: _____

ADDRESS: _____

TELEPHONE: _____

CONTACT PERSON: _____

CONTACT E-MAIL ADDRESS: _____

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CONSTRUCTION
SPECIAL CONDITIONS

A. **TERMS OF CONTRACT**

The resulting contract will commence on award and be in effect until completion of the project.

B. **PROHIBITION OF CONTACT**

Under no circumstances should any prospective organization or individual, or anyone acting for or on behalf of a prospective organization or individual, seek to influence or gain the support of any member of the City Council, public official or City staff favorable to the interest of any prospective organization or individual. Likewise, contact with City Council, any public official or city staff against the interests of other prospective organization (s) and or individual(s) is prohibited. Any such activities will result in the exclusion of the prospective organization or individual from consideration by the City.

C. **REFERENCES**

Bidder must submit a minimum of three references on the form provided. Additionally, a signed and dated IRS W-9 form with EIN is required from all vendors.

D. **STATEMENT OF NO BID**

If you will not be bidding on this producer/service, please help us by completing and returning the Statement of No Bid.

E. **BID FORMAT**

The Contract, if awarded, will be awarded on the basis of material and equipment illustrated and described on the Drawings or specified in the Specification. If a substitution or an “or equal” item is proposed, Proposer must submit this information to the City of Naples Purchasing Department ten (10) days prior to the Proposal Date for evaluation as an acceptable substitution or an “or equal” item. If the substitution or the “or equal” item is accepted, the City of Naples will issue an Addendum to all Proposers listing the allowable substitution or the “or equal” item. The cost of changes in related work, additional drawings which may be required to illustrate or define the substitute or “or equal” equipment and its relationship to the other parts or portions of the Work shall be paid by the Contractor. No change will be made in the amount of time in which to complete the Work or in the liquidated damages.

F. **BID SECURITY / BID BOND**

It is the policy of the City of Naples to require a Bid Bond for all construction-related sealed bids estimated to be in excess of \$125,000. A bid bond or equivalent financial security in the amount of five (5) percent of the bid price shall be required and must accompany all bids. The Bid Bond is to be provided by a surety company authorized to do business in the State of Florida or otherwise supplied in a form satisfactory to the City. The bid bond must be submitted with the bid. When the invitation for bids requires a bid bond, noncompliance will result in rejection of the bid.

Note that failure or refusal of the awarded bidder to enter into a contract within twenty (20) calendar days after receipt of said contract will result in damages to the City and bid bond will be forfeited to the City as liquidated damages.

G. PROPOSAL CONSTRUCTION PERFORMANCE & PAYMENT BONDS

A Performance and Payment Bond will be required of the Awarded Proposer for any contract that is in excess of \$125,000.00 dollars and will be in an amount equal to 100 (%) percent of the price specified in the Contract.

The bond(s) shall be executed by a surety company authorized to do business in the State of Florida, or otherwise secured in a manner satisfactory to the City for the protection of all persons supplying labor and material to the contractor or its subcontractors for the performance of the work provided for in the contract.

Proof of insurance from the successful proposer is required at the time of issuance and award of a contract.

H. QUESTIONS

Questions regarding this proposer packet must be received in writing in the Purchasing Division, NO LATER THAN TEN CALENDAR DAYS PRIOR TO THE PROPOSAL CLOSING DATE TO ENSURE AN ANSWER IS PROVIDED PRIOR TO CLOSING.

Direct all questions to:
Gerald "Jed" Secory, MBA / CPPO / CPM
Purchasing Manager
City of Naples, Purchasing Division
735 8th Street South
Naples, Florida 34102
PH: (239) 213-7102 FX: (239) 213-7105
Jsecory@naplesgov.com

DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS

001000	Detailed Invitation to Bid
002000	Instruction to Bidders
003000	Bid Proposal Form with Bid Schedule
003010	Statement of Bidders Qualifications
003020	List of Subcontractors
003030	Material Manufacturers
004100	Bid Proposal Bond
004200	Corporate Resolution
004500	Notice of Award Form
004700	Drug-Free Work Place Certification
004750	Schedule of Cost for Major Structures and/or Areas of Work
004800	Non-Collusion Affidavit
004900	Trench Safety Affidavit
005000	City Agreement/Contract
006200	Construction Payment Bond Form
006300	Construction Performance Bond Form
006500	Certificate of Insurance Requirements
007000	Standard General Conditions of Construction
008420	Notice to Proceed Form
008430	Contractor's Application for Payment Form
008440	Change Order Form
008450	Schedule of Values
008460	Materials Stored on Site Form
008480	Certificate of Substantial Completion Form
008500	Field Order Form
008510	Contractor Request for Information Form
008520	Construction Accident Form
008530	Pressure Test Form
008610	Work Directive Form
008620	Daily Construction Report Form
008630	Change Proposal Summary Form
008640	Request for Proposed Change Form
008650	Check-Out Form
008660	Certificate of Completed Demonstration Form
009800	Contractor's Release of Lien Form

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SECTION 001000 - DETAILED INVITATION TO BID

PORT ROYAL PUMP STATION IMPROVEMENTS

CITY OF NAPLES, BID # 14-015

Separate sealed bid proposals from Contractors will be received for the for City of Naples, **Port Royal Pump Station Improvements**, addressed to Mr. Gerald “Jed” Secory, Purchasing Manager, City of Naples, 735 8th Street South, Naples, FL, 34102 until **2:00 PM LOCAL TIME, on the 4th day of February 2014**, at which time all bids will be publicly opened and read aloud. Any bids received after the time and date specified will not be accepted and shall be returned unopened to the Bidder.

A **non-mandatory pre-bid conference** shall be held at the Streets and Stormwater Conference Room, 295 Riverside Circle, Naples, FL at **10:00 AM. LOCAL TIME on the 14th day of January 2014**, at which time all prospective Bidders may visit the project site and have questions answered regarding the Bidding Documents for this Project. All technical questions after the pre-bid meeting shall be submitted in writing no later than ten (10) days before the bid date for possible addendum to the contract documents.

The Work is briefly described as follows: The work shall include but not be limited to: replace three submersible pumps and discharging piping, new elevated concrete slab, new generator, new transfer switch, new pump control panel with VFD’s, RTU and antenna, new security system with one camera, and new flap gate located at the outfall structure.

Sealed envelopes containing **one (1) original signature, one (1) copy of the original bid documents, and one (1) PDF of the original bid documents on a CD** shall be marked or endorsed "Bid Proposal for City of Naples, **PORT ROYAL PUMP STATION IMPROVEMENTS PROJECT, Bid # 14-015, and Bid Opening Date of February 2, 2014.** The Bid Proposal documents shall be removed from the Project Manual prior to submittal.

One contract will be awarded for all Work. Bidding Documents may be examined at City of Naples Purchasing Department, 735 8th Street South, Naples, FL; and the City of Naples web site. Bidders may download the full bid package from the City of Naples Web Site. All procedural questions regarding the intended work shall be directed to Gerald “Jed” Secory, Purchasing Manager at 239-213-7100. All questions regarding the project shall be submitted in writing to the Purchasing Manager no later than 10 days before bid date for possible inclusion and response in an addendum.

Each bid shall be accompanied by a certified or cashiers check or a Bid Bond in an amount not less than five percent (5%) of the total Bid to be retained as liquidated damages in the event the successful Bidder fails to execute the Agreement and file the required bonds and insurance within ten (10) calendar days after the receipt of the Notice of Award.

The successful Bidder shall be required to furnish the necessary Payment and Performance Bonds, as prescribed in the Project Manual. All Bid Bonds, Payment and Performance Bonds, Insurance Contracts and Certificates of Insurance shall be either executed by or countersigned by a licensed resident agent of the surety or insurance company having its place of business in the State of Florida. Further, the said surety or insurance company shall be duly licensed and qualified to do business in the State of Florida. Attorneys-in-fact that sign Bid Bonds or Payment and Performance Bonds must file with each bond a certified and effective dated copy of their Power of Attorney.

In order to perform public work, the successful Bidder shall, as applicable, hold or obtain such contractor's and business licenses, certifications and registrations as required by State statutes, County & City ordinances.

Before a contract will be awarded for the work contemplated herein, the City shall conduct such investigations as it deems necessary to determine the performance record and ability of the apparent low Bidder to perform the size and type of work specified in the Bidding Documents. Upon request, the Bidder shall submit such information as deemed necessary by the City to evaluate the Bidder's qualifications.

The Successful Bidder shall be required to Substantially Complete all Work within 270 calendar days from and after the Commencement Date specified in the Notice to Proceed; and Final Completion of all Work within 300 calendar days from and after the Commencement Date specified in the Notice to Proceed.

The City reserves the right to reject all Bids or any Bid not conforming to the intent and purpose of the Bidding Documents, and to postpone the award of the contract for a period of time which, however, shall not extend beyond ninety (90) days from the bid opening date.

The City reserves the right to award all, part, or none of the defined sections of the project. The extent of the award will be dependent on the level of funding for this fiscal year, at the time of award.

END OF SECTION 001000 - DETAILED INVITATION TO BID

DIVISION 00 - SECTION 002000

INSTRUCTIONS TO BIDDERS

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DIVISION 00 - SECTION 00200
INSTRUCTIONS TO BIDDERS

Section 1. Definitions

- 1.1 The term "Owner" used herein refers to the City of Naples, Florida, a municipal corporation, or its duly authorized representative.
- 1.2 The term "Project Manager" used herein refers to the Owner's duly authorized representative and shall mean a Department Director acting directly or through duly authorized representatives.
- 1.3 The term "Design Professional" refers to the licensed professional engineer who represents the Owner for the purpose of designing and/or monitoring the construction of the project. Any or all duties of the Engineer (Design Professional) referenced under this Agreement may be assumed at any time by the Project Manager on behalf of the Owner. Conversely, the Project Manager may formally assign any of his/her duties specified in this agreement to the Engineer (Design Professional).
- 1.4 The term "Bidder" used herein means one who submits a bid directly to the Owner in response to this solicitation.
- 1.5 The term "Successful Bidder" means the lowest qualified, responsible and responsive Bidder who is awarded the contract by the City of Naples, on the basis of the Owner's evaluation, to be in the best interest of the City.
- 1.6 The term "Bidding Documents" includes the Legal Advertisement, these Instructions to Bidders, the Bid Proposal & Schedule and the Contract Documents as defined in the Agreement.
- 1.7 The term "Bid" shall mean a completed Bid Proposal & Schedule, bound in the Bidding Documents, properly signed, providing the Owner a proposed cost for providing the services required in the Bidding Documents.

Section 2. Preparation of Bids

- 2.1 The bids must be submitted on the prescribed Invitation to Bid and Bid Proposal forms furnished herein by the Owner. The Bidder shall complete the Bid Proposal in ink or by typewriter and shall sign the Bid correctly. The Bid may be rejected if it contains any omission, alteration of form, conditional bid or irregularities of any kind. **The Bid shall contain one (1) original signature, one (1) copy of the original bid documents, and one (1) PDF of the original bid documents on a CD must be submitted in sealed envelopes, marked with the Bid Number, Project Name and Bid opening Date and Time, and shall be addressed to Mr. Gerald "Jed" Secory, Purchasing Manager,**

City of Naples, 735 8th Street South, Naples, FL, 34102. If forwarded by mail, the sealed envelope containing the Bid must be enclosed in another sealed envelope addressed as above. Bids received at the location specified herein after the time specified for bid opening will be returned to the bidder unopened and shall not be considered.

Section 3. Bid Deposit Requirements

- 3.1 No Bid shall be considered or accepted unless at the time of Bid filing the same shall be accompanied by a cashiers check, a certified check payable to Owner on some bank or trust company located in the State of Florida insured by the Federal Deposit Insurance Corporation, or Bid Bond, in an amount not less than 5% of the bidder's maximum possible award (base bid, unit price proposals, alternates plus all addenda) (collectively referred to herein as the "Bid Deposit"). The Bid Deposit shall be retained by Owner as liquidated damages if the successful Bidder fails to execute and deliver to the City Purchasing Manager the Agreement, or fails to deliver the required Performance and Payment Bonds or Certificates of Insurance, all within ten (10) calendar days after receipt of the Notice of Award. Bid Bonds shall be executed by a corporate surety licensed under the laws of the State of Florida to execute such bonds, with conditions that the surety will, upon demand, forthwith make payment to Owner upon said bond. Bid Deposits of the Bidders shall be held until the Agreement has been executed by the Successful Bidder and same has been delivered to Owner together with the required bonds and insurance, after which all Bid Deposits shall be returned to the respective Bidders. All other Bid Deposits shall be released within ten (10) working days of the Bid Opening. If a Bid is not accepted within said time period it shall be deemed rejected and the Bid Deposit shall be returned to Bidder. In the event that the Owner awards the contract prior to the expiration of the 90 day period without selecting any or all alternates, the Owner shall retain the right to subsequently award said alternates at a later time but no later than 270 days from opening unless otherwise authorized by the Purchasing Manager.
- 3.2 The Successful Bidder shall execute three (3) copies of the Agreement and deliver same to Owner within the time period noted above. The Owner shall execute all copies and return two fully executed copies of the Agreement to Successful Bidder within thirty (30) working days after receipt of the executed Agreement from Successful Bidder unless any governmental agency having funding control over the project requires additional time, in which event the Owner shall have such additional time to execute the Agreement as may be necessary.

Section 4. Right to Reject Proposals

- 4.1 The Owner reserves the right to reject any and all Bids with or without cause and waive any and all formalities; and, to award the bid that it determines to be in the best interest of the City of Naples.
- 4.2 The Owner does not discriminate on the basis of race, color, national origin, sex, religion, age and handicapped status in employment or provision of service.

Section 5. Signing of Bids

- 5.1 Bids submitted by a corporation must be executed in the corporate name by the president or a vice president, and a corporate seal must be affixed and attested to by the secretary or assistant secretary of the corporation. The corporate address and state of incorporation must be shown below the signature.
- 5.2 Bid proposals by a partnership must be executed in the partnership name and signed by a general partner whose title must appear under the signature and the official address of the partnership must be shown below said signature.
- 5.3 If Bidder is an individual, its signature shall be inscribed.
- 5.4 If signature is by an agent or other than an officer of corporation or general partner of partnership, a properly notarized power of attorney must be submitted with the Bid.
- 5.5 All Bids shall have names typed or printed below all signatures.
- 5.6 All Bids shall state the Bidder's contractor license number, issue location, expiration date, and description.
- 5.7 Failure to follow the provisions of this section shall be grounds for rejecting the Bid as irregular or unauthorized.

Section 6. Withdrawal of Proposals

Any Bid may be withdrawn at any time prior to the hour fixed in the Legal Advertisement for the opening of Bids, provided that the withdrawal is requested in writing, properly executed by the Bidder and received by Owner prior to Bid Opening. The withdrawal of a Bid will not prejudice the right of a Bidder to file a new Bid prior to the time specified for Bid opening.

Section 7. Late Bids

No Bid shall be accepted that fails to be submitted prior to the time specified in the Legal Advertisement.

Section 8. Interpretation of Contract Documents

- 8.1 No interpretation of the meaning of the plans, specifications or other Bidding Documents shall be made to a Bidder orally. Any such oral or other interpretations or clarifications shall be without legal effect. All requests for interpretations or clarifications shall be submitted in writing, addressed to the City of Naples, Purchasing Manager or via facsimile (239) 213-7015, to be given consideration. All such requests for interpretations or clarification must be received at least ten (10) calendar days prior to the Bid opening date.

Questions received less than ten (10) calendar days prior to the bid opening date will not be answered. Any and all such interpretations and supplemental instructions shall be in the form of written addenda which, if issued, shall be sent by mail, email, or fax to all known Bidders at their respective addresses furnished for such purposes no later than seventy two (72) hours prior to the time fixed for the opening of Bids. Such written addenda shall be binding on Bidder and shall become a part of the Bidding Documents.

- 8.2 It shall be the responsibility of each Bidder to ascertain, prior to submitting its Bid that it has received all addenda issued and it shall acknowledge same in its Bid.
- 8.3 As noted in the Legal Advertisement, attendance by all bidders at the Pre-Bid Conference is non-mandatory.

Section 9. Examination of Site and Contract Documents

- 9.1 By executing and submitting its Bid, each Bidder certifies that it has:
 - a. Examined all Bidding Documents thoroughly;
 - b. Visited the site to become familiar with local conditions that may in any manner affect performance of the Work;
 - c. Become familiar with all federal, state and local laws, ordinances, rules, and regulations affecting performance of the Work; and
 - d. Correlated all of its observations with the requirements of bidding documents.
 - e. Review the City of Naples standard Contract/Agreement at the Purchasing Department located at 270 Riverside Circle.

No plea of ignorance of conditions or difficulties that may exist or conditions or difficulties that may be encountered in the execution of the Work pursuant to these Bidding Documents as a result of failure to make the necessary examinations and investigations shall be accepted as an excuse for any failure or omission on the part of the Successful Bidder, nor shall they be accepted as a basis for any claims whatsoever for extra compensation or for an extension of time.

Section 10. Material Requirements

It is the intention of these Bidding Documents to identify standard materials. When space is provided on the Bid Schedule, Bidders shall specify the materials which they propose to use in the Project. The Owner may declare any Bid non-responsive or irregular if such materials are not specifically named by Bidder.

Section 11. Award of Contract

Any prospective bidder who desires clarification on any aspect(s) or provision(s) of the bid invitation shall file his request with the City Purchasing Manager in writing 10 days prior to the time of the bid opening.

Award of contract will be made by the City Council or the City Manager depending on the amount of contract after it is determined to be in the best interest of the City of Naples. The Owner may reject all bids proposing the use of any subcontractors who have been disqualified or de-certified for bidding purposes by any public contracting entity, or who has exhibited an inability to perform through any other means. When the contract is awarded by Owner, such award shall be evidenced by a Notice of Award, signed by the Purchasing Manager of Owner and delivered to the intended awardee or mailed to awardee at the business address shown in the Bid.

Any bidder who desires to formally protest the contract award shall file a written notice to the Purchasing Manager explaining in detail the nature of the protest and the grounds it is based within 48 hours of the City's declaration of intent to award. If the Purchasing Manager can not resolve the dispute within two days the information will be forwarded to the City Attorney who will hand down a written decision within 10 business days. If the Protest is forwarded to the City Attorney, a protest bond in the form of a cashiers check, certified check or money order made payable to the City of Naples in not less than 5% of the bid amount but not to exceed \$7,500.00 shall be required to accompany the protest.

For Bidders who may wish to receive copies of Bids after the Bid opening, the City of Naples reserves the right to recover all costs associated with the printing and distribution of such copies.

Section 12. Sales Tax

The Contractor shall pay all applicable sales, consumer, use and other similar taxes required by law. The Contractor is responsible for reviewing the pertinent State statutes involving the sales tax and complying with all requirements.

If the City deems that it is in its best interest to pursue the option of a Direct Materials Purchase for any large equipment and/or material purchases; the successful bidder shall coordinate and provide all necessary documentation to the City for the smooth procurement of such materials and/or equipment by the City.

Section 13. City Permit Cost in Bid Prices

13.1 Bidders shall include the cost of all necessary City, County and State permits as required by this project.

Section 14. Use of Subcontractors

- 14.1 To ensure the work contemplated by this contract is performed in a professional and timely manner, all subcontractors shall be “qualified”, meaning a person or entity that has the capability in all respects to perform fully the contract requirements and has the integrity and reliability to assure good faith performance. A subcontractor’s disqualification from bidding by the Owner, or other public contracting entity within the past twelve months shall be considered by the Owner when determining whether the subcontractors are “qualified.”
- 14.2 The Owner may consider the past performance and capability of a subcontractor when evaluating the ability, capacity and skill of the Bidder and its ability to perform the contract within the time required. Owner reserves the right to disqualify a Bidder who includes subcontractors in its bid offer which are not “qualified” or who do not meet the legal requirements applicable to and necessitated by this Contract.

Section 15. Prohibition of Gifts

- 15.1 No organization or individual shall offer or give, either directly or indirectly, any favor, gift, loan, fee, service or other item of value to any City of Naples employee, as set forth in Chapter 112, Part III, Florida Statutes. Violation of this provision may result in one or more of the following consequences: a). Prohibition by the individual, firm, and/or any employee of the firm from contact with City of Naples staff for a specified period of time; b). Prohibition by the individual and/or firm from doing business with the City of Naples for a specified period of time, including but not limited to: submitting bids, RFP, and/or quotes; and, c). immediate termination of any contract held by the individual and/or firm for cause.

Section 16 - Copies of Bidding Documents

- 16.1 For complete sets of Bidding Documents, Bidders may download the documents from the City of Naples Web Site. Full size drawings (if applicable) and/or scaled drawings (if applicable) shall be requested through the Engineer at the bidder’s expense. This amount represents reproduction costs and is non-refundable. Bidder must register as a document holder with the Engineer.
- 16.2 Complete sets of full size Bidding Documents (Drawings) are recommended in preparing Bids; neither Owner nor Engineer assume any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.
- 16.3 Owner and Engineer, in making copies of Bidding Documents available on the above terms, do so only for the purpose of obtaining Bids on the Work and do not confer a license or grant for any other use.

Section 17 – Qualifications of Bidders

- 17.1 Each Bid must contain Bidder's license number to do business in the State of Florida.

- 17.2 To demonstrate qualifications to perform the Work, each Bidder must complete and submit with the bid the Experience History Form contained in these bid documents. The City may request additional post-bid information including, but not limited to, the qualifications submittals set forth in Section 18 of these Instructions to Bidders, evidence of authority to conduct business in the jurisdiction where the Project is located. Submittals requested pursuant to this paragraph shall be referred to as the Qualifications Submittals and are in addition to those required elsewhere.
- 17.3 Bidders will be evaluated with respect to having successfully completed projects of a similar size, nature and time frame.

Section 18 - Qualifications Submittals

- 18.1 It is the intention of the Owner to award this contract to a Bidder competent to perform and complete the Work in a satisfactory manner. Accordingly, Owner will require the Apparent Low Bidder to submit, within seven (7) days after bid opening, information including, but not limited to, the following, 1) evidence of Bidder's certification and license to perform the Work and services; 2) experience with references; 3) financial statement; 4) subcontractor listing, and 6) Preliminary Schedule of Values all as set forth below, to allow Owner to conduct qualifications investigations.
- 18.2 The experience and financial statement shall provide data additional to that information provided in the Bid Form pertaining to Contractor's financial resources, adequacy of plant and equipment, manpower, organization, and prior experience with references and a list of all previous or on-going construction contracts over the last five (5) years. Said information shall be certified by a Certified Public Accountant, and shall be submitted on the Associated General Contractors of America Form "Standard Questionnaires and Financial Statement for Bidders," available from AGC, 1975 "E" Street, NW Washington, DC 20006. The Owner at its discretion may require any or all of the above listed information from any other Bidder.
- 18.3 The Preliminary Progress Schedule shall consist of three (3) copies of a diagram and a narrative in accordance with appropriate formats set forth in Section 013216; Progress Schedules, incorporated by reference herein. Activities in the diagram shall show the order in which the Apparent Low Bidder proposes to perform the Work within the constraints and sequencing conditions set forth in the specifications and shall indicate starting and completion dates for key milestones and work pertaining to each Division of the Specifications within each major structure or geographical area of work. Activities shall further identify significant submittals/approvals, major equipment deliveries; equipment testing, Owner's responsibilities, and those of affected utilities and other similarly involved third parties.

- 18.4 The Preliminary Schedule of Values shall consist of an itemization of the Bid by major structures or areas of Work for each Division of the Contract Documents from Division 0 through 44.
- 18.5 The Apparent Low Bidder and his surety, if any, hereby agree that any delays within Bidder's control in the delivery of these Qualifications Submittals will require a written request by Bidder for an extension of the time during which the Bid shall remain open for the Owner's acceptance. Should Owner agree to such extension, Bidder will be required to comply with this Submittal Requirement within five (5) additional calendar days. At the Owner's option, failure by the Apparent Low Bidder to deliver these Qualifications Submittals within the extended period will void evaluation of the Bid and will constitute proof that the Apparent Bidder has abandoned his Bid; his Bid Security shall be declared forfeited to the Owner as liquidated damages, and the Work shall be awarded to another Bidder.
- 18.6 If upon receipt and evaluation of the submittals the Apparent Low Bidder does not pass the evaluations to Owner's satisfaction, Owner reserves the right to reject the Bid.

Section 19 – Substitutive Material and Equipment

- 19.1 The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration of possible substitute or “or-equal” items. Whenever it is specified or described in the Bidding Documents that a substitute or “or-equal” item of material or equipment may be furnished or used by Contractor if acceptable to Engineer, application for such acceptance will not be considered by Engineer until after the Effective Date of the Agreement.

Section 20 – Bonds and Insurance

- 20.1 The City’s General Insurance Requirements listed on Page 7 Herein sets forth City’s requirement as to Bonds and Insurance. When the Successful Bidder delivers the executed Agreement to City, it shall be accompanied by the required Bonds, Insurance Certificates and Endorsements.

Section 21 - Contract Time

- 21.1 All work included in the Contract Documents shall be **substantially complete** within **Two Hundred and Seventy (270) days** and **finally complete** within **Three Hundred (300) days** after the date when Contract Times commence to run.

Section 22 - Liquidated Damages and Indemnity

- 22.1 Contractor shall pay Owner one thousand five hundred dollars (\$1500) per day for each day that expires after the specified Contract Time.

- 22.2 All Bidders must state in the Bid Form the amount of consideration required by the Bidder in return for the Bidder's promise of indemnity contained in the City's General Conditions, General Insurance Requirements, and 725.06 of Florida Statutes. The amount to be stated shall be no less than \$1,000.

Section 22 – Required Disclosure

- 23.1 Public Entity Crimes: UNDER SECTION 287,133(2)(a), FLORIDA STATUTES, 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, for Category two for a period of 36 months from the date of being placed on the convicted vendor list.
- 23.2 At its sole discretion, the Owner may reject any Bidder it finds to lack, or whose present or former executive employees, officers, directors, stockholders, partners or owners are found by the Owner to lack honesty, integrity, or moral responsibility. The discretion of the Owner may be exercised based on the disclosure required herein, the Owner's own investigation, public records, or any other reliable sources of information. The Owner may also reject any Bidder failing to make the disclosure required herein. By submitting a Bid, Bidder recognizes and accepts that the Owner 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.

Section 24 – Public Bid Disclosure Act

- 24.1 This section may be cited as the Public Bid Disclosure Act, F.S. 218.80.
- 24.2 Florida Law requires the City to disclose all of its permits or fees, including, but not limited to, all license fees, impact fees or inspection fees, payable by the Contractor to the unit of the City that issues the Bid or other request for proposals, unless such permit or fees are disclosed in the Bidding Documents or other request for proposal for the project at the time that project was let for Bid. Florida Law also prohibits the City from halting construction to collect any undisclosed permits or fees which were not disclosed or included in the Bidding Documents or other request for proposal for the project at the time the project was let for Bid.
- 24.3 Bidding Documents or other request for proposal issued for Bids by the City, or any public Contract entered into between the City and a Contractor shall disclose each permit or fee which the Contractor will have to pay before or during construction and shall

include the dollar amount or the percentage method or the unit method of all permits or fee which may be required by the City as part of the Contract. If the request for proposal does not require the response to include a final fix price, the City is not required to disclose any fees or assessments in the request for proposal. However, at least ten (10) days prior to requiring the Contractor to submit a final fixed price for the project, the city shall make the disclosures required in this section. Any City permits or fees which are not disclosed in the Bidding Documents, other request for proposal, or a Contractor between the City and the Contractor shall not be assessed or collected after the Contract is let. The City shall not halt construction or delay completion of the Contract in order to collect any permit or fees which were not provided for or specified in the Bidding Documents, other request for proposal, or the Contract.

- 24.4 This section does not require disclosure in the Bidding Documents of any permits or fees imposed as a result of a Change Order or a modification to the Contract. The local government shall disclose all permits or the fees imposed as a result of a Change Order or a modification to the Contract, prior to the date the Contractor is required to submit a price for the Change Order or modification.
- 24.5 The Contractor is required to apply for and obtain any necessary permits from the City and the City will pay for said permits.

Section 25 – Compliance with Occupation Safety and Health Act (O.S.H.A.)

- 25.1 In instances where such is applicable due to the nature of the Work with which this Bid is concerned; all materials, equipment, services, etc., as proposed and offered by Bidders must meet and conform to all O.S.H.A. requirements. The Bidder's signature upon the Bid Form (Section 003000) is considered certification of conformance to such requirements.

Section 26 – Employment of Apprentices and Trainees

- 26.1 Bidder's attention is directed towards Florida Statutes Chapter 446 regarding employment of apprentices and trainees. Bidders must comply with all applicable provisions of Florida Law.

Section 27 - Discrimination

- 27.1 An entity or affiliate who has been placed on the discriminatory vendor list may not submit a bid on a contract to provide goods or services to a public entity, may not submit a bid on a contract with a public entity for the construction or repair of a public building or public work, may not submit bids on leases of real property to a public entity, may not award or perform work as a contractor, supplier, subcontractor, or a consultant under contract with any public entity, and may not transact business with any public entity.

Section 28 – Organization of Bid Documents - Project Manual and Drawings

28.1 Bid Documents - Project Manual and Drawings for the Work are incorporated as follows:

A. The Bid Documents - Project Manual and Drawings have been bound separately.

END OF SECTION 002000 – INSTRUCTIONS TO BIDDERS

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**DIVISION 00 - SECTION 003000
BID PROPOSAL
BID NO.: 14-015**

**PORT ROYAL PUMPING STATION IMPROVEMENTS PROJECT
CITY OF NAPLES**

Full Name of Bidder _____

Main Business Address _____

Place of Business _____

Telephone No. _____ Fax No. _____

Contractor's License #: _____ Type: _____ Issue Location: _____

To: CITY OF NAPLES, Purchasing Division, 735 8th Street South, Naples, FL 34102
(hereinafter called the Owner)

The undersigned, as Bidder declares that the only person or parties interested in this Proposal as principals are those named herein, that this Proposal is made without collusion with any other person, firm or corporation; that it has carefully examined the location of the proposed work, the proposed forms of Agreement and Bonds, and the Contract Drawings and Specifications, including Addenda issued thereto and acknowledges receipt below:

Addendum Number	Date Issued	Contractor's Initials
_____	_____	_____
_____	_____	_____
_____	_____	_____

Bidder proposes, and agrees if this Proposal is accepted, Bidder will contract with the Owner in the form of the copy of the Agreement included in these Contract Documents, to provide all necessary machinery, tools, apparatus and other means of construction, including utility and transportation services necessary to do all the Work, and furnish and install all the materials and equipment specified or referred to in the Contract Documents in the manner and time herein prescribed and according to the requirements of the Owner as therein set forth, furnish the specified Contractor's Bonds and Insurance specified in the General Conditions of the Contract, and to do all other things required of the Contractor by the Contract Documents, and that it will take full payment the sums set forth in the following Bid Schedule:

NOTE: If you choose to bid, please submit one (1) original signature, one (1) copy of the original bid documents, and one (1) PDF of the original bid documents on a CD of your bid proposal package on this form.

**DIVISION 00 - SECTION 003000
 BID PROPOSAL
 BID NO.: 14-015**

Having visited and become familiar with the conditions at the project site and having carefully examined the bidding requirements, drawings and specifications, the undersigned proposes to furnish all materials, labor, equipment and incidentals to complete the entire work in accordance with the design documents, applicable codes and ordinances as follows:

BASE BID				
Bid Item and Description		Quantity Each	Unit Price	Extended Amount Bid
1	Port Royal Pump Station Improvements	LS		
2	Security System with Camera	LS		
3	Subtotal Items No.1 through No.2	Subtotal		
4	Allowances for additional work as directed by the Owner; 5% of Line No.3	ALLOWANCE		
TOTAL AMOUNT BASE BID (Add Items No.3 & No.4)				

(Total base bid price in words)

THE DETERMINATION OF THE LOWEST RESPONSIBLE BIDDER WILL BE BASED SOLELY ON THE BASE BID.

THE FOLLOWING DOCUMENTS MUST BE COMPLETED AND SUBMITTED WITH THE BID. THESE DOCUMENTS ARE ATTACHED TO AND MADE A CONDITION OF THIS BID:

- ___ Invitation for Bid (Front Page)
- ___ References (Page 9)
- ___ Section 003000 - Bid Proposal with Bid Schedule
- ___ Section 003010 - Statement of Bidder's Qualifications
- ___ Section 003020 - List of Subcontractors
- ___ Section 003030 - Material Manufacturers
- ___ Section 004100 - Bid Proposal Bond
- ___ Section 004200 - Corporate Resolution

- ___ Section 004700 – Drug-Free Work Place Certification
- ___ Section 004750 – Schedule of Costs for Major Structures and/or Areas of Work
- ___ Section 004800 – Non-Collusion Affidavit
- ___ Section 004900 – Trench Safety Affidavit (Required by State Law)

Bidder agrees to submit Application for Payment on prescribed Application for Payment form and submit specified Release of Liens and Affidavit Forms for payment under this contract. Ten (10) percent shall be withheld from each payment until satisfactory completion of Punch List corrections and acceptance by Engineer and Owner and the Work is certified Substantially Complete by Engineer/Project Manager.

NOTE: Please return this bid form to the above address. **NO OTHER BID FORM WILL BE ACCEPTED.**

The service to be furnished by us is hereby declared and guaranteed to be in conformance with the project drawings and specifications.

In submitting this bid, the Bidder makes all representations required by the Invitation to Bid and Instructions to Bidders and further warrants and represents the following:

1. Bidder is aware of the general nature of Work to be performed by Owner and others at the site as it relates to this Work indicated in the contract documents.
2. Bidder has given Engineer/Project Manager/Owner notice of all conflicts, errors, ambiguities or discrepancies that Bidder has discovered in the Contract Documents and the written resolution thereof by Engineer is acceptable to Bidder and the Contract Documents are sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work for which this bid is submitted.

Upon receipt of written notice of conditional acceptance of this Bid, Bidder will execute the formal Contract attached within ten (10) calendar days and deliver Insurance as required by the Contract Documents.

If awarded a contract under this Proposal, the undersigned agrees to provide all required documentation within 7 calendar days from commencement date stipulated in the written “Notice to Proceed” and/or Official City of Naples Purchase Order, unless the Project Manager, in writing, subsequently notifies Contractor of a modified (later) commencement date.

Respectfully Submitted:

State of Florida
County of Collier

_____, being first duly sworn on oath deposes and says that the Bidder on the above Proposal is organized as indicated and that all statements herein made are made on behalf of such Bidder and that this deponent is authorized to make them.

_____, also deposes and says that it has examined and carefully prepared its Bid Proposal from the Contract Drawings and Specifications and has checked the same in detail before submitting this Bid; that the statements contained herein are true and correct.

(a) Corporation

The Bidder is a corporation organized and existing under the laws of the State of _____, which operates under the legal name of _____, and the full names of its officers are as follows:

President _____

Secretary _____

Treasurer _____

Manager _____

and it (does) or (does not) have a corporate seal. The _____ is authorized to sign construction proposals and contracts for the company by action of its Board of Directors taken _____, a certified copy of which is hereto attached (strike out this last sentence if not applicable).

(b) Co-Partnership

The Bidder is a co-partnership consisting of individual partners whose full names are as follows:

The co-partnership does business under the legal name of:

(c) Individual

The Bidder is an individual whose full name is _____, and if operating under a trade name, said trade name is _____.

DATED _____

Legal entity

Witness

BY: _____
Name of Bidder (Typed)

Witness

Signature

Title

[Corporate Seal]

Telephone and e-mail address: _____ / _____

STATE OF FLORIDA

COUNTY OF COLLIER

The foregoing instrument was acknowledged before me this ____ day of _____, 20__, by _____ of _____ a _____ corporation, on behalf of the corporation. He/she is personally known to me or has produced _____ as identification and did (did not) take an oath.

My Commission Expires:

(Signature of Notary)

NAME: _____
(Legibly Printed)

(AFFIX OFFICIAL SEAL)

Notary Public, State of _____

Commission No.: _____

RETURN WITH BID

END OF SECTION 003000 – BID PROPOSAL

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**DIVISION 00 – SECTION 003010
STATEMENT OF BIDDER’S QUALIFICATIONS**

PORT ROYAL PUMP STATION IMPROVEMENTS

Consideration of the bid requires certain experience qualifications. The bidder must identify below direct experience over the last ten years with the successful installation of at least five pump stations with two or more submersible pumps with a capacity of 2,500 gpm (each pump). Installation by a subcontractor shall not satisfy this requirement unless that same subcontractor is listed as the installing subcontractor for this project. Failure to strictly satisfy these qualifications will result in bid disqualification. Submission of the bidder’s qualifications must include the following information and format as a minimum. The bidder shall prepare his qualifications on separate sheets and attach to the bid when submitted.

Sample of required information and format to be submitted for each project:

Project Owner: _____

Project Name: _____

Size and Number of Pumps: _____

Manufacturer of Submersible Pumps: _____

Date Completed: _____

Installation by own forces: Yes / No

Installation by subcontractor: Yes / No

Owner or Engineer Contact (Name, phone and email): _____

Signed _____

Name of Bidder _____

RETURN WITH BID

END OF SECTION 003010 – STATEMENT OF BIDDER’S QUALIFICATIONS

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DIVISION 00 – SECTION 003020
LIST OF SUBCONTRACTORS

The undersigned states that the following is a full and complete list of the proposed subcontractors on this Project and the class of work to be performed by each, and that such list will not be added to nor altered without written consent of the Project Manager. The undersigned further acknowledges its responsibility for ensuring that the subcontractors listed herein meet all legal requirements applicable to and necessitated by this Agreement, including, but not limited to proper licenses, certifications, registrations and insurance coverage. The City reserves the right to disqualify any bidder who includes non-compliant or non-qualified subcontractors in his/her bid offer. Further, the City may direct the bidder/contractor to remove/replace any subcontractor that is found to be non-compliant with this requirement subsequent to award of the contract at no additional cost to the City. **THIS LIST MUST BE COMPLETED OR BID WILL BE DEEMED NON-RESPONSIVE. (Attach additional sheets as needed).**

BIDDER’S STATEMENT OF PROPOSED SUBCONTRACTOR FOR PORT ROYAL PUMPING STATION IMPROVEMENTS

The bidder identifies the following firm as the proposed installation subcontractor of the submersible pumps (if applicable).

Name of Firm: _____

Address and Phone: _____

Contact Person: _____

<u>Other Subcontractor and Address</u>	<u>Specialty</u>
1. _____ _____	_____
2. _____ _____	_____
3. _____ _____	_____

Signed _____

Name of Bidder _____

RETURN WITH BID

END OF SECTION 003020 – LIST OF SUBCONTRACTORS

**DIVISION 00 – SECTION 003030
MATERIAL MANUFACTURERS**

The Bidder is required to state below, material manufacturers it proposes to utilize on this project. No change will be allowed after submittal of Bid. If substitute material proposed and listed below is not approved by Engineer, Bidder shall furnish the manufacturer named in the specification. Acceptance of this Bid does not constitute acceptance of material proposed on this list. **THIS LIST MUST BE COMPLETED OR BID WILL BE DEEMED NON-RESPONSIVE. (Attach additional sheets as needed).**

**BIDDER’S STATEMENT OF PROPOSED MANUFACTURER FOR PORT ROYAL
PUMP STATION IMPROVEMENTS PROJECT**

The bidder lists the following manufacturers of the major equipment (pumps, VFD’s, standby power generator etc.):

<u>MATERIAL</u>	<u>MANUFACTURER</u>
1. <u>Submersible Pumps (Section 432140)</u>	_____
2. <u>Variable Frequency Drives (Section 262923)</u>	_____
3. <u>Standby Engine Generator (Section 263213)</u>	_____
4. _____	_____
5. _____	_____
6. _____	_____

Signed _____

Name of Bidder _____

RETURN WITH BID

END OF SECTION 003030 – MATERIAL MANUFACTURERS

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**DIVISION 00 - SECTION 004100
BID PROPOSAL BOND**

**RETURN IN DUPLICATE WITH BID (AS APPLICABLE)
NOT TO BE FILLED OUT IF A CERTIFIED CHECK IS SUBMITTED.**

KNOW ALL MEN BY THESE PRESENTS: That we, the undersigned,
_____ as Principal,

and _____ as Surety

are held and firmly bound unto the City of Naples, Florida, in the sum of \$_____ for the payment of which, will and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns.

The condition of the above obligation is such that if the attached Proposal of Principal and Surety for work specified as:

**PORT ROYAL PUMP STATION IMPROVEMENTS
CITY OF NAPLES, FLORIDA
BID # 14-015**

all as stipulated in said Proposal, by doing all work incidental thereto, in accordance with the plans and specifications provided heretofore, all within Collier County, is accepted and the bidder shall within ten (10) days after notice of said award, enter into a contract, in writing, and furnish the required Performance Bond with surety or sureties to be approved by the Director of Purchasing, this obligation shall be void; otherwise the same shall be in full force and virtue by law and the full amount of this Proposal Bond will be paid to the City as stipulated or liquidated damages.

Signed this _____ day of _____, 2013.

Principal

Surety

Principal must indicate whether corporation, partnership, company, or individual.

The person signing shall, in his own handwriting, sign the Principal's name, his own name, and his title. The person signing for a corporation must, by affidavit, show his authority to bind the corporation.

END OF SECTION 004100 – BID PROPOSAL BOND

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**DIVISION 00 - SECTION 004200
CORPORATE RESOLUTION**

I, _____, Secretary of _____, a corporation organized and existing under the laws of the State of _____, hereby certify that at a meeting of the Board of Directors of the Corporation duly called and held on _____, 20__, at which a quorum was present and acting throughout, the following resolutions were adopted and are now in full force and effect:

RESOLVED that the following individuals of this corporation are authorized to execute on behalf of this corporation a Bid and Agreement to _____ for the construction Of _____.

I further certify that the names of the officers of this corporation and any other persons authorized to act under this resolution and their official signatures are as follows:

<u>NAME</u>	<u>OFFICER</u>	<u>OFFICIAL SIGNATURE</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

IN WITNESS WHEREOF, I have hereunto subscribed my name as Secretary and affixed the seal of the corporation this __ day of _____, 20__.

RETURN WITH BID

END OF SECTION 004200 – CORPORATE RESOLUTION

**DIVISION 00 – SECTION 004500
NOTICE OF AWARD**

Date: _____

Contractor: _____

Project: _____

Date of Bid Opening: _____

You are hereby notified that you are the apparent successful Bidder on the Project noted above. Upon compliance with the conditions precedent to be fulfilled by you within the time specified, the Agreement will be executed and delivered to you. The OWNER expects to award you a contract for:

_____ (\$ _____)

(Indicate total Work, Alternates or Sections of Work Awarded)

The Contract Price of your contract is:

(\$ _____).

Enclosed are the following:

<u>No. of Copies</u>	<u>Item</u>
3	Agreement between Owner and Contractor
3	Performance Bond
3	Payment Bond
3	Certificate of Insurance and Endorsement
3	Notice of Award

Please take the following actions on all copies of the above documents.

1. Execute the Agreement and seal.
2. Have your insurance company complete Bond Forms and attach Notarized Acknowledgment of Authorized Representative.
3. Have your insurance company complete Certificates of Insurance and attach Acknowledgment of Authorized Representative
4. Return all 3 copies of Agreement, bonds and insurance certificates within ten (10) days of this Notice of Award to:

City of Naples
Purchasing Department
735 8th Street South
Naples, FL 34102

Attention: Purchasing Director

A fully executed copy of the Contract Documents shall be returned to you along with a Notice to Proceed.

BY:

Purchasing Manager

City of Naples

Date: _____

END OF SECTION 004500 – NOTICE OF AWARD FORM

**DIVISION 00 – SECTION 004700
DRUG-FREE WORKPLACE CERTIFICATION**

Preference shall be given to businesses with drug-free workplace programs. Whenever two or more bids which are equal with respect to price, quality, and service are received by the State or by any political subdivision for the procurement of commodities or contractual services, a bid received from a business that certifies that it has implemented a drug-free workplace program shall be given preference in the award process. Established procedures for processing tie bids will be followed if none of the tied bidders have a drug-free workplace program. In order to have a drug-free workplace program, a business certifies the following:

The undersigned bidder, in accordance with Florida Statute 287.087, hereby certifies that

_____ does:

Name of Business

1. Publish a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the workplace and specifying the actions that will be taken against employees for violations of such prohibition.
2. Inform employees about the dangers of drug abuse in the workplace, the business's policy of maintaining a drug-free workplace, any available drug counseling, rehabilitation, employee assistance programs and the penalties that may be imposed upon employees for drug abuse violations.
3. Give each employee engaged in providing the commodities or contractual services that are under bid a copy of the statement specified in Paragraph 1.
4. In the statement specified in Paragraph 1, notify the employees that, as a condition of working on the commodities or contractual services that are under bid, the employee will abide by the terms of the statement and will notify the employer of any conviction of, or plea of guilty or nolo contendere to, any violation of Chapter 893 or of any controlled substance law of the United States or any state, for any violation occurring in the workplace, no later than five (5) days after such conviction.
5. Impose a sanction on, or require the satisfactory participation in a drug abuse assistance or rehabilitation program, if such is available in the employee's community, by any employee who is so convicted.
6. Make a good faith effort to continue to maintain a drug-free workplace through implementation of Paragraphs 1 through 5.

As the person authorized to sign this statement, I certify that this firm complies fully with the above requirements.

Bidder's Signature

Date

RETURN WITH BID

END OF SECTION 004700 – DRUG-FREE WORK PLACE CERTIFICATION

**DIVISION 00- SECTION 004750
SCHEDULE OF COST FOR MAJOR STRUCTURES
AND/OR AREAS OF WORK**

To assist in the evaluation of the Bids received and qualifications of Bidders to perform the work under the Contract, the Bidders shall submit the following breakdown to show allocation among the general items which comprise the Lump Sum Prices included in the Total Base Bid:

Base Bid Item No.	Description	Amount	Total
1	a.		
	b.		
	c.		
	d.		
	e.		
	Total for Base Bid Item No. 1 =		
2	a.		
	b.		
	c.		
	d.		
	e.		
	Total for Base Bid Item No. 2 =		
3	a.		
	b.		
	c.		
	d.		
	e.		
	Total for Base Bid Item No. 3 =		
4	a.		
	b.		
	c.		
	d.		
	e.		
	Total for Base Bid Item No. 4 =		

Notes:

- 1) It is understood that the allocations of prices listed above which compromise the LUMP SUM prices in the Base Bid Items are part of the Bid and will be used in evaluation of the Successful Bidder's Bid and are binding upon the Contractor.
- 2) The Lump Sum Bids shall be Bid F.O.B. installed with full freight allowed.

RETURN WITH BID

END OF SECTION 004750 – SCHEDULE OF COST FOR MAJOR STRUCTURES AND/OR
AREAS OF WORK

**DIVISION 00 - SECTION 004800
NON-COLLUSION AFFIDAVIT**

STATE OF _____

COUNTY OF _____

_____, being first duly sworn deposes and says that:

1. He (it) is the _____, of _____, the Bidder that has submitted the attached Bid;
2. He is fully informed respecting the preparation and contents of the attached Bid and of all pertinent circumstances respecting such Bid;
3. Such Bid is genuine and is not a collusive or sham Bid;
4. Neither the said Bidder nor any of its officers, partners, owners, agents, representatives, employees, or parties in interest, including this affidavit, have in any way, colluded, conspired, connived or agreed, directly or indirectly, with any other Bidder, firm or person to submit a collusive or sham Bid in connection with the Contract for which the attached Bid has been submitted; or to refrain from bidding in connection with such Contract; or have in any manner, directly or indirectly, sought by agreement or collusion, or communication, or conference with any Bidder, firm, or person to fix the price or prices in the attached Bid or of any other Bidder, or to fix any overhead, profit, or cost elements of the Bid price or the Bid price of any other Bidder, or to secure through any collusion, conspiracy, connivance, or unlawful agreement any advantage against (Recipient), or any person interested in the proposed Contract;
5. The price or prices quoted in the attached Bid are fair and proper and are not tainted by any collusion, conspiracy, connivance, or unlawful agreement on the part of the Bidder or any other of its agents, representatives, owners, employees or parties in interest, including this affidavit.

By _____

Sworn and subscribed to before me this _____ day of _____, 20____, in the State of

_____, County of _____.

_____ Notary Public

My Commission Expires: _____

RETURN WITH BID

END OF SECTION 004800 – NON-COLLUSION AFFIDAVIT

**DIVISION 00- SECTION 004900
TRENCH SAFETY AFFIDAVIT**

Trench excavations on this Project are expected to be in excess of 5 feet deep. The Occupational Safety and Health Administration excavation safety standards, 29 CFR 1926.650 Subpart P trench safety standards will be in effect during the period of construction of the Project.

Bidder acknowledges that included in the Bid Price are costs for complying with the Florida Trench Safety Act (90-096, Laws of FL) effective October 1, 1990, and hereby gives assurance that, if awarded the Contract, the Contractor or Subcontractor performing trench excavation work on the Project will comply with the applicable trench safety standards. The Bidder further identifies the costs as follows:

Trench Safety Item (Description) _____ Cost

A. _____

(Cost in Words)

TOTAL \$ _____

FAILURE TO COMPLETE THE ABOVE SHALL RESULT IN THE BID BEING DECLARED NON-RESPONSIVE

COMPANY NAME: _____

DATE: _____

BY: _____

RETURN WITH BID

END OF SECTION 004900 - TRENCH SAFETY AFFIDAVIT

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**DIVISION 00 - SECTION 005000
CITY OF NAPLES, FLORIDA**

**AGREEMENT
(PROFESSIONAL SERVICES)**

Bid/Proposal No.: 14-015

Contract No. _____

Project Name: PORT ROYAL WORKS PUMP STATION IMPROVEMENTS

THIS AGREEMENT (the "Agreement") is made and entered into this.....th day of, 2013, by and between the City of Naples, a Florida municipal corporation, (the "CITY") and Company, a Florida corporation (or other entity), Address, (the "CONTRACTOR").

W I T N E S S:

WHEREAS, the CITY desires to obtain the services of the CONTRACTOR concerning **certain services specified in this Agreement** (referred to as the "Project"); and

WHEREAS, the CONTRACTOR has submitted a proposal for provision of those services; and

WHEREAS, the CONTRACTOR represents that it has expertise in the type of professional services that will be required for the Project.

NOW, THEREFORE, in consideration of the mutual covenants and provisions contained herein, the parties hereto agree as follows:

**ARTICLE ONE
CONTRACTOR'S RESPONSIBILITY**

1.1. The Services to be performed by CONTRACTOR are generally described as provide equipment improvements to the City of Naples Port Royal Pump Station, and may be more fully described in the Scope of Services *[if any]*, attached as Exhibit(s) _____ and made a part of this Agreement.

1.2. The CONTRACTOR agrees to obtain and maintain throughout the period of this Agreement all such licenses as are required to do business in the State of Florida, the City of Naples, and in Collier County, Florida, including, but not limited to, all licenses required by the respective state boards and other governmental agencies responsible for regulating and licensing the professional services to be provided and performed by the CONTRACTOR pursuant to this Agreement.

1.3. The CONTRACTOR agrees that, when the services to be provided hereunder relate to a professional service which, under Florida Statutes, requires a license, certificate of authorization or other form of legal entitlement to practice such services, it shall employ or retain only qualified personnel to provide such services.

1.4. CONTRACTOR agrees to employ and designate, in writing, within 5 calendar days after receiving its Notice to Proceed, or other directive from the CITY, a qualified licensed professional to serve as the CONTRACTOR's project manager (the "Project Manager"). The Project Manager shall be authorized and responsible to act on behalf of the CONTRACTOR with respect to directing, coordinating and administering all aspects of the services to be provided and performed under this Agreement.

1.5. The CONTRACTOR has represented to the CITY that it has expertise in the type of professional services that will be required for the Project. The CONTRACTOR agrees that all services to be provided by CONTRACTOR pursuant to this Agreement shall be subject to the CITY's review and approval and shall be in accordance with the generally accepted standards of professional practice in the State of Florida, **as may be applied to the type of services to be rendered**, as well as in accordance with all published laws, statutes, ordinances, codes, rules, regulations and requirements of any governmental agencies which regulate or have jurisdiction over the Project or the services to be provided and performed by CONTRACTOR. In the event of any conflicts in these requirements, the CONTRACTOR shall notify the CITY of such conflict and utilize its best professional judgment to advise CITY regarding resolution of the conflict.

1.6. The CONTRACTOR agrees not to divulge, furnish or make available to any third person, firm or organization, without CITY's prior written consent, or unless incident to the proper performance of the CONTRACTOR's obligations hereunder, or in the course of judicial or legislative proceedings where such information has been properly subpoenaed, any non-public information concerning the services to be rendered by CONTRACTOR hereunder, and CONTRACTOR shall require all of its employees, agents, subconsultants and subcontractors to comply with the provisions of this paragraph. **However, the CONTRACTOR shall comply with the Florida Public Records laws.**

1.7. The CONTRACTOR agrees not to employ or offer to employ any Elected Officer or City Managerial Employee of the CITY who in any way deals with, coordinates on, or assists with, the professional services provided in this Agreement, for a period of 2 years after termination of all provisions of this Agreement. For purposes of this paragraph, the term "Elected Officer" shall mean any member of the City Council. For purposes of this paragraph, the term "City Managerial Employee" shall mean the City Manager, the Assistant City Manager, the City Clerk, and any City department head or director. If the CONTRACTOR violates the provisions of this paragraph, the CONTRACTOR shall be required to pay damages to the CITY in an amount equal to any and all compensation which is received by the former Elected Officer or City Managerial Employee of the CITY from or on behalf of the contracting person or entity, or an amount equal to the former Elected Officer's or City Managerial Employee's last 2 years of gross compensation from the CITY, whichever is greater.

1.8 The CONTRACTOR agrees not to provide services for compensation to any other party other than the CITY on the same subject matter, same project, or scope of services as set forth in this Agreement without approval from the City Council of the CITY.

1.9 Except as otherwise provided in this Agreement, the CONTRACTOR agrees not to disclose or use any information not available to members of the general public and gained by reason of the CONTRACTOR's contractual relationship with the CITY for the special gain or benefit of the CONTRACTOR or for the special gain or benefit of any other person or entity.

ARTICLE TWO CITY'S RESPONSIBILITIES

2.1. The CITY shall designate in writing a project coordinator to act as the CITY's representative with respect to the services to be rendered under this Agreement (the "Project Coordinator"). The Project Coordinator shall have authority to transmit instructions, receive information, interpret and define the CITY's policies and decisions with respect to the CONTRACTOR's services for the Project. However, the Project Coordinator is not authorized to issue any verbal or written orders or instructions to the CONTRACTOR that would have the effect, or be interpreted to have the effect, of modifying or changing in any way whatever:

(a) The scope of services to be provided and performed by the CONTRACTOR;

(b) The time the CONTRACTOR is obligated to commence and complete all such services; or

(c) The amount of compensation the CITY is obligated or committed to pay the CONTRACTOR.

Any such modifications or changes ((a) (b) or (c)) shall only be made by or upon the authorization of the CITY's city manager as authorized by city council in the enabling legislation or in the CITY's procurement policies.

2.2. The Project Coordinator shall:

(a) Review and make appropriate recommendations on all requests submitted by the CONTRACTOR for payment for services and work provided and performed in accordance with this Agreement;

(b) Arrange for access to and make all provisions for the CONTRACTOR to enter the Project site to perform the services to be provided by the CONTRACTOR under this Agreement; and

(c) Provide notice to the CONTRACTOR of any deficiencies or defects discovered by the CITY with respect to the services to be rendered by the CONTRACTOR hereunder.

2.3. The CONTRACTOR acknowledges that access to the Project Site, to be arranged by the CITY for the CONTRACTOR, may be provided during times that are not the normal business hours of the CONTRACTOR.

ARTICLE THREE TIME

3.1. Services to be rendered by the CONTRACTOR shall be commenced subsequent to the execution of this Agreement upon written Notice to Proceed from the CITY for all or any designated portion of the Project and shall be performed and completed by _____ . Time is of the essence with respect to the performance of this Agreement.

3.2. Should the CONTRACTOR be obstructed or delayed in the prosecution or completion of its services as a result of unforeseeable causes beyond the control of the CONTRACTOR, and not due to its own fault or neglect, including but not restricted to acts of God or of public enemy, acts of government or of the CITY, fires, floods, epidemics, quarantine regulations, strikes or lock-outs, then the CONTRACTOR shall notify the CITY in writing within 5 working days after commencement of such delay, stating the cause or causes thereof, or be deemed to have waived any right which the CONTRACTOR may have had to request a time extension.

3.3. No interruption, interference, inefficiency, suspension or delay in the commencement or progress of the CONTRACTOR's services from any cause whatsoever, including those for which the CITY may be responsible in whole or in part, shall relieve the CONTRACTOR of its duty to perform or give rise to any right to damages or additional compensation from the CITY. The CONTRACTOR's sole remedy against the CITY will be the right to seek an extension of time to its schedule. This paragraph shall expressly apply to claims for early completion, as well as claims based on late completion. *[If Applicable-Provided, however, if through no fault or neglect of the CONTRACTOR, the services to be provided hereunder have not been completed within 18 months of the date hereof, the CONTRACTOR's compensation may be equitably adjusted, with respect to those services that have not yet been performed, to reflect the incremental increase in costs experienced by the CONTRACTOR after expiration of said 18 month period.]*

3.4. Should the CONTRACTOR fail to commence, provide, perform or complete any of the services to be provided hereunder in a timely and reasonable manner, in addition to any other rights or remedies available to the CITY hereunder, the CITY at its sole discretion and option may withhold any and all payments due and owing to the CONTRACTOR until such time as the CONTRACTOR resumes performance of its obligations hereunder in such a manner so as to reasonably establish to the CITY's satisfaction that the CONTRACTOR's performance is or will shortly be back on schedule.

**ARTICLE FOUR
COMPENSATION**

4.1. The total compensation to be paid the CONTRACTOR by the CITY for all Services shall not exceed \$_____ and shall be paid in the manner set forth in the "Basis of Compensation" [if any], which is attached as Exhibit B and made a part of this Agreement.

**ARTICLE FIVE
MAINTENANCE OF RECORDS**

5.1. The CONTRACTOR will keep adequate records and supporting documentation which concern or reflect its services hereunder. The records and documentation will be retained by the CONTRACTOR for a minimum of five 5 years from the date of termination of this Agreement or the date the Project is completed, whichever is later. The CITY, or any duly authorized agents or representatives of the CITY, shall have the right to audit, inspect and copy all such records and documentation as often as they deem necessary during the period of this Agreement and during the 5 year period noted above; provided, however, such activity shall be conducted only during normal business hours. **If the CONTRACTOR desires to destroy records prior to the minimum period, it shall first obtain permission from the CITY in accordance with the Florida Public Records laws.**

**ARTICLE SIX
INDEMNIFICATION**

6.1. The CONTRACTOR agrees to indemnify and hold harmless the City from liabilities, damages, losses and costs, including, but not limited to, reasonable attorneys' fees, to the extent caused by the negligence, recklessness, or intentional wrongful misconduct of the CONTRACTOR and persons employer or utilized by the CONTRACTOR in the performance of the Contract.

**ARTICLE SEVEN
INSURANCE**

7.1. CONTRACTOR shall obtain and carry, at all times during its performance under **this Agreement**, insurance of the types and in the amounts set forth in the document titled General Insurance Requirements, which is attached as **Exhibit C and made a part of** this Agreement.

**ARTICLE EIGHT
SERVICES BY CONTRACTOR'S OWN STAFF**

8.1. The services to be performed hereunder shall be performed by the CONTRACTOR's own staff, unless otherwise authorized in writing by the CITY. The employment of, contract with, or use of the services of any other person or firm by the CONTRACTOR, as independent contractor or otherwise, shall be subject to the prior written approval of the CITY. No provision of this Agreement shall, however, be construed as constituting an agreement between the CITY and any

such other person or firm. Nor shall anything contained in this Agreement be deemed to give any such party or any third party any claim or right of action against the CITY beyond such as may otherwise exist without regard to this Agreement.

ARTICLE NINE WAIVER OF CLAIMS

9.1. The CONTRACTOR's acceptance of final payment shall constitute a full waiver of any and all claims, except for insurance company subrogation claims, by it against the CITY arising out of this Agreement or otherwise related to the Project, except those previously made in writing and identified by the CONTRACTOR as unsettled at the time of the final payment. Neither the acceptance of the CONTRACTOR's services nor payment by the CITY shall be deemed to be a waiver of any of the CITY's rights against the CONTRACTOR.

ARTICLE TEN TERMINATION OR SUSPENSION

10.1. The CONTRACTOR shall be considered in material default of this Agreement and such default will be considered cause for the CITY to terminate this Agreement, in whole or in part, as further set forth in this section, for any of the following reasons: (a) failure to begin work under the Agreement within the times specified under the Notice(s) to Proceed, or (b) failure to properly and timely perform the services to be provided hereunder or as directed by the CITY, or (c) the bankruptcy or insolvency or a general assignment for the benefit of creditors by the CONTRACTOR or by any of the CONTRACTOR's principals, officers or directors, or (d) failure to obey laws, ordinances, regulations or other codes of conduct, or (e) failure to perform or abide by the terms or spirit of this Agreement, or (f) for any other just cause. The CITY may so terminate this Agreement, in whole or in part, by giving the CONTRACTOR at least 3 calendar days' written notice.

10.2. If, after notice of termination of this Agreement as provided for in paragraph 10.1 above, it is determined for any reason that the CONTRACTOR was not in default, or that its default was excusable, or that the CITY otherwise was not entitled to the remedy against the CONTRACTOR provided for in paragraph 10.1, then the notice of termination given pursuant to paragraph 10.1 shall be deemed to be the notice of termination provided for in paragraph 10.3 below and the CONTRACTOR's remedies against the CITY shall be the same as and limited to those afforded the CONTRACTOR under paragraph 10.3 below.

10.3. The CITY shall have the right to terminate this Agreement, in whole or in part, without cause upon 7 calendar day's written notice to the CONTRACTOR. In the event of such termination for convenience, the CONTRACTOR's recovery against the CITY shall be limited to that portion of the fee earned through the date of termination, together with any retainage withheld and any costs reasonably incurred by the CONTRACTOR that are directly attributable to the termination, but the CONTRACTOR shall not be entitled to any other or further recovery against the CITY, including, but not limited to, anticipated fees or profits on work not required to be performed.

**ARTICLE ELEVEN
CONFLICT OF INTEREST**

11.1. The CONTRACTOR represents that it presently has no interest and shall acquire no interest, either direct or indirect, which would conflict in any manner with the performance of services required hereunder. The CONTRACTOR further represents that no persons having any such interest shall be employed to perform those services.

**ARTICLE TWELVE
MODIFICATION**

12.1. No modification or change in this Agreement shall be valid or binding upon the parties unless in writing and executed by the party or parties intended to be bound by it.

**ARTICLE THIRTEEN
NOTICES AND ADDRESS OF RECORD**

13.1. All notices required or made pursuant to this Agreement to be given by the CONTRACTOR to the CITY shall be in writing and shall be delivered by hand or by United States Postal Service Department, first class mail service, postage prepaid, return receipt requested, addressed to the following CITY's address of record:

City of Naples
735 Eighth Street South
Naples, Florida 34102-3796
Attention: **A. William Moss**, City Manager

13.2. All notices required or made pursuant to this Agreement to be given by the CITY to the CONTRACTOR shall be made in writing and shall be delivered by hand or by the United States Postal Service Department, first class mail service, postage prepaid, return receipt requested, addressed to the following CONTRACTOR's address of record:

Attn: _____

13.3. Either party may change its address of record by written notice to the other party given in accordance with requirements of this Article.

**ARTICLE FOURTEEN
MISCELLANEOUS**

14.1. The CONTRACTOR, in representing the CITY, shall promote the best interest of the CITY and assume towards the CITY a duty of the highest trust, confidence, and fair dealing.

14.2. No modification, waiver, suspension or termination of the Agreement or of any terms thereof shall impair the rights or liabilities of either party.

14.3. This Agreement is not assignable, in whole or in part, by the CONTRACTOR without the prior written consent of the CITY.

14.4. Waiver by either party of a breach of any provision of this Agreement shall not be deemed to be a waiver of any other breach and shall not be construed to be a modification of the terms of this Agreement.

14.5. The headings of the Articles, Exhibits, Parts and Attachments as contained in this Agreement are for the purpose of convenience only and shall not be deemed to expand, limit or change the provisions in such Articles, Exhibits, Parts and Attachments.

14.6. This Agreement constitutes the entire agreement between the parties hereto and shall supersede, replace and nullify any and all prior agreements or understandings, written or oral, relating to the matter set forth herein, and any such prior agreements or understanding shall have no force or effect whatever on this Agreement.

Sec. 14. 7. The CONTRACTOR shall comply fully with all provisions of state and federal law, including without limitation all provisions of the Immigration Reform and Control Act of 1986 (“IRCA”) as amended, as well as all related immigration laws, rules, and regulations pertaining to proper employee work authorization in the United States. The CONTRACTOR shall execute the Certification of Compliance with Immigration Laws, attached hereto as **Exhibit “D”**.

ARTICLE FIFTEEN APPLICABLE LAW

15.1. Unless otherwise specified, this Agreement shall be governed by the laws, rules, and regulations of the State of Florida, and by the laws, rules and regulations of the United States when providing services funded by the United States government. Any suit or action brought by either party to this Agreement against the other party relating to or arising out of this Agreement must be brought in the appropriate Florida state court in Collier County, Florida.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement for the day and year first written above.

ATTEST:

CITY:

CITY OF NAPLES, FLORIDA,
A Municipal Corporation

By: _____
Patricia L. Rambosk, City Clerk

By: _____
A. William Moss, City Manager

Approved as to form
and legal sufficiency:

By: _____
Robert D. Pritt, City Attorney

CONTRACTOR:

A Florida Corporation [or other entity]

By:

Witness

Its

(CORPORATE SEAL)

END OF SECTION 005000 – CITY AGREEMENT CONTRACT

General Contract (not Architects/Engineer)

**DIVISION 00 - SECTION 006200
CONSTRUCTION PAYMENT BOND FORM**

KNOW ALL MEN BY THESE PRESENTS:

THAT _____, Corporation, as Principal, hereinafter called Contractor; and _____, a corporation of the State of _____, as surety, hereinafter called Surety, are held and firmly bound unto the City of Naples as Obligee, hereinafter called the City, in the amount of (\$_____) Dollars, for the payment whereof Contractor and Surety bind themselves, their heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, Contractor has by written agreement dated the _____day of _____, 20__, entered into a Contract with the City for the following described project:

**PORT ROYAL PUMP STATION IMPROVEMENTS
CITY OF NAPLES, FLORIDA, BID # 14-015**

which contract is by reference incorporated herein and made a part hereof, and is hereinafter referred to as the Contract.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if Contractor shall promptly make payments to all persons supplying Contractor labor, materials and supplies, used directly or indirectly by the said Contractor or Subcontractors in the prosecution of the work provided for in said Contract, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

PROVIDED FURTHER, that the said Surety for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed hereunder or the Specifications accompanying the same shall in anywise affect its obligation on this Bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract or to the work or to the Specifications.

PROVIDED FURTHER, that this Bond is issued pursuant to Section 255.05, Florida Statutes, and reference is hereby made to the notice and time limitations in said statute for making claims against this Bond.

PROVIDED FURTHER, that any suit under this Bond must be instituted before the expiration of one (1) year from the performance of the labor or completion of delivery of the materials or supplies.

PROVIDED FURTHER, no right of action shall accrue on this Bond to or for the use of any person or corporation other than the City named herein and those persons or corporations provided for by Section 255.05, Florida Statutes, their heirs, executors, administrators, successors or assigns.

SIGNED AND SEALED this _____ day of _____, A.D., 2009.

IN THE PRESENCE OF:

CONTRACTOR

_____ BY: _____

INSURANCE COMPANY

BY: _____
Agent and Attorney in Fact

END OF SECTION 006200 - CONSTRUCTION PAYMENT BOND FORM

**DIVISION 00 - SECTION 006300
CONSTRUCTION PERFORMANCE BOND FORM**

KNOW ALL MEN BY THESE PRESENTS:

THAT _____ Corporation, as Principal, hereinafter called Contractor; and _____, as surety, hereinafter called Surety, are held and firmly bound unto the City of Naples as Obligee, hereinafter called the City, in the amount of (\$ _____) _____ Dollars, for the payment whereof Contractor and Surety bind themselves, their heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, Contractor has by written agreement dated the _____ day of _____, 20__, entered into a contract with the City for the following described project:

**PORT ROYAL PUMP STATION IMPROVEMENTS
CITY OF NAPLES, FLORIDA
BID # 14-015**

which contract is by reference incorporated herein and made a part hereof, and is hereinafter referred to as the contract.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if the Contractor shall promptly and faithfully perform the Contract during the original term thereof and any extensions thereof which may be granted by the City with or without notice to the Surety and during any guarantee or warranty period, including the obligation to correct any latent defects not discovered until after acceptance of the project by the City, and if he shall satisfy all claims and demands incurred under said Contract and shall fully indemnify and save harmless the City, its agents, Engineer and employees from all losses, damages, expenses, costs and Attorney's Fees, including appellate proceedings which it may suffer by reason of failure to do so, and shall reimburse and repay the City all outlay and expense which the City may incur in making good any default, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

PROVIDED FURTHER, whenever Contractor shall be, and declared by the City to be in default under the Contract, the City having performed its obligations hereunder, the Surety may promptly remedy the default or shall promptly:

- (1) Complete the Contract in accordance with its terms and conditions; or
- (2) Obtain a bid or bids for submission to the City for completing the Contract in accordance with its terms and conditions and upon determination by the City and Surety of the lowest responsible bidder, arrange for a contract between such bidder and City and make available as work progresses (even though there should be a default or a succession of defaults under the Contract or Contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion, less the balance of the contract price; but not exceeding, including other costs and damages for which the Surety may be liable hereunder, the amount set forth in the first paragraph hereof. The term

"balance of the contract price" as used in this paragraph, shall mean the total amount payable by the City to Contractor under the Contract and any amendments thereto, less the amount properly paid by the City to the Contractor.

PROVIDED FURTHER, the Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed hereunder or the contract documents accompanying the same shall in any waive notice of any such change, extension of time, alteration or addition to the terms of the Contract or to the work or to the contract documents.

PROVIDED FURTHER, any suit under this bond must be instituted before the expiration of two (2) years from the date on which final payment under the Contract falls due; except that, when the action involves a latent defect, suit must be instituted within four (4) years from the time the defect is discovered or should have been discovered with the exercise of due diligence.

PROVIDED FURTHER, no right of action shall accrue on this bond to or for the use of any person or corporation other than the City, its successors or assigns.

SIGNED AND SEALED this _____ day of _____, A.D., 20__.

IN THE PRESENCE OF:

CONTRACTOR

BY: _____

INSURANCE COMPANY

BY: _____

Agent and Attorney in Fact

END OF SECTION 006300 - CONSTRUCTION PERFORMANCE BOND FORM

**DIVISION 00 - SECTION 006500
CERTIFICATE OF INSURANCE REQUIREMENTS**

A. INSURANCE REQUIREMENTS

1. Contractor shall purchase and maintain such comprehensive general liability and other insurance as required by the General Conditions, Special Conditions and General Insurance Requirements.

B. CERTIFICATE OF INSURANCE

1. The Certificate of Insurance submitted to the Owner on the Insurance Company's form with a format similar to the popular ACCORD Corporation form.
2. The Certificate of Insurance shall indicate the Owner's Name and address. Should any of the required policies be canceled before the expiration date, the issuing company shall provide written notice to each additional insured 30 day prior to cancellation.
3. The Owner's project name and project number shall be shown on the Certificate.
4. Submit five (3) copies of the Certificate with the executed Contract Agreement and Performance and Payment Bonds.

END SECTION 006500 - CERTIFICATE OF INSURANCE REQUIREMENTS

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**DIVISION 0 – SECTION 007000
STANDARD GENERAL CONDITIONS
OF THE CONSTRUCTION PROJECT DOCUMENTS &
TECHNICAL SPECIFICATIONS FOR PORT ROYAL
PUMP STATION IMPROVEMENTS**

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ARTICLE 1 - DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Contract/Project Documents and printed with initial or all capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof.
1. *Addenda* -- Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the Contract/Project Documents.
 2. *Agreement* -- The written instrument which is evidence of the agreement between OWNER and CONTRACTOR covering the Work.
 3. *Application for Payment* -- The form acceptable to ENGINEER and OWNER which is to be used by CONTRACTOR during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract/Project Documents.
 4. *Asbestos* -- Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.
 5. *Bid* -- The offer or proposal of a bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 6. *Bidding Documents* -- The Bidding Requirements and the proposed Contract/Project Documents, Project Manual, Plans & Specifications (including all Addenda issued prior to receipt of Bids).
 7. *Bidding Requirements* -- The Advertisement or Invitation to Bid, Instructions to Bidders, Bid security form, if any, and the Bid form with any supplements.
 8. *Bonds* -- Performance and payment bonds and other instruments of security.
 9. *Change Order* -- A document recommended by ENGINEER which is signed by CONTRACTOR and OWNER and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.
 10. *Claim* -- A demand or assertion by OWNER or CONTRACTOR seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.
 11. *Contract* -- The entire and integrated written agreement between the OWNER and CONTRACTOR concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.
 12. *Contract/Project Documents* -- The Contract/Project Documents establish the rights and obligations of the parties and include the Agreement, Addenda (which pertain to the Contract/Project Documents), CONTRACTOR's Bid (including documentation accompanying the Bid and any post Bid documentation submitted prior to the Notice of Award) when attached as an exhibit to the Agreement, the Notice to Proceed, the Bonds, these Standard General Conditions, the Supplementary Conditions, the Specifications and the Drawings as the same are more specifically identified in the Agreement, together with all Written Amendments, Change Orders, Work Change Directives, Field Orders, and ENGINEER's written interpretations and clarifications issued on or after the Effective Date of the Agreement. Approved Shop Drawings and the reports and drawings of subsurface and physical conditions are not Contract/Project Documents. Only printed or hard copies of the items listed in this paragraph are Contract/Project Documents. Files in electronic media format of text, data, graphics, and the like that may be furnished by OWNER to CONTRACTOR are not Contract/Project Documents.
 13. *Contract Price* -- The moneys payable by OWNER to CONTRACTOR for completion of the Work in accordance with the Contract/Project Documents as stated in the Agreement (subject to the provisions of paragraph 11.03 in the case of Unit Price Work).
 14. *Contract Times* -- The number of days or the dates stated in the Agreement to: (i) Milestones if any, (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by ENGINEER's written recommendation of final payment.
 15. *CONTRACTOR* -- The individual or entity with whom OWNER has entered into the Agreement.
 16. *Cost of the Work* -- See paragraph 11.01.A for definition.
 17. *Drawings* -- That part of the Contract/Project Documents prepared or approved by ENGINEER which graphically shows the scope, extent, and character of the Work to be performed by CONTRACTOR. Shop Drawings and other CONTRACTOR submittals are not Drawings as so defined.
 18. *Effective Date of the Agreement* -- The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.
 19. *ENGINEER* -- The individual or entity named as such in the Agreement.
 20. *ENGINEER's Consultant* -- An individual or entity having a contract with ENGINEER to furnish services as ENGINEER's independent professional associate or consultant with respect to the Project and who is identified as such in the Supplementary Conditions.
 21. *Field Order* -- A written order issued by ENGINEER which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.
 22. *General Requirements* -- Sections of Division 1 of the Specifications. The General Requirements pertain to all sections of the Specifications.
 23. *Hazardous Environmental Condition* -- The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto in connection with the Work.

24. *Hazardous Waste* -- The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.
25. *Laws or Regulations* -- Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
26. *Liens* -- Charges, security interests, or encumbrances upon Project funds, real property, or personal property.
27. *Milestone* -- A principal event specified in the Contract/Project Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.
28. *Notice of Award* -- The written notice by OWNER to the apparent successful bidder stating that upon timely compliance by the apparent successful bidder with the conditions precedent listed therein, OWNER will sign and deliver the Agreement.
29. *Notice to Proceed* -- A written notice given by OWNER to CONTRACTOR fixing the date on which the Contract Times will commence to run and on which CONTRACTOR shall start to perform the Work under the Contract/Project Documents.
30. *OWNER* -- The individual, entity, public body, or authority with whom CONTRACTOR has entered into the Agreement and for whom the Work is to be performed.
31. *Partial Utilization* -- Use by OWNER of a substantially completed part of the Work for the purpose for which it is intended (or a related purpose) prior to Substantial Completion of all the Work.
32. *PCBs* -- Polychlorinated biphenyls.
33. *Petroleum* -- Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.
34. *Progress Schedule*--A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.
35. *Project* -- The total construction of which the Work to be performed under the Contract/Project Documents may be the whole, or a part as may be indicated elsewhere in the Contract/Project Documents.
36. *Project Manual* -- The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.
37. *Radioactive Material* -- Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.
38. *Related Entity* -- An officer, director, partner, employee, agent, consultant, or subcontractor.
39. *Resident Project Representative* -- The authorized representative of ENGINEER who may be assigned to the Site or any part thereof.
40. *Samples* -- Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.
41. *Schedule of Submittals*--A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.
42. *Schedule of Values*--A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.
43. *Shop Drawings* -- All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for CONTRACTOR and submitted by CONTRACTOR to illustrate some portion of the Work.
44. *Site* -- Lands or areas indicated in the Contract/Project Documents as being furnished by OWNER upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by OWNER which are designated for the use of CONTRACTOR.
45. *Specifications* -- That part of the Contract/Project Documents consisting of written technical descriptions of materials, equipment, systems, standards, and workmanship as applied to the Work and certain administrative details applicable thereto.
46. *Subcontractor* -- An individual or entity having a direct contract with CONTRACTOR or with any other Subcontractor for the performance of a part of the Work at the Site.
47. *Substantial Completion* -- The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of ENGINEER, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract/Project Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.
48. *Successful Bidder*--The Bidder submitting a responsive Bid to whom Owner makes an award.
49. *Supplementary Conditions* -- That part of the Contract/Project Documents which amends or supplements these General Conditions.
50. *Supplier* -- A manufacturer, fabricator, supplier, distributor, material-man, or vendor having a direct contract with CONTRACTOR or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by CONTRACTOR or any Subcontractor.
51. *Underground Facilities* -- All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

52. *Unit Price Work* -- Work to be paid for on the basis of unit prices.
53. *Work* -- The entire completed construction or the various separately identifiable parts thereof required to be provided under the Contract/Project Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract/Project Documents.
54. *Work Change Directive* -- A written statement to CONTRACTOR issued on or after the Effective Date of the Agreement and signed by OWNER and recommended by ENGINEER ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.
55. *Written Amendment* -- A written statement modifying the Contract/Project Documents, signed by OWNER and CONTRACTOR on or after the Effective Date of the Agreement and normally dealing with the non-engineering or non-technical rather than strictly construction-related aspects of the Contract/Project Documents.

1.02 Terminology

The following words or terms are not defined but, when used in the Bidding Requirements or Contract/Project Documents, have the following meaning.

A. *Intent of Certain Terms or Adjectives*

1. Whenever in the Contract/Project Documents the terms "as allowed," "as approved," or terms of like effect or import are used, or the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of ENGINEER as to the Work, it is intended that such action or determination will be solely to evaluate, in general, the completed Work for compliance with the requirements of and information in the Contract/Project Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract/Project Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective shall not be effective to assign to ENGINEER any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of paragraph 9.10 or any other provision of the Contract/Project Documents.

B. *Day*

1. The word "day" shall constitute a calendar day of 24 hours measured from midnight to the next midnight.

C. *Defective*

1. The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it does not conform to the Contract/Project Documents or does not meet the requirements of any inspection, reference standard, test, or approval referred to in the Contract/Project Documents, or has been damaged prior to ENGINEER's recommendation of final payment (unless responsibility for the protection thereof has been assumed by OWNER at Substantial Completion in accordance with paragraph 14.04 or 14.05).

D. *Furnish, Install, Perform, Provide*

1. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
2. The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
3. The words "perform" or "provide," when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
4. When "furnish," "install," "perform," or "provide" is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of CONTRACTOR, "provide" is implied.

- E. Unless stated otherwise in the Contract/Project Documents, words or phrases which have a well-known technical or construction industry or trade meaning are used in the Contract/Project Documents in accordance with such recognized meaning.

ARTICLE 2 - PRELIMINARY MATTERS

2.01 *Delivery of Bonds*

- A. When CONTRACTOR delivers the executed Agreements to OWNER, CONTRACTOR shall also deliver to OWNER such Bonds as CONTRACTOR may be required to furnish.

2.02 *Copies of Documents*

- A. OWNER shall furnish to CONTRACTOR up to ten copies of the Contract/Project Documents. Additional copies will be furnished upon request at the cost of reproduction.

2.03 *Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

2.04 *Starting the Work*

- A. CONTRACTOR shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.
- 2.05 *Before Starting Construction*
- A. CONTRACTOR's Review of Contract/Project Documents: Before undertaking each part of the Work, CONTRACTOR shall carefully study and compare the Contract/Project Documents and check and verify pertinent figures therein and all applicable field measurements. CONTRACTOR shall promptly report in writing to ENGINEER any conflict, error, ambiguity, or discrepancy which CONTRACTOR may discover and shall obtain a written interpretation or clarification from ENGINEER before proceeding with any Work affected thereby; however, CONTRACTOR shall not be liable to OWNER or ENGINEER for failure to report any conflict, error, ambiguity, or discrepancy in the Contract/Project Documents unless CONTRACTOR knew or reasonably should have known thereof.
- B. Preliminary Schedules: Within ten days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), CONTRACTOR shall submit to ENGINEER for its timely review:
1. a preliminary progress schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract/Project Documents;
 2. a preliminary schedule of Shop Drawing and Sample submittals which will list each required submittal and the times for submitting, reviewing, and processing such submittal; and
 3. a preliminary schedule of values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.
- C. *Evidence of Insurance*: Before any Work at the Site is started, CONTRACTOR and OWNER shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which CONTRACTOR and OWNER respectively are required to purchase and maintain in accordance with Article 5.
- 2.06 *Preconstruction Conference*
- A. Before any Work at the Site is started, a conference attended by CONTRACTOR, ENGINEER, OWNER, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in paragraph 2.05.B, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.
- 2.07 *Initial Acceptance of Schedules*
- A. Unless otherwise provided in the Contract/Project Documents, at least ten days before submission of the first Application for Payment a conference attended by CONTRACTOR, ENGINEER, and others as appropriate will be held to review for acceptability to ENGINEER as provided below the schedules submitted in accordance with paragraph 2.05.B. CONTRACTOR shall have an additional ten days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to CONTRACTOR until acceptable schedules are submitted to ENGINEER.
1. The progress schedule will be acceptable to ENGINEER if it provides an orderly progression of the Work to completion within any specified Milestones and the Contract Times. Such acceptance will not impose on ENGINEER responsibility for the progress schedule, for sequencing, scheduling, or progress of the Work nor interfere with or relieve CONTRACTOR from CONTRACTOR's full responsibility therefore.
 2. CONTRACTOR's schedule of Shop Drawing and Sample submittals will be acceptable to ENGINEER if it provides a workable arrangement for reviewing and processing the required submittals.
 3. CONTRACTOR's schedule of values will be acceptable to ENGINEER as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 - CONTRACT/PROJECT DOCUMENTS: INTENT, AMENDING, REUSE

- 3.01 *Intent*
- A. The Contract/Project Documents are complementary; what is called for by one is as binding as if called for by all.
- B. It is the intent of the Contract/Project Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract/Project Documents. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Contract/Project Documents or from prevailing custom or trade usage as being required to produce the intended result will be provided whether or not specifically called for at no additional cost to OWNER.
- C. Clarifications and interpretations of the Contract/Project Documents shall be issued by ENGINEER as provided in Article 9.
- 3.02 *Reference Standards*
- A. *Standards, Specifications, Codes, Laws, and Regulations*
1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract/Project Documents.

2. No provision of any such standard, specification, manual or code, or any instruction of a Supplier shall be effective to change the duties or responsibilities of OWNER, CONTRACTOR, or ENGINEER, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract/Project Documents, nor shall any such provision or instruction be effective to assign to OWNER, ENGINEER, or any of ENGINEER's Consultants, agents, or employees any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract/Project Documents.
- 3.03 *Reporting and Resolving Discrepancies*
- A. Reporting Discrepancies
 1. *Contractor's Review of Contract/Project Documents Before Starting Work:* Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract/Project Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor may discover and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.
 2. *Contractor's Review of Contract/Project Documents During Performance of Work:* If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract/Project Documents or between the Contract/Project Documents and any provision of any Law or Regulation applicable to the performance of the Work or of any standard, specification, manual or code, or of any instruction of any Supplier, Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract/Project Documents has been issued by one of the methods indicated in Paragraph 3.04.
 3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract/Project Documents unless Contractor knew or reasonably should have known thereof.
 - B. Resolving Discrepancies
 1. Except as may be otherwise specifically stated in the Contract/Project Documents, the provisions of the Contract/Project Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract/Project Documents and:
 - a. the provisions of any standard, specification, manual, code, or instruction (whether or not specifically incorporated by reference in the Contract/Project Documents); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract/Project Documents would result in violation of such Law or Regulation).
- 3.04 *Amending and Supplementing Contract/Project Documents*
- A. The Contract/Project Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof in one or more of the following ways: (i) a Written Amendment; (ii) a Change Order; or (iii) a Work Change Directive.
 - B. The requirements of the Contract/Project Documents may be supplemented and minor variations and deviations in the Work may be authorized, by one or more of the following ways: (i) a Field Order; (ii) ENGINEER's approval of a Shop Drawing or Sample (Subject to the provisions of Paragraph 6.17.D.3); or (iii) ENGINEER's written interpretation or clarification.
- 3.05 *Reuse of Documents*
- A. CONTRACTOR and any Subcontractor or Supplier or other individual or entity performing or furnishing any of the Work under a direct or indirect contract with OWNER: (i) shall not have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of ENGINEER or ENGINEER's Consultant, including electronic media editions; and (ii) shall not reuse any of such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of OWNER and ENGINEER and specific written verification or adaptation by ENGINEER. This prohibition will survive final payment, completion, and acceptance of the Work, or termination or completion of the Contract. Nothing herein shall preclude CONTRACTOR from retaining copies of the Contract/Project Documents for record purposes.
- 3.06 *Electronic Data*
- A. Copies of data furnished by Owner or Engineer to Contractor or Contractor to Owner or Engineer that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.
 - B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.
 - C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

ARTICLE 4 - AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS

4.01 *Availability of Lands*

- A. OWNER shall furnish the Site. OWNER shall notify CONTRACTOR of any encumbrances or restrictions not of general application but specifically related to use of the Site with which CONTRACTOR must comply in performing the Work. OWNER will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If CONTRACTOR and OWNER are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in OWNER's furnishing the Site, CONTRACTOR may make a Claim therefore as provided in paragraph 10.05.
- B. Upon reasonable written request, OWNER shall furnish CONTRACTOR with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and OWNER's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. CONTRACTOR shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.02 *Subsurface and Physical Conditions*

- A. *Reports and Drawings:* The Supplementary Conditions identify:
 1. those reports of explorations and tests of subsurface conditions at or contiguous to the Site that ENGINEER has used in preparing the Contract/Project Documents; and
 2. those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) that ENGINEER has used in preparing the Contract/Project Documents.
- B. *Limited Reliance by CONTRACTOR on Technical Data Authorized:* CONTRACTOR may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract/Project Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," CONTRACTOR may not rely upon or make any Claim against OWNER, ENGINEER, or any of ENGINEER's Consultants with respect to:
 1. the completeness of such reports and drawings for CONTRACTOR's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by CONTRACTOR, and safety precautions and programs incident thereto; or
 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
 3. any CONTRACTOR interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

4.03 *Differing Subsurface or Physical Conditions*

- A. *Notice:* If CONTRACTOR believes that any subsurface or physical condition at or contiguous to the Site that is uncovered or revealed either:
 1. is of such a nature as to establish that any "technical data" on which CONTRACTOR is entitled to rely as provided in paragraph 4.02 is materially inaccurate; or
 2. is of such a nature as to require a change in the Contract/Project Documents; or
 3. differs materially from that shown or indicated in the Contract/Project Documents; or
 4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract/Project Documents;then CONTRACTOR shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by paragraph 6.16.A), notify OWNER and ENGINEER in writing about such condition. CONTRACTOR shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.
- B. *ENGINEER's Review:* After receipt of written notice as required by paragraph 4.03.A, ENGINEER will promptly review the pertinent condition, determine the necessity of OWNER's obtaining additional exploration or tests with respect thereto, and advise OWNER in writing (with a copy to CONTRACTOR) of ENGINEER's findings and conclusions.
- C. *Possible Price and Times Adjustments*
 1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in CONTRACTOR's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. such condition must meet any one or more of the categories described in paragraph 4.03.A; and
 - b. with respect to Work that is paid for on a Unit Price Basis, any adjustment in Contract Price will be subject to the provisions of paragraphs 9.08 and 11.03.
 2. CONTRACTOR shall not be entitled to any adjustment in the Contract Price or Contract Times if:
 - a. CONTRACTOR knew of the existence of such conditions at the time CONTRACTOR made a final commitment to OWNER in respect of Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or
 - b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract/Project Documents to be conducted by or for CONTRACTOR prior to CONTRACTOR's making such final commitment; or
 - c. CONTRACTOR failed to give the written notice within the time and as required by paragraph 4.03.A.

3. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefore as provided in paragraph 10.05. However, OWNER, ENGINEER, and ENGINEER's Consultants shall not be liable to CONTRACTOR for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by CONTRACTOR on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

A. *Shown or Indicated:* The information and data shown or indicated in the Contract/Project Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to OWNER or ENGINEER by the owners of such Underground Facilities, including OWNER, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. OWNER and ENGINEER shall not be responsible for the accuracy or completeness of any such information or data; and
2. the cost of all of the following will be included in the Contract Price, and CONTRACTOR shall have full responsibility for:
 - a. reviewing and checking all such information and data,
 - b. locating all Underground Facilities shown or indicated in the Contract/Project Documents,
 - c. coordination of the Work with the owners of such Underground Facilities, including OWNER, during construction, and
 - d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract/Project Documents, CONTRACTOR shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to OWNER and ENGINEER. ENGINEER will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract/Project Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, CONTRACTOR shall be responsible for the safety and protection of such Underground Facility.
2. If ENGINEER concludes that a change in the Contract/Project Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price of Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract/Project Documents and that CONTRACTOR did not know of and could not reasonably have been expected to be aware of or to have anticipated. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, OWNER or CONTRACTOR may make a Claim therefore as provided in paragraph 10.05.

4.05 *Reference Points*

A. OWNER shall provide engineering surveys to establish reference points for construction which in ENGINEER's judgment are necessary to enable CONTRACTOR to proceed with the Work. CONTRACTOR shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of OWNER. CONTRACTOR shall report to ENGINEER whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.06 *Hazardous Environmental Condition at Site*

A. *Reports and Drawings:* Reference is made to the Supplementary Conditions for the identification of those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that have been utilized by the ENGINEER in the preparation of the Contract/Project Documents.

B. *Limited Reliance by CONTRACTOR on Technical Data Authorized:* CONTRACTOR may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract/Project Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," CONTRACTOR may not rely upon or make any Claim against OWNER, ENGINEER or any of ENGINEER's Consultants with respect to:

1. the completeness of such reports and drawings for CONTRACTOR's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by CONTRACTOR and safety precautions and programs incident thereto; or
2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
3. any CONTRACTOR interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.

C. CONTRACTOR shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract/Project Documents to be within the scope of the Work. CONTRACTOR shall be responsible for a Hazardous Environmental Condition created with

any materials brought to the Site by CONTRACTOR, Subcontractors, Suppliers, or anyone else for whom CONTRACTOR is responsible.

- D. If CONTRACTOR encounters a Hazardous Environmental Condition or if CONTRACTOR or anyone for whom CONTRACTOR is responsible creates a Hazardous Environmental Condition, CONTRACTOR shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by paragraph 6.16); and (iii) notify OWNER and ENGINEER (and promptly thereafter confirm such notice in writing). OWNER shall promptly consult with ENGINEER concerning the necessity for OWNER to retain a qualified expert to evaluate such condition or take corrective action, if any.
- E. CONTRACTOR shall not be required to resume Work in connection with such condition or in any affected area until after OWNER has obtained any required permits related thereto and delivered to CONTRACTOR written notice: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If OWNER and CONTRACTOR cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by CONTRACTOR, either party may make a Claim therefore as provided in paragraph 10.05.
- F. If after receipt of such written notice CONTRACTOR does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then OWNER may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If OWNER and CONTRACTOR cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefore as provided in paragraph 10.05. OWNER may have such deleted portion of the Work performed by OWNER's own forces or others in accordance with Article 7.
- G. To the fullest extent permitted by Laws and Regulations, OWNER shall indemnify and hold harmless CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants and the officers, directors, partners, employees, agents, other consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract/Project Documents to be included within the scope of the Work, and (ii) was not created by CONTRACTOR or by anyone for whom CONTRACTOR is responsible. Nothing in this paragraph 4.06.E shall obligate OWNER to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- H. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultants, and the officers, directors, partners, employees, agents, other consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by CONTRACTOR or by anyone for whom CONTRACTOR is responsible. Nothing in this paragraph 4.06.F shall obligate CONTRACTOR to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- I. The provisions of paragraphs 4.02, 4.03, and 4.04 are not intended to apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 - BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

- A. CONTRACTOR shall furnish performance and payment Bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all CONTRACTOR's obligations under the Contract/Project Documents. These Bonds shall remain in effect at least until one year after the date when final payment becomes due, except as provided otherwise by Laws or Regulations or by the Contract/Project Documents. CONTRACTOR shall also furnish such other Bonds as are required by the Contract/Project Documents.
- B. All Bonds shall be in the form prescribed by the Contract/Project Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All Bonds signed by an agent must be accompanied by a certified copy of such agent's authority to act.
- C. If the surety on any Bond furnished by CONTRACTOR is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of paragraph 5.01.B, CONTRACTOR shall within 20 days thereafter substitute another Bond and surety, both of which shall comply with the requirements of paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

A. All Bonds and insurance required by the Contract/Project Documents to be purchased and maintained by OWNER or CONTRACTOR shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue Bonds or insurance policies for the limits and coverage's so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.03 *Certificates of Insurance*

A. Contractor shall deliver to Owner, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.

B. Owner shall deliver to Contractor, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.

5.04 *CONTRACTOR's Liability Insurance*

A. Contractor shall purchase and maintain such liability and other insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract/Project Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:

1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;
2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;
3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;
4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:
 - a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or
 - b. by any other person for any other reason;
5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting there-from; and
6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

B. The policies of insurance required by this Paragraph 5.04 shall:

1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, include as additional insured (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, partners, employees, agents, consultants and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;
2. include at least the specific coverage's and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;
3. include completed operations insurance;
4. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;
5. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);
6. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and
7. with respect to completed operations insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least two years after final payment.
 - a. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

5.05 *OWNER's Liability Insurance*

A. In addition to the insurance required to be provided by CONTRACTOR under paragraph 5.04, OWNER, at OWNER's option, may purchase and maintain at OWNER's expense OWNER's own liability insurance as will protect OWNER against claims which may arise from operations under the Contract/Project Documents.

5.06 *Property Insurance*

A. Unless otherwise provided in the Supplementary Conditions, OWNER shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:

1. include the interests of OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an additional insured;

2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, false work, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage, and such other perils or causes of loss as may be specifically required by the Supplementary Conditions;
 3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
 4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by OWNER prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by ENGINEER;
 5. allow for partial utilization of the Work by OWNER;
 6. include testing and startup; and
 7. be maintained in effect until final payment is made unless otherwise agreed to in writing by OWNER, CONTRACTOR, and ENGINEER with 30 days written notice to each other additional insured to whom a certificate of insurance has been issued.
- B. OWNER shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants, and any other individuals or entities identified in the Supplementary Conditions, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured.
- C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to OWNER and CONTRACTOR and to each other additional insured to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with paragraph 5.07.
- D. OWNER shall not be responsible for purchasing and maintaining any property insurance specified in this paragraph 5.06 to protect the interests of CONTRACTOR, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by CONTRACTOR, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.
- E. If CONTRACTOR requests in writing that other special insurance be included in the property insurance policies provided under paragraph 5.06, OWNER shall, if possible, include such insurance, and the cost thereof will be charged to CONTRACTOR by appropriate Change Order or Written Amendment. Prior to commencement of the Work at the Site, OWNER shall in writing, advise the CONTRACTOR whether or not such other insurance has been procured by OWNER.
- 5.07 *Waiver of Rights*
- A. OWNER and CONTRACTOR intend that all policies purchased in accordance with paragraph 5.06 will protect OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants, and all other individuals or entities identified in the Supplementary Conditions to be listed as insured's or additional insured's (and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insured's or additional insured's there-under. OWNER and CONTRACTOR waive all rights against each other and their respective officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors, ENGINEER, ENGINEER's Consultants, and all other individuals or entities identified in the Supplementary Conditions to be listed as insured's or additional insured's (and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by OWNER as trustee or otherwise payable under any policy so issued.
- B. OWNER waives all rights against CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants, and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them for:
1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to OWNER's property or the Work caused by, arising out of, or resulting from fire or other peril whether or not insured by OWNER; and
 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by OWNER during partial utilization pursuant to paragraph 14.05, after Substantial Completion pursuant to paragraph 14.04, or after final payment pursuant to paragraph 14.07.
- C. Any insurance policy maintained by OWNER covering any loss, damage or consequential loss referred to in paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against CONTRACTOR, Subcontractors, ENGINEER, or ENGINEER's Consultants and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

- A. Any insured loss under the policies of insurance required by paragraph 5.06 will be adjusted with OWNER and made payable to OWNER as fiduciary for the insured's, as their interests may appear, subject to the requirements of any applicable mortgage clause and of paragraph 5.08.B. OWNER shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order or Written Amendment.
- B. OWNER as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to OWNER's exercise of this power. If such objection be made, OWNER as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, OWNER as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, OWNER as fiduciary shall give bond for the proper performance of such duties.

5.09 *Acceptance of Bonds and Insurance; Option to Replace*

- A. If either OWNER or CONTRACTOR has any objection to the coverage afforded by or other provisions of the Bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract/Project Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by paragraph 2.05.C. OWNER and CONTRACTOR shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the Bonds or insurance required of such party by the Contract/Project Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent Bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

- A. If OWNER finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

- A. CONTRACTOR shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract/Project Documents. CONTRACTOR shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction, but CONTRACTOR shall not be responsible for the negligence of OWNER or ENGINEER in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract/Project Documents. CONTRACTOR shall be responsible to see that the completed Work complies accurately with the Contract/Project Documents.
- B. At all times during the progress of the Work, CONTRACTOR shall assign a competent resident superintendent thereto who shall not be replaced without written notice to OWNER and ENGINEER except under extraordinary circumstances. The superintendent will be CONTRACTOR's representative at the Site and shall have authority to act on behalf of CONTRACTOR. All communications given to or received from the superintendent shall be binding on CONTRACTOR.

6.02 *Labor; Working Hours*

- A. CONTRACTOR shall provide competent, suitably qualified personnel to survey, lay out, and construct the Work as required by the Contract/Project Documents. CONTRACTOR shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract/Project Documents, all Work at the Site shall be performed during regular working hours, and CONTRACTOR will not permit overtime work or the performance of Work on Saturday, Sunday, or any legal holiday without OWNER's written consent (which will not be unreasonably withheld) given after prior written notice to ENGINEER.

6.03 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract/Project Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.
- B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract/Project Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract/Project Documents.

6.04 *Progress Schedule*

- A. CONTRACTOR shall adhere to the progress schedule established in accordance with paragraph 2.07 as it may be adjusted from time to time as provided below.
 - 1. CONTRACTOR shall submit to ENGINEER for acceptance (to the extent indicated in paragraph 2.07) proposed adjustments in the progress schedule that will not result in changing the Contract Times (or Milestones). Such adjustments will conform generally to the progress schedule then in effect and additionally will comply with any provisions of the General Requirements applicable thereto.
 - 2. Proposed adjustments in the progress schedule that will change the Contract Times (or Milestones) shall be submitted in accordance with the requirements of Article 12. Such adjustments may only be made by a Change Order or Written Amendment in accordance with Article 12.

6.05 *Substitutes and "Or-Equals"*

- A. Whenever an item of material or equipment is specified or described in the Contract/Project Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to ENGINEER for review under the circumstances described below.
 - 1. *"Or-Equal" Items:* If in ENGINEER's sole discretion an item of material or equipment proposed by CONTRACTOR is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by ENGINEER as an "or-equal" item, in which case review and approval of the proposed item may, in ENGINEER's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment ENGINEER determines that: (i) it is at least equal in quality, durability, appearance, strength, and design characteristics; (ii) it will reliably perform at least equally well the function imposed by the design concept of the completed Project as a functioning whole, and;
 - b. CONTRACTOR certifies that: (i) there is no increase in cost to the OWNER; and (ii) it will conform substantially, even with deviations, to the detailed requirements of the item named in the Contract/Project Documents.
 - 2. *Substitute Items*
 - a. If in ENGINEER's sole discretion an item of material or equipment proposed by CONTRACTOR does not qualify as an "or-equal" item under paragraph 6.05.A.1, it will be considered a proposed substitute item.
 - b. CONTRACTOR shall submit sufficient information as provided below to allow ENGINEER to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefore. Requests for review of proposed substitute items of material or equipment will not be accepted by ENGINEER from anyone other than CONTRACTOR.
 - c. The procedure for review by the ENGINEER will be as set forth in paragraph 6.05.A.2.d, as supplemented in the General Requirements and as ENGINEER may decide is appropriate under the circumstances.
 - d. CONTRACTOR shall first make written application to ENGINEER for review of a proposed substitute item of material or equipment that CONTRACTOR seeks to furnish or use. The application shall certify that the proposed substitute item will perform adequately the functions and achieve the results called for by the general design, be similar in substance to that specified, and be suited to the same use as that specified. The application will state the extent, if any, to which the use of the proposed substitute item will prejudice CONTRACTOR's achievement of Substantial Completion on time, whether or not use of the proposed substitute item in the Work will require a change in any of the Contract/Project Documents (or in the provisions of any other direct contract with OWNER for work on the Project) to adapt the design to the proposed substitute item and whether or not incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty. All variations of the proposed substitute item from that specified will be identified in the application, and available engineering, sales, maintenance, repair, and replacement services will be indicated. The application will also contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change, all of which will be considered by ENGINEER in evaluating the proposed substitute item. ENGINEER may require CONTRACTOR to furnish additional data about the proposed substitute item.
- B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is shown or indicated in and expressly required by the Contract/Project Documents, CONTRACTOR may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by ENGINEER. CONTRACTOR shall submit sufficient information to allow ENGINEER, in ENGINEER's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract/Project Documents. The procedure for review by ENGINEER will be similar to that provided in subparagraph 6.05.A.2.

- C. *Engineer's Evaluation:* ENGINEER will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to paragraphs 6.05.A and 6.05.B. ENGINEER will be the sole judge of acceptability. No "or-equal" or substitute will be ordered, installed or utilized until ENGINEER's review is complete, which will be evidenced by either a Change Order for a substitute or an approved Shop Drawing for an "or equal." ENGINEER will advise CONTRACTOR in writing of any negative determination.
- D. *Special Guarantee:* OWNER may require CONTRACTOR to furnish at CONTRACTOR's expense a special performance guarantee or other surety with respect to any substitute.
- E. *ENGINEER's Cost Reimbursement:* ENGINEER will record time required by ENGINEER and ENGINEER's Consultants in evaluating substitute proposed or submitted by CONTRACTOR pursuant to paragraphs 6.05.A.2 and 6.05.B and in making changes in the Contract/Project Documents (or in the provisions of any other direct contract with OWNER for work on the Project) occasioned thereby. Whether or not ENGINEER approves a substitute item so proposed or submitted by CONTRACTOR, CONTRACTOR shall reimburse OWNER for the charges of ENGINEER and ENGINEER's Consultants for evaluating each such proposed substitute.
- F. *CONTRACTOR's Expense:* CONTRACTOR shall provide all data in support of any proposed substitute or "or-equal" at CONTRACTOR's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

- A. CONTRACTOR shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to OWNER as indicated in paragraph 6.06.B), whether initially or as a replacement, against whom OWNER may have reasonable objection. CONTRACTOR shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom CONTRACTOR has reasonable objection.
- B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to OWNER in advance for acceptance by OWNER by a specified date prior to the Effective Date of the Agreement, and if CONTRACTOR has submitted a list thereof in accordance with the Supplementary Conditions, OWNER's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract/Project Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. CONTRACTOR shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued or Written Amendment signed. No acceptance by OWNER of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of OWNER or ENGINEER to reject defective Work.
- C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract/Project Documents:
 - 1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity, nor
 - 2. shall anything in the Contract/Project Documents create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.
- D. CONTRACTOR shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with CONTRACTOR.
- E. CONTRACTOR shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with the ENGINEER through CONTRACTOR.
- F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control CONTRACTOR in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- G. All Work performed for CONTRACTOR by a Subcontractor or Supplier will be pursuant to an appropriate agreement between CONTRACTOR and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract/Project Documents for the benefit of OWNER and ENGINEER. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in paragraph 5.06, the agreement between the CONTRACTOR and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against OWNER, CONTRACTOR, ENGINEER, ENGINEER's Consultants, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, CONTRACTOR will obtain the same.

6.07 *Patent Fees and Royalties*

- A. CONTRACTOR shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract/Project Documents for use in the performance of the Work and if to the actual knowledge of OWNER or ENGINEER its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by OWNER in the Contract/Project Documents.

- B. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultants, and the officers, directors, partners, employees or agents, and other consultants of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract/Project Documents.

6.08 *Permits*

- A. Unless otherwise provided in the Supplementary Conditions, CONTRACTOR shall obtain and pay for all construction permits and licenses. OWNER shall assist CONTRACTOR, when necessary, in obtaining such permits and licenses. CONTRACTOR shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. CONTRACTOR shall pay all charges of utility owners for connections to the Work, and OWNER shall pay all charges of such utility owners for capital costs related thereto, such as plant investment fees.

6.09 *Laws and Regulations*

- A. CONTRACTOR shall give all notices and comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither OWNER nor ENGINEER shall be responsible for monitoring CONTRACTOR's compliance with any Laws or Regulations.
- B. If CONTRACTOR performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, CONTRACTOR shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work; however, it shall not be CONTRACTOR's primary responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve CONTRACTOR of CONTRACTOR's obligations under paragraph 3.03.
- C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work may be the subject of an adjustment in Contract Price or Contract Times. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefore as provided in paragraph 10.05.

6.10 *Taxes*

- A. CONTRACTOR shall pay all sales, consumer, use, and other similar taxes required to be paid by CONTRACTOR in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

6.11 *Use of Site and Other Areas*

- A. Limitation on Use of Site and Other Areas
 - 1. CONTRACTOR shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. CONTRACTOR shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.
 - 2. Should any claim be made by any such owner or occupant because of the performance of the Work, CONTRACTOR shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.
 - 3. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultant, and the officers, directors, partners, employees, agents, and other consultants of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against OWNER, ENGINEER, or any other party indemnified hereunder to the extent caused by or based upon CONTRACTOR's performance of the Work.
- B. *Removal of Debris During Performance of the Work:* During the progress of the Work CONTRACTOR shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.
- C. *Cleaning:* Prior to Substantial Completion of the Work CONTRACTOR shall clean the Site and make it ready for utilization by OWNER. At the completion of the Work CONTRACTOR shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract/Project Documents.
- D. *Loading Structures:* CONTRACTOR shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall CONTRACTOR subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.12 *Record Documents*

- A. CONTRACTOR shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Written Amendments, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to ENGINEER for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to ENGINEER for OWNER.

6.13 *Safety and Protection*

- A. CONTRACTOR shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. CONTRACTOR shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:
 - 1. all persons on the Site or who may be affected by the Work;
 - 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 - 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
 - B. CONTRACTOR shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. CONTRACTOR shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.
 - C. All damage, injury, or loss to any property referred to in paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by CONTRACTOR, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by CONTRACTOR (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of OWNER or ENGINEER or ENGINEER's Consultant, or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of CONTRACTOR or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
 - D. CONTRACTOR's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and ENGINEER has issued a notice to OWNER and CONTRACTOR in accordance with paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).
- 6.14 *Safety Representative*
- A. CONTRACTOR shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.
- 6.15 *Hazard Communication Programs*
- A. CONTRACTOR shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.
- 6.16 *Emergencies*
- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, CONTRACTOR is obligated to act to prevent threatened damage, injury, or loss. CONTRACTOR shall give ENGINEER prompt written notice if CONTRACTOR believes that any significant changes in the Work or variations from the Contract/Project Documents have been caused thereby or are required as a result thereof. If ENGINEER determines that a change in the Contract/Project Documents is required because of the action taken by CONTRACTOR in response to such an emergency, a Work Change Directive or Change Order will be issued.
- 6.17 *Shop Drawings and Samples*
- A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the acceptable Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.
 - 1. Shop Drawings
 - a. Submit number of copies specified in the General Requirements.
 - b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.
 - 2. *Samples:* Contractor shall also submit Samples to Engineer for review and approval in accordance with the acceptable schedule of Shop Drawings and Sample submittals.
 - a. Submit number of Samples specified in the Specifications.
 - b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.
 - B. Where a Shop Drawing or Sample is required by the Contract/Project Documents or the Schedule of Submittals any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.
 - C. Submittal Procedures
 - 1. Before submitting each Shop Drawing or Sample, Contractor shall have determined and verified:
 - a. all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
 - b. the suitability of all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;
 - c. all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto; and

- d. shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract/Project Documents.
 - 2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract/Project Documents with respect to Contractor's review and approval of that submittal.
 - 3. With each submittal, Contractor shall give Engineer specific written notice of any variations, that the Shop Drawing or Sample may have from the requirements of the Contract/Project Documents. This notice shall be both a written communication separate from the Shop Drawing's or Sample Submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.
- D. Engineer's Review
- 1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract/Project Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract/Project Documents.
 - 2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract/Project Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
 - 3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract/Project Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.
- E. Re-submittal Procedures
- 1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.
- F. *Re-submittal Procedures*
- 1. CONTRACTOR shall make corrections required by ENGINEER and shall return the required number of corrected copies of Shop Drawings and submit as required new Samples for review and approval. CONTRACTOR shall direct specific attention in writing to revisions other than the corrections called for by ENGINEER on previous submittals.
- 6.18 *Continuing the Work*
- A. CONTRACTOR shall carry on the Work and adhere to the progress schedule during all disputes or disagreements with OWNER. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by paragraph 15.04 or as OWNER and CONTRACTOR may otherwise agree in writing.
- 6.19 *CONTRACTOR's General Warranty and Guarantee*
- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract/Project Documents and will not be defective. Engineer and its Related Entities shall be entitled to rely on representation of Contractor's warranty and guarantee.
 - B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 - 1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 - 2. normal wear and tear under normal usage.
 - C. Contractor's obligation to perform and complete the Work in accordance with the Contract/Project Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract/Project Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract/Project Documents:
 - 1. observations by Engineer;
 - 2. recommendation by Engineer or payment by Owner of any progress or final payment;
 - 3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 - 4. use or occupancy of the Work or any part thereof by Owner;
 - 5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;
 - 6. any inspection, test, or approval by others; or
 - 7. any correction of defective Work by Owner.

6.20 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable.
- B. In any and all claims against Owner or Engineer or any of their respective consultants, agents, officers, directors, partners, or employees by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, partners, employees, agents, consultants and subcontractors arising out of:
 - 1. the preparation or approval of, or the failure to prepare or approve, maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
 - 2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

6.21 *Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract/Project Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.
- B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract/Project Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.
- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract/Project Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract/Project Documents.

ARTICLE 7 - OTHER WORK

7.01 *Related Work at Site*

- A. OWNER may perform other work related to the Project at the Site by OWNER's employees, or let other direct contracts therefore, or have other work performed by utility owners. If such other work is not noted in the Contract/Project Documents, then:
 - 1. written notice thereof will be given to CONTRACTOR prior to starting any such other work; and
 - 2. if OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefore as provided in paragraph 10.05.
- B. CONTRACTOR shall afford each other contractor who is a party to such a direct contract and each utility owner (and OWNER, if OWNER is performing the other work with OWNER's employees) proper and safe access to the Site and a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work and shall properly coordinate the Work with theirs. Unless otherwise provided in the Contract/Project Documents, CONTRACTOR shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with 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 the others whose work will be affected. The duties and responsibilities of CONTRACTOR under this paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of CONTRACTOR in said direct contracts between OWNER and such utility owners and other contractors.

- C. If the proper execution or results of any part of CONTRACTOR's Work depends upon work performed by others under this Article 7, CONTRACTOR shall inspect such other work and promptly report to ENGINEER in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of CONTRACTOR's Work. CONTRACTOR's failure to so report will constitute an acceptance of such other work as fit and proper for integration with CONTRACTOR's Work except for latent defects and deficiencies in such other work.

7.02 *Coordination*

- A. If OWNER intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:
 - 1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;
 - 2. the specific matters to be covered by such authority and responsibility will be itemized; and
 - 3. the extent of such authority and responsibilities will be provided.
- B. Unless otherwise provided in the Supplementary Conditions, OWNER shall have sole authority and responsibility for such coordination.

7.03 *Legal Relationships*

- A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.
- B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's actions or inactions.
- C. Contractor shall be liable to Owner and any other contractor for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's action or inactions.

ARTICLE 8 - OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, OWNER shall issue all communications to CONTRACTOR through ENGINEER.

8.02 *Replacement of ENGINEER*

- A. In case of termination of the employment of ENGINEER, OWNER shall appoint an engineer to whom CONTRACTOR makes no reasonable objection, whose status under the Contract/Project Documents shall be that of the former ENGINEER.

8.03 *Furnish Data*

- A. OWNER shall promptly furnish the data required of OWNER under the Contract/Project Documents.

8.04 *Pay Promptly When Due*

- A. OWNER shall make payments to CONTRACTOR promptly when they are due as provided in paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

- A. OWNER's duties in respect of providing lands and easements and providing engineering surveys to establish reference points are set forth in paragraphs 4.01 and 4.05. Paragraph 4.02 refers to OWNER's identifying and making available to CONTRACTOR copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site that have been utilized by ENGINEER in preparing the Contract/Project Documents.

8.06 *Insurance*

- A. OWNER's responsibilities, if any, in respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 *Change Orders*

- A. OWNER is obligated to execute Change Orders as indicated in paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

- A. OWNER's responsibility in respect to certain inspections, tests, and approvals is set forth in paragraph 13.03.B.

8.09 *Limitations on OWNER's Responsibilities*

- A. The OWNER shall not supervise, direct, or have control or authority over, nor be responsible for, CONTRACTOR's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of CONTRACTOR to comply with Laws and Regulations applicable to the performance of the Work. OWNER will not be responsible for CONTRACTOR's failure to perform the Work in accordance with the Contract/Project Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

- A. OWNER's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

- A. If and to the extent OWNER has agreed to furnish CONTRACTOR reasonable evidence that financial arrangements have been made to satisfy OWNER's obligations under the Contract/Project Documents, OWNER's responsibility in respect thereof will be as set forth in the Supplementary Conditions.

ARTICLE 9 - ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *OWNER'S Representative*

A. ENGINEER will be OWNER's representative during the construction period. The duties and responsibilities and the limitations of authority of ENGINEER as OWNER's representative during construction are set forth in the Contract/Project Documents and will not be changed without written consent of OWNER and ENGINEER.

9.02 *Visits to Site*

A. ENGINEER will make visits to the Site at intervals appropriate to the various stages of construction as ENGINEER deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of CONTRACTOR's executed Work. Based on information obtained during such visits and observations, ENGINEER, for the benefit of OWNER, will determine, in general, if the Work is proceeding in accordance with the Contract/Project Documents. ENGINEER will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. ENGINEER's efforts will be directed toward providing for OWNER a greater degree of confidence that the completed Work will conform generally to the Contract/Project Documents. On the basis of such visits and observations, ENGINEER will keep OWNER informed of the progress of the Work and will endeavor to guard OWNER against defective Work.

B. ENGINEER's visits and observations are subject to all the limitations on ENGINEER's authority and responsibility set forth in paragraph 9.10, and particularly, but without limitation, during or as a result of ENGINEER's visits or observations of CONTRACTOR's Work ENGINEER will not supervise, direct, control, or have authority over or be responsible for CONTRACTOR's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of CONTRACTOR to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Project Representative*

A. If OWNER and ENGINEER agree, ENGINEER will furnish a Resident Project Representative to assist ENGINEER in providing more extensive observation of the Work. The responsibilities and authority and limitations thereon of any such Resident Project Representative and assistants will be as provided in paragraph 9.10 and in the Supplementary Conditions. If OWNER designates another representative or agent to represent OWNER at the Site who is not ENGINEER's Consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 *Clarifications and Interpretations*

A. Engineer may authorize minor variations in the Work from the requirements of the Contract/Project Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract/Project Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefore as provided in Paragraph 10.05.

9.05 *Rejecting Defective Work*

A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract/Project Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract/Project Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.06 *Shop Drawings, Change Orders and Payments*

A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.

B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.

C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.

D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

9.08 *Decisions on Requirements of Contract/Project Documents and Acceptability of Work*

A. Engineer will be the initial interpreter of the requirements of the Contract/Project Documents and judge of the acceptability of the Work there-under. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract/Project Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.

B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believe that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.

- C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.
 - D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.
- 9.09 *Limitations on Engineer's Authority and Responsibilities*
- A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract/Project Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.
 - B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract/Project Documents.
 - C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
 - D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with the Contract/Project Documents.
 - E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to, the Resident Project Representative, if any, and assistants, if any.

ARTICLE 10 - CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract/Project Documents (except as otherwise specifically provided).
- B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefore as provided in Paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract/Project Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.B.

10.03 *Execution of Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:
 1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;
 2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and
 3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract/Project Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

10.04 *Notification to Surety*

- A. If notice of any change affecting the general scope of the Work or the provisions of the Contract/Project Documents (including, but not limited to, Contract Price or Contract Times) is required by the provisions of any bond to be given to a surety, the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

10.05 *Claims*

- A. Engineer's Decision Required: All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract/Project Documents or by Laws and Regulations in respect of such Claims.

- B. Notice: Written notice stating the general nature of each Claim, shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Time shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).
- C. Engineer's Action: Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:
 - 1. deny the Claim in whole or in part,
 - 2. approve the Claim, or
 - 3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.
- D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.
- E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.
- F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

ARTICLE 11 - COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

11.01 Cost of the Work

- A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items, and shall not include any of the costs itemized in Paragraph 11.01.B.
 - 1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time at the Site. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.
 - 2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
 - 3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.
 - 4. Costs of special consultants (including but not limited to Engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
 - 5. Supplemental costs including the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

- c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
 - d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, imposed by Laws and Regulations.
 - e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
 - f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.
 - g. The cost of utilities, fuel, and sanitary facilities at the Site.
 - h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, expresses, and similar petty cash items in connection with the Work.
 - i. The costs of premiums for all bonds and insurance Contractor is required by the Contract/Project Documents to purchase and maintain.
- B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:
- 1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.
 - 2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
 - 3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
 - 4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
 - 5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A and 11.01.B.
- C. Contractor's Fee: When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.
- D. Documentation: Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

11.02 Allowances

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract/Project Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.
- B. *Cash Allowances*
- 1. Contractor agrees that:
 - a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
 - b. Contractor's costs for overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.
- C. *Contingency Allowance*
- 1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 *Unit Price Work*

- A. Where the Contract/Project Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:
 1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
 2. there is no corresponding adjustment with respect any other item of Work; and
 3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 - CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

12.01 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:
 1. where the Work involved is covered by unit prices contained in the Contract/Project Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or
 2. where the Work involved is not covered by unit prices contained in the Contract/Project Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or
 3. where the Work involved is not covered by unit prices contained in the Contract/Project Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).
- C. Contractor's Fee: The Contractor's fee for overhead and profit shall be determined as follows:
 1. a mutually acceptable fixed fee; or
 2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;
 - b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;
 - c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraph 12.01.C.2.a is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;
 - d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;
 - e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
 - f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

12.03 *Delays*

- A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefore as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.

- B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.
- D. Owner, Engineer and the Related Entities of each of them shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of Engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.
- E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

ARTICLE 13 - TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 Notice of Defects

- A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. All defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 Access to Work

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspecting, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's Site safety procedures and programs so that they may comply therewith as applicable.

13.03 Tests and Inspections

- A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.
- B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract/Project Documents except:
 - 1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;
 - 2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in said Paragraph 13.04.C; and
 - 3. as otherwise specifically provided in the Contract/Project Documents.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.
- D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.
- E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, it must, if requested by Engineer, be uncovered for observation.
- F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

13.04 Uncovering Work

- A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.
- B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.
- C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefore as provided in Paragraph 10.05.

- D. If, the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefore as provided in Paragraph 10.05.

13.05 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract/Project Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.06 *Correction or Removal of Defective Work*

- A. Promptly after receipt of notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).
- B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract/Project Documents) or by any specific provision of the Contract/Project Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. repair such defective land or areas; or
 - 2. correct such defective Work; or
 - 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting there-from.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.
- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting there-from) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
- E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract/Project Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefore as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.09 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract/Project Documents, or if Contractor fails to comply with any other provision of the Contract/Project Documents, Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.
- C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract/Project Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefore as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.
- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

- A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 *Progress Payments*

A. *Applications for Payments*

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract/Project Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.
2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
3. The amount of retainage with respect to progress payments will be **TEN PERCENT (10%)** or as stipulated in the Agreement.

B. *Review of Applications*

1. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations on the Site of the executed Work as an experienced and qualified design professional and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
 - a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract/Project Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract/Project Documents, to a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and to any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
 - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract/Project Documents; or
 - b. that there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
 4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
 - a. to supervise, direct, or control the Work, or
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
 - d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
 5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:
 - a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or
 - d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.
- C. Payment Becomes Due
1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.
- D. Reduction in Payment
1. Owner may refuse to make payment of the full amount recommended by Engineer because:
 - a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;
 - b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
 - c. there are other items entitling Owner to a set-off against the amount recommended; or
 - d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.
 2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor corrects to Owner's satisfaction the reasons for such action.
 3. If it is subsequently determined that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1.

14.03 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

14.04 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.
- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefore.

- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will within 14 days after submission of the tentative certificate to Owner notify Contractor in writing, stating the reasons therefore. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will within said 14 days execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.
- E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to complete or correct items on the tentative list.

14.05 *Partial Utilization*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract/Project Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions.
 - 1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor will certify to Owner and Engineer that such part of the Work is substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
 - 2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
 - 3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefore. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
 - 4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

14.06 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.07 *Final Payment*

A. *Application for Payment*

- 1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract/Project Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.
- 2. The final Application for Payment shall be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract/Project Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.7;
 - b. consent of the surety, if any, to final payment;
 - c. a list of all Claims against Owner that Contractor believes are unsettled; and
 - d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner or Owner's property might in any way be responsible have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

B. Engineer's Review of Application and Acceptance

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract/Project Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract/Project Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. Payment Becomes Due

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and , will be paid by Owner to Contractor.

14.08 *Final Completion Delayed*

- A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 *Waiver of Claims*

A. The making and acceptance of final payment will constitute:

1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract/Project Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract/Project Documents; and
2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefore as provided in Paragraph 10.05.

15.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract/Project Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);
2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;
3. Contractor's disregard of the authority of Engineer; or
4. Contractor's violation in any substantial way of any provisions of the Contract/Project Documents.

B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:

1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion),
2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and
3. complete the Work as Owner may deem expedient.

- C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph Owner shall not be required to obtain the lowest price for the Work performed.
- D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.
- E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.
- F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B, and 15.02.C.

15.03 *Owner May Terminate For Convenience*

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 - 1. completed and acceptable Work executed in accordance with the Contract/Project Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract/Project Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;
 - 3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and
 - 4. reasonable expenses directly attributable to termination.
- B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

ARTICLE 16 - DISPUTE RESOLUTION

16.01 *Methods and Procedures*

- A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.
- B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.
- C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:
 - 1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions, or
 - 2. agrees with the other party to submit the Claim to another dispute resolution process, or
 - 3. gives written notice to the other party of their intent to submit the Claim to a court of competent jurisdiction located in Collier County, Florida.

ARTICLE 17 - MISCELLANEOUS

17.01 *Giving Notice*

- A. Whenever any provision of the Contract/Project Documents requires the giving of written notice, it will be deemed to have been validly given if:
 - 1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or
 - 2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

- A. When any period of time is referred to in the Contract/Project Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

17.03 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract/Project Documents. The provisions of this Paragraph will be as effective as if repeated specifically in the Contract/Project Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.04 *Survival of Obligations*

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract/Project Documents, as well as all continuing obligations indicated in the Contract/Project Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

17.05 *Controlling Law*

- A. This Contract is to be governed by the law of the state in which the Project is located.

17.06 *Headings*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

END OF SECTION 007000

**DIVISION 00 - SECTION 008420
NOTICE TO PROCEED FORM**

Date: _____

Contractor: _____

Re: Notice to Proceed on Project: **PORT ROYAL PUMP STATION
IMPROVEMENTS
CITY OF NAPLES, FLORIDA
BID # 14-015**

You are hereby notified that the Contract Time and Commencement Date under the above contract will commence to run on _____. On that date you are to start performing the work and your other obligations under the Contract Documents. Based on the Contract Time stated in the Agreement, the dates of Substantial Completion and Final Completion are calculated as _____, and _____ respectively.

Two (2) sets of Bid Documents shall follow under separate cover. The Bid Documents contain the following documents:

- Instructions to Bidders
- Bid Form
- Bid Bond
- Executed Agreement
- Payment Bond
- Performance Bond
- Certificates of Insurance
- General Conditions
- Notice of Award
- Specifications and Contract Drawings
- Addenda Numbers _____ through _____
- General Requirements

By:

City of Naples, Florida

Date

END OF SECTION 008420- NOTICE TO PROCEED FORM

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**DIVISION 00 - SECTION 008420
NOTICE TO PROCEED FORM**

Date: _____

Contractor: _____

Re: Notice to Proceed on Project: **PORT ROYAL PUMP STATION
IMPROVEMENTS
CITY OF NAPLES, FLORIDA
BID # 14-015**

You are hereby notified that the Contract Time and Commencement Date under the above contract will commence to run on _____. On that date you are to start performing the work and your other obligations under the Contract Documents. Based on the Contract Time stated in the Agreement, the dates of Substantial Completion and Final Completion are calculated as _____, and _____ respectively.

Two (2) sets of Bid Documents shall follow under separate cover. The Bid Documents contain the following documents:

- Instructions to Bidders
- Bid Form
- Bid Bond
- Executed Agreement
- Payment Bond
- Performance Bond
- Certificates of Insurance
- General Conditions
- Notice of Award
- Specifications and Contract Drawings
- Addenda Numbers _____ through _____
- General Requirements

By:

City of Naples, Florida

Date

END OF SECTION 008420- NOTICE TO PROCEED FORM

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**DIVISION 00 – SECTION 008440
CHANGE ORDER FORM
Change Order Exhibit E**

No. _____

Date of Issuance: _____

Effective Date: _____

Project: _____

Owner: _____

Owner's Contract No.: _____

Contact: _____

Date of Contract: _____

Contractor: _____

Engineer's/Owner's Project No.: _____

The Contract Documents are modified as follows upon execution of this Change Order:
Description:

Attachments: (List documents supporting change): _____

CHANGE IN CONTRACT PRICE:

CHANGE IN CONTRACT TIMES:

Original Contract Price:

Original Contract Times: Working Days Calendar Days

\$ _____

Substantial completion (days or date): _____

Ready for final payment (days or date): _____

[Increase] [Decrease] from previously approved Change Orders NO. _____ to NO. _____

[Increase] [Decrease] from previously approved Change Orders NO. _____ to NO. _____

\$ _____

Substantial Completion (days): _____

Ready for final payment (days): _____

Contract price prior to Change Order:

Contract times prior to this Change Order:

\$ _____

Substantial Completion (days): _____

Ready for final payment (days): _____

[Increase] [Decrease] of this Change Order:

[Increase] [Decrease] of this Change Order:

\$ _____

Substantial Completion (days): _____

Ready for final payment (days): _____

Contract price incorporating this Change Order:

Contact Times with all approved Change Orders:

\$ _____

Substantial Completion (days): _____

Ready for final payment (days): _____

RECOMMENDED:

ACCEPTED:

ACCEPTED:

By: _____

By: _____
Owner (Authorized Signature)

By: _____

Date: _____
Engineer (Authorized Signature)

Date: _____

Date: _____
Contractor(Authorized Signature)

Date: _____

Approved by Funding Agency (if applicable): _____

Change Order Instructions

A. GENERAL INFORMATION

This document was developed to provide a uniform format for handling contract changes that affect Contract Price or Contract Times. Changes that have been initiated by a Work Change Directive must be incorporated into a subsequent Change Order if they affect Price or Times.

Changes that affect Contract Price or Contract Times should be promptly covered by a Change Order. The practice of accumulating Change Orders to reduce the administrative burden may lead to unnecessary disputes.

If Milestones have been listed in the Agreement, any effect of a Change Order thereon should be addressed.

For supplemental instructions and minor changes not involving a change in the Contract Price or Contract Times, a Field Order should be used.

B. COMPLETING THE CHANGE ORDER FORM

Engineer normally initiates the form, including a description of the changes involved and attachments based upon documents and proposals submitted by Contractor, or requests from Owner, or both.

Once Engineer has completed and signed the form, all copies should be sent to Owner or Contractor for approval, depending on whether the Change Order is a true order to the Contractor or the formalization of a negotiated agreement for a previously performed change. After approval by one contracting party, all copies should be sent to the other party for approval. Engineer should make distribution of executed copies after approval by both parties.

If a change only applies to price or to times, cross out the part of the tabulation that does not apply.

END OF SECTION 008440 – CHANGE ORDER FORM

**DIVISION 00- SECTION 008450
SCHEDULE OF VALUES**

Pay Estimate No. _____ Project: _____
 For Period Ending _____ Prepared by: _____ Page ____ of ____

A Item	B Description	C Bid Quantity	D Units	E Unit Price	F Bid Amount	G Complete Through Last Period		H Complete Through This Period		I Value of Items Completed
						Qty.	%	Qty.	%	
						Subtotals				

END OF SECTION 008450 - SCHEDULE OF VALUES

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**DIVISION 00 - SECTION 008460
MATERIALS STORED ON SITE FORM**

Pay Estimate No. _____	Project _____	Date Prepared _____
For Period Ending _____	Prepared by _____	Page _____ of _____

A	B	Value Last Period			(-) Value Mat'l Installed			(+) Value Mat'l Delivered			Value This Period		
		C	D	E	F	G	H	I	J	K	L	M	N
Item	Descpt	Quant	Unit Price	Inv Amnt	Quant	Unit Price	Inv Amnt	Quant	Unit Price	Invoice Amount	Quantity	Unit Price	Invoice Amount

END OF SECTION 008460 – MATERIALS STORED ON SITE FORM

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DIVISION 00 - SECTION 008480

CERTIFICATE OF SUBSTANTIAL COMPLETION

OWNER'S Project No.: _____ ENGINEER's Project No.: 60289240

**City of Naples
Port Royal Pump Station Improvements**

CONTRACTOR _____

Contract Date _____

This Certificate of Substantial Completion applies to all Work under the Contract Documents or to the following specified parts thereof.

To _____
Owner

And To _____
Contractor

The Work to which this Certificate applies has been inspected by authorized representatives of OWNER, CONTRACTOR and ENGINEER, and that Work is hereby declared to be substantially complete in accordance with the Contract Documents on

Date of Substantial Completion

A tentative list of items to be completed or corrected is attached hereto. This list may not be all-inclusive, and the failure to include an item therein does not alter the responsibility of CONTRACTOR to complete all the Work in accordance with the Contract documents. When this Certification applies to a specified part of the Work the items in the tentative list shall be completed or corrected by CONTRACTOR within ____ days of the above date of Substantial Completion.

The date of Substantial Completion is the date upon which all guarantees and warranties begin, except as follows:

The responsibilities between OWNER and CONTRACTOR for security, operation, safety, maintenance, heat, utilities and insurance shall be as follows:

RESPONSIBILITIES:

OWNER _____

CONTRACTOR _____

The following documents are attached to and made a part of this Certificate:

This certificate does not constitute an acceptance of Work not in accordance with the Contract Documents nor is it a release of CONTRACTOR'S obligation to complete the Work in accordance with the Contract Documents.

Executed by ENGINEER on _____, 20__.

(Engineer)

By _____

The CONTRACTOR accepts this Certificate of Substantial Completion on:

_____, 20__.

(Contractor)

By _____

END OF SECTION 008480 – CERTIFICATE OF SUBSTANTIAL COMPLETION

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**DIVISION 00 - SECTION 008500
FIELD ORDER FORM**

<input type="checkbox"/>	OWNER:	_____	No. Copies	_____	
<input type="checkbox"/>	ENGINEER:	_____	No. Copies	_____	
<input type="checkbox"/>	ARCHITECT:	_____	No. Copies	_____	FIELD ORDER
<input type="checkbox"/>	CONTRACTOR:	_____	No. Copies	_____	NO. _____
<input type="checkbox"/>	FIELD:	_____	No. Copies	_____	
<input type="checkbox"/>	OTHER:	_____	No. Copies	_____	

PROJECT DATA

NAME: _____
LOCATION: _____
OWNER: _____
OTHER: _____

CONTRACT DATA

NUMBER: _____
DATE: _____
DRAWING NO.: _____
SPECIFICATION SECTION: _____

To: (Contractor)

You are hereby directed to execute promptly this Field Order which interprets the Contract Documents or orders minor changes in the Work without change in Contract Sum or Contract Time.

If you consider that a change in Contract Sum or Contract Time is required, please submit your itemized proposal to the Engineer immediately and before proceeding with this Work. If your proposal is found to be satisfactory and in proper order, this Field Order will in that event be superseded by a Change Order.

Description (of interpretation or change): _____

Attachments (listing of attached documents that support description):

1. Contractor Request for information No.: _____
2. _____
3. _____
4. _____
5. _____

City of Naples – Utilities Department

Project No.:

BY: _____

DATE: _____

END OF SECTION 008500 – FIELD ORDER FORM

DIVISION 00 - SECTION 008510

CONTRACTOR REQUEST FOR INFORMATION FORM

<input type="checkbox"/> OWNER:	_____	No. Copies	_____	CONTRACTOR REQUEST FOR INFORMATION NO. _____
<input type="checkbox"/> ENGINEER:	_____	No. Copies	_____	
<input type="checkbox"/> ARCHITECT:	_____	No. Copies	_____	
<input type="checkbox"/> CONTRACTOR:	_____	No. Copies	_____	
<input type="checkbox"/> FIELD:	_____	No. Copies	_____	
<input type="checkbox"/> OTHER:	_____	No. Copies	_____	

PROJECT DATA

CONTRACT DATA

NAME: _____
LOCATION: _____
OWNER: _____
OTHER: _____

NUMBER: _____
DATE: _____
DRAWING NO: _____
SPECIFICATION SECTION: _____

QUESTION:

BY: _____

DATE: _____

REPLY:

BY: _____

DATE: _____

END OF SECTION 008510 – CONTRACTOR REQUEST FOR INFORMATION FORM

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DIVISION 00 - SECTION 008520

CONSTRUCTION ACCIDENT REPORT FORM

<input type="checkbox"/> OWNER:	_____	No. Copies	_____	CONSTRUCTION ACCIDENT REPORT NO. _____
<input type="checkbox"/> ENGINEER:	_____	No. Copies	_____	
<input type="checkbox"/> ARCHITECT:	_____	No. Copies	_____	
<input type="checkbox"/> CONTRACTOR:	_____	No. Copies	_____	
<input type="checkbox"/> FIELD:	_____	No. Copies	_____	
<input type="checkbox"/> OTHER:	_____	No. Copies	_____	

PROJECT DATA

NAME:	_____	CONTRACTOR:	_____
LOCATION:	_____	SUBCONTRACTOR:	_____
OWNER:	_____	OTHER:	_____
ENGINEER:	_____		

ACCIDENT INFORMATION

Accident Date: _____ Time: _____
Name(s) of Injured or Deceased: _____

Describe what occurred: _____

NOTE: Use other side or attach additional sheets as required.

Names & Address of Witnesses: _____

Employer's Name & Address: _____

Where treated (Name & Address): _____

(Attach sketch if applicable)

Send original to Project Manager in charge
of Construction immediately.

Signed

END OF SECTION 0085200 – CONSTRUCTION ACCIDENT REPORT FORM

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DIVISION 00 - SECTION 008530

PRESSURE TEST FORM

<input type="checkbox"/>	OWNER:	_____	No. Copies _____	
<input type="checkbox"/>	ENGINEER:	_____	No. Copies _____	PRESSURE
<input type="checkbox"/>	ARCHITECT:	_____	No. Copies _____	TEST
<input type="checkbox"/>	CONTRACTOR:	_____	No. Copies _____	NUMBER _____
<input type="checkbox"/>	FIELD:	_____	No. Copies _____	
<input type="checkbox"/>	OTHER:	_____	No. Copies _____	

PROJECT DATA:

Name:	_____	Owner:	_____
Location:	_____	Contractor:	_____
Number:	_____	Subcontractor:	_____
Date:	_____		

LOCATION OF TEST:

COMPUTATION FOR MEASURED LEAKAGE:

Time-End of Test _____	Pressure-End of Test (psi) _____
Time-Start of Test _____	Pressure-Start of Test (psi) _____
Test Time (Hours) _____	Average Test Pressure (psi) _____
Pipe Material _____	
Quantity of Water Required to Return to Original Pressure (gals.) _____	

Computation for Allowable Leakage (for Ductile Iron Pipe):

- D = Size of Line Tested: Diameter (inches)
- S = Length of Pipe Tested: (feet)
- T = Test Time: (hours)
- P = Average Test Pressure: (psi)

Q = Allowable Leakage: $\frac{S \times D \times \sqrt{P} \times T}{133,200}$ (gal.) Per AWWA Std. C600

Allowable Leakage for PVC pipe shall be 90% of value calculated above.

REMARKS:

THE ABOVE TEST (DOES) (DOES NOT) MEET THE SPECIFICATIONS

TEST WITNESS

by Contractor

by Subcontractor

END OF SECTION 008530 – PRESSURE TEST FORM

DIVISION 00 - SECTION 008610

WORK DIRECTIVE FORM

<input type="checkbox"/>	OWNER:	_____	No. Copies _____	WORK DIRECTIVE NO. _____
<input type="checkbox"/>	ENGINEER:	_____	No. Copies _____	
<input type="checkbox"/>	ARCHITECT:	_____	No. Copies _____	
<input type="checkbox"/>	CONTRACTOR:	_____	No. Copies _____	
<input type="checkbox"/>	FIELD:	_____	No. Copies _____	
<input type="checkbox"/>	OTHER:	_____	No. Copies _____	

PROJECT DATA:

CONTRACT DATA

NAME: _____
LOCATION: _____
OWNER: _____
CONTRACTOR: _____

NUMBER: _____
DATE: _____
DRAWING NO.: _____
SPECIFICATION
SECTION: _____

TO: (Contractor) _____

You are directed to proceed promptly with the following change(s):

Description:

Purpose of Work Directive Change:

If a claim is made that the above changes(s) have affected Contract Price or Contract Time, any claim for a Change Order based thereon will involve one of the following methods of determining the effect of the change(s).

Method of determining change
in Contract Price:

- Time and materials
- Unit prices
- Cost plus fixed fee
- Other _____

Method of determining change
in Contract Time:

- Contractor's records
- Engineer's records
- Other _____

Estimated increase (decrease) in Contract Price.
\$ _____

If the change involves an increase, the estimated amount is not to be exceeded without further authorization.

Estimated increase (decrease) in Contract Times.

Substantial Completion _____ days;
Ready for final payment _____ days.
If the change involves an increase, the estimated times are not to be exceeded without further authorization.

RECOMMENDED:

BY: _____
(Engineer)

AUTHORIZED:

BY: _____
(Owner)

Attachments (listing of attached documents that support description):

1. Contractor Request for Information No.: _____
2. Request for Proposal for Proposed Change (RFP) No.: _____
3. _____
4. _____
5. _____

END OF SECTION 008610 – WORK DIRECTIVE FORM

DIVISION 00 - SECTION 008620

DAILY CONSTRUCTION REPORT FORM

<input type="checkbox"/>	OWNER:	_____	No. Copies _____	DAILY
<input type="checkbox"/>	ENGINEER:	_____	No. Copies _____	
	CONSTRUCTION			
<input type="checkbox"/>	ARCHITECT:	_____	No. Copies _____	REPORT
<input type="checkbox"/>	CONTRACTOR:	_____	No. Copies _____	DAYS FROM
<input type="checkbox"/>	FIELD:	_____	No. Copies _____	NOTICE TO
<input type="checkbox"/>	OTHER:	_____	No. Copies _____	PROCEED__

PROJECT DATA:

CONTRACT DATA

NAME: _____
 LOCATION: _____
 OWNER: _____
 CONTRACTOR: _____

NUMBER: _____
 DATE: _____
 DRAWING NO.: _____
 SPECIFICATION _____
 SECTION: _____

1. WEATHER

<input type="checkbox"/> Sunny	<input type="checkbox"/> Overcast	Temp. Range	Precipitation
<input type="checkbox"/> Cloudy	<input type="checkbox"/> Windy	AM _____°F	Type:
		PM _____°F	Duration:

2. GROUND CONDITIONS

<input type="checkbox"/> Saturated	<input type="checkbox"/> Dry	Time
<input type="checkbox"/> Frozen	<input type="checkbox"/> Wet but workable	Work Started:
		Work Stopped:

3. RECORD OF LABOR

Contractor	Type	No.	Hrs.	Contractor	Type	No.	Hrs.

4. EQUIPMENT

Contractor	Type	Model	Hrs.	Use

5. MATERIAL RECEIVED

Received By	Type	Quantity	Supplier	Use

6. DESCRIPTION OF WORK PERFORMED

END OF SECTION 008620 – DAILY CONSTRUCTION REPORT FORM

DIVISION 00 - SECTION 008630

CHANGE PROPOSAL SUMMARY FORM

<input type="checkbox"/>	OWNER:	_____	No. Copies _____	
<input type="checkbox"/>	ENGINEER:	_____	No. Copies _____	CHANGE PROPOSAL SUMMARY NO. _____
<input type="checkbox"/>	ARCHITECT:	_____	No. Copies _____	
<input type="checkbox"/>	CONTRACTOR:	_____	No. Copies _____	
<input type="checkbox"/>	FIELD:	_____	No. Copies _____	
<input type="checkbox"/>	OTHER:	_____	No. Copies _____	

PROJECT DATA:

CONTRACT DATA

NAME: _____
 LOCATION: _____
 OWNER: _____
 CONTRACTOR: _____

NUMBER: _____
 DATE: _____
 DRAWING NO.: _____
 SPECIFICATION
 SECTION: _____

REFERENCE: Work Directive No. _____ RFP No. _____
 Field Order No. _____ Other _____

DESCRIPTION: _____

PRICING INFORMATION

1.	DIRECT LABOR	Skill/Trade	Manhours	Rate	Cost
	1.A Production Labor	_____	_____	_____	_____
	1.B. Supervision		_____	_____	_____
<input type="checkbox"/>	Foreman				
<input type="checkbox"/>	Superintendent				
	1.C Field Engineering		_____	_____	_____
	1.D Expenses		_____	_____	_____

Subtotal(1)

2. MATERIALS & EQUIPMENT

	Description	Quantity	Unit Price	Cost
2.A	Incorporated in Work			
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
2.B	Consumed in Performance			
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
2.C	Equipment			
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
2.D	Direct Costs			
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
2.E	Bonds, Insurance			
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
				Subtotal(2)

3. TOTAL LABOR, MATERIALS & EQUIPMENT

$$\begin{array}{r}
 \text{_____} \\
 \text{Subtotal (1)}
 \end{array}
 +
 \begin{array}{r}
 \text{_____} \\
 \text{Subtotal (2)}
 \end{array}
 =
 \begin{array}{r}
 \text{_____} \\
 \text{Total}
 \end{array}$$

END OF SECTION 008630 – CHANGE PROPOSAL SUMMARY FORM

DIVISION 00 - SECTION 008640

REQUEST FOR PROPOSAL FOR PROPOSED CHANGE FORM

OWNER: _____ No. Copies _____ REQUEST FOR
 ENGINEER: _____ No. Copies _____ PROPOSAL
 ARCHITECT: _____ No. Copies _____ FOR
PROPOSED
 CONTRACTOR: _____ No. Copies _____ CHANGE
(RFP)
 FIELD: _____ No. Copies _____ NO. _____
 OTHER: _____ No. Copies _____

PROJECT DATA:

CONTRACT DATA

NAME: _____
LOCATION: _____
OWNER: _____
CONTRACTOR: _____

NUMBER: _____
DATE: _____
DRAWING NO.: _____
SPECIFICATION
SECTION: _____

TO: (Contractor) _____

Provide the undersigned a proposal for the following change in the work within seven (7) calendar days after receipt of this request. The written proposal must clearly delineate the scope of the proposed change in work providing an itemized estimate of time and all material and labor (by trade), subcontract and overhead costs and fees. Any amount claimed for subcontracts must be similarly supported.

Description of change in work:

Change Order Type: (Deletion) (Addition) (Revision)

Constraints of Change: _____

Initiated by: _____

Proposal must be received by: _____ (7 days from date below)

Attachments (listing of attached documents that support description):

1. Contractor Request for Information No.: _____
2. _____
3. _____
4. _____
5. _____

PROJECT NO.: _____

Issued By: _____

DATE: _____

END OF SECTION 008640 – REQUEST FOR PROPOSAL FOR PROPOSED CHANGE
FORM

DIVISION 00 - SECTION 008650

CHECK OUT FORM

<input type="checkbox"/>	OWNER:	_____	No. Copies _____	
<input type="checkbox"/>	ENGINEER:	_____	No. Copies _____	CHECK-OUT
<input type="checkbox"/>	ARCHITECT:	_____	No. Copies _____	
<input type="checkbox"/>	CONTRACTOR:	_____	No. Copies _____	MEMO NO. __
<input type="checkbox"/>	FIELD:	_____	No. Copies _____	
<input type="checkbox"/>	OTHER:	_____	No. Copies _____	

PROJECT DATA:

CONTRACT DATA

NAME: _____
LOCATION: _____
OWNER: _____
CONTRACTOR: _____

NUMBER: _____
DATE: _____
DRAWING NO.: _____
SPECIFICATION SECTION: _____

Name of equipment checked: _____

Name of manufacturer of equipment: _____

1. The equipment furnished by us has been checked on the job by us. We have reviewed (where applicable) the performance verification information submitted to us by the Contractor.
2. The equipment is properly installed, except for items noted on page 008650-2.
3. The equipment is operating satisfactorily, except for items noted on page 008650-2.
4. The written operating and maintenance information (where applicable) has been presented to the Contractor, and gone over with him in detail. Five (5) copies of all applicable operating and maintenance information and parts lists have been furnished to him.

Checked By: _____
Name of Manufacturer's Rep. _____
Address and Phone # of Rep. _____
Sig./Title/Person Making Check _____
Date Checked _____

_____ Name of General Contractor
_____ Authorized Sign./Title/Date
_____ Name of Subcontractor
_____ Authorized Sig./Title/Date

Manufacturer's Representative Notations: Exceptions noted at time of check were:

Manufacturer's Representative to note adequacy of related equipment that directly affects operation, performance or function of equipment checked. (No comment presented herein will indicate adequacy of related systems or equipment):

END OF SECTION 008650 – CHECK OUT FORM

DIVISION 00 - SECTION 008660

CERTIFICATE OF COMPLETED DEMONSTRATION FORM

<input type="checkbox"/>	OWNER:	_____	No. Copies _____	CERTIFICATE OF
<input type="checkbox"/>	ENGINEER:	_____	No. Copies _____	
COMPLETED				
<input type="checkbox"/>	ARCHITECT:	_____	No. Copies _____	
DEMONSTRATION				
<input type="checkbox"/>	CONTRACTOR:	_____	No. Copies _____	MEMO NO. _____
<input type="checkbox"/>	FIELD:	_____	No. Copies _____	
<input type="checkbox"/>	OTHER:	_____	No. Copies _____	

PROJECT DATA:

CONTRACT DATA

NAME: _____
LOCATION: _____
OWNER: _____
CONTRACTOR: _____

NUMBER: _____
DATE: _____
DRAWING NO.: _____
SPECIFICATION
SECTION: _____

NOTE TO CONTRACTOR:

Submit five (5) copies of all information listed below for checking at least one (1) week before scheduled demonstration of the Work. After all information has been approved by the Engineer, give the Owner a Demonstration of Completed Systems as specified and have the Owner sign five (5) copies of this form. After this has been done, a written request for a final inspection of the system shall be made.

MEMORANDUM:

This memo is for the information of all concerned that the Owner has been given a Demonstration of Completed Systems on the work covered under this Specification Section. This conference consisted of the system operation, a tour on which all major items of equipment were explained and demonstrated, and the following items were given to the Owner:

- (a) Owner's copy of Operation and Maintenance Manual for equipment or systems specified under this section containing approved submittal sheets on all items, including the following:
 - (1) Maintenance information published by manufacturer on equipment items.
 - (2) Printed warranties by manufacturers on equipment items.
 - (3) Performance verification information as recorded by the Contractor.

- (4) Check-Out Memo on equipment by manufacturer's representative.
- (5) Written operating instructions on any specialized items.
- (6) Explanation of guarantees and warranties on the system.
- (b) Prints showing actual "As-Built" conditions.
- (c) A demonstration of the System in Operation and of the maintenance procedures which will be required.

 (Name of General Contractor)

By: _____
 (Authorized Signature, Title & Date)

 (Name of Subcontractor)

By: _____
 (Authorized Signature, Title & Date)

Operations and Maintenance Manual, Instruction Prints, Demonstration & Instruction in Operation Received:

 (Name of Owner)

By: _____
 (Authorized Signature, Title & Date)

END OF SECTION 008660 – CERTIFICATE OF COMPLETED DEMONSTRATION FORM

**DIVISION 00 - SECTION 009800
CONTRACTOR'S RELEASE OF LIEN**

Before me, the undersigned authority in said County and State, appeared _____, who being first duly sworn, deposes and says that he is _____ of _____ a company and/or corporation authorized to do business under the laws of Florida, which is the contractor on Project _____ known as _____ City _____ of Naples, _____, Bid No. _____, located in the City of Naples, County of Collier, Florida, under contract with the City of Naples, dated the _____ day of _____, 20____, that the said deponent is duly authorized to make this affidavit by resolution of the Board of Directors of said company and/or corporation; that deponent knows of his own knowledge that said contract has been complied with in every particular by said contractor and that all parts of the work have been approved by the City Engineer; that there are no bills remaining unpaid for labor, material or otherwise, in connection with said contract and work, and that there are no suits pending against the undersigned as contractor or anyone in connection with the work done and materials furnished or otherwise, under said contract.

Deponent further says that the final estimate which has been submitted to the City simultaneously with the making of this affidavit, constitutes all claims and demands against the City on account of said contract or otherwise, and that acceptance of the sum specified in said final estimate will operate as a full and final release and discharge of the City from any further claims, demands or compensation by contractor under the above contract.

Deponent further agrees that all guarantees under this contract shall start and be in full force from the date of this release as spelled out in the contract documents.

Signature: _____

Printed Name: _____

STATE OF FLORIDA
COUNTY OF _____

Signed before me this _____ day of _____, 20____,
by _____ who is personally known to me or has
produced _____ as identification.

Notary Public

My Commission Expires:
Commission Number:

WE, the _____, having heretofore executed a performance bond and a payment bond for the above named contractor covering project and section as described above in the sum of (\$_____) Dollars, hereby agree that the Owner may make full payment of the final estimate, including the retained percentage, to said contractor.

IT IS fully understood that the granting of the right to make the payment of the final estimate to said contractor and/or his assigns, shall in no way relieve this surety company of its obligations under its bonds, as set forth in the specifications, contract, and bonds pertaining to the above project.

IN WITNESS WHEREOF, the _____ has caused this instrument to be executed on its behalf by its _____, and/or its duly authorized attorney in fact, and its corporate seal to be hereunto affixed, all on this _____ day of _____, A.D., 200__.

Surety Company

Attorney in Fact

Power of Attorney must be attached if executed by Attorney in Fact.

STATE OF FLORIDA)
COUNTY OF)

BEFORE ME, the undersigned authority, appeared _____ who is personally known to me or has produced _____ as identification, and who executed the foregoing instrument in the name of _____ as its _____ and the said _____ acknowledged that he executed said instrument in the name of _____ as its _____ and/or _____, for the purpose therein expressed and that he had due and legal authority to execute the same on behalf of said _____, a corporation.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal at
_____ this ____ day of _____, 200__.

Notary Public

My Commission Expires:
Commission Number:

END OF SECTION 009800 – CONTRACTOR’S RELEASE OF LEIN

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DIVISION 01 – GENERAL REQUIREMENTS

010100	Summary of Work
010500	Request for Information (RFI) Procedures
011100	Coordination of Work, Permits, and Regulations
012000	Measurement and Payment
013000	Administrative Requirements
013216	CPM Construction Schedule Requirements
013233	Preconstruction Audio-Video Documentation
013300	Submittals
014210	General Abbreviations
015070	Traffic Regulations
015100	Construction Facilities and Temporary Controls
017000	Contract Closeout
017410	Cleaning During Construction and Final Cleaning
019310	Operation and Maintenance Manual

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SECTION 010100 SUMMARY OF WORK

PART 1 - GENERAL

1.01 Work Under This Contract

1. Work under this contract includes the following:
 - a. The intent of this project is to replace three existing submersible pumps and discharge piping with new pumps and piping; construct new elevated generator / electrical slab; provide and install new wetwell coating, new generator, new lift station control panel, new electrical rack, electrical and instrumentation systems, SCADA upgrades, security system, and new flap gate.
2. The principal components of this project include the followings:
 - a. Pump Station Improvements:
 - (1) Complete demolition work including, but not limited to, existing submersible pumps, piping, concrete pump pad(s), hatch, control panel, RTU and antenna, electrical service, electrical disconnect and meter.
 - (2) Furnish and install three new submersible pumps, concrete pump base, discharge piping, valves, wetwell coating, hatch, and coatings.
 - (3) Furnish and install new elevated concrete slab with handrail and stairs.
 - (4) Furnish and install new generator, lift station control panel, automatic transfer switch, electrical rack, electrical systems, instrumentation and control systems, and SCADA systems.
 - (5) Furnish and install new driveway and walkway paths, reclaimed water line to pump station.
 - (6) Furnish and install new flap gate located at the outfall structure.
 - b. Furnish and install security video camera and DVR system.
 - c. Complete miscellaneous work as directed by the Owner.

1.02 Sequence of Construction

1. Provide bypass pumping when the pump station cannot run in automatic mode due to the sequence of work. There are two areas of construction as follows:

- a. Work at the existing pump station.
 - b. Installation of the elevated concrete slab with electrical gear.
2. There is no limitation on the sequence of these main areas of construction and construction sequencing will be the responsibility of the contractor. However, to limit bypass pumping time, the elevated concrete slab with electrical gear should be constructed first to allow the pump station to continue to run on the existing pumps and controls. Once elevated slab is near completion with electrical rack, lift station control panel, and SCADA system; work should start in the existing pump station.

1.03 Coordination

1. Coordinate with Owner during construction of the project.
2. Coordinate with all permitting authorities, acquire inspections and meet permit requirements.
3. Coordinate with utility companies in connection with providing the various utility services to the project.

1.04 Special Procedures

1. The Contractor shall be responsible for the following:
 - a. Locating, before excavation, blocking and protecting, all underground utilities including pipelines, conduit, duct cables, tanks, etc.
 - b. Keeping a record of the locations of all valves, fittings, etc. which are installed as part of the work, or which are discovered

1.05 Disturbed Areas

1. Restore all areas disturbed by construction to a condition at least equal to the pre-construction condition including, but not limited to, all landscaping, driveways, roads, fences, traffic control devices, and other improvements. Maintain ingress and egress to all properties adjacent to the construction and minimize inconvenience to abutting property occupants.

1.06 Contractor's Superintendent

1. The Contractor shall have a superintendent on site at all times while work is being performed by the Contractor or subcontractor(s). The superintendent does not have to be on site during maintenance of the Contractor's equipment. The Contractor's superintendent shall have at least 5 years experience with this type of work and speak fluent English.

1.07 Storage and Protection

1. 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, vandalism, or other cause. Manufactured items shall be stored in a manner as recommended by the manufacturer.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

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SECTION 010500 REQUEST FOR INFORMATION (RFI) PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

1. Section Includes
 - a. Requests for Information (RFI) procedures.
2. Related Section
 - a. Section 007000 – General Conditions.
 - b. Applicable provisions of Division 1 shall govern all work under this Section.
3. Definitions
 - a. Drawing/Plan Clarification: Answer from Engineer, on behalf of Owner, in response to inquiry from Contractor, intended to make some requirement(s) of Drawings clearly understood. Drawing clarifications may be sketches, drawings, or in narrative form and will not change any requirements of Drawings. Responses to Contractor inquiries shall be as outlined in "Requests for Information" as specified herein.
 - b. Non-Conformance Notice: Notice issued by Engineer, on behalf of Owner, documenting that the Work or some portion thereof has not been performed in accordance with requirements of the Contract Documents. Payment shall not be made on any portion of the Work for which a Non-Conformance Notice has been issued and the Work not corrected to satisfaction of Engineer and Owner.

Upon receipt of Non-Conformance Notice, Contractor shall provide a written Response to Non-Conformance Notice within five (5) working days after receipt of Notice. Contractor response shall detail either (a) why they believe that the work was performed in accordance with the Contract Documents or (b) what corrective action they intend to take, at their sole expense, to correct non-conforming work.

If Contractor disputes issuance of Non-Conforming Notice, Engineer, on behalf of Owner, has five (5) working days to respond by either (a) withdrawing Non-Conformance Notice or (b) directing Contractor to correct such Work. Such determination by Engineer, on behalf of Owner, shall be final and conclusive.

- c. If directed to correct the Work, Contractor shall do so within five (5) working days after receipt of such direction from Engineer, on behalf of Owner, or such other time as may be agreed to.
- d. Project Communications: Routine written communications between Engineer, Owner, and Contractor which are in letter, field memo, or fax format. Such communications shall not be identified as Requests for Information nor shall they substitute for any other written requirement pursuant to the provisions of these Contract Documents.
- e. Requests for Information: Request from Contractor or subcontractor, to Engineer, on behalf of Owner, seeking interpretation or clarification of some requirement of the Contract Documents. Contractor shall clearly and concisely set forth issue for which it seeks clarification or interpretation and why a response is needed. Contractor shall, in written request, set forth its interpretation or understanding of Contract requirements with reasons why it has reached such an understanding.

PART 2 - PRODUCTS NOT USED

PART 3 - EXECUTION

3.01 REQUESTS FOR INFORMATION

1. If Contractor or subcontractor, at any tier, determines that some portion of Drawings, Specifications, or other Contract Documents requires clarification or interpretation, Contractor shall submit a Request for Information in writing. Only Prime Contractor shall submit Requests for Information and submitted on Request for Information form provided.
 - a. Contractor shall clearly and concisely set forth issue for which clarification or interpretation is sought and why a response is needed. In Request for Information, Contractor shall set forth an interpretation or understanding of requirement along with reasons why such an understanding was reached.
2. Engineer, on behalf of Owner, will review all Requests for Information to determine whether they are Requests for Information as defined in the Contract Documents. If it is determined that document is not an RFI, it will be returned to Contractor, un-reviewed as to content, for re-submittal on proper form in proper manner.
3. Responses to Requests for Information shall be issued within five (5) working days of receipt of request from Contractor, unless Engineer determines that a longer time is needed to provide an adequate response. If a longer time is deemed necessary by Engineer, then Engineer shall, within five (5) working days of receipt of request, notify Contractor of anticipated response time.

- a. If Contractor submits a Request for Information on an activity with five (5) working days or less of float on current project schedule, Contractor shall not be entitled to any time extension due to time it takes Engineer, on behalf of Owner, to respond to request provided that Engineer responds within five (5) working days set forth above.
4. Responses from Engineer, on behalf of Owner, will not change any requirements of the Contract Documents. In the event that Contractor believes response to a Request for Information will cause a change to requirements of the Contract Documents, Contractor shall immediately give written notice that Contractor considers response to be a Change Order. Failure to give such written notice immediately shall waive Contractor's right to seek additional time or cost under provisions set forth in the General Conditions.

END OF SECTION

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SECTION 011100 COORDINATION OF WORK, PERMITS, AND REGULATIONS

PART 1 - GENERAL

1.01 Description

This section generally describes the project and includes work sequence and schedule, Contractor's use of premises, Owner occupancy, maintenance and operation of existing facilities, permits, and regulations.

1.02 General Nature of Work

The intent of this project is to replace three existing submersible pumps and discharge piping with new pumps and piping; construct new elevated generator / electrical slab; provide and install new wetwell coating, new generator, new lift station control panel, new electrical rack, electrical and instrumentation systems, SCADA upgrades, and security system.

1.02.1 Location of Project Site

The project site is located at 2689 Lantern Lane, Naples, FL 34102.

1.04 Possible Sequence and Progress of Work

Per Specification Section 010100 – Summary of Work.

1.05 Maintenance and Operation of Existing Facilities

The pump station must be operational all the time during the construction of the project.

1.06 Permits

1. Obtain and pay the fees for the following permits:

Name or Type of Permit	Name and Telephone Number of Permitting Agency
City of Naples Building Permit	City of Naples
Dewatering Permit	Southwest Florida Water Management District

2. Contact the permitting agencies listed above for current fees associated with each permit.

PART 2 - MATERIALS

Not used

PART 3 - EXECUTION

Not used

END OF SECTION

SECTION 012000 MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 Payment

1. Work under this contract will be paid for on a unit price or lump sum basis as outlined on the Bid Proposal (Section 003000) for the quantity of work installed. The amount of payment will be as defined in the Standard form of Agreement between Owner and Contractor.
2. The quotations for the work are intended to establish a total price cost for completing the work in its entirety.
3. Additions, deletions, modifications or changes to the work as defined by this contract will be performed by change order according to the General Conditions and will be paid for on the basis of the Cost of the Work.

1.02 General

1. All work under this contract shall be included in the pay items listed on the Bid Proposal (Section 003000). Any items for which a specific pay item is not included shall be included in the price of the item to which it pertains or is associated. The items establish the value of work for determining partial and final payments. The Owner reserves the right to determine the value of partially completed work and when work is complete, in accordance with terms of the Contract.
2. 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 Owner.
3. The prices shall include all labor, materials, tools, equipment required to complete the work.
4. No additional payment will be made for well pointing or other methods of dewatering excavations.
5. Thrust blocks or mechanical restraints are not separate pay items.
6. Payment for repair and replacement of existing utilities will be included in the unit price or lump sum bid amount for the related new construction bid item.
7. Payment for lump sum items shall be on a percentage of completion of the particular item basis.

1.03 Partial Pay Request

1. The installation of pipe and fittings includes backfilling, compacting, hydrostatic testing, fine grading, property restoration, clean up, and placing the facilities in operation. When measurements of the amount of work constructed each month are made, for the purpose of partial payment, the following will be considered.
 - a. For unit price items, the Contractor shall be paid for the actual amount of work installed and accepted during the period of construction. After the Work is completed and before final payment is made, the Owner's Representative shall make final measurements to determine the actual quantities of the various items of work installed and accepted as the basis of final payment for the unit priced item less retained amounts.
 - b. For lump sum items, the Contractor shall be paid in accordance with the progress schedule and schedule of values on the basis of actual work installed and accepted until the work item is completed. Upon completion of the item, 100% of the lump sum price may be paid, less retained amounts.
 - c. Prior to submitting any Application for Payment, the Contractor's superintendent or other authorized representative of the Contractor shall meet with the Owner's Representative and determine the quantities of unit price and/or lump sum price work accomplished and/or completed during the period for which the Application for Payment is being submitted.
 - d. Once a month the Contractor will prepare and sign an Application for Payment, and submit the original and five (5) copies for review and signature of the Owner's Representative. These completed forms will provide the basis upon which payment will be made to the Contractor.
 - e. Payment to the Contractor will be made for the actual work completed and accepted in accordance with the Contract Documents.
 - f. No payment of any Application for Payment or of any retained percentage shall relieve the Contractor of his obligation to repair or replace any defective parts of the construction or to be responsible for all damage due to such defects during the construction period or the one-year correction period.
 - g. Partial payments shall be made monthly as the work progresses. All partial invoices and payment shall be subject to correction in the final Application for Payment.
 - h. No payment shall be made for materials delivered and not installed, unless specifically agreed upon by the Owner prior to delivery of such materials.

2. No less than 2% of the contract price shall be retained until the record drawings, specifications, addenda, modifications, and shop drawings are delivered and reviewed by the Engineer.
3. Mobilization and demobilization shall be paid at no more than a total of 5% of the subtotal of all other bid items.

1.04 Description of Pay Items- Base Bid

Described below is a brief summary of the work to be accomplished for the pay items in the Bid Form and the way to measure for payment purposes. Each pay item will include clean-up, testing, and placing in operation. The summary is not intended to describe all items in detail, but to clarify the items on which the price is to be based. The summary does not relieve the Contractor of his responsibility to supply all items complete. The Base Bid includes the following items:

1. Pump Station Improvements

Measurement and payment of the lump sum price shall be full compensation for furnishing all labor, materials, supplies and equipment for complete improvements and modifications of the pump station including all mobilization, demobilization, shop drawings and sample submittals, record drawing submittals, O&M Manual submittals, start-up and testing.

2. Security System with Camera

Measurement and payment of the lump sum price shall be full compensation for furnishing all labor, materials, equipment, and incidentals to furnish and install a new security system.

3. A subtotal for bid items 1 and 2 shall be calculated for the purposes of establishing an allowance.

4. Allowance for Additional Work as Specified by Owner

An allowance in the amount of 5% of bid items 1 and 2 has been established for additional work as directed by the Owner. The Contractor shall furnish all labor, materials, equipment, and incidentals to complete the additional work requested by the Owner or other changes approved by the Owner. The Owner is not obligated to utilize any of the funds allocated to this pay item. Proposals for allowance work shall be submitted to Engineer for approval prior to initiating work. Final invoices, and other supporting documentation shall be submitted for final payment of work.

END OF SECTION 012000

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SECTION 013000 ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

1. Section Includes:
 - a. Coordination and project conditions.
 - b. Preconstruction meeting.
 - c. Progress meetings.
 - d. Equipment electrical characteristics and components.
 - e. Cutting and patching.
 - f. Special procedures.
2. Related Sections:
 - a. Applicable provisions of Division 1 shall govern all work under this Section.

1.02 COORDINATION AND PROJECT CONDITIONS

1. Coordinate scheduling, submittals, and Work of various sections of Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
2. Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for operating equipment installation, connection, and start-up.
3. Coordinate space requirements, supports, and installation of mechanical and electrical Work indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
4. Coordinate completion and clean-up of Work of separate sections in preparation for Substantial Completion and for portions of Work designated for Owner's occupancy.

5. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.03 PRECONSTRUCTION MEETING

1. Owner will administer pre-construction conference for execution of Owner-Contractor Agreement and exchange of preliminary submittals, clarification of Owner and Contractor responsibilities in use of site and for review of administrative procedures.
2. Required attendance shall include representatives of the Contractor including the superintendent(s) designated for the project, representative of major subcontractors, resident project representative, and representatives of the Owner.

1.04 PROGRESS MEETINGS

1. Schedule and administer Project meetings throughout progress of the Work twice each month, called meetings, and pre-installation conferences.
2. Make physical arrangements for meetings, prepare agenda with copies for participants, preside at meetings, record minutes, and distribute copies within two (2) days to Owner, Engineer, participants, and those affected by decisions made at meetings.
3. Attendance: Job superintendent, major Subcontractors and suppliers, resident project representative, Owner and Engineer as appropriate to agenda topics for each meeting.
4. Suggested Agenda: Review of Work progress, work during next period, status of progress schedule and adjustments thereto, delivery schedules, submittals, maintenance of quality standards, pending changes and substitutions, and other items affecting progress of Work.

PART 2 - PRODUCTS

2.01 EQUIPMENT ELECTRICAL CHARACTERISTICS AND COMPONENTS

1. Motors: Specific motor type is specified in individual specification sections.
2. Wiring Terminations: Furnish terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Include lugs for terminal box.
3. Cord and Plug: Furnish minimum six (6) foot cord and plug including grounding connector for connection to electric wiring system. Cord of longer length is specified in individual specification sections.

PART 3 - EXECUTION

3.01 CUTTING AND PATCHING

1. Employ skilled and experienced installer to perform cutting and patching.
2. Submit written request in advance of cutting or altering elements affecting:
 - a. Structural integrity of element.
 - b. Integrity of weather-exposed or moisture-resistant elements.
 - c. Efficiency, maintenance, or safety of element.
 - d. Work of Owner.
3. Perform cutting, fitting, and patching ,including excavation and fill, to complete Work, and to:
 - a. Fit the several parts together, to integrate with other Work.
 - b. Remove and replace defective and non-conforming Work.
 - c. Remove samples of installed Work for testing.
 - d. Provide openings in elements of Work for penetrations of electrical Work.
4. Execute Work by methods to avoid damage to other Work, and to provide proper surfaces to receive patching and finishing.
5. Cut masonry and concrete materials using masonry saw or core drill.
6. Restore Work with new products in accordance with requirements of Contract Documents.
7. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.
8. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for assembly, refinish entire unit.
9. Identify hazardous substances or conditions exposed during the Work to Engineer for decision or remedy.

3.02 SPECIAL PROCEDURES

1. Materials: As specified in product sections; match existing with new products for patching and extending work.
2. Employ skilled and experienced installer to perform alteration work.

3. Cut, move, or remove items as necessary for access to alterations and renovation Work. Replace and restore at completion.
4. Remove unsuitable material not marked for salvage, including rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specified for finished Work.
5. Remove debris and abandoned items from area and from concealed spaces.
6. Remove, cut, and patch Work in manner to minimize damage and to permit restoring products and finishes to original condition.
7. Refinish existing visible surfaces to remain in renovated rooms and spaces, to specified condition for each material, with neat transition to adjacent finishes.
8. Where new Work abuts or aligns with existing, provide smooth and even transition. Patch Work to match existing adjacent Work in texture and appearance.
9. When finished surfaces are cut so that smooth transition with new Work is not possible, terminate existing surface along straight line at natural line of division and submit recommendation to Engineer for review.
10. Patch or replace portions of existing surfaces that are damaged, lifted, discolored, or showing other imperfections.
11. Finish surfaces as specified in individual product sections.

END OF SECTION

SECTION 013216 CONSTRUCTION PROGRESS SCHEDULES

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. Section includes administrative and procedural requirements for planning, monitoring and documenting the progress of construction during performance of the Work.
- B. Contractor shall prepare and submit to Engineer for review within 60 days after Notice to Proceed, a construction progress schedule.
- C. No work shall be done between the listed hours described in the general notes or legal holidays without written permission of Owner. However, emergency work may be done without prior permission.
- D. The Contractor has the obligation and responsibility at all times to plan and monitor all of its activities, anticipating and scheduling its staff, materials, plant and Work methods in a manner that is likely to ensure completion of the Work in accordance with the terms and conditions of the Contract and at a rate that will allow it to be completed within the Contract Time.

1.02 FORM OF SCHEDULES:

- A. Prepare schedules in form of a horizontal bar chart.
 - 1. Provide separate horizontal bar for each trade or operation.
 - 2. Horizontal Time Scale: Identify first work day of each week.
 - 3. Scale and spacing to allow space for notations and future revisions.
- B. Format of Listings: Chronological order of start of each item of work.
- C. Identification of Listings: By major specification section numbers.
- D. Computer scheduling software: Use Microsoft Project or Primavera operating system.

1.03 CONTENT OF SCHEDULES:

- A. Construction Progress Schedule:
 - 1. Show complete sequence of construction by activity.
 - 2. Show dates for beginning and completion of each major element of construction and installation dates for major items of equipment. Elements shall include, but not be limited to, the following:

- a. Shop drawing receipt from supplier/manufacturer submitted to Engineer, review and return to supplier/manufacturer.
- b. Material and equipment order, manufacturer, delivery, installation, and checkout.
- c. Performance tests and supervisory services activity.
- d. Piping, duct work, and wiring installation.
- e. Construction of various facilities.
- f. Concrete pour sequence.
- g. Structural steel erection.
- h. Precast concrete erection.
- i. Backfilling, grading, seeding, sodding, landscaping, fence construction, and paving.
- j. Electrical work activity.
- k. Heating, ventilating, and air conditioning work activity.
- l. Plumbing work activity.
- m. Sewer installation.
- n. Connection to existing sewers.
- o. Water main installation.
- p. Subcontractor's items of work.
- q. Functional Testing.
- r. Start-up.
- s. Commissioning.
- t. Performance testing.
- u. Training.
- v. Final cleanup.
- w. Allowance for inclement weather.

- x. Demolition.
 - y. Miscellaneous concrete placement.
3. Show projected percentage of completion for each item as of first day of each month.

1.04 SCHEDULE REVISIONS:

- A. Every 30 days Contractor shall revise construction schedule to reflect changes in progress of work.
- B. Indicate progress of each activity at date of submittal.
- C. Show changes occurring since previous submittal of schedule.
 - 1. Major changes in scope.
 - 2. Activities modified since previous submittal.
 - 3. Revised projections of progress and completion.
 - 4. Other identifiable changes.
- D. Provide a narrative report as needed to define:
 - 1. Problem areas, anticipated delays, and impact on schedule.
 - 2. Corrective action recommended and its effect.
 - 3. Effect of changes on schedules of other Contractors.
- E. Recovery Schedule:
 - 1. When periodic update indicates the Work is 14 or more calendar days behind the current accepted schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.
 - 2. If, at any time, the Work is behind schedule with respect to the progress schedule currently in force, and if the Engineer believes there is a risk of the Work not being completed within the Contract Time as a result of such delay, the Contractor shall take all necessary measures to make up for such delay either by increasing staff, plant or facilities, or by amending its Work methods, whichever is applicable, with no change to the Contract Price.

1.05 SUBMITTAL REQUIREMENTS:

- A. For initial submittal of construction schedule and subsequent revisions thereof, furnish six copies of schedule to Engineer.
- B. Format for Submittals: Submit required submittals in the following format:
 - 1. PDF electronic file.

1.06 CONTRACTOR'S LOOK-AHEAD SCHEDULES

- A. The Contractor shall provide short interval "look ahead" schedules bi-weekly, identifying Work that has been performed during the past two weeks and activities that are planned for the next four weeks. The short interval schedule shall be consistent with the progress schedule currently in force.
- B. The Look-Ahead Schedules shall generally reflect the Work associated with the Detailed Progress Schedule. The activities in the Look-Ahead Schedules shall be identified by the same number coding as the Detailed Progress Schedule and revised as necessary.
- C. The final format of the look-ahead schedules will be determined by the Engineer and Owner.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION

SECTION 013233 PRECONSTRUCTION DIGITAL AUDIO-VIDEO DOCUMENTATION

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes materials and performance for preconstruction digital audio-video documentation and generally defines Contractor's responsibilities, unless otherwise stated, for the following:

- A. Equipment.
- B. Submittals.
- C. Technique.
- D. Quality assurance.

1.02 VIDEO AND AUDIO QUALITY

- A. Documentation shall be performed by a responsible commercial firm skilled and regularly engaged in the preparation of preconstruction color audio-video DVD documentation acceptable to the Owner.
- B. Completed documentation shall reproduce bright, sharp pictures with accurate colors and shall be free from distortion 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.
- C. The Owner's Representative will accompany the commercial firm in performing the audio-video documentation. One person will accompany the commercial firm to observe the documentation effort. The accompanying personnel may direct the commercial firm to record certain features observed. Notify the Owner's Representative seven days in advance so that the accompanying personnel can be scheduled.
- D. Construction shall not proceed until the Owner and Owner's Representative have reviewed the documentation and notified the Contractor of its acceptability. It is anticipated that such review will be completed within 10 days after submittal.

1.03 MEASUREMENT AND PAYMENT

No separate payment item is provided for this work. The cost of performing this work shall be incorporated into lump sum for the work.

PART 2 - MATERIALS

2.01 RECORDING EQUIPMENT

Utilize a high-resolution digital video camera with extended still frame capability.

2.02 RECORDING MEDIA

Utilize new, color DVD having:

- A. High resolution.
- B. Extended still frame capability.
- C. American TV Standard DVD playback capability.

PART 3 - EXECUTION

3.01 COVERAGE

- A. Record coverage of surface features located in the construction's zone of influence including, but not limited to:
 - 1. Roadways, driveways, sidewalks, bicycle paths, and railroads.
 - 2. Buildings, walls, retaining walls, and seawalls.
 - 3. Ponds, culvert ends, and drainage structures.
 - 4. Landscaping, trees, shrubbery, fences, and irrigation heads.
- B. Record the individual features of each item with particular attention being focused upon the existence of any existing faults, fractures, or defects.
- C. Control pan rate, rate of travel, camera height, and zoom rate to maintain a steady clear view.
- 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 videotaping.

- B. Audio recording shall assist in viewer orientation and in any needed identification, clarification, or description of features being recorded.
- C. Audio recording shall only consist of camera operator commentary.

3.03 INDEXING

- A. Permanently label each DVD with a sequential 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 DVD is played.
- C. Prepare a written log which describes the contents of each DVD including:
 - 1. Names of streets or easements.
 - 2. Coverage begin/end station and location.
 - 3. Recording date.

3.04 CONDITIONS

- A. Record coverage during dry, clear weather and during daylight hours only.
- B. Record coverage when the area is free of debris or obstructions.
- C. Record coverage no more than 21 days prior to mobilization at the site.

END OF SECTION

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SECTION 013300 SUBMITTALS

PART 1 - GENERAL

1.01 Related Work Specified Elsewhere

1. CPM Construction Schedule Requirements: 013216.
2. Preconstruction audio-video documentation: 013233.
3. Operation and Maintenance Manuals: 019310.

1.02 Shop Drawings

1. Submit shop drawings in accordance with the General Conditions and Section 013300.
2. Submit shop drawings for equipment specified in the project manual and drawings.
3. The use of contract drawing reproductions for shop drawings is subject to rejection.
4. Submit six copies of shop drawings. The Owner's Representative will keep four copies and return two copies. If the Contractor desires more than two copies, he/she shall transfer the Owner's Representative's comments onto additional copies at his/her own expense. Clearly indicate the equipment tag or identification number, specification section, and drawing number to which each shop drawing is referenced.
5. If the Contractor submits shop drawings of equipment by manufacturers other than those listed in the specifications, provide the following information with the submittal:
 - a. The name and address of at least three companies or agencies that are currently using the equipment.
 - b. The name and telephone number of at least one person at each of the above companies or agencies whom the Owner's Representative may contact.
 - c. A description of the equipment that was installed at the above locations. The description shall be in sufficient detail to allow the Owner's Representative to compare it with the equipment that is proposed to be installed in this project.
6. For materials originating outside of the United States for which tests are required, provide recertification and retesting by an independent domestic testing laboratory.

1.03 Samples

1. Furnish samples of the various materials, together with the finish thereon, as specified for and intended to be used on or in the work. Send samples to the office of the Owner's Representative, carriage prepaid.
2. Submit samples before purchasing, fabricating, applying, or installing such materials and finishes.
3. Submit samples, other than field samples, in duplicate. A cover letter shall accompany the sample and shall list all items being transmitted, designating their particular usage and location in the project. One sample marked "Resubmittal Not Required" will be returned to the Contractor; rejected samples will not be returned.
4. Samples shall be submitted and resubmitted until acceptable. Materials, finishes, and workmanship in the completed project shall be equal in every respect to that of the samples so submitted and accepted.
5. Samples shall conform to materials, fixtures, equipment, surface textures, colors, etc., as required by drawings and specifications or as requested by the Owner's Representative.
6. Identify sample as to product, color, manufacturer, trade name, lot, style, model, etc., location of use, and contract document reference, as well as the names of the Contractor, supplier, project, and Owner's Representative.
7. Samples shall be 8 inches by 10 inches in size and shall be limited in thickness to a minimum consistent with sample presentation. In lieu thereof, submit the actual full-size item.
8. Samples of value may be returned to the Contractor for use in the project after review, analysis, comparison, and/or testing as may be required by the Owner's Representative.
9. Furnish one 8-inch by 10-inch sample of the finally reviewed materials, colors, or textures to the Owner's Representative for final record. Such material samples shall carry on the back all identification as previously described including, if paint sample, manufacturer, mix, proportion, name of color, building, Contractor, subcontractor, and surfaces to which applied.

1.04 Submittal Register

1. Designate in a submittal register/schedule, coordinated with the construction schedule and the CPM Schedule required in Section 013216, the date for submission and the date the reviewed shop drawings, product data, and samples will be needed. The submittal register shall be on 8-1/2-inch by 11-inch or 11-inch by 17-inch sheets in a format acceptable to the Owner's Representative. The submittal

register shall include the submittal description, specification section, date to be submitted, date reviewed, and date acceptable submittal is required.

1.05 Submittal Requirements

1. Make submittals promptly in accordance with the submittal register/schedule and in such sequence as to cause no delay in the work. Schedule submission a minimum of 30 calendar days before reviewed submittals will be needed.
2. Submittals shall contain:
 - a. The date of submission and the dates of any previous submissions.
 - b. The project title and number.
 - c. Contract identification.
 - d. The names of:
 - 1) Contractor.
 - 2) Supplier.
 - 3) Manufacturer.
 - e. Identification of the product, with the specification section number.
 - f. Field dimensions, clearly identified as such.
 - g. Relationship to adjacent or critical features of the work or materials.
 - h. Identification of deviations from contract documents.
 - i. Identification of revisions on resubmittals.
 - j. A 5-inch by 5-inch blank space for Engineer's stamps.
 - k. Contractor's stamp, initialed or signed, shall certify Contractor's review of submittal, verification of products, field measurements and field construction criteria, and coordination of the information within the submittal that the product meets the requirements of the work and of the contract documents.

1.06 Submittal Format

1. Each submittal shall have a transmittal form. A sample transmittal form is included at the end of this section. Every page in a submittal shall be numbered in sequence. Each copy of a submittal shall be collated and stapled or bound, as appropriate. Copies not collated will be rejected.

2. Where product data from a manufacturer is submitted, clearly mark which model is proposed, with all pertinent data, capacities, dimensions, clearances, diagrams, controls, connections, anchorage, and supports. Present a sufficient level of detail for assessment of compliance with the contract documents.
3. Each submittal shall be assigned a unique number. Submittals shall be numbered sequentially. The submittal numbers shall be clearly noted on the transmittal. Original submittals shall be assigned a numeric submittal number. Resubmittals shall bear an alphanumeric system which consists of the specification section number assigned to the original submittal for that item followed by a letter of the alphabet to represent that it is a subsequent submittal of the original. For example, if Submittal 25 requires a resubmittal, the first resubmittal will bear the designation "25-A" and the second resubmittal will bear the designation "25-B" and so on.
4. Disorganized submittals that do not meet the requirements above will be returned without review.

1.07 Resubmittals

1. Resubmittal of submittals will be reviewed and returned in the same review period as for the original submittal. It is considered reasonable that the Contractor shall make a complete and acceptable submittal by the second submission of a submittal item. The Owner's Representative reserves the right to withhold monies due to the Contractor to cover additional costs of any review beyond the second submittal.

1.08 Contractor's Jobsite Drawings

1. Provide and maintain on the jobsite one complete set of prints of all drawings which form a part of the contract. Immediately after each portion of the work is installed, indicate all deviations from the original design shown in the drawings either by additional sketches or ink thereon. Upon completion of the job, deliver this record set to the Owner's Representative.

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COPY:

RETURNED BY: _____
ENGINEER

DATE

END OF SECTION

SECTION 014210 GENERAL ABBREVIATIONS

PART 1 - GENERAL

1.01 General

Interpret abbreviations used in the drawings and in the specifications as tabulated below. If an abbreviation on a drawing is not explained below, it shall be as explained in ANSI Y1.1. The interpretation of abbreviations shall consider the context or discipline in which they are used, for example:

1. FF usually means "finish floor" when referring to a floor slab.
2. FF usually means "flat face" when referring to a pipe flange.

1.02 List of General Abbreviations

Abbreviation	Term
A	
A	Ampere/Area
AA	Aluminum Association
AABC	Associated Air Balance Council
AAMA	Architectural Aluminum Manufacturer's Association
AAS	Airport Advisory Service
AASHTO	American Association of State Highway and Transportation Officials
AATCC	American Association of Textile Chemists and Colorists
AB	Anchor Bolt/Aggregate Base
ABAN	Abandoned
ABC	Asphalt Base Course
ABS	Acrylonitrile-Butadiene-Styrene
ABT	About
AC	Acre/Asphaltic Concrete/Alternating Current/Air Conditioning
ACCU	Air Cooled Condensing Unit
ACGIH	American Conference of Governmental Industrial Hygienists
ACI	American Concrete Institute
ACP	Asbestos-Cement Pipe
ACU	Air Conditioning Unit
AD	Access Door

Abbreviation	Term
ADA	Americans with Disabilities Act
ADDL	Additional
ADJ	Adjacent
AE	Architect-Engineer
AF	Air Filter/Ampere Frame
AFB	Air Force Base
AFBMA	Anti-Friction Bearing Manufacturer's Association
AGA	American Gas Association
AGMA	American Gear Manufacturer's Association
AHD	Ahead
AHU	Air Handling Unit
AI	The Asphalt Institute
AIA	American Institute of Architects
AICS	Amperes Interrupting Capacity, Symmetrical
AIEE	American Institute of Electrical Engineers
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AL	Aluminum
ALIGN	Alignment
ALM	Alarm
ALTN	Alternate
AMB	Ambient
AMCA	Air Movement and Control Association
AMP	Ampere
ANCH	Anchor
ANG	Angle
ANSI	American National Standards Institute
API	American Petroleum Institute
APPROX	Approximate
APWA	American Public Works Association
ARCH	Architecture/Architectural
AREA	American Railway Engineering Association
ARI	Air Conditioning and Refrigeration Institute
ARV	Air-Release Valve

Abbreviation	Term
ARVV	Air-Release/Vacuum Valve
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASPH	Asphalt
ASSY	Assembly
ASTM	American Society of Testing and Materials
ATS	Automatic Transfer Switch
AVE	Avenue
AVG	Average
AWG	American Wire Gauge
AWPA	American Wood Preservers Association
AWPB	American Wood Preservers Bureau
AWS	American Welding Society
AWWA	American Water Works Association
B	
BB	Back-to-Back
BC	Beginning of Curve/Back of Curve/Bolt Circle
BCR	Begin Curb Return
BEG	Begin
BEP	Best Efficiency Point
BETW	Between
BF	Blind Flange
BHP	Brake Horsepower
BK	Back/Brake
BKR	Breaker
BL	Base Line
BLDG	Building
BLK	Block
BM	Bench Mark/Beam
BO	Blowoff
BOCA	Building Officials Code Administration International, Inc.
BOD	Biochemical Oxygen Demand

Abbreviation	Term
BOT	Bottom
BP	Baseplate
BR	Bronze/Branch
BRG	Bearing
BTN	Button
BTU	British Thermal Unit
BUR CBL	Buried Cable
BV	Butterfly Valve
BVC	Begin Vertical Curve
BW	Block Wall
C	
C	Conduit/Celsius
CAB	Crushed Aggregate Base
CANTIL	Cantilevered
CAP	Capacity
CATV	Cable Television
CB	Catch Basin/Circuit Breaker
CC	Cooling Coil
C-C	Center-to-Center
CCB	Concrete Block
CCP	Concrete Cylinder Pipe
CCS	Central Control Station
CCTV	Closed-Circuit Television
CD	Cross Drain/Condensate Drain/Ceiling Diffuser
CEM	Cement
CF	Cubic Feet/Curb Face
CFH	Cubic Feet Per Hour
CFM	Cubic Feet Per Minute
CFS	Cubic Feet Per Second
CG	Ceiling Grill
C & G	Curb and Gutter
CGA	Compressed Gas Association
CH	Chiller
CHG	Change

Abbreviation	Term
CHKD PL	Checkered Plate
CI	Cast Iron
CIP	Cast in Place/Cast-Iron Pipe
CIPP	Cured-in-Place Pipe
CISP	Cast- Iron Soil Pipe
CISPI	Cast-Iron Soil Pipe Institute
CJ	Construction Joint
CL	Centerline/Class/Clearance
CLR	Clear
CMAA	Crane Manufacturer's Association of America
CMC	Cement-Mortar Coated or Coating
CML	Cement-Mortar Lined or Lining
CMLCSP	Cement-Mortar Lined and Coated Steel Pipe
CMP	Corrugated Metal Pipe
CMPA	Corrugated Metal Pipe Arch
CMU	Concrete Masonry Unit
CO	Cleanout/Conduit Only
COL	Column
COMM	Communication
COMP	Composite
COMPL	Complete
CONC	Concrete
CONN	Connection
CONST	Construct or Construction
CONT	Continuous
CONTR	Contractor
COORD	Coordinate/Coordinated
COP	Copper
COR	Corner
CPLG	Coupling
CPU	Central Processing Unit
CRES	Corrosion-Resistant Steel
CRI	Carpet and Rug Institute
CRSI	Concrete Reinforcing Steel Institute

Abbreviation	Term
CS	Carbon Steel/Commercial Standard
CSP	Corrugated Steel Pipe
CT	Center Top/Current Transformer
CTG	Coating
CTR	Center
CTV	Cable Television
CULV	Culvert
CU YD, CY	Cubic Yard
CYL	Cylinder
D	
D	Degree of Curvature
DB	Direct Buried/Decibel
DBL	Double
DC	Direct Current
DEPT	Department
DET	Detail/Detour
DG	Decomposed Granite
DI	Drop Inlet/Ductile Iron
DIA	Diameter
DIAG	Diagonal
DIM	Dimension
DIMJ	Ductile-Iron Mechanical Joint
DIP	Ductile-Iron Pipe
DIPRA	Ductile-Iron Pipe Research Association
DISCH	Discharge
DIST	Distance
DIV	Divide/Division
DO	Dissolved Oxygen
DMH	Drop Manhole
DN	Down
DP	Differential Pressure
DPI	Differential Pressure Indicator
DPNL	Distribution Panel
DR	Drain/Door

Abbreviation	Term
DSL	Diesel
DWG	Drawing
DWY	Driveway
E	
E	East
EA	Each
EC	End of Curve
ECC	Eccentric
ECR	End of Curb Return
ED	External Distance
EDUC	Educator
EE	Each End
EF	Each Face/Exhaust Fan
EFF	Efficiency
EFL	Effluent
EG	Exhaust Grill
EGL	Energy Grade Line
EL	Elevation/Each Layer
E/L	Easement Line
ELEC	Electric
ELEV	Elevation
ELL	Elbow
ELP	Elliptical
EMB	Embankment
ENC	Encasement
ENCL	Enclosure
ENG	Engine
ENGR	Engineer
EOP	Edge of Pavement
EOS	Equivalent Opening Size
EOTW	Edge of Traveled Way
EP	Explosion Proof/Edge of Pavement
EPA	Environmental Protection Agency (Federal)
EPDM	Ethylene Propylene Diene Monomer

Abbreviation	Term
EPR	Ethylene-Propylene Rubber
EQ	Equation
EQL	Equal
ESMT	Easement
EST	Estimate or Estimated
ETC	And so Forth
ETM	Elapsed Time Meter
EVAP	Evaporator
EVC	End Vertical Curve
EW	Each Way
EWC	Electric Water Cooler
EXC	Excavate or Excavation
EXP	Expansion
EXST	Existing
EXT	Exterior/Extension
F	
F	Fahrenheit/Floor
FAA	Federal Aviation Administration
FAB	Fabricate
FBC	Florida Building Code
FBRBD	Fiberboard
FC	Foot-Candle
FCC	Filter Control Console
FCO	Floor Cleanout
FCV	Flow Control Valve
FD	Floor Drain
FDN	Foundation
FDOT	Florida Department of Transportation
FE	Flanged End
FF	Finished Floor/Flat Face
FG	Finished Grade
FHY	Fire Hydrant
F&I	Furnish and Install
FIG	Figure

Abbreviation	Term
FIN	Final
FIT	Fitting
FL	Floor/Flow Line
FLEX	Flexible/Flexure
FLG	Flange
FLT	Float
FLUOR	Fluorescent
FM	Force Main/Factory Mutual
FMH	Flexible Metal Hose
FNSH	Finish
FOC	Face of Concrete
FOS	Face of Stud
FPC	Flexible Pipe Coupling
FPM	Feet Per Minute
FPS	Feet Per Second
FPT	Female Pipe Thread
FRP	Fiberglass-Reinforced Plastic
FS	Finished Surface/Floor Sink/Federal Specifications
FSTNR	Fastener
FT	Feet or Foot
FTG	Footing
FUT	Future
FWY	Freeway
FX	Fire Extinguisher
G	
G	Gas
GA	Gauge
GAL	Gallon
GALV	Galvanized
GAS	Gasoline
GB	Grade Break
GDR	Guard Rail
GE	Grooved End
GEN	Generator

Abbreviation	Term
GENL	General
GFI	Ground Fault Interrupter
GM	Gas Main
GMAW	Gas Metal Arc Welding
GMT	Greenwich Mean Time
GND	Ground
GPD	Gallons Per Day
GPM	Gallons Per Minute
GR	Grade
GRTG	Grating
GSKT	Gasket
GUT	Gutter
GV	Gate Valve
GWB	Gypsum Wallboard
GWBX	Gypsum Wallboard, Fire Rated
GYP	Gypsum
H	
H	Humidistat
HARN	Harness
HB	Hose Bibb
HC	Heating Coil
HD	Heavy Duty
HDPE	High Density Polyethylene
HEPA	High Efficiency Particulate Air
HGL	Hydraulic Grade Line
HID	High Intensity Discharge
HOA	Hand-Off-Automatic
HOR	Hand-Off-Remote
HORIZ	Horizontal
HP	Horsepower/High Pressure
HPS	High Pressure Sodium
HPT	High Point
HR	Hour/Handrail
HS	High Strength

Abbreviation	Term
HT	Height
HTG	Heating
HTR	Heater
HV	Hose Valve
HVAC	Heating, Ventilating, and Air Conditioning
HVY	Heavy
HW	Headwall/Hot Water
HWL	High Water Level
HWY	Highway
HYDR	Hydraulic
HZ	Hertz (cycles per second)
I	
I	Intersection Angle
ICBO	International Conference of Building Officials
ID	Inside Diameter
IE	Invert Elevation
IEEE	Institute of Electrical and Electronics Engineers
IN	Inches
INCAND	Incandescent
INCL	Include
INL	Inlet
INS	Insulating
INSTL	Install or Installation
INTR	Interior/Intersection
INV	Invert
IP	Iron Pipe
IPS	Iron Pipe Size
IPT	Iron Pipe Thread
IRR	Irrigation
ISA	Instrument Society of America
J	
J	Joist
JB	Junction Box
JCT	Junction

Abbreviation	Term
JIC	Joint Industrial Council
JN	Join
JT	Joint
K	
KG	Kilogram
KM	Kilometer
KIPS	Thousands of Pounds
KV	Kilovolt
KVA	Kilovolt-Ampere
KW	Kilowatt
KWH	Kilowatt-Hour
KWHM	Kilowatt-Hour Meter
L	
L	Length of Curve/Long/Left
LATL	Lateral
LAV	Lavatory
LB	Pound
LBR	Lumber
LCL	Local
LF	Linear Foot
LG	Long
LGTH	Length
LI	Level Indicator
LLO	Long Leg Outstanding
LOC	Location/Locate
LONGIT	Longitudinal
LOS	Lockout Stop
LP	Light Pole
LPT	Low Point
LR	Long Radius
LS	Lift Station
LT	Left/Light
LTG	Lighting
LWC	Lightweight Concrete

Abbreviation	Term
LWIC	Lightweight Insulating Concrete
LWL	Low Water Level
M	
MA	Milliampere
MAG	Magnet/Magnetic
MATL	Material
MAX	Maximum
MB	Machine Bolt/Megabyte/Millibars
MBH	Thousand BTU Per Hour
MECH	Mechanical
MC	Metal Channel
MCC	Motor Control Center
MCM	Thousand Circular Mils
MCP	Motor Circuit Protector
MD	Motorized Damper
MFR	Manufacturer
MG	Million Gallons/Milligram
MGD	Million Gallons Per Day
MG/L	Milligrams Per Liter
MH	Manhole
MHZ	Megahertz
MI	Malleable Iron/Mile
MIL	Military Specifications
MIN	Minimum
MISC	Miscellaneous
MLSS	Mixed Liquor Suspended Solids
MLVSS	Mixed Liquor Volatile Suspended Solids
MJ	Mechanical Joint
MMA	Monorail Manufacturer's Association
MO	Motor Operator/Motor Operated/Masonry Opening
MOD	Modification
MON	Monument
MOT	Motor
MPT	Male Pipe Thread

Abbreviation	Term
MSL	Mean Sea Level
MSS	Manufacturer's Standardization Society
MTD	Mounted
N	
N	North/Neutral/Nitrogen
NA	Not Applicable
NAAMM	National Association of Architectural Metal Manufacturers
NBFU	National Board of Fire Underwriters
NBS	National Bureau of Standards
N & C	Nail and Cap
NC	Normally Closed
NDT	Nondestructive Testing
NE	Northeast
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFC	National Fire Code
NH	National Hose
NIC	Not in Contract
NIP	Nipple
NMTBA	National Machine Tool Builders Association
NO	Number/Normally Open
NOM	Nominal
NPT	National Pipe Taper
NRS	Nonrising Stem
NSF	National Sanitation Foundation
NTS	Not to Scale
NTU	Nephelometric Turbidity Unit
NW	Northwest
NWL	Normal Water Level
O	
OA	Overall/Outside Air
OC	On Center/Overcurrent
OD	Outside Diameter
ODP	Open Dripproof

Abbreviation	Term
OE	Or Equal
OF	Outside Face
OPER	Operator
OPNG	Opening
OPP	Opposite
ORIG	Original
OSA	Outside Air
OSHA	Occupational Safety and Health Administration
O TO O	Out to Out
OVFL	Overflow
OVHD	Overhead
P	
P	Pole
PARA	Paragraph
PB	Push Button/Pull Box
PC	Point of Curvature/Programmable Controller
PCA	Portland Cement Association
PCC	Point of Compound Curvature/Portland Cement Concrete
PDI	Plumbing and Drainage Institute
PE	Plain End/Polyethylene/Professional Engineer
PEN	Penetration
PERF	Perforated
PF	Power Factor
PG	Pressure Gauge
PI	Point of Intersection
PJTN	Projection
PKWY	Parkway
PL	Plate/Property Line
PLATF	Platform
PLC	Programmable Logic Controller
PLF	Pounds Per Lineal Foot
PNL	Panel
POB	Point of Beginning
POC	Point of Connection

Abbreviation	Term
POJ	Push-On Joint
PP	Power Pole/Polypropylene
PPB	Parts Per Billion
PPM	Parts Per Million
PR	Pair
PRC	Point of Reverse Curve
PRESS	Pressure
PRL	Parallel
PROV	Provisions
PRPSD	Proposed
PRVC	Point of Reverse Vertical Curve
PSI	Pounds Per Square Inch
PSIG	Pounds Per Square Inch Gauge
PSF	Pounds Per Square Foot
PSHL	Pressure Switch (High/Low)
PSL	Pressure Switch (Low)
PT	Point of Tangency
PV	Plug Valve
PVC	Polyvinyl Chloride
PVMT	Pavement
PWR	Power
Q	
Q	Flow Rate
QTY	Quantity
R	
R	Right/Radius
RAD	Radius/Radial
RAF	Return Air Fan
RAG	Return Air Grille
RC	Reinforced Concrete
RCB	Reinforced Concrete Box
RCP	Reinforced Concrete Pipe
RCPA	Reinforced Concrete Pipe Arch
RD	Road

Abbreviation	Term
RDC	Reduce
RDCR	Reducer
RDWY	Roadway
REF	Reference
REINF	Reinforce or Reinforced
RELOC	Relocated
REQ	Required/Requirement
REQD	Required
REV	Revise/Revision
RF	Raised Face
RH	Relative Humidity
RND	Round
RJ	Restrained Joint
RLG	Railing
RPM	Revolutions Per Minute
RR	Railroad
RST	Reinforcing Steel
RT	Right
RTD	Resistance Temperature Detector
RTU	Remote Terminal Unit
R/W	Right-of-Way
S	
S	South/Slope in Feet Per Foot/Sewer
SAE	Society of Automotive Engineers
SAN	Sanitary
SAR	Supply Air Register
SBCCI	Southern Building Codes Congress International
SC	Seal Coat
SCFM	Standard Cubic Feet Per Minute
SCHED	Schedule
SCR	Silicon-Controlled Rectifier/Selective Catalytic Reduction
SCRN	Screen
SD	Storm Drain
SDG	Siding

Abbreviation	Term
SDI	Steel Deck Institute
SDWK	Sidewalk
SE	Southeast
SECT	Section
SF	Square Feet
SGL	Single
SH	Sheet/Sheeting/Shielded
SIM	Similar
SLP	Slope
SLV	Sleeve
SM	Sheet Metal
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SMAW	Shielded Metal Arc Welding
SOL	Solenoid
SOV	Solenoid-Operated Valve
SP	Space/Steel Pipe/Static Pressure/Spare
SPCG	Spacing
SPEC	Specification
SPLC	Splice
SPRT	Support
SQ	Square
SQ FT	Square Feet
SR	Short Radius
SS	Sanitary Sewer
SSPC	Steel Structures Painting Council
SST	Stainless Steel
ST	Street
STA	Station
STBY	Standby
STC	Sound Transmission Class
STD	Standard
STK	Stake
STL	Steel
STR	Straight

Abbreviation	Term
STRL	Structural
STRUCT	Structure
STS	Storm Sewer
STGR	Stringer
STWY	Stairway
SURF	Surface
SW	Southwest
SWG	Swing
SWI	Steel Window Institute
SYMM	Symmetrical
SYS	System
T	
T	Ton/Tangent Length of Curve/Telephone
TAN	Tangent
T/B	Top of Beam
TB	Top of Bank/Terminal Board
T & B	Top and Bottom
TBG	Tubing
TBM	Temporary Bench Mark
TC	Top of Curb
TD	Time Delay
TDH	Total Dynamic Head
TDS	Total Dissolved Solids
TEFC	Totally Enclosed Fan Cooled
TEL	Telephone
TEMP	Temperature/Temporary
TENV	Totally Enclosed Nonventilated
THB	Thrust Block
THD	Thread or Threaded
THH	Thrust Harness
THK	Thick
TIG	Tungsten Inert Gas
TIR	Total Indicator Reading
TO	Turnout

Abbreviation	Term
T/O	Top of
TOC	Top of Concrete
TOS	Top of Slab/Top of Steel
TOT	Total
TP	Telephone Pole
TRD	Tread
TRA	Tie Rod Assembly
TS	Tube Steel
TV	Television
TYP	Typical
U	
UBC	Uniform Building Code
UD	Underdrain
UG	Underground
UH	Unit Heater
UHMW	Ultra High Molecular Weight
UL	Underwriters' Laboratories, Inc.
ULT	Ultimate
UNO	Unless Noted Otherwise
UPS	Uninterruptible Power Supply
UR	Urinal
USGS	United States Geological Survey
UTC	Underground Telephone Cable
UTR	Up Through Roof
UV	Ultraviolet
V	
V	Vent/Valve/Volt
VAC	Vacuum/Volts, Alternating Current
VC	Vertical Curve
VCP	Vitrified Clay Pipe
VEL	Velocity
VERT	Vertical
VFD	Variable Frequency Drive
VOL	Volume

Abbreviation	Term
VPC	Vertical Point of Curve
VPI	Vertical Point of Intersection
VPT	Vertical Point of Tangency
VSS	Volatile Suspended Solids
VTR	Vent Through Roof
W	
W	West/Watt/Wide/Water
W/	With
WC	Water Closet
WCO	Wall Cleanout
WG	Water Gauge
WH	Wall Hydrant
WL	Waterline
WLD	Welded
WM	Water Meter/Water Main
W/O	Without
WP	Waterproof/Working Point
WRGWB	Water-Resistant Gypsum Wallboard
WSE	Water Surface Elevation
WSP	Water Stop
WT	Weight
WTR	Water
WWF	Welded Wire Fabric (same as WWR)
WWM	Woven Wire Mesh (same as WWR)
WWR	Welded Wire Reinforcement
X	
XFMR	Transformer
XFR	Transfer
Y	
YCO	Yard Cleanout
YD	Yard
YP	Yield Point
YR	Year
YS	Yield Strength

Abbreviation	Term
<i>Z</i>	

END OF SECTION

SECTION 015070 TRAFFIC REGULATIONS

PART 1

1.01 Description

This section describes procedures for traffic regulation during construction in public streets and highways.

1.02 Standard Specifications

Wherever reference is made to the State Specifications and Plans, such reference shall mean the State of Florida, Department of Transportation, Design Standards, 2014 edition.

1.03 Submittals

The Contractor shall submit a traffic control plan for work proposed in the travel-ways. No work shall begin involving or requiring alternate traffic control until a traffic control plan is approved by the city.

1.04 General

1. Provide safe and continuous passage for pedestrian and vehicular traffic at all times.
2. Control traffic at those locations indicated and in conformance with the approved traffic control plans and specifications.
3. Furnish, construct, maintain, and remove detours, road closures, traffic signal equipment, lights, signs, barricades, fences, K-rail, flares, solar-powered flashing arrow signs, miscellaneous traffic devices, flagmen, drainage facilities, paving, and such other items and services as are necessary to adequately safeguard the public from hazard and inconvenience. All such work shall comply with the ordinances, directives, and regulations of authorities with jurisdiction over the public roads in which the construction takes place and over which detoured traffic is routed by the Contractor. After devices have been installed, maintain and keep them in good repair and working order until no longer required. Replace such devices that are lost or damaged, to such an extent as to require replacement, regardless of the cause of such loss or damage.
4. Prior to the start of construction operations, notify the police and fire department in whose jurisdiction the project lies, giving the expected starting date, completion date, and the names and telephone numbers of two responsible persons who may be contacted at any hour in the event of a condition requiring immediate emergency service to remove, install, relocate, and maintain warning devices. In the event these persons do not promptly respond or the authority deems it

necessary to call out other forces to accomplish emergency service, the Contractor will be held responsible for the cost of such emergency service.

5. Provide a minimum of 72 hours' notice to the City for any work which may affect signal loops, equipment, or devices. In the event that any underground utilities, traffic devices, pipes, or conduits are damaged and require emergency repair by the City, all costs incurred by the city in making such repairs, plus 15 for administration costs, shall be paid by the Contractor.
6. Post temporary "No Parking - Tow Away" signs 48 hours prior to work in areas where parking is normally permitted. The City Police Department shall be notified 48 hours prior to the posting of any temporary parking restrictions along the pipeline route.
7. Coordinate the relocation of public bus and school bus routes, bus stops, and trash collection services with the agencies listed on the plans in advance of construction activity.
8. Post the construction information signs along force main alignment at least two weeks prior to construction.
9. Notify each postal address at least two working days prior to restricting parking along the project route via first class United States mail of the nature and duration of the parking restriction.

1.05 Traffic Control Devices and Signs

1. Traffic control devices and temporary striping shall conform to the 2003 edition of the Manual of Uniform Traffic Control Devices (MUTCD). Construction signs shall conform to the latest edition of the FHA publication "Standard Highway Signs".
2. The placement of construction signing, striping, barricades, and other traffic control devices used for handling traffic and public convenience shall conform to the MUTCD and the State of Florida, Department of Transportation, Design Standards 2006.
3. Signs shall be illuminated when they are used during hours of darkness. Cones and portable delineators used for night lane closures shall have reflective sleeves. Equip barricades used in the diversion of traffic with flashers if in place during hours of darkness.
4. During the duration of a detour, cover existing signs not in accordance with the traffic control plan. Relocate existing signs that are in force to provide visibility from all relocated traffic lanes.

1.06 Vehicular Traffic Control

1. Accomplish construction in phases by detouring traffic from its normal patterns. Restore traffic to normal patterns in each phase before proceeding to the next phase.

1.07 Pedestrian Traffic Control

1. Maintain and delineate a minimum of one 4-foot-wide pedestrian walkway along each public street at all times during construction. Maintain existing pedestrian accesses at intersections at all times. When existing crosswalks are blocked by construction activity, install signs directing pedestrian traffic to the nearest alternative crosswalk.
2. Erect a fence or provide other means of securement to preclude unauthorized entry to any excavation during all nonworking hours on a 24-hour basis including weekends and holidays. Said fence shall be a minimum of 7 feet high around the entire excavation, consisting of a minimum 9-gauge chain-link type fence fabric and shall be sturdy enough to prohibit toppling by children or adults. There shall be no openings under the wire large enough for any child to crawl through. Lock any gates if no adult is in attendance. Place warning signs spaced on 50-foot centers on the outside of the fence with the statement "DEEP HOLE DANGER."

1.08 Access to Adjacent Properties

1. Maintain reasonable access from public streets to adjacent properties at all times during construction. Prior to restricting normal access from public streets to adjacent properties, notify each property owner or responsible person, informing him of the nature of the access restriction, the approximate duration of the restriction, and the best alternate access route for that particular property.
2. Special Considerations at Fire Stations: Do not hinder unobstructed ingress and egress at any time to fire stations.

1.09 Permanent Traffic Control Devices

1. Existing permanent traffic control signs, barricades, and devices shall remain in effective operation unless a substitute operation is arranged for and approved as a portion of vehicular traffic control above.
2. Maintain daily liaison with the Owner's Representative in regards to traffic control.
3. Contact the Owner's Representative 48 hours prior to work affecting traffic signal phasing or vehicular detection loops.
4. Completely restore traffic signals and signs affected by the construction of the pipeline to its original operation immediately upon completion of the work requiring the signal modification.

5. Traffic Control Detection Loops: Completely replace traffic control detection loops which are cut, removed, or otherwise disturbed for construction of the pipeline to the original position or as directed by the Owner's Representative immediately after the specific stage affecting loops is completed. Check new loops for continuity from the traffic signal cabinet to assure splicing and signal operation is correct.
6. Replace traffic signal conduits damaged to the nearest pull box, including new wire, back to the terminal, and/or back to the signal controller to the satisfaction of the owning agency before proceeding to the next construction stage. Splicing is not permitted. Report all such damage immediately to the Owner's Representative.
7. Restriping of Streets: Permanent restriping shall be in accordance with the requirements of the agencies having jurisdiction. Place and remove temporary striping required for traffic control during construction by sandblasting. Temporary striping includes any striping required on any pavement replaced prior to the final surface course. Replace any damaged or obliterated raised pavement markers in accordance with the standards of the agency having jurisdiction.

END OF SECTION

SECTION 015100 CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 – GENERAL

1.01 Construction Water

1. Related Work Specified Elsewhere:
 - a. Earthwork and Trenching: 312300
 - b. Concrete: 033000.
 - c. Pressure Testing of Piping: 400515.
2. The Contractor shall make his own arrangements for developing water sources and supply labor and equipment to collect, load, transport, and apply water as necessary for compaction of materials, concrete construction operations, testing, pipeline disinfection, dust control, and other construction use.
3. Develop sources of water supply or obtain water from private sources. Payment for 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.
4. 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.

1.02 Electrical Power--Construction Phase

1. Provide for the purchase of power or provide portable power for the construction of the project where existing outlets are not available. Provide for the extension of utility lines to the point of usage. 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.

1.03 Dust Control

Perform dust control operations to prevent construction operations from producing dust in amounts harmful to persons or causing a nuisance to persons living nearby or occupying buildings in the vicinity of the work. Use water or dust preventative to control dust.

1.04 Construction Solid Waste Disposal

Provide a roll-off container for construction debris for the duration of the construction contract.

1.05 Fire Danger

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.

1.06 Temporary Sanitary Facilities

1. Provide temporary toilet facilities separate from the job office. Maintain these during the entire period of construction under this Contract for the use of all construction personnel on the job. Provide enough chemical toilets to conveniently serve the needs of all personnel.
2. Chemical toilets and their maintenance shall meet the requirements of the State and local health regulations and ordinances. Any facilities or maintenance methods failing to meet these requirements shall be corrected immediately.

1.07 Construction Staking

The Contractor shall provide all construction staking for the Work.

1.08 Access Roads and Parking Areas

1. Access to project site is from Lantern Lane. Keep the existing parking spaces accessible at all times for the Owner and general public.
2. The Contractor and his employees will be permitted to park their vehicles on the Owner's property at the adjacent water plant. The Owner will designate a location for the Contractor and employee parking.

1.09 Security

Full time watchmen will not be required as a part of the contract, but the contractor shall inspect the area daily and take whatever measures are necessary to protect the safety of the public, workmen, materials, and provide for the site, both day and night.

1.10 Drainage, Erosion, Dust, and Mud Control

1. Provide Erosion and Sedimentation Control per State and Federal requirements.
2. Provide for the drainage of stormwater as may rain or flow onto or be discharged from the site in performance of the work. Drainage facilities shall be adequate to prevent damage to the work, the site, and adjacent property.

3. Existing drainage channels and conduits shall be cleaned, enlarged or supplemented as permitted by drainage control agencies to carry all runoff attributable to Contractor's operations. Dikes shall be constructed to divert runoff from entering adjacent property (except in natural channels), to protect County's facilities and the Work, and to direct water to drainage channels or conduits. Ponding shall be provided to prevent downstream flooding and waterway contamination.
4. Install silt barriers, turbidity curtains and screens for capturing sediments-solids from erosion and liquids from temporary pumping and dewatering activities.
5. Prevent erosion of soil on the site and adjacent property resulting from his construction activities. Effective measures shall be initiated prior to the commencement of clearing, grading, excavation, or other operation that will disturb the natural protection. Install silt barriers or screens for capturing sediments/solids from erosion and dewatering activities.
6. Work shall be scheduled to expose areas subject to erosion for the shortest possible time, and natural vegetation preserved to the greatest extent practicable. Temporary storage and construction buildings shall be located, and construction traffic routed, to minimize erosion. Temporary fast growing vegetation or other suitable ground cover shall be provided as necessary to control runoff.
7. Perform dust and mud control operations to prevent construction operations from producing dust and mud in amounts harmful to persons or causing a nuisance to persons living nearby or occupying buildings in the vicinity of the work. Use water or dust preventative to control dust during dry weather. Take necessary steps to prevent the tracking of mud onto adjacent streets and highways.

END OF SECTION

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SECTION 017000 CONTRACT CLOSEOUT

PART 1

1.01 Clean-Up Operations

1. Thoroughly clean the project site at the completion of the Work. Clean-up operations shall consist of the removal and legal disposal of all broken concrete, wood scraps, wire, packaging materials, forms, debris, scaffolds, and other objectionable rubble created during construction operations; cleaning of spilled mortar, concrete, and metalwork; and removal of all temporary manufacturer's labels from and washing of all equipment.
2. Remove excess dust and mud created by the construction project from all sidewalks, streets and highways.

1.02 Closeout Submittals

1. Upon completion of the project, or portions thereof, and prior to final payment, the Contractor shall transfer to the Owner all applicable items accumulated throughout construction. These include, but are not limited to, the following items:
 - a. Service manuals, installation instructions, and operation and maintenance manuals.
 - b. Spare parts and special tools ordered as part of this Contract.
 - c. Manufacturers' guarantees, bonds, and letters of coverage extending them beyond the time limitations of the Contractors' guarantee.
 - d. Salvaged materials or materials and equipment borrowed from the Owner.
 - e. Record documents of completed facilities.
 - f. All keys to all doors, gates, and equipment.
 - g. Statements from the manufacturer's representatives as called for in the Contract Documents.
 - h. Releases of lien. General release from Contractor plus copies of releases from subcontractors and material suppliers.
2. The closeout requirements of this section are in addition to the requirements of the Standard General Conditions and Supplementary Conditions.

END OF SECTION

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SECTION 017410 CLEANING DURING CONSTRUCTION AND FINAL CLEANING

PART 1 - GENERAL

1.01 General

1. This section includes cleaning during construction and final cleaning on completion of the work.
2. At all times maintain areas covered by the contract and adjacent properties and public access roads free from accumulations of waste, debris, and rubbish caused by construction operations.
3. Conduct cleaning and disposal operations to comply with local ordinances and antipollution laws. Do not burn or bury rubbish or waste materials on project site. Do not dispose of volatile wastes, such as mineral spirits, oil, or paint thinner, in storm or sanitary drains. Do not dispose of wastes into streams or waterways.
4. Use only cleaning materials recommended by manufacturer of surface to be cleaned.

1.02 Cleaning During Construction

1. During execution of work, clean site, adjacent properties, and public access roads and dispose of waste materials, debris, and rubbish to assure that buildings, grounds, and public properties are maintained free from accumulations of waste materials and rubbish.
2. Wet down dry materials and rubbish to lay dust and prevent blowing dust.
3. Provide containers for collection and disposal of waste materials, debris, and rubbish.
4. Cover or wet excavated material leaving and arriving at the site to prevent blowing dust. Clean the public access roads to the site of any material falling from the haul trucks.

1.03 Final Cleaning

1. At the completion of work and immediately prior to final inspection, clean the entire project site as follows.
2. Clean, sweep, wash, and polish all work and equipment including finishes.
3. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from sight-exposed interior and exterior finished surfaces; polish surfaces.
4. Repair, patch, and touch up marred surfaces to match adjacent surfaces.

5. Broom clean paved surfaces; rake clean landscaped areas.
6. Remove from the site temporary structures and materials, equipment, and appurtenances not required as a part of, or appurtenant to, the completed work.

END OF SECTION

SECTION 019310 OPERATION AND MAINTENANCE MANUALS

PART 1 - GENERAL

1.01 General

Submit six copies of all manufacturer's operation and maintenance manuals and data pertinent to equipment supplied for the project. Prepare and organize the material in three-ring binders with divider tabs and labels. Include a table of contents.

1.02 Submittals

1. Submittals shall include:
 - a. List of equipment furnished for project with name, address, and telephone number of each vendor.
 - b. List of serial numbers of equipment furnished.
 - c. A copy of shop drawings for mechanical, electrical, and instrument equipment in final form.
 - d. Manufacturer's operation and maintenance instructions and parts lists.
 - e. Tabulation of motor nameplate horsepower, nameplate current, field-measured current, overload relay setting, and catalog number for polyphase motors.
 - f. List of fuses, lamps, seals, and other expendable equipment and devices. Specify size, type, and ordering description. List name, address, e-mail address, fax number, and telephone number of vendor.
 - g. Submit a tabulation of maintenance schedules separate from the operation and maintenance manuals.
2. Provide manuals for each piece of equipment including individual components and subsystems of complete assemblies. Line out nonapplicable text and illustrations. The section of the manual on operation shall describe the functions and limitations of each component and its relationship to the system of which it is a part. Where several models, options, or styles are described, the manual shall identify the items actually provided.
3. Each manual shall contain the following:
 - a. Manufacturer's identification, including order number, model, and serial number.
 - b. Blue line prints or reviewed shop drawings and diagrams of all systems, including temperature control system.

- c. Certified equipment drawings or reviewed shop drawing data clearly marked for equipment furnished.
 - d. Complete operating and maintenance instructions for each and every item of equipment, setting forth in detail and step-by-step the procedure for starting, stopping, operating, and maintaining the entire system as installed. Include a schedule of recommended maintenance intervals.
 - e. Complete parts list of replaceable parts, their part numbers, and the name and address of their nearest vendor.
 - f. A complete valve tag list including the name and function of the pipe in which the valve is mounted.
 - g. Any special emergency operating instruction and a list of service organizations (including addresses and telephone numbers) capable of rendering emergency service to the various parts of the system.
 - h. Copy of manufacturer's equipment guarantees and warranties.
4. Brochures shall be loose leaf with durable plastic or fiberboard covers. Each sheet shall be reinforced to prevent tearing from continued use, and each brochure shall have the following information clearly printed on its cover:
- a. Project name, name of Owner, and address.
 - b. Name and address of Owner's Representative.
 - c. Name and addresses of contractors and subcontractors and department to contact.
 - d. Telephone number of contractors, including night and emergency numbers.
 - e. Major equipment vendors' names and telephone numbers.
5. Submit complete manuals at least four weeks before the date of the instructions required by the subsections on "Manufacturer's Services" in the various specification sections.
6. Operation and maintenance manuals specified herein are in addition to any operation, maintenance, or installation instructions required by the Contractor to install, test, and start up equipment.

1.03 Equipment Data Sheets

Provide six sets of equipment data sheets, bound in three-ring binders, summarizing the equipment manufacturer's maintenance instructions and recommendations. A blank data sheet and a sample data sheet are attached.

Preventive Maintenance and Operating Requirement Sheets

Preventive Maintenance Program	Equipment Record Number	
EQUIPMENT DESCRIPTION	ELECTRICAL OR MECHANICAL DATA	
Name:	Size:	
Serial No.:	Model:	
Vendor:		
Vendor Address:	Type:	
	Mfr.:	
Vendor Rep:	Voltage:	Amps:
Phone:	Phase:	rpm:
Maintenance Work to be Done	Frequency*	
OPERATING REQUIREMENTS AND REFERENCE		

*D - Daily; W - Weekly; B - Biweekly; M - Monthly; Q - Quarterly;
S - Semiannually; A - Annually.

SAMPLE

Preventive Maintenance and Operating Requirement Sheets

Preventive Maintenance Program	Equipment Record Number	
EQUIPMENT DESCRIPTION	ELECTRICAL OR MECHANICAL DATA	
Name: Influent Pump No. 1 Tag No.: P01-1	Size: 15 hp	
Serial No.: 123456ABC Vendor: ABC Pump Co.	Model: 140T Frame Serial No. 987654ZY Class F Insulation W/Space Heater	
Vendor Address: 1111 Pump Circle Newport Beach, CA 92663	Type:	
	Mfr.: DEF Motors, Inc.	
Vendor Rep: XYZ Equipment, Inc.	Voltage: 460	Amps: 20
Phone: 714/752-0505	Phase: 3	rpm: 1,800
Maintenance Work to be Done		Frequency*
1. Operate all valves and check such things as a) bearing temperature, b) changes in running sound, c) suction and discharge gauge readings, d) pump discharge rate, and e) general condition of the drive equipment.		D
2. Check packing.		D
3. Checking pumping unit for any dust, dirt, or debris.		W
(Continued on attached sheet)		
OPERATING REQUIREMENTS AND REFERENCE		
For manufacturer's instructions regarding installation, operation, maintenance, and trouble shooting of this equipment, see Volume ____, Section _____.		

*D - Daily; W - Weekly; B - Biweekly; M - Monthly; Q - Quarterly;
S - Semiannually; A - Annually.

SAMPLE

Preventive Maintenance and Operating Requirement Sheets

Preventive Maintenance Program	Equipment Record Number	
EQUIPMENT DESCRIPTION	ELECTRICAL OR MECHANICAL DATA	
Name:	Size:	
Serial No.:	Model:	
Vendor:		
Vendor Address:	Type:	
	Mfr.:	
Vendor Rep:	Voltage:	Amps:
Phone:	Phase:	rpm:
Maintenance Work to be Done		Frequency*
4. Lubricate bearing frame and motor bearings (consult manufacturer's instructions for type of grease or oil).		Q
5. Disassemble and change or repair the following: a) impeller, b) shafts, c) shaft sleeve, d) rotary seals, and e) sleeve bearings.		A
OPERATING REQUIREMENTS AND REFERENCE		

*D - Daily; W - Weekly; B - Biweekly; M - Monthly; Q - Quarterly;
S - Semiannually; A - Annually.

END OF SECTION

DIVISION 02 – EXISTING CONDITIONS

020120 Protecting Existing Underground Utilities
024100 Equipment, Piping, and Materials Demolition

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SECTION 020120 PROTECTING EXISTING UNDERGROUND UTILITIES

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes materials and procedures for protecting existing underground utilities.

PART 2 - MATERIALS

2.01 REPLACEMENT IN KIND

Except as indicated below or as specifically authorized by the Owner's Representative, reconstruct utilities with new material of the same size, type, and quality as that removed.

2.02 VITRIFIED CLAY SEWER PIPE AND COUPLINGS

For sewer pipe 8 inches and less in diameter, replacement shall consist of plain-end pipe conforming to ASTM C700. Compression couplings shall conform to ASTM C594, band seal couplings or equal. Use at least two lengths of pipe in crossing the trench section or as shown on the details in the drawings.

PART 3 - EXECUTION

3.01 GENERAL

- 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 Owner'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. **Cut and Plug Ends:** Cut abandoned utility lines and plug the ends. Plug storm drains and sewers with an 8-inch wall of brick and mortar. Cap waterlines with a cast-iron cap or install a 3-foot-long concrete plug. Dispose of the cut pipe as unsuitable material.
- C. **Remove and Reconstruct:** Where so indicated in the drawings or as required by the Owner's Representative, remove the utility and, after passage, reconstruct it with new materials. Provide temporary service for the disconnected utility.

3.03 COMPACTION

- 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.
- C. **Alternative Construction--Sand-Cement Slurry:** Sand-cement slurry consisting of one sack (94 pounds) of portland cement per cubic yard of sand and sufficient moisture for workability may be substituted for other backfill materials to aid in reducing compaction difficulties. Submit specific methods and procedures for the review of the Owner's Representative prior to construction.

3.04 SPECIAL CONSTRUCTION

- A. **Reinforced Concrete Beam:** Where indicated in the drawings or as determined by the Owner's Representative, support utilities by a reinforced concrete beam as shown on the utility support details in the drawings. The primary purpose of the beam is to prevent settlement of the utility line after construction. The Contractor is responsible for the protection of the utility during construction and shall incorporate the beam as part of the protection.
- B. **Concrete Support Wall:** Where indicated in the drawings or as determined by the Owner's Representative, support the utilities by a concrete support wall as shown on the utility support details in the drawings. The purpose of the concrete support wall is to prevent settlement of the utility line after construction. The Contractor is responsible for the protection of the utility during construction.

3.05 THRUST BLOCKS ON WATERLINES

- A. The Contractor's attention is called to thrust blocks for waterlines throughout the project whose thrust is in the direction of the new excavation and, therefore, may be affected by the construction. These waterlines are owned and operated by the Owner. Protect thrust

blocks in place or shore to resist the thrust by a means approved by the Owner's water division superintendent and reconstruct. If the thrust blocks are exposed or rendered to be ineffective in the opinion of the Owner's Representative, reconstruct them to bear against firm unexcavated or backfill material.

- B. Provide firm support by backfilling that portion of the trench for a distance of 2 feet on each side of the thrust block to be reconstructed from the pipe bedding to the pavement subgrade, with either:
 - 1. Sand-cement slurry (94 pounds of cement per cubic yard).
 - 2. The native material compacted to a relative compaction of 95%.
- C. Then excavate the backfill material for construction of the thrust block.
- D. Test compaction of the backfill material before pouring any concrete thrust block. Use Class A concrete per Section 033000 for reconstruction.

END OF SECTION

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SECTION 024100 - EQUIPMENT, PIPING, AND MATERIALS DEMOLITION

PART 1 - GENERAL

1.01 DESCRIPTION

This section describes demolition and removal, replacement of existing process and mechanical and electrical equipment and piping.

PART 2 - MATERIALS

Refer to other sections of these specifications for material to be used as replacements for removal or abandoned equipment.

PART 3 - EXECUTION

3.01 GENERAL

Perform removal, replacement, and demolition work specified and indicated in the drawings. Prepare remaining surfaces to receive new scheduled and specified materials and finishes or finish to match adjacent surfaces if no additional work is scheduled or indicated.

3.02 SALVAGE

The City shall have the option to salvage all equipment. Equipment salvaged from the premises is the property of the Owner. Carefully remove and handle the equipment. Leave the property free of debris and material. All equipment identified by the City to be salvaged shall be stockpiled at City's Riverside Circle yard. Remaining materials to be removed shall be disposed of by Contractor.

3.03 SHUTDOWNS OF EXISTING PIPING AND ELECTRICAL UTILITIES

Shut off or disconnect utilities affecting demolition work. Schedule shutdowns with the Owner; notify the Owner three working days in advance of any shutdown that is required to perform the work.

3.04 TEMPORARY SUPPORT OF EXISTING EXPOSED PIPING

- A. Provide temporary supports for existing piping that must be kept in service during demolition of adjacent piping or other existing work in the project. Do not block access to the adjacent valves, equipment, or access door and stairways with the temporary supports.

3.05 PLUGGING ABANDONED PIPING

Plug buried pipes 6 inches and larger to be abandoned. Plug pipes of all sizes to be abandoned under structures. Plug by placing a 3-foot-long concrete plug in the open ends.

3.06 REMOVAL OR RELOCATION OF ELECTRICAL MATERIALS AND EQUIPMENT

- A. Unless otherwise noted, remove existing electrical materials and equipment from areas indicated for demolition or where equipment is to be relocated. Disconnect circuits at their source. Remove materials no longer used, such as studs, straps, and conduits. Remove or cut off concealed or embedded conduit, boxes, or other materials and equipment to a point at least 3/4 inch below the final finished surface. Remove existing unused wires.
- B. Repair affected surfaces to conform to the type, quality, and finish of the surrounding surface.

3.07 ELECTRICAL DISCHARGE LIGHTING BALLASTS

- A. Electrical discharge lighting ballasts manufactured before 1974 that will be removed under this contract contain polychlorinated biphenyls (PCBs).
- B. Electrical discharge lighting ballasts manufactured after 1973 may contain PCBs.
- C. It is the Contractor's responsibility to identify the presence of PCBs and to dispose of them in compliance with all local, state, and federal laws, regulations, and ordinances.

3.08 TRANSFORMERS AND OTHER ELECTRICAL APPARATUS

Transformers, switches, capacitors, resistors, and/or other liquid-filled electrical apparatus that will be removed under this contract may contain PCBs. It is the Contractor's responsibility to identify the presence of PCBs and to dispose of them in compliance with all local, state, and federal laws, regulations, and ordinances.

3.09 PATCHING

- A. Patching shall mean the restoration of a surface or item to a condition as near as practicable to match the existing adjoining surfaces unless otherwise noted, detailed, or specified.
- B. When patching involves painting, special coating, vinyl fabric, or other applied finish, refinish the entire surface plane (i.e., wall or ceiling), unless complete refinishing of the entire space is scheduled or specified.
- C. Patching includes cleaning of soiled surfaces.

3.10 DEMOLITION

- A. Existing buildings, structures, boxes, pipes, pavements, curbs, and other items are to be removed, altered, salvaged, and disposed of as specified herein or indicated in the drawings. Remove and dispose of all portions of these items that interfere with project construction.
- B. Remove and dispose offsite facilities to be demolished in their entirety including belowground footings, foundations, and other associated appurtenances, as shown in the drawings or as specified herein. Backfill and compact all site areas disturbed by demolition work with earth backfill or gravel material in accordance with Section 312300.
- C. Perform the work in a manner that will not damage parts of the structure not intended to be removed or to be salvaged for the Owner. If, in the opinion of the Owner's Representative, the method of demolition used may endanger or damage parts of the structure or affect the satisfactory operation of the facilities, promptly change the method when so notified by the Owner's Representative. No blasting will be permitted.
- D. Equipment, material, and piping, except as specified to be salvaged for the Owner, or removed by others, within the limits of the demolition, excavations, and backfills, will become the property of the Contractor and shall be removed from the project site. The salvage value of this equipment, materials, and piping shall be reflected in the contract price of the demolition work.
- E. Do not reuse material salvaged from demolition work on this project, except as specifically shown.

END OF SECTION

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DIVISION 03 – CONCRETE

031110	Concrete Formwork
032100	Concrete Reinforcement
033000	Cast-In-Place Concrete
033500	Concrete Finishes and Floor Treatment
036000	Grout

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SECTION 031110 CONCRETE FORMWORK

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. Design and furnish materials for formwork and shoring for cast-in-place concrete as indicated and in compliance with Contract Documents.

1.02 REFERENCES:

- A. American Concrete Institute (ACI):
 1. 117/117R: Standard Tolerances for Concrete Construction and Materials.
 2. 309.2R: Identification and Control of Visible Effects of Consolidation on Formed Concrete Surfaces.
 3. 318/318R: Building Code Requirements for Structural Concrete and Commentary.
 4. 347: Guide to Formwork for Concrete.

1.03 DESIGN REQUIREMENTS:

- A. Design formwork in conformance with methodology of ACI 347R for anticipated loads, lateral pressures, depth of concrete placement and rate of concrete placement. Design shall consider any special requirements due to the use of self-consolidating, plasticized and/or retarded set concrete.

1.04 QUALIFICATIONS:

- A. Formwork and shoring design shall be by an engineer licensed in the State of Florida.

1.05 SUBMITTALS:

- A. Submit product data for form ties, spreaders, chamfer strips, form coatings, and bond breakers.

1.06 QUALITY ASSURANCE:

- A. Design of Formwork:
 1. Formwork shall be designed to be readily removable without impact, shock, or damage to 'green' concrete surfaces and adjacent materials.
- B. Unless otherwise specified herein, formwork shall be constructed so that the concrete surfaces will conform to the tolerance limits as given in ACI 117.

- C. Materials, fabrications and workmanship found defective shall be promptly removed and replaced and new acceptable work shall be provided in accordance with Contract requirements at no additional cost to the owner.

1.07 DELIVERY, STORAGE AND HANDLING:

- A. Materials shall be delivered to the site in an undamaged condition.
- B. Material shall be stored and protected in a clean, properly drained location. Material shall be kept off the ground under a weather-tight covering permitting good air circulation. Formwork materials shall be stored on dry wood sleepers, pallets, platforms or other appropriate supports which have slope for positive drainage. Materials shall be protected from distortion, excessive stresses, corrosion and other damage. Materials shall not be stored on the structure in a manner that might cause distortion or damage to the supporting structure.

PART 2 - PRODUCTS

2.01 LUMBER:

- A. Lumber used in form construction shall be Douglas fir, No. 2 grade, S4S, Standard Grading and Dressing Rules No. 16, West Coast Lumber Inspection Bureau or Southern Yellow Pine, No. 2, S4S, Standard Grade Rules Southern Pine Inspection Bureau. Boards shall be 6 inches or more in width.
- B. Do not use boards on exposed concrete surfaces.

2.02 PLYWOOD:

- A. Only grade-marked plywood conforming to APA shall be provided.
- B. Plywood used in form construction shall be Grade B-B, Class 1 plyform, mill-oiled, and sanded on both sides in conformance with U.S. Product Standard PS 1 Structural Plywood.
- C. Thickness shall be sized to maintain alignment and surface smoothness, but not less than 5/8-inch thick.

2.03 STEEL FORMS:

- A. Commercial grade sheets not less than 16 gage shall be provided.
- B. Stock material that is free from warps, bends, kinks, cracks, and rust or other matter that could stain the concrete shall be provided.

2.04 FORM MATERIAL:

- A. Plywood, hard plastic finished plywood, overlaid waterproof particleboard, or steel in new and undamaged condition, of sufficient strength and surface smoothness to produce specified finish.
- B. Rustication Grooves and Chamfer Strips: Nonabsorbent material, compatible with form surface, fully sealed on all sides prohibiting loss of paste or water between the two surfaces.

2.05 FORM TIES:

- A. Locate form ties on exposed surfaces in a uniform pattern. Place form ties so they remain embedded in the concrete except for a removable portion at each end. Form ties shall have conical or spherical type inserts. Ties shall be removed minimum 1 inch from formed surface. Ties shall withstand all pressures and maintain forms within acceptable deflection limits.
- B. Provide plastic cone snap ties or other approved device.
- C. Wire ties are not permitted.

2.06 BOND BREAKER:

- A. Bond breaker shall be a V.O.C.-compliant nonstaining type that will provide a positive bond prevention.
- B. Manufacturers:
 - 1. Edoco Burke; Clean Lift 90 W.B..
 - 2. Nox-Crete, Inc.; Silcoseal 97EC.

2.07 FORM CAULKING:

- A. Form caulking shall be a one-component, gun-grade silicone sealant that is capable of producing flush, watertight and non-absorbent surfaces and joints. Sealant shall be compatible with the type of forming material and concrete ingredients used.
- B. Products:
 - 1. Series 1200 Construction Caulking; GE Silicones, Waterford, NY.
 - 2. Dow Corning 999-A; Dow Corning Co., Midland, MI.

2.08 CHAMFER STRIPS:

- A. Provide 3/4 inch by 3/4-inch chamfer strips milled from clear, straight-grain pine, surfaced each side, or having extruded vinyl type.

2.09 INSERTS:

- A. Provide galvanized cast steel or galvanized welded steel inserts, complete with anchors to concrete and fittings such as bolts, wedges and straps.

2.10 FORM RELEASE AGENT:

- A. Form release agent shall not bond with, stain, or adversely affect concrete surfaces and shall not impair subsequent treatments of concrete surfaces when applied to forms. A ready-to-use water-based material formulated to reduce or eliminate surface imperfections and containing no mineral oil or organic solvents.

- B. Manufacturers and Products:

1. BASF, Shakopee, MN; MBT, Rheofinish 211.
2. Cresset Chemical Company; Crete-Lease 20-VOC.
3. Unitex Chemicals; Farm Fresh.
4. Magic Kote: Symons Corporation, Des Plaines, IL

PART 3 - EXECUTION

3.01 FORM TOLERANCES:

- A. Comply with the requirements of ACI 117 for tolerances for formed surfaces.
- B. Failure of the forms to produce the specified concrete surface and surface tolerance shall be grounds for rejection of the concrete work. Rejected work shall be repaired or replaced at no additional cost to the Owner.

3.02 PREPARATION:

- A. Clean form surfaces to be in contact with concrete or foreign material prior to installation. Tape, gasket, plug, and/or caulk joints, gaps, and apertures in forms so that the joint will remain watertight and withstand placing pressures without bulging outward or creating surface irregularities.
- B. Coat form surfaces in contact with concrete with a form release agent prior to form installation.
- C. Keep form coatings off steel reinforcement, items to be embedded, and previously placed concrete.
- D. Apply form release agent to steel forms as soon as they are cleaned to prevent discoloration of concrete from rust.

3.03 ERECTION AND INSTALLATION:

- A. Forms shall be constructed in accordance with ACI 347 to required dimensions, plumb, straight and mortar tight, and all joints and seams shall be made mortar-tight. Forms shall be substantial, properly braced, and tied together to maintain position and shape and to resist all pressures to which they may be subject. Unless otherwise indicated on the Contract Documents, formwork shall be constructed so that the concrete surfaces will conform to the tolerance limits in ACI 117 and herein specified.
- B. Provide means for holding adjacent edges and ends of form panels tight and in accurate alignment to prevent the formation of ridges, fins, offsets, or similar surface defects in the finished concrete. Forms shall be tight and shall prevent the loss of mortar and fines during placing and vibration of concrete.
- C. Provide 3/4 inch chamfer on external corners of exposed concrete.
- D. Provide means for removing forms without damage to the surface of finished concrete.
- E. Do not embed any form-tying device or part thereof other than metal in the concrete.
- F. Use only form or form-tying methods that do not cause spalling of the concrete upon form stripping or tie removal.
- G. Set anchor bolts and other embedded items accurately before placing concrete and hold securely in position until the concrete is placed and set.

3.04 PROTECTION:

- A. During installation, the forms shall not be used as a storage platform nor as a working platform until the forms have been permanently fastened in position.

3.05 REMOVAL OF FORMS:

- A. Forms shall be removed in accordance with ACI 347 recommendations without damage to concrete and in a manner to ensure complete safety to the structure. Forms, form ties and bracing shall not be removed without specific permission of the Contractor's Registered Professional Engineer.
- B. The following table indicates the minimum allowable time after the last cast concrete is placed before forms, shoring, or wall bracing may be removed; during which the air surrounding the concrete is above 50 degrees F.

Table 03100-2	
Sides of footings and encasements	24 hours
Walls	48 hours

- C. Removal times will be increased if the concrete temperature following placement is permitted to drop below 50 degrees F.

END OF SECTION

SECTION 032100 CONCRETE REINFORCING

PART 1 - GENERAL

1.01 DESCRIPTION:

Provide concrete reinforcement as indicated and in compliance with Contract Documents:

1. Section Includes:
 - a. Reinforcement bars.
 - b. Welded wire reinforcement.
 - c. Reinforcement accessories.

1.02 REFERENCES:

A. American Society for Testing and Materials International (ASTM):

1. A82: Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
2. A184: Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
3. A1064/A1064M: Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
4. A496: Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement.
5. A497: Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete Reinforcement.
6. A615: Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
7. A616: Standard Specification for Rail-Steel Deformed and Plain Bars for Concrete Reinforcement.
8. A617: Standard Specification for Axle-Steel Deformed and Plain Bars for Concrete Reinforcement.
9. A706: Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.

10. A767: Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.

B. American Concrete Institute (ACI):

1. 301: Standard Specification for Structural Concrete.
2. 315: Details and Detailing of Concrete Reinforcement.
3. 318: Building Code Requirements for Structural Concrete.
4. SP-66: ACI Detailing Manual.
5. Concrete Reinforcing Steel Institute (CRSI):
6. Manual of Standard Practice.
7. Placing Reinforcing Bars.

C. Where reference is made to one of the above standards, the version in effect at the time of bid opening shall apply.

1.03 SUBMITTALS:

A. Each submittal shall include reinforcement only for the individual structure to which it pertains.

B. Shop Drawings:

1. Submit bar lists and placing drawings for all reinforced concrete structures in accordance with Section 013300.
2. Detail reinforcement in conformance with ACI SP-66.
3. Clearly indicate bar sizes, spacings, locations and quantities of reinforcement steel and wire reinforcement, bending schedules, and supporting and spacing devices. Show joints, with applicable joint reinforcement.
4. Coordinate bar splicing and placement with Contractor's concrete placing schedule and joint locations. Do not add or delete joints without permission from the Engineer.
5. Show location and size of all penetrations greater than 12-inches in diameter or least dimension of the opening with the corresponding added reinforcement around the penetrations.
6. Clearly show marking for each reinforcement item.
7. Indicate locations of reinforcement bar cut-offs, splices and development lengths.

1.04 QUALITY ASSURANCE:

- A. Do not fabricate reinforcement until shop and placement drawings have been reviewed and accepted by the Engineer.
- B. Perform concrete reinforcement work in accordance with CRSI Manual of Practice.

1.05 INSPECTION AND TESTING:

- A. In no case shall any reinforcement steel be covered with concrete until the installation of the reinforcement has been observed by the Engineer and the Engineer's authorization to proceed with the concreting has been obtained. The Engineer shall be given 48 hours minimum prior notice of the readiness of placed reinforcement for observation. The forms shall be kept open until the Engineer has finished observations of the reinforcement steel.

1.06 DELIVERY STORAGE AND HANDLING:

- A. Keep reinforcement steel free from mill scale, rust, dirt, grease or other foreign matter.
- B. Ship and store reinforcement steel with bars of the same size and shape fastened in bundles with durable tags, marked in a legible manner with waterproof markings showing the same "mark" designations as those shown on the submitted placing drawings.
- C. Store reinforcement steel off the ground, protected from moisture and kept free from dirt, oil or other injurious contaminants.

PART 2 - PRODUCTS

2.01 REINFORCEMENT STEEL:

- A. Reinforcement Steel: ASTM A615, 60 ksi yield grade.
- B. Welded Wire Reinforcement:
 - 1. Provide welded wire reinforcement conforming to ASTM A1064 in flat sheets
 - 2. Provide support bars and reinforcement bar supports as specified herein to obtain the concrete cover indicated.
 - 3. Unless otherwise noted, welded wire reinforcement shall be 6x6-W2.9xW2.9.

2.02 ACCESSORY MATERIALS:

- A. Tie Wire: Minimum 16 gage annealed type.

- B. Chairs, Bolsters, Bar Supports, and Spacers: sized and shaped for strength and support of reinforcement during concrete placement including load bearing pad on bottom of base slabs and slabs on grade to prevent puncturing the vapor retarder.
- C. Special Chairs, Bolsters, Bar Supports, and Spacers Adjacent to Weather Exposed Concrete Surfaces: plastic coated steel.
- D. Provide 3-inch by 3-inch plain precast concrete blocks for support of bottom reinforcement in foundation mats. Provide block thickness to produce concrete cover of reinforcement as indicated.
- E. Provide epoxy adhesive for grouting reinforcement dowel bars into existing concrete.

2.03 FABRICATION:

- A. Fabricate concrete reinforcement in accordance with CRSI Manual of Standard Practice.
- B. Locate reinforcement splices not indicated on Drawings, at point of minimum stress.
- C. Cold bend bars. Do not straighten or rebend bars.
- D. Do not heat reinforcement steel to bend or straighten.
- E. Bend bars around a revolving collar having a diameter of not less than that recommended by the ACI 318.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position. Place reinforcement a minimum of 2 inches clear of any metal pipe or fittings.
- B. Tack welding of reinforcement is prohibited.
- C. Welding of reinforcing bars is not permitted.
- D. Do not displace or damage vapor retarder.
- E. Position dowels accurately. Rigidly support, align and securely tie dowels normal to the concrete surface before concrete placement. Setting dowels into wet concrete is prohibited.
- F. Position wall dowels projecting from base slabs on grade with templates or guides held in place above the concrete placement line. Position the templates to obtain the required clearance between the dowels and the face of the walls.

- G. Bars additional to those indicated that may be found necessary or desirable by the Contractor for the purpose of securing reinforcement in position shall be provided by the Contractor at no additional cost to the Owner.
- H. Provide additional reinforcement bars to support top reinforcement in slabs. Do not shift reinforcement bars from positions in upper layers to positions in lower layers as a substitute for additional support bars.
- I. Support reinforcement steel in accordance with CRSI "Placing Reinforcement Bars" with maximum spacing of 4 feet-0 inches.
- J. Tie reinforcement steel at intersections in accordance with CRSI "Placing Reinforcement Bars":
 - 1. Maximum tie spacing: every third intersection or 3 feet-0 inches.
 - 2. Tie a minimum of 25 percent of all intersecting bars.
 - 3. Secure all dowels in place before placing concrete.
 - 4. Tie wires shall be bent away from the forms and from finished concrete surfaces in order to provide the required concrete coverage.
- K. Locate reinforcement to avoid interference with items drilled in later, such as concrete anchors.
- L. Extend welded wire reinforcement to within 2 inches of edges of slab or section. Lap sheets at least 12 inches or two wire spaces, whichever is greater, at ends and edges and wire tightly together. Stagger end laps.
- M. Unless shown otherwise on Drawings, place welded wire reinforcement in slabs on grade between the upper third point and mid-point of slab. Placing welded wire reinforcement on the subgrade and pulling it up during concrete placement is not permitted.
- N. Support welded wire reinforcement placed over the ground on wired concrete blocks (dobies) spaced not more than 3 feet on centers in any direction.
- O. Support welded wire reinforcement placed over horizontal forms on slab bolsters spaced not more than 30 inches on center.
- P. Securely support and tie reinforcement steel to prevent movement during concrete placement.
- Q. Do not bend reinforcement bars that project from in-place concrete.
- R. Reinforcement shall be clean and free from loose mill scale, dirt, grease, oil, form release agent, dried concrete or any material reducing bond with concrete.

- S. Setting bars and welded wire reinforcement on layers of fresh concrete as the work progresses or adjusting reinforcement during the placement of concrete is prohibited.
 - T. Provide and place safety caps on all exposed ends of vertical reinforcement that pose a danger to injury or life safety.
- 3.02 CONCRETE COVER OVER REINFORCEMENT BARS:
- A. Maintain clear cover as noted on drawings. Tolerances shall be in accordance with ACI 117 and ACI 318 unless otherwise noted.
- 3.03 SPLICING OF REINFORCEMENT:
- A. Make reinforcement continuous through construction joints.
 - B. Reinforcement may be spliced at construction joints provided that entire lap is placed within only one concrete placement.
- 3.04 ACCESSORIES:
- A. Provide accessories such as chairs, chair bars and the like in sufficient quantities and strength to adequately support the reinforcement and prevent its displacement during the erection of the reinforcement and the placement of concrete.
 - B. Use precast concrete blocks where the reinforcement steel is to be supported over soil.
 - C. Do not use metal chairs, ferrous clips, nails, etc. that extend to the surfaces of the concrete. Do not use stones, brick or wood block supports.
- 3.05 FIELD QUALITY CONTROL:
- A. Remove reinforcement with kinks or bends not shown on shop or placement drawings. Remove such reinforcement from job site and replace with new fabricated steel. Do not field bend reinforcement.
 - B. Protect reinforcement from rusting, deforming, bending, kinking and other injury. Clean in-place reinforcement that has rusted, or been splattered with concrete using sand or water blasting prior to incorporation into the Work.

END OF SECTION

SECTION 033000 CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. Provide cast-in-place concrete as indicated and in compliance with Contract Documents.

1.02 REFERENCES:

- A. American Concrete Institute (ACI):

1. 117: Specifications for Tolerances for Concrete Construction and Materials and Commentary.
2. 211.1: Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
3. 214R: Recommended Practice for Evaluation of Strength Test Results of Concrete
4. 301: Standard Specifications for Structural Concrete
5. 304R: Guide for Measuring, Mixing, Transporting and Placing Concrete
6. 304.2R: Placing Concrete by Pumping Methods
7. 305R: Hot Weather Concreting
8. 306R: Cold Weather Concreting
9. 308: Standard Practice for Curing Concrete
10. 309R: Guide for Consolidation of Concrete
11. 311.4R: Guide for Concrete Inspection
12. 318: Building Code Requirements for Structural Concrete
13. 350: Code Requirements For Environmental Engineering Concrete Structures

- B. American Society for Testing and Materials International (ASTM):

1. C31: Standard Practice for Making and Curing Concrete Test Specimens in the Field
2. C33: Standard Specification for Concrete Aggregates

3. C39: Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
4. C40: Standard Test Method for Organic Impurities in Fine Aggregates for Concrete
5. C87: Standard Test Method for Effect of Organic Impurities in Fine Aggregate on Strength of Mortar
6. C88: Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
7. C94: Standard Specification for Ready-Mixed Concrete
8. C136: Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
9. C138: Standard Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete
10. C150: Standard Specification for Portland Cement
11. C171: Standard Specification for Sheet Materials for Curing Concrete
12. C172: Standard Practice for Sampling Freshly Mixed Concrete
13. C192: Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory
14. C231: Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
15. C260: Standard Specification for Air-Entraining Admixtures for Concrete
16. C289: Standard Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method)
17. C309: Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
18. C311: Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland Cement Concrete
19. C494: Standard Specification for Chemical Admixtures for Concrete
20. C618: Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete

21. C881: Standard Test Method for Epoxy Resin Base Bonding Systems for Concrete
22. C882: Standard Test Method for Bond Strength of Epoxy Resin Systems Used with Concrete by Slant Shear
23. C1017: Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
24. C1064: Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete
25. C1107: Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
26. C1116: Standard Specification for Fiber Reinforced Concrete
27. C1240: Standard Specification for Silica Fume for Use as a Mineral Admixture in Hydraulic-Cement Concrete, Mortar, and Grout
28. D75: Standard Practice for Sampling Aggregates
29. E154: Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover
30. E1745: Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs
31. E329: Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials used in Construction

1.03 TOLERANCES

- A. Conform to ACI 117.

1.04 SUBMITTALS:

- A. Submit the following shop drawings in accordance with Section 013300.
- B. Product Data:
 1. Manufacturer's specifications and instructions including Material safety Data Sheets (MSDS) for admixtures and curing materials. Manufacturer's certification of compatibility of all admixtures.
- C. Shop Drawings:

1. Provide certificate that cement used complies with ASTM C150 and these specifications.
2. Provide certificates that aggregates comply with ASTM. Submit gradation analysis with concrete mix designs.
3. Provide certificate of compliance with these specifications from the manufacturer of the concrete admixtures.
4. For each formulation of concrete proposed, prepare mix designs in accordance with ACI 318, Chapters 4 and 5, except as modified herein. Submit mix design for review by the Engineer at least 15 days before placing of any concrete.
5. Proposed special procedures for protection of concrete under wet weather placement conditions.
6. Proposed special procedures for protection and curing of concrete under hot and cold weather conditions.

D. Manufacturers' Instructions

1. Provide epoxy bonding compound manufacturer's specific instructions for use. Provide manufacturer's data sheets as to suitability of product to meet job requirements with regard to surface, pot life, set time, vertical or horizontal application, and forming restrictions.

E. Field Quality Control Submittals

1. Provide delivery tickets for ready-mix concrete or weighmasters certificate per ASTM C94, including weights of cement and each size aggregate and amount of water added at the plant and record of pours. Record the amount of water added on the job on the delivery ticket. Water added at the plant shall account for moisture in both coarse and fine aggregate.

1.05 QUALITY ASSURANCE:

- A. Plant Certification: Plant or concrete supplier shall comply with requirements of National Ready Mixed Concrete Association (NRMCA) certification plan as regards material storage and handling, batching equipment, central mixer, truck mixers with counters, agitators, nonagitating units, and ticketing system.
- B. Unless otherwise indicated, materials, workmanship, and practices shall conform to the following standards:
 1. FBC.
 2. ACI 301, "Structural Concrete for Buildings."

3. ACI 318, "Building Code Requirements for Reinforced Concrete."
- C. Where provisions of pertinent codes and standards conflict with this specification, the more stringent provisions govern.
 - D. Concrete not meeting the minimum specified 28-day design strength shall be cause for rejection and removal from the work.
 - E. Perform concrete work in conformance with ACI 301 unless otherwise specified.
 - F. Do not use admixtures, including calcium chloride, which will cause accelerated setting of cement in concrete.
 - G. Do not place concrete until design mix, material tests and trial concrete batch mix compression test results are accepted by the Engineer.
 - H. Employ an independent testing laboratory, acceptable to the Engineer, to develop concrete mix designs and testing. Concrete testing shall be performed by an ACI Concrete Field Technician, Grade I or equivalent.
 - I. Methods of Sampling and Testing:
 1. Fresh Concrete Sampling: ASTM C172
 2. Specimen Preparation: ASTM C31
 3. Compressive Strength: ASTM C39
 4. Air Content: ASTM C231
 5. Slump: ASTM C143
 6. Temperature: ASTM C1064
 7. Unit Weight: ASTM C138
 8. Obtaining Drilled Cores: ASTM C42
 - J. Acceptance of Structure: Acceptance of completed concrete work requires conformance with dimensional tolerances, appearance and strength as indicated or specified.
 - K. Hot weather concrete to conform to ACI 305R and as specified herein.
 - L. Cold weather concrete to conform to ACI 306R and as specified herein.
 - M. Reject concrete delivered to job site that exceeds the time limit or temperature limitations specified.
 - N. Do not place concrete in water or on frozen or uncompacted ground.

1.06 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver concrete to discharge locations in watertight agitator or mixer trucks without altering the specified properties of water-cement ratio, slump, air entrainment, temperature and homogeneity.
- B. Reject concrete not conforming to specification, unsuitable for placement, exceeding the time or temperature limitations or not having a complete delivery batch ticket.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Cement:

- 1. Portland Cement, ASTM C150, Type I or Type II.
- 2. Shall be one brand from one source. Use no cement that has become damaged, partially set, lumpy, or caked. Reject the entire contents of the sack or container that contains such cement. Use no salvaged or reclaimed cement.
 - 1. Maximum tricalcium aluminate shall not exceed 8 percent. The maximum percent alkalis shall not exceed 0.6 percent.

B. Fly Ash:

- 1. Provide fly ash conforming to the following requirements:
 - a. Class F or Class C fly ash conforming to ASTM C 618 for chemical and physical properties.
 - b. Supplemental requirements in percent:
 - (1) Maximum carbon content: 3 percent
 - (2) Maximum sulfur trioxide (SO₃) content: 4 percent
 - (3) Maximum loss on ignition: 3 percent
 - (4) Maximum water requirement (as a percent of control): 100 percent
 - (5) Fineness, maximum retained on No. 325 sieve: 25 percent

C. Fine Aggregates:

- 1. Clean, sharp, natural sand conforming to requirements of ASTM C33 with a fineness modulus between 2.50 and 3.0.

2. Coarse Aggregate:
3. Well graded crushed stone, natural rock conforming to requirements of ASTM C33.
4. Limit deleterious substances in accordance with ASTM C33, Table 3, Severe Weathering Regions, limit clay lumps not to exceed 1.0 percent by weight, and limit loss when tested for soundness using magnesium sulfate to 12 percent.

D. Water and Ice:

1. Use water and ice free from injurious amounts of oil, acid, alkali, salt, organic matter or other deleterious substances and conforms to requirements of ASTM C94.
2. Water shall not contain more than 500 mg/L of chlorides nor more than 500 mg/L of sulfate.
3. Heat or cool water to obtain concrete temperatures specified, and in conformance with ACI 305R and ACI 306R.

E. Color Additive for Exterior Electrical Duct Encasement:

1. For exterior electrical duct concrete encasements, use a color additive for identification purposes.

F. Concrete Admixtures:

1. Maintain compressive strength and maximum water-cement ratios specified in Table 03300-1 when using admixtures. Include admixtures in solution form in the water-cement ratio calculations.
2. Do not use any admixture that contains chlorides or other corrosive elements in any concrete. Admixtures shall be nontoxic after 30 days. Use admixtures in compliance with the manufacturer's printed instructions. The manufacturer shall certify the compatibility of multiple admixtures used in the same mix. Do not use admixtures in greater dosages than recommended by manufacturer.
3. Air Entrainment:
 - a. Class A concrete; an air-entraining admixture conforming to ASTM C260.
 - b. Products:
 - (1) BASF Corporation; MB-AE 90.
 - (2) Sika Corporation, AER.

- c. Adjust the admixture content to accommodate fly ash or pozzolan requirements, and other admixtures when used, in order to obtain the specified air content.
4. Water Reducing:
- a. Class A concrete; a water-reducing admixture conforming to ASTM C494, Type A and compatible with the air-entraining admixtures. The amount of admixture added to the concrete shall be in accordance with the manufacturer's recommendations.
 - b. Products:
 - (1) BASF Corporation; Polyheed Series
 - (2) Sika Corporation, Plastocrete 161
 - (3) WR Grace & Co.;Darex II-AEA
 - (4) Euclid Chemical Company; Eucon NW
5. Water Reducing and Retarding:
- a. Class A concrete; a water-reducing and retarding admixture conforming to ASTM C494, Type D and compatible with the air-entraining admixtures. The amount of admixture added to the concrete shall be in accordance with the manufacturer's recommendations.
 - b. Products:
 - (1) BASF Corporation; Pozzolith Series
 - (2) Sika Corporation; Plastiment
 - (3) Euclid Chemical company; Eucon WR-91
6. High-Range Water-Reducing Admixture (Superplasticizer):
- a. Class A concrete; a High-Range water-reducing admixture conforming to ASTM C494, Type F or ASTM C1017, Type I.
 - b. Products:
 - (1) BASF Corporation; Glenium Series
 - (2) WR Grace & Co.; Daracem 100
 - (3) Euclid Chemical company; Eucon SPC

G. Epoxy Bonding Agent:

1. Epoxy bonding agent shall conform to ASTM C881 Type I, II, IV or V; Grade 2 for epoxy resin adhesives. The class of epoxy bonding agent shall be suitable for ambient and substrate temperatures.
2. Products:
 - a. Sika Corp.; Sikadur 32
 - b. Euclid Chemical Company; Duralcrete
 - c. BASF Corporation, Concrecive Liquid LPL
3. Vapor Retarder: 10 mil polyethylene sheet conforming to ASTM E1745.

H. Curing Compound:

1. Liquid form, which will form impervious membrane over, exposed surface of concrete when applied to fresh concrete by means of spray gun. Compound shall not inhibit future bond of floor covering or concrete floor treatment. Use Type I-D compound with red fugitive dye, Class B, having 18 percent minimum solids conforming to ASTM C309.
2. Products:
 - a. BASF Building Systems; Kure 1315.
 - b. Euclid Chemical Company; Super Diamond Clear VOX.
 - c. W. R. Meadows, Inc.; VOCOMP-30.
 - d. Dayton Superior Corp; Safe Cure and Seal 30 percent.

I. Sisal-Kraft Paper and Polyethylene Sheets for Curing:

1. Conform to ASTM C171.

2.02 MIXES:

- A. Conform to ASTM C94, except as modified by these specifications.
- B. Air content as determined by ASTM C231:
 1. 2 ± 1 percent
- C. Provide concrete with the following compressive strengths at 28 days and proportion it for strength and quality requirements in accordance with ACI 318. The resulting mix shall not conflict with limiting values specified in Table 03300-1.

Table 033000-1				
Class	Type of Work	28-Day Minimum Compressive Strength (psi)	Minimum Cementitious Content (lbs per C.Y.)	Maximum Water/Cement Ratio
A	Concrete for all structures and concrete not otherwise specified. Concrete fill at structure foundations, cradle, supports across pipe trenches, and reinforced pipe encasement.	4,000	560	0.44
B	Pavement, concrete topping, pipe encasement	3,000	500	0.54
C	Miscellaneous unreinforced concrete	2,500	376	0.60

D. Measure slump in accordance with ASTM C143:

1. Proportion and produce the concrete to have a maximum slump of 3±1 inches.
2. Mixes containing water reducers shall have a maximum slump of 6 inches after the addition of a mid-range water reducer and maximum slump of 8 inches after the addition of a high range water reducer.

E. Pozzolan Content:

1. Water to cementitious ratio shall not exceed water to cement ratio given on table.
2. Fly Ash: Use of is optional. Combine fly ash with cement at rate of 1.0 lb fly ash/lb reduction of cement. Fly ash shall not be less than 15 percent nor more than 20 percent of the total cementitious content given in table.

F. Aggregate Size:

1. Aggregate size shall be 3/4-inch maximum unless noted otherwise. Aggregate size for floor topping shall be 3/8-inch maximum.
2. Combined aggregate grading shall be as shown in the following table:

Table 033000-2		
Maximum Aggregate Size	3/4-inch	3/8-inch
Aggregate Grade per ASTM C33	67	8

PART 3 - EXECUTION

3.01 INSPECTION:

- A. Examine the subgrade and the conditions under which work is to be performed and notify the Engineer in writing of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions are corrected to comply with specified subgrade conditions in a manner acceptable to the Engineer.

3.02 MIXING AND TRANSPORTING CONCRETE:

- A. General: Conform to concreting procedures set forth in ASTM C94, ACI 304R and as specified herein.
 1. Transport concrete to discharge locations without altering the specified properties of water-cement ratio, slump, air entrainment, temperature and homogeneity.
 2. Discharge concrete into forms within 1-1/2 hours after cement has entered mixing drum or before the drum has revolved 300 revolutions after the addition of water, whichever occurs first.
 3. Do not add water at the jobsite.
 4. Keep a record showing time and place of each pour of concrete, together with transit-mix delivery slips certifying the contents of the pour.
 5. Discharge of concrete shall be completed within the limits set out in Table 033300-3.

Table 033000-3	
Maximum Time to Concrete Discharge	
Concrete Temperature	Limit
Over 90 Degree F	Remove concrete from jobsite and discard concrete
86 to 90 Degree F	45 minutes
81 to 85 Degree F	60 minutes
70 to 80 Degree F	75 minutes
Below 70 Degree F	90 minutes

3.03 CONCRETE ACCEPTANCE:

- A. Accept or reject each batch of concrete delivered to the point of agitator or mixer truck discharge. Sign delivery batch tickets to indicate concrete acceptance.
- B. Reject concrete delivered without a complete concrete delivery batch ticket as specified herein. The concrete supplier will furnish copies of the signed batch ticket to the Contractor and Engineer.
- C. The testing agency shall perform field tests at the point of agitator or mixer truck discharge. Accept or reject concrete on the basis of conformity with slump, air content and temperature specified. Slump and air content of pumped concrete will be tested at pipe discharge.
- D. The testing agency shall inspect concrete transit truck's barrel revolution counter and gauge for measuring water added to the concrete. Reject concrete that exceeds the maximum barrel revolution of 300, the time limits in Table 033000-3 or concrete that has water content exceeding the specified water-cement ratio.
- E. Reject concrete not conforming to specification before discharging into the forms.

3.04 PREPARATION AND COORDINATION:

- A. Contractor shall notify the Engineer of readiness to place concrete in any portion of the work a minimum of 5 working days prior to concrete placement. Failure to provide this notification could be cause for delay in placing concrete.
- B. Reinforcement, installation of waterstop, positioning of embedded items, and condition of formwork will be observed by the prior to concrete placement.
- C. Coordinate the sequence of placement such that construction joints will occur only as designed.
- D. Schedule sufficient equipment for continuous concrete placing. Provide for backup equipment and procedures to be taken in case of an interruption in placing. Provide backup concrete vibrators at the project site. Test concrete vibrators the day before placing concrete.
- E. Compact the subgrade and/or bedding. Saturate the subgrade approximately eight hours before placement and sprinkle ahead of the placement of concrete in areas where vapor barrier is not used. Remove standing water, mud, and foreign matter before concrete is deposited.
- F. Where concrete is required to be placed and bonded to existing concrete, coat the contact surfaces with epoxy bonding agent. The method of preparation and application of the bonding agent shall conform to the manufacturer's recommendations.

3.05 CONCRETE PLACEMENT:

- A. Placement shall conform to ACI 304R as modified by these specifications.
- B. Do not place concrete until free water has been removed or has been diverted by pipes or other means and carried out of the forms, clear of the work. Do not deposit concrete underwater, and do not allow free water to rise on any concrete until the concrete has attained its initial set. Do not permit free or storm water to flow over surfaces of concrete so as to injure the quality or surface finish.
- C. Do not place concrete during inclement weather. Protect concrete placed from inclement weather. Keep sufficient protective covering ready at all times for this purpose.
- D. Deposit concrete at or near its final position to avoid segregation caused by rehandling or flowing. Do not deposit concrete in large quantities in one place to be worked along the forms with a vibrator.
- E. Deposit concrete continuously and in level layers. Place in lifts not exceeding 24 inches. Avoid inclined layers and cold joints. Place concrete at lower portion of slope first on sloping surfaces.
- F. Do not deposit partially hardened concrete in forms. Retempering of partially hardened concrete is not permitted. Remove partially hardened concrete from site at no additional compensation.
- G. Do not allow concrete to fall freely in forms to cause segregation (separation of coarse aggregate from mortar). Limit maximum free fall of concrete to 4 feet. Do not move concrete horizontally more than four feet from point of discharge. Space points of deposit not more than eight feet apart.
- H. Consolidate concrete using mechanical vibrators operated within the mass of concrete and/or on the forms conforming to procedures set forth in ACI 309R and as specified herein.
- I. Conduct vibration to produce concrete of uniform texture and appearance, free of honeycombing, streaking, cold joints or visible lift lines.
- J. Conduct vibration in a systematic manner with regularly maintained vibrators. Use vibrators having minimum frequency of 8,000 vibrations per minute and of sufficient amplitude to consolidate concrete.
- K. Insert and withdraw vibrator vertically at a uniform spacing over the entire area of placement. Space distances between insertions such that spheres of influence of each insertion overlap.
- L. Use additional vibration with pencil vibrators on vertical surfaces and on exposed concrete to bring full surface of mortar against the forms so as to eliminate air voids, bug

holes and other surface defects. Employ the following additional procedures for vibrating concrete as necessary to maintain proper consolidation of concrete:

1. Reduce distance between internal vibration insertions and increase time for each insertion.
2. Insert vibrator as close to face of form as possible without contacting form or reinforcement.
3. Thoroughly vibrate area immediately adjacent to waterstops without damaging the waterstop.
4. Use spading as a supplement to vibration where particularly difficult conditions exist.

M. Pumping Concrete:

1. Conform to the recommendations of ACI 304.2R except as modified herein.
2. Base pump size on rate of concrete placement, length of delivery pipe or hose, aggregate size, mix proportions, vertical lift, and slump of concrete.
3. Use pipe with inside diameter of at least three times the maximum coarse aggregate size, but not less than 2 inches.
4. Do not use aluminum pipes for delivery of concrete to the forms.

3.06 CURING AND PROTECTION:

A. General:

1. Protect concrete from premature drying, hot or cold temperatures, and mechanical injury, beginning immediately after placement and maintain concrete with minimal moisture loss at relatively constant temperature.
2. Comply with curing procedures set forth in ACI 301, ACI 308 and as specified herein.
3. Perform hot weather concreting in conformance with ACI 305R and as specified herein when the ambient atmospheric temperature is 90 degrees F or above.
4. Perform cold weather concreting in conformance with ACI 306R.
5. Concrete required to be moist cured shall remain moist for the entire duration of the cure. Repeated wetting and drying cycles of the curing process will not be allowed.

B. Curing Duration:

1. Start initial curing after placing and finishing concrete as soon as free moisture has disappeared from unformed concrete surfaces. Initial curing starts as soon as concrete achieves final set. Forms left tightly in place are considered as part of the curing system, provided that wooden forms are kept continuously moist. Keep continuously moist for not less than 72 hours.
2. Begin final curing procedures immediately following initial curing and before the concrete has dried. Continue final curing for at least 7 days and in accordance with ACI 301 procedures for a total curing period, initial plus final, of at least 10 days.
3. Avoid rapid drying at the end of the final curing period

C. Curing Requirements:

1. Unformed Surfaces: Cover and cure entire surface of newly placed concrete immediately after completing finishing operations and water film has evaporated from surface or as soon as marring of concrete will not occur. Protect finished slabs from direct rays of the sun to prevent checking, crazing and plastic shrinkage.
2. Formed Surfaces: Minimize moisture loss for formed surfaces exposed to heating by the sun by keeping forms wet until safely removed. Keep surface continuously wet by warm water spray or warm water saturated fabric immediately following form removal unless otherwise permitted by the Engineer.
3. Other concrete: Moist cure by moisture-retaining cover curing, or by the use of curing compound.

D. Curing Methods:

1. Sealing Materials:
 - a. Use common sealing materials such as plastic film or waterproofing (kraft) paper.
 - b. Lap adjacent sheets a minimum of 12 inches. Seal edges with waterproof tape or adhesive. Use sheets of sufficient length to cover sides of concrete member.
 - c. Place sheet materials only on moist concrete surfaces. Wet concrete surface with fine water spray if the surface appears dry before placing sheet material.
 - d. The presence of moisture on concrete surfaces at all times during the prescribed curing period is proof of acceptable curing using sheet material.
2. Membrane Curing Compound:

- a. Apply membrane-curing compound uniformly over concrete surface by means of roller or spray at a rate recommended by the curing compound manufacturer, but not less than 1 gallon per 150 sq. ft. of surface area. Agitate curing material in supply container immediately before transfer to distributor and thoroughly agitate it during application for uniform consistency and dispersion of pigment.
 - b. Do not use curing compounds on construction and expansion joints or on surfaces to receive liquid hardener, dustproofer/sealer, concrete paint, tile, concrete fills and toppings or other applications requiring positive bond.
 - c. Reapply membrane-curing compound to concrete surfaces that have been subjected to wetting within 3 hours after curing compound has been applied by method for initial application.
- E. Protection from environmental conditions: Maintain the concrete temperature above 50 degrees F continuously throughout the curing period. Make arrangements before concrete placing for heating, covering, insulation or housing to maintain the specified temperature and moisture conditions continuously for the curing period.
- 1. When the atmospheric temperature is 90 degrees F and above, or during other climatic conditions which will cause too rapid drying of the concrete, make arrangements before the start of concrete placing for the installation of wind breaks or shading, and for fog spraying, wet sprinkling, or moisture-retaining covering.
 - 2. Protect the concrete continuously for the entire curing period.
 - 3. Maintain concrete temperature as uniformly as possible, and protect from rapid atmospheric temperature changes.
 - 4. Avoid temperature changes in concrete that exceed 5 degrees F in any one hour and 50 degrees F in any 24-hour period.
- F. Protection from physical injury: Protect concrete from physical disturbances such as shock and vibration during curing period. Protect finished concrete surfaces from damage by construction equipment, materials, curing procedures and rain or running water. Do not load concrete in such a manner as to overstress concrete.
- G. Protection from Deicing Agents: Do not apply deicing chemicals to concrete.

3.07 FIELD QUALITY CONTROL:

A. Hot Weather Requirements

- 1. During hot weather, give proper attention to ingredients, production methods, handling, placing, protection, and curing to prevent excessive concrete

temperatures or water evaporation in accordance with ACI 305R and the following.

2. When the weather is such that the temperature of the concrete as placed would exceed 90 degrees F, use ice or other means of cooling the concrete during mixing and transportation so that the temperature of the concrete as placed will not exceed 90 degrees F.
3. Take precautions when placing concrete during hot, dry weather to eliminate early setting of concrete. This includes protection of reinforcing from direct sunlight to prevent heating of reinforcing, placing concrete during cooler hours of the day, and the proper and timely application of specified curing methods.
4. There will be no additional reimbursement to the Contractor for costs incurred for placing concrete in hot weather.

B. Cold Weather Requirements

1. Provide adequate equipment for heating concrete materials and protecting concrete during freezing or near-freezing weather in accordance with ACI 306R and the following.
2. When the temperature of the surrounding atmosphere is 40 degrees F or is likely to fall below this temperature, use heated mixing water not to exceed 140 degrees F. Do not allow the heated water to come in contact with the cement before the cement is added to the batch.
3. When placed in the forms during cold weather, maintain concrete temperature at not less than 55 degrees F. Materials shall be free from ice, snow, and frozen lumps before entering the mixer.
4. Maintain the air and the forms in contact with the concrete at temperatures above 40 degrees F for the first five days after placing, and above 35 degrees F for the remainder of the curing period. Provide thermometers to indicate the ambient temperature and the temperature 2 inches inside the concrete surface.
5. There will be no additional reimbursement made to the Contractor for costs incurred for placing concrete during cold weather.

C. Backfill

1. Do not place backfill until the concrete has obtained a compressive strength equal to the specified 28-day compressive strength. Where backfill is to be placed on both sides, place the backfill uniformly on both sides.

D. Concrete Testing

1. Concrete quality testing will be performed on the concrete by independent testing agency retained by the Contractor.
2. The testing agency will use concrete samples provided by the Contractor at the point of agitator or mixer truck discharge to perform slump (per ASTM C143) , air content (per ASTM C231), and temperature tests (per ASTM C1064) and for field control test specimens.
3. The testing agency will submit test reports of concrete field measurements specified above to the Contractor and to the Engineer.
4. Provide and maintain facilities for safe storage and proper curing of concrete test specimens on the project site, as required by ASTM C31.
5. Concrete Quality Test Specimen:
 - a. Perform sampling and curing of test specimen in accordance with ASTM C31.
 - b. Testing agency personnel will record truck and load number from the delivery batch ticket, the concrete placement location of each specimen, the date, concrete strength, slump, air content and temperature.
 - c. The testing agency will cast a minimum of one set of 8 test specimens, each 4 inch diameter by 8 inch long cylinders, for each 50 cubic yard of each mix design of concrete but not less than once a day.
 - d. Test cylinders in accordance with ASTM C39. Test two cylinder at 7 days for information; test three cylinders at 28 days for acceptance; and hold three reserve cylinders for verification. Strength acceptance will be based on the average of the strengths of the three cylinders tested at 28 days. If one cylinder of a 28-day test manifests evidence of improper sampling, molding, or testing, other than low strength, discard it and use a reserve cylinder for the test result
6. Concrete acceptance shall be based on the requirements of ACI.
7. Field cured cylinders conforming to ASTM C31 will be required to determine field compressive strength of concrete. Laboratory cured cylinders for concrete quality testing shall not be used for determining field compressive strength.
8. Concrete Coring:
 - a. When the concrete quality test specimen compression tests fail to be in compliance with the Contract Documents or when the Engineer detects deficiencies in the concrete, the Contractor will take concrete cores at least 2 inches in diameter from the structure in conformance with ASTM C 42 at locations determined by the Engineer.

- b. Obtain at least three representative cores from each member or area of concrete that is considered potentially deficient.
- c. Obtain additional cores to replace cores that show evidence of having been damaged subsequent to or during removal from the structure.
- d. The testing agency shall compression test the cores taken from the structure in conformance with ASTM C39 and submit test strength test results of cores specified above to the Contractor and to the Engineer.
- e. All costs associated with coring and testing of cores will be borne by the Contractor at no additional cost to the Owner.

END OF SECTION

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SECTION 033500 CONCRETE FINISHES AND FLOOR TREATMENT

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. This section describes materials and methods of concrete finishes for cast in place concrete and floor treatment.

1.02 REFERENCES:

- A. American Concrete Institute (ACI):
 - 1. 301: Specifications for Structural Concrete.
 - 2. 302.1R: Construction of Concrete Floors.
 - 3. 311.4R: Guide for Concrete Inspection.
- B. American Society for Testing and Materials International (ASTM):
 - 1. D4263: Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.

1.03 SUBMITTALS:

- A. Submit following shop drawings in accordance with Section 013300.

1.04 QUALITY ASSURANCE:

- A. Prior to concrete construction, develop an outlined quality control program for concrete finishing.
- B. For concrete that will receive additional applied floor finishes, ensure that concrete surface finish and preparation is compatible with the accepted floor finish manufacturer's products. Provide documentation from the floor product manufacturer that specifies the concrete finish and preparation required for proper installation of the floor products.

1.05 DELIVERY, STORAGE AND HANDLING:

- A. Comply with the requirements in section Section 016610.

PART 2 - PRODUCTS

2.01 FLOOR SEALERS AND DENSIFIERS:

- A. Shall contain silicate and silicate and be VOC compliant.
- B. Products:
 - 1. Dayton Superior: Sure Hard Densifier J17
 - 2. Euclid Chemical Company: Euco Diamond Hard
 - 3. BASF Construction Chemicals: Kure-and-Harden

PART 3 - EXECUTION

3.01 CONCRETE FINISHES:

- A. Do not use curing compound where epoxy, urethane, mortar bed, grout, additional concrete or other toppings or adhesive will be applied.
- B. Do not sprinkle with dry cement or add water when finishing concrete surfaces.
- C. Finish concrete surfaces in accordance with the following schedule:

Table 033500-1	
Finish Designation	Area Applied
F-1	Exterior walls not exposed to view.
F-2	Walls exposed to view and to 1 foot below finished grade. EXCEPTION: Surfaces that are to be coated.
F-3	Surfaces to be coated.
S-1	Slabs and floors to be covered with concrete or grout.
S-2	Slabs and floors not liquid containing.
S-3	Slab surfaces on which mechanical equipment moves. Slab surfaces to receive sealer or hardener shall be prepared in accordance with product manufacturer's requirements.
S-4	Slabs and floors exposed to view.

- 1. Finish F-1: Repair defective concrete, fill depressions deeper than 1/2-inch, and fill tie holes.
- 2. Finish F-2: Repair defective concrete, remove fins, fill depressions 1/4-inch or deeper, and fill tie holes. Fill depressions and airholes with mortar. Dampen

surfaces and then spread a slurry consisting of one part cement and one and one-half parts sand by damp loose volume, over the surface with clean burlap pads or sponge rubber floats. Remove any surplus by scraping and then rubbing with clean burlap.

3. Finish F-3: Repair defective concrete, remove fins, fill depressions 1/16-inch or deeper, fill tie holes, remove mortar spatter, and remove bulges higher than 1/16-inch.
 4. Finish S-1: Screed to grade without special finish unless otherwise shown on contract documents. Roughen and/or apply bonding agent where shown on contract drawings.
 5. Finish S-2: Smooth steel trowel finish.
 6. Finish S-3: Steel trowel finish free from trowel marks and all irregularities.
 7. Finish S-4: Steel trowel finish without local depressions or high points.
 8. Provide 3/4-inch chamfer on external corners of exposed concrete, equipment pads and exposed edges of construction joints.
- D. Protect finished concrete surfaces from damage by construction equipment, materials, curing procedures and rain or running water.
- 3.02 FINISHING OF FORMED SURFACES:
- A. Cure surfaces until finishing and repairing are completed.
 - B. Perform finish work in accordance with the schedule in Table 033500-1 as soon as possible after forms are removed.
- 3.03 FINISHING OF UNFORMED SURFACES:
- A. Perform finish work in accordance with the schedule in Table 033500-1.
 - B. Provide S-3 steel-trowel finish to all top, horizontal and inclined surfaces not otherwise specified or indicated.
 - C. Provide sealer and densifier for floor slab.
- 3.04 CLOSEOUT ACTIVITIES:
- A. Provide in accordance with Section 017000.

END OF SECTION

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SECTION 036000 GROUT AND ADHESIVES

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. Furnish all labor, materials, equipment, and incidentals required, and install grout complete as shown on the Drawings and as indicated and in compliance with Contract Documents.

1.02 SUMMARY:

A. Section Includes:

1. Material for grouting under bearing plates.
2. Materials for grouting under equipment.
3. Material for grouting reinforcing bars, anchor bolts into existing or newly placed concrete.
4. Materials for grouting concrete spall and voids.
5. Materials for grouting and filling notched concrete surfaces.
6. Materials for miscellaneous grouting including but not limited to railing posts, equipment guides, bollards and supports etc.

1.03 REFERENCE STANDARDS:

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

1. M182: Burlap Cloth made from Jute or Kenaf

B. American Petroleum Institute (API):

1. RP 686: Recommended Practice for Machinery Installation and Installation Design

C. American Society for Testing and Materials International (ASTM):

1. C33: Standard Specification for Concrete Aggregates
2. C150: Standard Specification for Portland Cement
3. C1107: Standard Specification for Packaged Dry, Hydraulic, Cement Grout (Non-shrink)

D. U.S. Army Corps of Engineers Standard (CRD):

1. C621: Corps of Engineers Specification for Non-shrink Grout

1.04 DESIGN REQUIREMENTS:

- A. Design grout and related anchorage systems in accordance with the design loads as required by the equipment manufacturer.
- B. The design and selection of the grout and grouting system shall be based on the duration and magnitude of the load and the frequency of application. The use of a grout for a specific application shall be verified by the manufacturer of the grout.

1.05 SUBMITTALS:

- A. Submit the following shop drawings.
- B. Product Data:
 - a. Include catalogue cuts, technical data, storage requirements, product life, working time after mixing, temperature considerations, conformity to referenced ASTM standards, and Material Safety Data Sheet.

1.06 QUALITY ASSURANCE:

- A. Qualifications
 1. Grout manufacturer to have a minimum of 5 years experience in the production and use of the type of grout proposed for the Work.

1.07 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver materials to the jobsite in original, unopened packages, clearly labeled with the manufacturer's name, product identification, batch numbers, and printed instructions.
- B. Store materials in accordance with the manufacturer's recommendations. Total storage time from date of manufacture to date of installation shall be limited to six months or the manufacturer's recommended storage time, whichever is less.
- C. Reject material that becomes damp, lumpy or otherwise unacceptable and immediately remove from the site and replace with acceptable material at no cost to the Owner.
- D. Deliver non-shrink cement based grouts as pre-blended, prepackaged mixes requiring only the addition of water.
- E. Deliver non-shrink epoxy grouts as premeasured, prepackaged, three component systems requiring only blending as directed by the manufacturer.

PART 2 - PRODUCTS

2.01 GENERAL:

- A. Provide materials produced by one manufacturer or supplier in order to provide standardization of appearance.

2.02 APPLICATION:

- A. Unless indicated otherwise, provide grouts as listed below:

Table 036000-1	
Type of Grout	Application
Patching Mortar	Surface repairs
Polymer modified concrete mix	Concrete repair
Epoxy Adhesive	Adhesive anchoring for reinforcement and anchors
Non-Shrink Grout	Storage tanks and other equipment.
	Filling block-out spaces for embedded items such as railing posts, gate guide frames, etc.

2.03 MATERIALS:

- A. Patching Mortar:

1. Products:

- a. Sika Corp.; Sikatop 123 Plus.
- b. Master Builders, Inc.; HB2 Repair Mortar.

2. Polymer modified cementitious system consisting of 2 components.

- a. Component A: Liquid polymer emulsion of acrylic copolymer base and additives.
- b. Component B: Blend of selected Portland cements, specially graded aggregates, organic accelerator, and admixtures for controlling setting time, water reducers for workability, and corrosion inhibitor.
- c. System shall not contain chlorides, nitrates, added gypsum, added lime or high alumina cements. System shall be noncombustible, before or after cure.
- d. Color: Concrete gray.
- e. Minimum Compressive Strength: 5,000 psi.

- f. Bond Strength: 100% concrete substrate failure (pull off method), minimum 400 psi.
 - g. System shall not produce vapor barrier, shall be thermally compatible with concrete, and freeze-thaw resistant.
- B. Epoxy Adhesive Anchors:
 - 1. Products:
 - a. Hilti Corporation, HIT-RE 500-SD
 - b. Powers Fasteners, PE1000+ Epoxy Adhesive Anchoring System
 - c. Simpson Strong Tie, SET-XP Epoxy-Tie or Acrylic-Tie
- C. Non-shrink Grout:
 - 1. Non-shrink Class I Grout shall have a minimum 28-day compressive strength of 5000 psi, when mixed at a fluid consistency.
 - 2. Non-shrink Class I grout shall meet the requirements of ASTM C1107, Grade B or C, when mixed to fluid, flowable and plastic consistencies.
 - 3. Products:
 - a. Sika Corp.; SikaGrout 212.
 - b. Master Builders, Inc.; Construction Grout.
 - c. The Euclid Chemical Co.; Euco NS.

PART 3 - EXECUTION

3.01 GENERAL:

- A. Grout shall not be placed until base concrete has attained its design strength, unless authorized otherwise by the Engineer.
- B. Contact the grout manufacturer's representative for assistance on hot and cold weather grouting techniques and precautions if applicable.

3.02 PREPARATION:

- A. Clean grout contact surfaces of oil, grease, scale, and other foreign matter. Chip away unsound concrete leaving surface level but rough.
- B. Underside of base plates and bolts shall be free of grease, oil, dirt or coatings.

3.03 MIXING AND PLACING:

- A. Mix and place in accordance with manufacturer's written instructions.
- B. Provide sealing materials where necessary to retain grout until hardened.
- C. Work grout from one side to the other.
- D. Remove plastic anchor bolt sleeve tops where used, and fill with grout at same time base plates are grouted.

3.04 CURING:

- A. Cure as recommended by material manufacturer.

END OF SECTION

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DIVISION 05 – METALS

055120 Aluminum Stairs
055200 Aluminum Railings
055300 Aluminum Grating

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SECTION 055120 ALUMINUM STAIRS

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. This section describes materials, fabrication, and installation of aluminum stairs as indicated and in compliance with Contract Documents.

1.02 REFERENCES:

- A. Aluminum Association (AA):

- 1. Aluminum Design Manual—Specifications and Guidelines for Aluminum Structures.

- B. American Society for Testing and Materials International (ASTM):

- 1. B26: Specification for Aluminum-Alloy Sand Castings.
- 2. B209: Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- 3. B211: Specification for Aluminum-Alloy Bars, Rods, Profiles and Tubes.
- 4. B221: Specification for Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
- 5. B247: Specification for Aluminum and Aluminum-Alloy Die Forgings, Hand Forgings and Rolled Ring Forgings.
- 6. B429: Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.

- C. American Welding Society (AWS):

- 1. A2.4: Standard Symbols for Welding, Brazing, and Nondestructive Examination.
- 2. D1.1: Structural Welding Code - Steel.

- D. Florida Building Code.

- E. Occupational Safety and Health Administration (OSHA):

- 1. 29 CFR, Part 1910, Occupational Safety and Health Standards.

1.03 DESIGN CRITERIA:

- A. Stairs shall conform to OSHA and FBC.

- B. Stairs shall be designed to withstand a minimum uniform live load of 100 psf or a concentrated live load of 300 pounds applied on an area of 4 square inches at any point along the element.

1.04 SUBMITTALS:

- A. Submit the following shop drawings in accordance with Section 013300.
 - 1. Shop drawings showing clearly the location, size and details of all members
 - 2. Indicate materials, dimensions, connection attachments, anchorage, size and type of fasteners, holes, finishes, and accessories for aluminum stairs.
 - 3. Reference materials of construction by ASTM designation and grade.
 - 4. Indicate welds including length and size of all shop and field welds by symbols conforming to AWS standards.
 - 5. Letter certifying that stairs are designed and detailed to meet the requirements of standards, building codes, specifications and design criteria herein described.
- B. Product Data:
 - 1. Manufacturer's catalog sheets on pre-manufactured items.
 - 2. Manufacturer's specifications, load tables, anchor details, and installation details.

1.05 QUALITY ASSURANCE:

- A. Obtain field measurements and elevations prior to preparation of shop drawings and fabrication.
- B. Welding Qualification and Certification:
 - 1. Use welders and welding operators certified by test to perform type of work required in conformance with AWS Structural Welding Code. Maintain current test records certified by an independent testing laboratory.

1.06 DELIVERY, STORAGE AND HANDLING:

- A. Identify and match-mark materials, items and fabrications, for installation and field assembly.
- B. Deliver items to jobsite as complete units, wherever practicable, ready for installation or erection, with anchors, hangers, fasteners and miscellaneous metal items required for installation.
- C. Carefully handle and store materials, protected from weather, corrosion and other damage.

- D. Store off the ground on suitable supports.
- E. Accept material on site. Inspect for damage.
- F. Do not incorporate damaged material in the work.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Aluminum plates, shapes, pipe and castings shall conform to the following ASTM specifications, alloy and temper designations.
 - 1. Extruded structural shapes, bars and tubes: ASTM B221 Alloy 6061-T6.
 - 2. Extruded structural tube or pipe: ASTM B429 Alloy 6061-T6.
 - 3. Sheet and plate: ASTM B209 Alloy 6061-T6.
 - 4. Die and hand forgings: ASTM B247 Alloy 6061-T6.
 - 5. Castings: ASTM B26.
 - 6. Bolts, washers and nuts: Type 304 stainless steel.
- B. Welding:
 - 1. Provide filler materials appropriate for the alloys and tempers in accordance with the AWS Structural Welding Code.
- C. Railings per Section 055200.
- D. Grating and Treads.
 - 1. Provide per Section 055300.
 - 2. Treads shall have 1-1/2 inch abrasive nosing.

2.02 FABRICATION:

- A. General:
 - 1. Fabricate true to shape, size and tolerances as indicated and specified.
 - 2. Straighten work bent by shearing or punching.
 - 3. Dress exposed edges and ends of metal smooth, with no sharp edges and with corners slightly rounded.

4. Provide sufficient quantity and size of anchors for the proper fastening of the work.
5. Fabricate details and connection assemblies in accordance with drawings, with projecting corners clipped and filler pieces welded flush.
6. Provide clips, lugs, brackets, straps, plates, bolts, nuts, washers, and similar items, as required for fabrication and erection.
7. Use connections of type and design required by forces to be resisted, and to provide secure fastening.
8. Fit work together in fabrication shop and deliver complete, or in parts, ready to be set in place.

B. Welding:

1. Grind exposed edges of welds to a 1/8 inch minimum radius. Grind burrs, jagged edges and surface defects smooth.
2. Prepare welds and adjacent areas such that there is no undercutting or reverse ridges on the weld bead and no sharp peaks or ridges along the weld bead.
3. Grind embedded pieces of electrode or wire flush with adjacent surface of weld bead.

C. Bolting:

1. Provide stainless steel stud bolts and nuts with heavy aluminum washers for fastening aluminum material.
2. Provide holes required for the connection of adjacent or adjoining work wherever noted on drawings. Locate holes for bolting to supports to a tolerance of 1/16 inch of exact dimensions indicated.

2.03 ALUMINUM STAIRS:

- A. Provide aluminum stairs fabricated from structural aluminum channel stringers, aluminum pipe rails and aluminum treads.

PART 3 - EXECUTION

3.01 GENERAL:

- A. Set and secure in place as indicated. Where bolted connections are used, draw together and draw nuts tightly. Use bolts of lengths required so that they do not project more than 1/4-inch beyond face of nut. Do not use washers unless specified. Provide hexagonal head bolts with hexagonal nuts.

- B. Locate anchors and anchor bolts and build into connecting work.
 - C. Install stairs in accordance with accepted shop drawings.
- 3.02 STAIRS:
- A. Provide structural aluminum angles, struts, closure plates, and brackets indicated.
- 3.03 CORROSION PROTECTION FOR ALUMINUM SURFACES:
- A. Coat aluminum surfaces to be embedded or which will be in contact with concrete with a heavy coat of two part epoxy.
 - B. Where aluminum surfaces come in contact with dissimilar metals, keep the dissimilar metallic surfaces from direct contact by use of neoprene gaskets or washers.
- 3.04 CLOSEOUT ACTIVITIES:
- A. Provide in accordance with Section 017000.

END OF SECTION

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SECTION 055200 ALUMINUM RAILINGS

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. Design, furnish and install handrails, guardrails and railing systems, including connectors, fasteners, and system required accessories.

1.02 REFERENCES:

- A. Aluminum Association (AA):

- 1. Aluminum Association Designation System for Aluminum Finishes
- 2. AAMA 607.1: Voluntary Guide Specification and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum

- B. American Society of Civil Engineers (ASCE):

- 1. 7: Minimum Design Loads for Buildings and Other Structures.

- C. American Society for Testing and Materials (ASTM):

- 1. B210: Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes
- 2. B221/B221M: Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- 3. B241: Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube
- 4. B429: Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube
- 5. C1107: Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
- 6. E935: Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings
- 7. E985: Standard Specification for Permanent Metal Railing Systems and Rails for Buildings

- D. American Welding Society (AWS):

- 1. C5.6: Recommended Practices for Gas Metal Arc Welding

2. D1.1-1.17: Structural Welding Code.

E. Florida building Code (FBC).

F. National Ornamental & Miscellaneous Metals Association (NOMMA):

1. Guideline 1: Joint Finishes.

2. Metal Rail Manual.

1.03 PERFORMANCE/ DESIGN CRITERIA:

A. Design and provide handrail and guardrail system to meet FBC, OSHA and the criteria specified herein. Railing shall be capable of withstanding the following loads without exceeding design allowable stress of materials for handrails, railing anchors and connections.

1. Top rail:

a. Uniform load of 50 pounds per foot applied in any direction.

b. Concentrated load of 200 pounds applied in any direction at any point.

c. Uniform and concentrated loads above need not be assumed to act concurrently.

2. Intermediate rail:

a. Uniform load of 50 pounds per foot applied in any direction. Uniform load above need not be assumed to act concurrently with loads acting on top rail.

B. Thermal movements: Provide adequate expansion within the system to allow for thermal expansion and contraction caused by a temperature change of 120 degrees F to -10 degrees F without buckling or warping, opening of joints, overstressing of components, failure of connections and other detrimental effects.

C. Control of corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.04 SUBMITTALS:

A. Submit the following shop drawings.

1. Show fabrication and installation of handrails and railings assembled from standard components. Include plans, elevations, component details, materials, finishes, connection and joining methods, and mounting details to adjoining work.

2. Identify location and type indicated.

3. Shop drawings shall be stamped by Professional Engineer registered in the State of Florida.
- B. Product Data:
 1. Manufacture's literature.
 2. Assembly and installation instructions.
 - C. Certificates:
 1. Submit certification that the railing system is in compliance with FBC and OSHA
 - D. Operation and Maintenance Data:
 1. Manufacturer's instructions describing procedures for maintaining including cleaning materials, application methods, and precautions as to use of materials which may be detrimental to finish when improperly used.
- 1.05 QUALITY ASSURANCE:
- A. Obtain field measurements prior to preparation of shop drawings and fabrication.
 - B. Handrails provided shall be end products of one manufacturer to achieve standardization for appearance, maintenance and replacement.
 - C. Manufacturer shall have minimum ten years experience specializing in manufacturing products specified in the section.
 - D. Welding Qualification and Certification:
 1. Each welder and welding operator shall be certified by test to perform type of work required in conformance with AWS Structural Welding Code. Testing shall be conducted, and witnessed by an independent testing laboratory.
- 1.06 DELIVERY STORAGE AND HANDLING:
- A. Deliver, store and handle materials in manner preventing damage to finished surfaces.
 - B. Store materials in a dry, well ventilated, weather tight place away from uncured concrete or masonry.
- 1.07 SITE CONDITIONS.
- A. Field verify measurements prior to fabrication and indicate measurements in shop drawings.

PART 2 - PRODUCTS

2.01 ALUMINUM RAILING SYSTEM AND COMPONENTS:

- A. Material: ASTM B429, alloy 6063-T6, Schedule 40, 1-1/2 inch diameter minimum extruded structural pipe or tube rails and schedule 80 posts.
- B. Railings at open-side construction shall consist of two members with posts. Locate intermediate rails between top rail and finish floor as indicated on Drawings.
- C. Provide 1/4 inch thick by 4 inch high or “S” type toe plate except on stairs and where concrete curb provided. Provide 1/4inch clearance above floor level.
- D. Fabrication:
 - 1. Angles, offsets, other changes in alignment, and joining of posts and rails shall be made with welded or mechanically fastened connections. Miter and weld joints by fitting post to top rail and intermediate rail to post, mitering corners, groove welding joints, and grinding smooth. Run top rails continuously over post.
 - 2. Rail splices shall be butted and reinforced by tight fitting interior sleeve not less than 6 inch long.
 - 3. Space posts not more than 5 feet on center. Erect posts plumb in each direction.
 - 4. Fabricate joints which will be exposed to weather so as to exclude water. Provide weep holes at the lowest possible point on all railing system posts.
- E. Anchorage;
 - 1. Railings: Provide concrete anchorage for posts by means of base flange welded to post and anchored to concrete with minimum of with minimum of 4 stainless steel concrete anchors.
 - 2. For posts set on stair or platform stringers, provide base flange welded to post and bolted to stringer with minimum of two 1/2 inch stain less bolts, or weld post to stringer.
- F. Finishes:
 - 1. Aluminum Association Finish Designation: AA-M12A41 Mechanical finish, nonspecular, anodic coating, architectural Class I, clear coating 0.7 mil complying with AAMA 607.1 on exposed surfaces.
 - a. Extruded Components: 0.7 mil anodized.
 - b. Cast Components: 0.4 mil anodized.

2.02 DISSIMILAR METAL:

1. Keep surfaces of dissimilar metal from direct contact by coating the dissimilar metal with a heavy coat of a two part epoxy.
2. Keep surfaces of aluminum components from direct contact with cement or mortar by coating with a heavy coat of a two part epoxy.

2.03 GROUT AND ANCHORING CEMENT:

- A. Nonshrink, nonmetallic, nonstaining and noncorrosive grout premixed and factory packaged. Provide grout conforming to requirements of ASTM C 1107.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Install as shown on Drawings and accepted Shop Drawings.
- B. Set posts plumb and aligned in each direction to within 1/4 inch in 12 feet.
- C. Set rails horizontal or parallel to rake of steps to within 1/4 inch in 12 feet.
- D. Fit exposed connections together to form tight, hairline joints.
- E. Provide anchorage devices and fasteners for securing handrails and railings and for transferring loads structures.
- F. Provide mechanical joints for permanently connecting railing components at nonwelded connections.

3.02 CLEANING:

- A. Wash thoroughly using clean water and soap, rinse with clean water.
- B. Do not use acid solution, steel wool or other harsh abrasive.
- C. When stain remains after washing, remove finish and restore in accordance with manufacturer's instructions.

3.03 PROTECTION:

- A. Protect surfaces of completed installations to prevent damage during construction activities.

3.04 REPAIR OF DEFECTIVE WORK:

- A. Remove stained or otherwise defective work and replace with no additional cost to Owner.

END OF SECTION

SECTION 055300 ALUMINUM GRATING

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. Provide metal grating as indicated and in compliance with Contract Documents.
- B. Furnish all labor, materials, equipment and incidentals necessary to install the products specified.

1.02 REFERENCES:

- A. American Society for Testing and Materials International (ASTM):
 - 1. B26: Specification for Aluminum-Alloy Sand Castings.
 - 2. B209: Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - 3. B221: Specification for Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
 - 4. B247: Specification for Aluminum and Aluminum-Alloy Die Forgings, Hand Forgings and Rolled Ring Forgings.
- B. American Welding Society (AWS):
 - 1. D1.2: Structural Welding Code - Aluminum.
- C. National Association of Architectural Metal Manufacturers (NAAMM):
 - 1. MBG 531: Metal Bar Grating Manual.
 - 2. MBG 533: Welding Specifications for Fabrication of Steel, Aluminum and Stainless Bar Grating.
- D. Aluminum Association:
 - 1. Aluminum Association Designation System for Aluminum Finishes
 - 2. AAMA 607.1: Voluntary Guide Specification and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum

1.03 DESIGN CRITERIA:

- A. Grating

1. Provide grating of minimum depth shown on contract drawings, not exceeding manufacturer's maximum recommended span, and meeting the following load and deflection criteria.
 - a. 100psf uniform live load or 300 pounds concentrated live load, whichever produces maximum stress.
 - b. 1/4 inch maximum deflection under uniform live load of 100 psf.
 - c. 12,000 psi maximum flexural stress.

1.04 SUBMITTALS:

A. Submit the following shop drawings.

1. Detail shop drawings indicating:
 - a. Dimensions.
 - b. Sectional assembly.
 - c. Location and identification mark.
 - d. Connections and fastening methods.
 - e. Size and location of supporting frames required.
 - f. Materials of construction.
 - g. Installation instructions.
2. Catalog data and design tables showing limits for span length and deflection under load.

1.05 QUALITY ASSURANCE:

A. Obtain field measurements prior to preparation of shop drawings and fabrication.

B. Aluminum:

1. Weld with gas metal arc (GMA) or gas tungsten arc (GTA) processes in accordance with manufacturer's recommendations as accepted and in accordance with recommendations of AWS D1.2.

1.06 DELIVERY STORAGE AND HANDLING:

A. Store to avoid damage.

B. Remove material that has become damaged as to be unfit for use.

- C. Identify and match-mark all materials, items, and fabrications for installation and field assembly.

1.07 FIELD MEASUREMENTS:

- A. Verify dimensions and make any field measurements necessary and be fully responsible for accuracy and layout of the work.
- B. Review the Contract Drawings and report any discrepancies to the Engineer for clarification prior to starting fabrication.

PART 2 - PRODUCTS

2.01 ALUMINUM BAR GRATING:

- A. Manufacturers:
 - 1. IKG Borden Metal Products Co.; Type B.
 - 2. Ohio Gratings, Inc.; Type SG Series.
 - 3. McNichols Co.; GAL Series.
- B. Provide shop-fabricated grating in accordance with latest edition of Metal Bar Grating Manual.
- C. Provide aluminum alloy 6063-T6 or alloy 6063-T1 grating material.
- D. Provide accessories such as frames, support angles, and fasteners to complete work.
- E. Provide bearing bars spaced 1-3/16-inch center to center with cross bars pressure locked on 4 inch centers.
- F. Apply bearing bar banding at ends of grating sections and at fixture or pipe openings where two or more bearing bars are cut.
- G. Anchor grating to support members using stainless steel saddle clips or G-Clips. Minimum of 4 per panel.
- H. Provide trim banding or load carrying banding on edges and cutouts. Bearing bar ends not resting on support shall have load carrying banding sized to span opening. Minimum banding thickness shall match bearing bars. Banding shall be flush with top of grating. Banding depth shall be 1/4 inch less than the depth of bearing bar. Weld banding to grating in accordance with NAAMM requirements.
- I. Panels shall have minimum bearing equal to depth of bearing bar, but not less than 1 inch, including removal panels after being offset between support angles or other restraints.

J. Minimum bearing bar sizes shall be as noted:

Maximum Clear Span (feet-inch)	Minimum Bar Size (inch)
3-8	1 x 3/16
4-4	1-1/4 x 3/16
4-11	1-1/2 x 3/16
6-1	2 x 3/16
7-3	2-1/2 x 3/16

K. Maximum Clearances:

1. 1/4 inch from vertical metal section.
2. 1/2 inch from concrete.
3. 1/4 inch between sections and at ends.

PART 3 - EXECUTION

3.01 EXAMINATION:

- A. Upon receipt of material at job site, inspect all materials for shipping damage. Damaged items shall be replaced at no cost to Owner.
- B. Examine supports for size, layout and alignment. Surface shall be free of debris.
- C. Correct defects considered detrimental to proper installation.

3.02 PROTECTION:

- A. Coat aluminum surfaces to be embedded or which come in contact with concrete with a heavy coat of two part epoxy.

3.03 INSTALLATION:

- A. Install and make connections in accordance with accepted submittals and manufacturer's written instructions.
- B. Install materials accurately in location and elevation, level and plumb. Field fabricate as necessary for accurate fit.
- C. Coordinate and furnish anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction.

END OF SECTION

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DIVISION 09 – FINISHES

- 099000 Painting and Coating
- 099720 Calcium Aluminate Lining for Concrete
- 099761 Fusion-Bonded Epoxy Linings and Coatings

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SECTION 099000 PAINTING AND COATING

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes materials and application of painting and coating systems for the following surfaces:

- A. Submerged metal.
- B. Exposed metal.
- C. Buried metal.
- D. Fusion-bonded epoxy coated steel.
- E. Concrete

1.02 SUBMITTALS

- A. Submit shop drawings in accordance with the General Conditions, Section 013300, and the following.
- B. Submit manufacturer's data sheets showing the following information:
 - 1. Percent solids by volume.
 - 2. Minimum and maximum recommended dry-film thickness per coat for prime, intermediate, and finish coats.
 - 3. Recommended surface preparation.
 - 4. Recommended thinners.
 - 5. Statement verifying that the specified prime coat is recommended by the manufacturer for use with the specified intermediate and finish coats.
 - 6. Application instructions including recommended equipment and temperature limitations.
 - 7. Curing requirements and instructions.
- C. Submit color swatches.
- D. Submit certificate and supplier's data sheets identifying the type and gradation of abrasives used for surface preparation. The certificate or data sheets shall specifically

identify that the abrasives comply with federal and state of Florida regulations for materials to be used for abrasive blasting for surface preparation for paints and coatings.

- E. Submit material safety data sheets for each coating.

PART 2 - MATERIALS

2.01 PAINTING AND COATING SYSTEMS

The following index lists the various painting and coating systems by service and generic type:

PAINT COATINGS SYSTEM INDEX

No.	Title	Generic Coating
Submerged Metal Coating Systems		
1.	Submerged Metal, Raw Water (Non-potable) or Raw Sewage	Epoxy
6.	Submerged Metal, Raw Water (Non-potable) or Grit Slurries	Epoxy resin/ceramic
7.	Submerged Metal, Potable or Non-potable Water	Epoxy
Exposed Metal Coating Systems		
10.	Exposed Metal, Corrosive Environment	High-build epoxy (two-coat system) with polyurethane topcoat
Buried Metal Coating Systems		
21.	Buried Metal	Epoxy
Concrete and Masonry Coating Systems		
32.	Exposed Concrete and Masonry, Atmospheric Weathering Environment	Acrylic
PVC, CPVC, and FRP Coating Systems		
41.	PVC, CPVC, and FRP, Ultraviolet Exposure	Polyurethane

These systems are specified in detail in the following paragraphs. For each coating, the required surface preparation, prime coat, intermediate coat (if required), topcoat, and coating thicknesses are described. Mil thicknesses shown are minimum dry-film thicknesses.

2.02 SUBMERGED METAL COATING SYSTEMS

- A. System No. 1--Submerged Metal—Raw Water (Non-potable) or Raw Sewage:

Type: Epoxy having a minimum volume solids of 80%.

Service Conditions: For use with metal pipes or structures (such as scum troughs, sluice gates, or piping) alternately submerged in raw sewage or raw water (nonpotable) and exposed to a moist saturated hydrogen sulfide atmosphere, as in raw sewage wet wells. Minimum temperature resistance of the coating shall be 140°F for moist heat conditions.

Surface Preparation: SSPC SP-10.

Prime Coat: Devoe Bar-Rust 233H, 8 mils; Tnemec 104-1211, 8 mils; or equal.

Finish Coat: Devoe Bar-Rust 233H, 8 mils; Tnemec 104-ABO5, 8 mils; or equal.

B. System No. 6--Submerged Metal, Raw Sewage or Grit Slurries:

Type: Two-component epoxy resin/ceramic having a 100% volume solids and having the following characteristics:

Tensile shear adhesion (ASTM D1002)	2,500 psi (min)
Shore D hardness (minimum)	85
Abrasion resistance (ASTM D4060)	0.8 mg (max) loss per 1,000 cycles

Service Conditions: For use as a lining for pump volutes, pump impellers, piping, valves, and heat exchanger tubes, subject to severe abrasion service.

Surface Preparation: SSPC SP-10.

Coating System: Apply two coats (of two different colors) to a minimum thickness of 10 mils per coat. Minimum total coating thickness shall be 20 mils. Product: THORTEX Cerami-Tech C.R. as applied by Western Industrial Technology, Inc., Fullerton, California, or Paragon Industries, Horsham, Pennsylvania; Belzona 1341; or equal.

C. System No. 7--Submerged Metal, Potable or Non-potable Water:

Type: Epoxy.

Service Conditions: For use with structures, valves, piping, or equipment immersed in potable or non-potable water.

Surface Preparation: SSPC SP-10.

Coating System: Apply the manufacturer's recommended number of coats to attain the specified minimum dry-film coating thickness. Products: Devoe Bar-Rust 233H, Tnemec 100, Scotchkote 323, Tnemec N140, Sherwin-Williams Tank Clad HS B62-80, Scotchkote 306, PPG AQUAPON® LT NSF Low Temperature Epoxy Coatings 95-172,

Carboline Carboguard 891, PPG Amercoat 395FD, Carboline Plasite 7133 or 9133, Keysite 740, or equal; 16 mils total. Color of topcoat: white. Each coat shall be different color than the one preceding it.

2.03 EXPOSED METAL COATING SYSTEMS

A. System No. 10--Exposed Metal, Corrosive Environment:

Type: High-build epoxy intermediate coat having a minimum volume solids of 60%, with an inorganic zinc prime coat and a pigmented polyurethane finish coat having a minimum volume solids of 52%.

Service Conditions: For use with metal structures or pipes subjected to water condensation; chemical fumes, such as hydrogen sulfide; salt spray; and chemical contact.

Surface Preparation: SSPC SP-10.

Prime Coat: Self-curing, two-component inorganic zinc-rich coating recommended by the manufacturer for over-coating with a high-build epoxy finish coat. Minimum zinc content shall be 12 pounds per gallon. Apply to a thickness of 3 mils. Products: Tnemec 90E-92, Devoe Catha-Coat 304 or 304V, International Interzinc 22HS, PPG Dimetcote 9HS, Carboline Carbozinc 11 or 11HS, Sherwin-Williams Zinc-Clad II Plus, PPG METALHIDE® 28 Inorganic Zinc-Rich Primer 97-672, or equal.

Intermediate Coat: Tnemec 104, Devoe Devran 224HS or 231, International Interseal 670HS, PPG Amercoat 385, Carboline Carboguard 890, Sherwin-Williams Macropoxy 646 B58-600, PPG PITT-GUARD® Direct-to-Rust Epoxy Mastic Coating 97-145 series, or equal; 5 mils.

Finish Coat: Two-component pigmented acrylic or aliphatic polyurethane recommended by the manufacturer for overcoating a high-build epoxy coating. Apply to a thickness of at least 2 mils. Products: Tnemec Series 1075, Devoe Devthane 379, International Interline 990HS, PPG Amercoat 450HS, Carboline 133HB or 134HG, Sherwin-Williams Hi-Solids Polyurethane B65-300, PPG PITTHANE® Ultra Gloss Urethane Enamel 95-812 series, or equal.

2.04 BURIED METAL COATING SYSTEMS

A. System No. 21--Buried Metal:

Type: High solids epoxy or phenolic epoxy having a minimum volume solids of 80% (ASTM D2697).

Service Conditions: Buried metal, such as valves, flanges, bolts, nuts, structural steel, and fittings.

Surface Preparation: SSPC SP-10.

Coating System: Apply three or more coats of PPG Amerlock 400 or 400VOC, Tnemec 104HS or 80, Devoe Bar-Rust 233H, Carboline 890LT, Sherwin-Williams Tank Clad HS B62-80 series, or equal; 30 mils total. Maximum thickness of an individual coating shall not exceed the manufacturer's recommendation.

System No. 22 may be substituted for System No. 21.

B. System No. 22--Buried Metal:

Type: Two-component polyurethane having the following characteristics:

1. Coatings shall contain no tar or hydrocarbon additives or solvent.
2. Hardness (ASTM D2240, Shore "D"): 65 to 85.
3. Abrasion Resistance (ASTM D4060, Taber CS-17): 20 mg (maximum) loss per 1,000 cycles or a maximum loss of 65 mg per ASTM C501.

Service Conditions: Buried metal, such as valves, flanges, bolts, nuts, structural steel, and fittings.

Surface Preparation: SSPC SP-10.

Coating System: Madison Chemical Industries, Inc. Corrocote II TX or Futura Coatings, Inc., Futura-Thane 527, Corrocote Plus (CM) or equal. Apply to a total thickness of 50 mils.

2.05 CONCRETE AND MASONRY COATING SYSTEMS

A. System No. 32--Exposed Concrete and Masonry, Atmospheric Weathering Environment:

Type: Acrylic enamel or acrylic latex having a minimum volume solids of 36%.

Service Conditions: Exposed concrete or masonry exposed to normal sunlight and weathering.

Surface Preparation: In accordance with Part 3, subsection on "Preparation of Concrete and Masonry Surfaces To Be Coated."

Prime Coat: Water-borne acrylic or cementitious acrylic emulsion having a minimum solids volume of 40%. Apply one coat of Carboline Sanitile 100 to fill all voids, pores, and cracks; Devoe Bloxfill 4000; PPG Amerlock 400 BF; Tnemec 54-562 Masonry Filler; International Intercryl 320WB; Sherwin-Williams Heavy Duty Block Filler B42W46; PPG SPEEDHIDE® Int/Ext Acrylic Masonry Block Filler 6-15; or equal.

Finish Coat: Two coats of Carboline 3359, two coats of Devoe 4208, two coats of PPG Amercoat 220, two coats Tnemec Series 6, two coats of International Intercryl 530WB 520, Sherwin-Williams Metalatex Semi-Gloss B42 series, two coats of PPG Int/Ext

Semi-Gloss Acrylic Metal Finish 7-374 series, or equal. Apply to a thickness of 2 mils per coat.

Provide non-slip additive for areas designated to have a non-slip coating for pedestrian traffic.

2.06 PVC COATING SYSTEM

A. System No. 41—PVC Ultraviolet Exposure or Color Coding:

Type: Epoxy primer with a minimum volume solids of 54% and a pigmented polyurethane enamel having a minimum volume solids of 52%.

Service Conditions: Color coding of PVC exposed to sunlight.

Surface Preparation: SSPC SP-1. Then lightly abrade the surface with medium-grain sandpaper.

Prime Coat: One coat of Tnemec Series N69 Epoxoline, International 7510, PPG Amercoat 385, Devoe Devran 224HS, Sherwin-Williams Macropoxy 646 B58 series, Carboline 888 or 890, PPG PITT-GUARD® Direct-to-Rust Epoxy Mastic Coating 97-145 series, or equal. Apply to a minimum dry-film thickness of 4 mils.

Finish Coat: One coat of Tnemec Series 1075, International Interthane 990HS, PPG Amercoat 450HS, Devoe Devran 379, Carboline 133HB or 134HG, Sherwin-Williams Hi-Solids Polyurethane B65-300 series, PPG PITTHANE® Ultra Gloss Urethane Enamel 95-812 series, or equal. Apply to a minimum dry-film thickness of 3 mils.

2.07 ABRASIVES FOR SURFACE PREPARATION

A. Abrasives used for preparation of ferrous (excluding stainless steel) surfaces shall be one of the following:

1. 16 to 30 or 16 to 40 mesh silica sand or mineral grit.
2. 20 to 40 mesh garnet.
3. Crushed iron slag, 100% retained on No. 80 mesh.
4. SAE Grade G-40 or G-50 iron or steel grit.

B. In the above gradations, 100% of the material shall pass through the first stated sieve size and 100% shall be retained on the second stated sieve size.

2.08 ORGANIC ZINC PRIMER FOR FIELD TOUCH-UP AND SHOP COATING

Where shop-applied inorganic zinc primers cannot be used because of volatile organic compound (VOC) regulations, the organic zinc primer described in System No. 18 may be substituted for the specified inorganic zinc primers.

PART 3 - EXECUTION

3.01 WEATHER CONDITIONS

- A. Do not paint in the rain, wind, snow, mist, and fog or when steel or metal surface temperatures are less than 5°F above the dew point.
- B. Do not apply paint when the relative humidity is above 85%.
- C. Do not paint when temperature of metal to be painted is above 120°F.
- D. Do not apply alkyd, inorganic zinc, silicone aluminum, or silicone acrylic paints if air or surface temperature is below 40°F or expected to be below 40°F within 24 hours.
- E. Do not apply epoxy, acrylic latex, and polyurethane paints on an exterior or interior surface if air or surface temperature is below 60°F or expected to drop below 60°F in 24 hours.

3.02 SURFACE PREPARATION PROCEDURES

- A. Remove oil and grease from metal surfaces in accordance with SSPC SP-1. Use clean cloths and cleaning solvents and wipe dry with clean cloths. Do not leave a film or greasy residue on the cleaned surfaces before abrasive blasting.
- B. Remove weld spatter and weld slag from metal surfaces and grind smoothly rough welds, beads, peaked corners, and sharp edges including erection lugs in accordance with SSPC SP-2 and SSPC SP-3. Grind 0.020 inch (minimum) off the weld caps on pipe weld seams. Grind outside sharp corners, such as the outside edges of flanges, to a minimum radius of 1/4 inch.
- C. Do not abrasive blast or prepare more surface area in one day than can be coated in one day; prepare surfaces and apply coatings the same day. Remove sharp edges, burrs, and weld spatter.
- D. Do not abrasive blast PVC piping or equipment. Do not abrasive blast epoxy- or enamel-coated pipe that has already been factory coated, except to repair scratched or damaged coatings.
- E. For carbon steel, do not touch the surface between the time of abrasive blasting and the time the coating is applied. Apply coatings within two hours of blasting or before any rust bloom forms.
- F. Surface preparation shall conform with the SSPC specifications as follows:

Solvent Cleaning	SP-1
Hand Tool Cleaning	SP-2
Power Tool Cleaning	SP-3
White Metal Blast Cleaning	SP-5
Commercial Blast Cleaning	SP-6
Brush-Off Blast Cleaning	SP-7
Pickling	SP-8
Near-White Blast Cleaning	SP-10
Power Tool Cleaning to Bare Metal	SP-11
Surface Preparation and Cleaning of Steel and Other Hard Materials by High- and Ultrahigh-Pressure Water Jetting Prior to Recoating	SP-12
Surface Preparation of Concrete	SP-13

- G. Wherever the words “solvent cleaning,” “hand tool cleaning,” “wire brushing,” or “blast cleaning” or similar words are used in these specifications or in paint manufacturer’s specifications, they shall be understood to refer to the applicable SSPC (Society for Protective Coatings), surface preparation specifications listed above.
- H. Dust blasting is defined as cleaning the surface through the use of very fine abrasives, such as siliceous or mineral abrasives, 80 to 100 mesh. Apply a fine etch to the metal surface to clean the surface of any contamination or oxide and to provide a surface profile for the coating.
- I. Brush-off blasting of concrete and masonry surfaces is defined as opening subsurface holes and voids and etching the surface for a coating to bond.
- J. For carbon steel surfaces, after abrasive blast cleaning, the height of the surface profile shall be 2 to 3 mils. Verify the surface profile by measuring with an impresser tape acceptable to the Owner’s Representative. Perform a minimum of one test per 100 square feet of surface area. Testing shall be witnessed by the Owner’s Representative. The impresser tape used in the test shall be permanently marked with the date, time, and locations where the test was made. Test results shall be promptly presented to the Owner’s Representative.
- K. Do not apply any part of a coating system before the Owner’s Representative has reviewed the surface preparation. If coating has been applied without this review, if directed by the Owner’s Representative, remove the applied coating by abrasive blasting and reapply the coat in accordance with this specification.

3.03 ABRASIVE BLAST CLEANING

- A. Use dry abrasive blast cleaning for metal surfaces. Do not use abrasives in automatic equipment that have become contaminated. When shop or field blast cleaning with handheld nozzles, do not recycle or reuse blast particles.
- B. After abrasive blast cleaning and prior to application of coating, dry clean surfaces to be coated by dusting, sweeping, and vacuuming to remove residue from blasting. Apply the specified primer or touch-up coating within the period of an eight-hour working day. Do not apply coating over damp or moist surfaces. Re-clean prior to application of primer or touch-up coating any blast cleaned surface not coated within said eight-hour period.
- C. Keep the area of the work in a clean condition and do not permit blasting particles to accumulate and constitute a nuisance or hazard.
- D. During abrasive blast cleaning, prevent damage to adjacent coatings. Schedule blast cleaning and coating such that dust, dirt, blast particles, old coatings, rust, mill scale, etc., will not damage or fall upon wet or newly coated surfaces.

3.04 PREPARATION OF CONCRETE AND MASONRY SURFACES TO BE COATED

- A. Surface preparation of concrete and masonry surfaces shall be in accordance with SSPC SP-13 and the following.
- B. Do not apply coating until concrete has cured at least 30 days. Finish concrete surfaces per Section 033000. Do not use curing compound on surfaces that are to be coated.
- C. Concrete and masonry surfaces on which coatings are to be applied shall be of even color, gray or gray-white. The surface shall have no pits, pockets, holes, or sharp changes of surface elevation. Scrubbing with a stiff-bristle fiber brush shall produce no dusting or dislodging of cement or sand. Sprinkling water on the surface shall produce no water beads or standing droplets. Concrete and masonry shall be free of laitance and slick surfaces.
- D. Detergent clean the concrete or masonry surface with trisodium phosphate per ASTM D4258. Then sandblast surfaces (brush-off blast). Floor slabs may be acid etched per ASTM D4260 in lieu of sandblasting. After sandblasting, wash surfaces with water to remove dust and salts, per ASTM D4258 or D4261. The grain of the concrete surface to touch shall not be rougher than that of No. 10 mesh sand.
- E. Prior to coating concrete, plaster, and masonry with System No. 32; determine the presence of capillary moisture per ASTM D4263, except as modified below. Tape a 4-foot by 4-foot sheet of polyethylene plastic to the concrete surface to be coated. Allow the plastic sheet to remain in place at least 24 hours. After the specified time has elapsed, remove the plastic sheet and visually examine both the underside of the plastic sheet and the concrete surface beneath it. There shall be no indication of moisture on either surface. If moisture is indicated, allow additional curing time for the concrete and then retest. Provide one test sheet for every 300 square feet of concrete surface to be coated.

For walls, provide one test sheet for each 10 feet (or fraction thereof) of vertical rise in all elevations starting within 12 inches of the floor or base slab.

- F. Acceptance criteria for concrete surfaces shall be in accordance with SSPC SP-13, Table 1, "Severe Service."
- G. Do not apply coatings to concrete when the concrete is outgassing. Apply coatings only when the concrete surface temperature is stable, not rising.

3.05 PROCEDURES FOR ITEMS HAVING SHOP-APPLIED PRIME COATS

- A. After application of primer to surfaces, allow coating to cure for a minimum of two hours before handling to minimize damage.
- B. When loading for shipment to the project site, use spacers and other protective devices to separate items to prevent damaging the shop-primed surfaces during transit and unloading. If wood spacers are used, remove wood splinters and particles from the shop-primed surfaces after separation. Use padded chains or ribbon binders to secure the loaded items and minimize damage to the shop-primed surfaces.
- C. Cover shop-primed items 100% with protective coverings or tarpaulins to prevent deposition of road salts, fuel residue, and other contaminants in transit.
- D. Handle shop-primed items with care during unloading, installation, and erection operations to minimize damage. Do not place or store shop-primed items on the ground or on top of other work unless ground or work is covered with a protective covering or tarpaulin. Place shop-primed items above the ground upon platforms, skids, or other supports.

3.06 FIELD TOUCH-UP OF SHOP-APPLIED PRIME COATS

- A. Remove oil and grease surface contaminants on metal surfaces in accordance with SSPC SP-1. Use clean rags wetted with a degreasing solution, rinse with clean water, and wipe dry.
- B. Remove dust, dirt, salts, moisture, chalking primers, or other surface contaminants that will affect the adhesion or durability of the coating system. Use a high-pressure water blaster or scrub surfaces with a broom or brush wetted with a solution of trisodium phosphate, detergent, and water. Before applying intermediate or finish coats to inorganic zinc primers, remove any soluble zinc salts that have formed by means of scrubbing with a stiff bristle brush. Rinse scrubbed surfaces with clean water.
- C. Remove loose or peeling primer and other surface contaminants not easily removed by the previous cleaning methods in accordance with SSPC SP-7. Take care that remaining primers are not damaged by the blast cleaning operation. Remaining primers shall be firmly bonded to the steel surfaces with blast cleaned edges feathered.

- D. Remove rust, scaling, or primer damaged by welding or during shipment, storage, and erection in accordance with SSPC SP-10. Take care that remaining primers are not damaged by the blast cleaning operation. Areas smaller than 1 square inch may be prepared per SSPC SP-11. Remaining primers shall be firmly bonded to the steel surfaces with cleaned edges feathered.
- E. Use repair procedures on damaged primer that protects adjacent primer. Blast cleaning may require the use of lower air pressure, smaller nozzles, and abrasive particle sizes, short blast nozzle distance from surface, shielding, and/or masking.
- F. After abrasive blast cleaning of damaged and defective areas, remove dust, blast particles, and other debris by dusting, sweeping, and vacuuming; then apply the specified touch-up coating.
- G. Surfaces that are shop primed with inorganic zinc primers shall receive a field touch-up of organic zinc primer cover scratches or abraded areas.
- H. Other surfaces that are shop primed shall receive a field touch-up of the same primer used in the original prime coat.

3.07 PAINTING SYSTEMS

- A. All materials of a specified painting system, including primer, intermediate, and finish coats, shall be produced by the same manufacturer. Thinners, cleaners, driers, and other additives shall be as recommended by the paint manufacturer for the particular coating system.
- B. Deliver paints to the jobsite in the original, unopened containers.

3.08 PAINT STORAGE AND MIXING

- A. Store and mix materials only in areas designated for that purpose by the Owner's Representative. The area shall be well-ventilated, with precautionary measures taken to prevent fire hazards. Post "No Smoking" signs. Storage and mixing areas shall be clean and free of rags, waste, and scrapings. Tightly close containers after each use. Store paint at an ambient temperature from 50°F to 100°F.
- B. Prepare multiple-component coatings using all of the contents of the container for each component as packaged by the paint manufacturer. Do not use partial batches. Do not use multiple-component coatings that have been mixed beyond their pot life. Provide small quantity kits for touch-up painting and for painting other small areas. Mix only the components specified and furnished by the paint manufacturer. Do not intermix additional components for reasons of color or otherwise, even within the same generic type of coating.

3.09 PROCEDURES FOR THE APPLICATION OF COATINGS

- A. Conform to the requirements of SSPC PA-1. Follow the recommendations of the coating manufacturer including the selection of spray equipment, brushes, rollers, cleaners, thinners, mixing, drying time, temperature and humidity of application, and safety precautions.
- B. Stir, strain, and keep coating materials at a uniform consistency during application. Power mix components. For multiple component materials, premix each component before combining. Apply each coating evenly, free of brush marks, sags, runs, and other evidence of poor workmanship. Use a different shade or tint on succeeding coating applications to indicate coverage where possible. Finished surfaces shall be free from defects or blemishes.
- C. Do not use thinners unless recommended by the coating manufacturer. If thinning is allowed, do not exceed the maximum allowable amount of thinner per gallon of coating material. Stir coating materials at all times when adding thinner. Do not flood the coating material surface with thinner prior to mixing. Do not reduce coating materials more than is absolutely necessary to obtain the proper application characteristics and to obtain the specified dry-film thicknesses.
- D. Remove dust, blast particles, and other debris from blast cleaned surfaces by dusting, sweeping, and vacuuming. Allow ventilator fans to clean airborne dust to provide good visibility of working area prior to coating applications. Remove dust from coated surfaces by dusting, sweeping, and vacuuming prior to applying succeeding coats.
- E. Apply coating systems to the specified minimum dry-film thicknesses as determined per SSPC PA-2.
- F. Apply primer immediately after blast cleaning and before any surface rusting occurs, or any dust, dirt, or any foreign matter has accumulated. Re-clean surfaces by blast cleaning that have surface colored or become moist prior to coating application.
- G. Apply a brush coat of primer on welds, sharp edges, nuts, bolts, and irregular surfaces prior to the application of the primer and finish coat. Apply the brush coat prior to and in conjunction with the spray coat application. Apply the spray coat over the brush coat.
- H. Before applying subsequent coats, allow the primer and intermediate coats to dry for the minimum curing time recommended by the manufacturer. In no case shall the time between coats exceed the manufacturer's recommendation.
- I. Each coat shall cover the surface of the preceding coat completely, and there shall be a visually perceptible difference in applied shade or tint of colors.
- J. Applied coating systems shall be cured at 75°F or higher for 48 hours. If temperature is lower than 75°F, curing time shall be in accordance with printed recommendations of the manufacturer, unless otherwise allowed by the Owner's Representative.

- K. Assembled parts shall be disassembled sufficiently before painting or coating to ensure complete coverage by the required coating.

3.10 SURFACES NOT TO BE COATED

Do not paint the following surfaces unless otherwise noted in the drawings or in other specification sections. Protect during the painting of adjacent areas:

- A. Concrete walkways.
- B. Mortar-coated pipe and fittings.
- C. Stainless steel.
- D. Metal letters.
- E. Glass.
- F. Roofings.
- G. Fencing.
- H. Electrical fixtures except for factory coatings.
- I. Nameplates.
- J. Grease fittings.
- K. Brass and copper, submerged.
- L. Buried pipe, unless specifically required in the piping specifications.
- M. Fiberglass items, unless specifically required in the FRP specifications.
- N. Aluminum handrail, stairs, and grating.

3.11 PROTECTION OF SURFACES NOT TO BE PAINTED

Remove, mask, or otherwise protect hardware, lighting fixtures, switch plates, aluminum surfaces, machined surfaces, couplings, shafts, bearings, nameplates on machinery, and other surfaces not intended to be painted. Provide drop cloths to prevent paint materials from falling on or marring adjacent surfaces. Protect working parts of mechanical and electrical equipment from damage during surface preparation and painting process. Mask openings in motors to prevent paint and other materials from entering the motors.

3.12 SURFACES TO BE COATED

The exact coating to be applied in any location is not designated by the descriptive phrases in the coating system titles such as “corrosive environment,” “buried metal,” or “submerged metal.” Coat surfaces with the specific coating systems as described below:

- A. Coat mechanical equipment, such as pumps, blowers, clarifier mechanisms, as described in the various mechanical equipment specifications. Color of finish coat shall match the color of the connecting piping.
- B. Coat aboveground and exposed piping or piping in vaults and structures as described in the Piping Schedule in the drawings. Color of finish coat shall be as shown in the Piping Schedule in the drawings.
- C. Coat valves as described in the various valve specifications. Aboveground valves, or valves in vaults and structures, shall match the color of the connecting piping.
- D. Coating Schedule:

Surface or Item	Coating System No.
Generator / Electrical Structure Exterior Walls	32
Top of Existing Pump Station Slab (Non-Slip)	32

- E. Submit swatches to Owner for color selection.

3.13 DRY-FILM THICKNESS TESTING

- A. Measure coating thickness specified for carbon steel surfaces with a magnetic-type dry-film thickness gauge in accordance with SSPC PA-2. Provide certification that the gauge has been calibrated by a certified laboratory within the past six months. Provide dry-film thickness gauge as manufactured by Mikrotest or Elcometer.
- B. Test the finish coat of metal surfaces (except zinc primer and galvanizing) for holidays and discontinuities with an electrical holiday detector, low-voltage, wet-sponge type. Provide measuring equipment. Provide certification that the gauge has been calibrated by a certified laboratory within the past six months. Provide detector as manufactured by Tinker and Razor or K-D Bird Dog.
- C. Check each coat for the correct dry-film thickness. Do not measure within eight hours after application of the coating.
- D. For metal surfaces, make five separate spot measurements (average of three readings) spaced evenly over each 100 square feet of area (or fraction thereof) to be measured. Make three readings for each spot measurement of either the substrate or the paint. Move the probe or detector a distance of 1 to 3 inches for each new gauge reading. Discard any

unusually high or low reading that cannot be repeated consistently. Take the average (mean) of the three readings as the spot measurement. The average of five spot measurements for each such 100-square-foot area shall not be less than the specified thickness. No single spot measurement in any 100-square-foot area shall be less than 80%, nor more than 120%, of the specified thickness. One of three readings which are averaged to produce each spot measurement may underrun by a greater amount as defined by SSPC PA-2.

- E. Perform tests in the presence of the Owner's Representative.

3.14 REPAIR OF IMPROPERLY COATED SURFACES

If the item has an improper finish color or insufficient film thickness, clean and topcoat the surface with the specified paint material to obtain the specified color and coverage. Sandblast or power-sand visible areas of chipped, peeled, or abraded paint, feathering the edges. Then prime and finish coat in accordance with the specifications. Work shall be free of runs, bridges, shiners, laps, or other imperfections.

3.15 CLEANING

- A. During the progress of the work, remove discarded materials, rubbish, cans, and rags at the end of each day's work.
- B. Thoroughly clean brushes and other application equipment at the end of each period of use and when changing to another paint or color.
- C. Upon completion of painting work, remove masking tape, tarps, and other protective materials, using care not to damage finished surfaces.

END OF SECTION

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SECTION 099720 CALCIUM ALUMINATE LINING FOR CONCRETE

PART 1 - GENERAL

1.01 DESCRIPTION

This section provides details for furnishing and installing the SewperCoat® lining system where shown on the drawings for protection of concrete structures against hydrogen sulfide corrosion.

1.02 SUBMITTALS

- A. Submit shop drawings in accordance with the General Conditions, Section 013300, and the following.
- B. The Contractor shall furnish detailed and complete data pertaining to the surfaces of the structure to be rehabilitated, the rehabilitation product, surface preparation and installation to the engineer for approval. At the request of the Engineer, the Contractor shall test for adverse chemical conditions that may hinder overall product performance.
- C. Submit manufacturer's data sheets showing the following information:
 - 1. Provide documentation that the material has a minimum 5-year history in the reconstruction of sanitary sewer structures.
 - 2. Chemical composition of coating compound.
 - 3. Number of coats required to give the specified thickness.
 - 4. Minimum recommended thickness per coat.
 - 5. Recommended surface preparation.
 - 6. Recommended surface tensile strength of the concrete surface.
 - 7. Application instructions including recommended equipment and temperature limitation.
 - 8. Curing requirements and instructions.
- D. Submit certificate and supplier's data sheets identifying the type and gradation of abrasives used for surface preparation. The certificate or data sheets shall specifically identify that the abrasives comply with federal and state of Florida regulations for materials to be used for abrasive blasting for surface preparation for paints and coatings.
- E. Submit material safety data sheets for each coating.

- F. Submit a work plan.
- G. A safety plan. It is the contractor's responsibility to comply with OSHA standards and all regulations pertaining to the work including confined space entry.

PART 2 - MATERIALS

2.01 PRODUCTS

- A. Lining material shall be a prepackaged mortar mix, including all cement, aggregates, and any required additives. The Contractor only shall be required to add the proper amount of potable water so as to produce concrete suitable for spray application. Do not add portland cement, other aggregates, or any admixtures whatsoever to lining material. Typical package weights shall not be less than 50 lbs and shall be identical for all material furnished on this project.
- B. The chemical composition of the cement portion as well as the aggregates of the mortar mix shall be as follows:

Al_2O_3	CaO	$FeO + Fe_2O_3$	SiO_2
39-44%	35-39%	9-14%	5-7%

- C. The design properties of the mortar mix shall be as follows:

Compressive Strength (ASTM C109)	> 7,000 psi	24 hours
Flexural Strength (ASTM C293)	> 1,200 psi	24 hours
Splitting Tensile Strength (ASTM C496)	> 1,400 psi	28 days
Bond Strength/Slant Shear (ASTM C882)	> 800 psi	24 hours
Shrinkage at 28 days (ASTM C596)	< 0.08% cured @ 90% relative humidity	
Freeze/Thaw after 300 Cycles (ASTM C666)	No visible damage after 300 cycles	

- D. The mortar mix shall be either "SewperCoat PG" or "SewperCoat 2000HS Regular", both as manufactured by Lafarge Calcium Aluminates, Inc. - Chesapeake, Virginia.
- E. Mortar mix must have at least five (5) years of successful performance in similar applications and be supplied by an ISO 9001 certified manufacturer. Manufacturer's ISO 9001 certificate shall be submitted to Engineer and Owner.

- F. In addition, the mortar mix shall be designed to withstand long-term exposure to a severe bacterially corrosive hydrogen sulfide environment that may be expected to produce a pH of 1 on exposed surfaces.
- G. The mortar mix shall form a mechanical and chemical bond to the wetwell surface.
- H. Water used in mixing shall be fresh, clean, potable water, free from injurious amounts of oil, acid, alkali, vegetable, sewage and/or organic matter.
- I. Mortar mix shall be stored with adequate provisions for the prevention of absorption of moisture. It shall be stored in a manner that will permit easy access for inspection and identification of each shipment.

2.02 METHODS FOR SURFACE PREPARATION OF CONCRETE

Abrasives blasting and/or steel shot blasting shall be used for preparation of concrete surfaces.

PART 3 - EXECUTION

3.01 COATING SYSTEM

- A. Deliver coatings to the jobsite in the original, unopened containers.

3.02 PROTECTION OF SURFACES NOT TO BE COATED

- A. Plug or bypass all pipes in service before any work is started on the structure. No debris is to be flushed down the line.
- B. Remove, mask, or otherwise protect hardware, lighting fixtures, switchplates, aluminum surfaces, machined surfaces, couplings, shafts, bearings, nameplates on machinery, and other surfaces not intended to be coated. Provide drop cloths to prevent coating materials from falling on or marring adjacent surfaces. Protect working parts of mechanical and electrical equipment from damage during surface preparation and coating process. Mask openings in motors to prevent coating and other materials from entering the motors.

3.03 WEATHER CONDITIONS

- A. Do not coat in the rain, wind, snow, mist, and fog or when surface temperatures are less than 5°F above the dew point.
- B. Do not coat when temperature of concrete to be lined is above 120°F.
- C. Do not apply coatings if air or surface temperature is below 32°F or expected to drop below 32°F in 24 hours.

3.04 ABRASIVE/STEEL SHOT BLAST CLEANING

- A. Use dry blast cleaning material. When field blast cleaning with hand-held nozzles, do not recycle or reuse blast particles.
- B. After blast cleaning and prior to application of coating, dry clean surfaces to be coated by dusting, sweeping, and vacuuming to remove residue from blasting.
- C. Keep the area of the work in a clean condition, and do not permit blasting particles to accumulate and constitute a nuisance or hazard.
- D. During sandblast cleaning, prevent damage to adjacent coatings. Schedule blast cleaning and coating such that dust, dirt, blast particles, old coatings, rust, mill scale, etc., will not damage or fall upon wet or newly coated surfaces.
- E. Blast clean overhead sub-surfaces to a minimum degree of roughness designated as CSP 4 by the International Concrete Repair Institute (ICRI), refer to Guideline No. 03732.
- F. Blast clean sub-surfaces other than overhead to a minimum degree of roughness designated as CSP 3 by the International Concrete Repair Institute (ICRI), refer to Guideline No. 03732.

3.05 INFLOW AND INFILTRATION PREVENTION

- A. If inflow or infiltration is observed within the structure after surface preparation is complete, a pressure grout product specifically formulated for infiltration control shall be used to stop infiltration flows in accordance with the manufacturer's recommendations.
- B. Repair all leaks by injecting grout using Avanti Multi-grout AV-202 or Engineer approved equal.

3.06 SURFACE PREPARATION

- A. To ensure sufficient bond, all sub-surfaces shall be cleaned and prepared to a degree of roughness as described above. Sub-surfaces shall also be thoroughly saturated with water prior to the application of the lining materials. In no instance shall shotcrete be applied in an area where running water exists. The existing surface be saturated and free of any running water just prior to installation.
- B. All surfaces to be lined shall be saturated with water just prior to lining materials application. If saturation does not occur naturally, it can be accomplished by presoaking all sub-surfaces for a minimum of 24 hours immediately prior to the application of the lining materials.

3.07 EQUIPMENT

- A. Equipment shall be of spray type and approved by the material manufacturer. Alternate equipment may be utilized provided it meets the performance requirements of the specification. All equipment must be kept in operating condition and good repair.

3.08 OPERATION

- A. The Contractor shall provide all equipment necessary to individually gauge, control, and monitor the actual amounts of all component materials necessary to complete the lining installation. The type of equipment and methods used to gauge, control, and monitor component materials shall be subject to approval by the Engineer and Manufacturer.
- B. All lining materials shall be thoroughly mixed by mechanical means to ensure all agglomerated particles are reduced to original size or removed prior to placement into the application equipment (i.e.the hopper). Each batch of material should be entirely discharged before recharging with fresh material. Mixing equipment shall be cleaned at regular intervals to remove all adherent materials.
- C. The addition of water to the mix shall be in strict accordance with the Manufacturer 's recommendations.
- D. Re-mixing or tempering shall not be permitted. Rebound materials shall not be reused.

3.09 COATING APPLICATION

- A. The material shall be installed in strict accordance with the manufacturer's recommendations, instructions, and the following.
- B. Lining material shall not be applied to a frozen surface or to a surface that may freeze within 24 hours of application. Frozen conditions shall be defined as ambient temperatures of 32 degrees Fahrenheit or below.
- C. Sequence of application may be from the bottom up or vice versa if rebound is properly removed.
- D. Application shall be from an angle as nearly perpendicular to the surface as practicable, with the nozzle heal as least one foot from the working sub-surface. If the flow of material at the nozzle is not uniform and slugs, sand spots, or wet sloughs result, the nozzelman shall direct the nozzle away from the work until the faulty conditions are corrected. Any defects shall be replaced as the work progresses.
- E. Application shall be suspended if:
 - 1. Air velocity separates the cement from the aggregate at the nozzle.
 - 2. Ambient temperature approaches freezing and the newly placed lining cannot be protected and insulated.

- F. The time interval between successive layers of material application must be sufficient to allow “tackiness” to develop but not final set.
- G. After the final coat has been placed, the surface shall be trued with a thin edge screed to remove high areas and expose low areas. Low areas shall be properly filled with additional material to insure a flat surface. Apply a “brushed” finish after troweling.
- H. The coating shall be applied to the floor, pump bench, walls, ceiling of the wetwell and effluent chamber to a minimum thickness of one inch; number and thickness of coating shall be in accordance with the manufacturer’s recommendations.

3.10 CURING

- A. The material shall cure in strict accordance with the manufacturer’s recommendations, instructions, and the following.
- B. If the material has been applied and furnished in accordance to the specifications, and it has been determined that the environment is not moist enough for natural curing, the Contractor will be required to apply a colored curing compound to all coated surfaces. Curing compound shall meet the requirements of ASTM C309 and have the approval of the lining material manufacturer and the Engineer prior to use.
- C. Moist curing may also be used in lieu of curing compound. If moist curing is selected, it should be implemented just after the notice of uniform heat generation of the installed lining. Moist curing can consist of the use of soaker hoses, water sprinklers, or vapor/misting machines. Regardless of the delivery method, moist curing should continue for a minimum of 18 hours.

3.11 HOLIDAY (CONTINUITY) TESTING OF APPLIED COATING

Inspect lining system for holidays, cracks and pinholes. Take particular care to check lining over brick, block, heavy spalled surfaces, and other very rough surfaces and locate holes in the lining caused by voids in bricks, block, concrete and structure joints. Fill voids and holidays in accordance with the lining system manufacturer’s instructions.

END OF SECTION

SECTION 099761 FUSION-BONDED EPOXY LININGS AND COATINGS

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes materials, application, and testing of one-part, fusion-bonded, heat-cured, thermosetting, 100% solids epoxy linings and coatings on steel, cast-iron, and ductile-iron equipment, such as valves, flexible pipe couplings, slide gates, and structural steel, and steel pipe.

1.02 SUBMITTALS

- A. Submit shop drawings in accordance with the General Conditions, Section 013300, and the following.
- B. Submit manufacturer's catalog literature and product data sheets, describing the physical and chemical properties of the epoxy coating. Describe application and curing procedure.
- C. Submit coating application test records for measuring coating thickness and holiday detection for each item or pipe section and fitting. Describe repair procedures used.

PART 2 - MATERIALS

2.01 PIPING AND EQUIPMENT SURFACES

- A. The Contractor shall require the equipment suppliers to provide equipment that is free of salts, oil, and grease to the coating applicator.
- B. The Contractor shall require pipe suppliers to provide bare pipe that is free of salts, oil, and grease to the coating applicator.

2.02 SHOP-APPLIED EPOXY LINING AND COATING

Lining and coating shall be a 100% solids, thermosetting, fusion-bonded, dry powder epoxy resin: Scotchkote 134 or 206N, Valspar "Pipeclad 1500 Red," or equal. Epoxy lining and coating shall meet or exceed the following requirements:

Hardness (minimum)	Barcol 17 (ASTM D2583) Rockwell 50 ("M" scale)
Abrasion resistance (maximum value)	1,000 cycles: 0.05 gram removed
	5,000 cycles: 0.115 gram removed
	ASTM D1044, Tabor CS 17 wheel, 1,000-gram weight
Adhesion (minimum)	3,000 psi (Elcometer)
Tensile strength	7,300 psi (ASTM D2370)
Penetration	0 mil (ASTM G17)
Adhesion overlap shear, 1/8-inch steel panel, 0.010 glue line	4,300 psi, ASTM D1002
Impact (minimum value)	100 inch-pounds (Gardner 5/8-inch diameter tup)

2.03 FIELD-APPLIED EPOXY COATING FOR PATCHING

Use a minimum 80% solids liquid epoxy resin, such as Scotchkote 306 or 323.

2.04 PAINTING AND COATING OF GROOVED-END AND FLEXIBLE PIPE COUPLINGS

Line and coat couplings the same as the pipe. Color shall match the color of the pipe fusion epoxy coating.

PART 3 - EXECUTION

3.01 SHOP APPLICATION OF FUSION-BONDED EPOXY LINING AND COATING--GENERAL

- A. Grind surface irregularities, welds, and weld spatter smooth before applying the epoxy. The allowable grind area shall not exceed 0.25 square foot per location, and the maximum total grind area shall not exceed 1 square foot per item or piece of equipment. Do not use any item, pipe, or piece of equipment in which these requirements cannot be met.
- B. Remove surface imperfections, such as slivers, scales, burrs, weld spatter, and gouges. Grind outside sharp corners, such as the outside edges of flanges, to a minimum radius of 1/4 inch.
- C. Uniformly preheat the pipe, item, or piece of equipment prior to blast cleaning to remove moisture from the surface. The preheat shall be sufficient to ensure that the surface temperature is at least 5°F above the dew point temperature during blast cleaning and inspection.

- D. Sandblast surfaces per SSPC SP-5. Protect beveled pipe ends from the abrasive blast cleaning.
- E. After cleaning and surface preparation, test the surface for residual chloride concentration. If the residual chloride concentration exceeds $5 \mu\text{g}/\text{cm}^2$, then apply a phosphoric acid wash to the surface after sandblasting. The average temperature, measured at three different locations, shall be 80°F to 130°F during the acid wash procedure. The acid wash shall be a 5% by weight phosphoric acid solution. The duration in which the acid is in contact with the surface shall be determined by using the average temperature as tabulated below:

Surface Temperature (°F)	Contact Time (seconds)
80	52
85	45
90	36
95	33
100	28
105	24
110	21
130	10

After the acid wash has been completed, remove the acid with demineralized water having a maximum conductivity of 5 micromhos/cm at a minimum nozzle pressure of 2,500 psi.

- F. Apply lining and coating by the electrostatic spray or fluidized bed process. Minimum thickness of lining or coating shall be 15 mils. Heat and cure per the epoxy manufacturer's recommendations. The heat source shall not leave a residue or contaminant on the metal surface. Do not allow oxidation of surfaces to occur prior to coating. Do not permit surfaces to flash rust before coating.

3.02 SHOP APPLICATION OF FUSION-BONDED EPOXY LINING AND COATING TO PIPE--ADDITIONAL REQUIREMENTS

- A. Apply lining and coating per AWWA C213 except as modified herein.
- B. Grind 0.020 inch (minimum) off the weld caps on the pipe weld seams before beginning the surface preparation and heating of the pipe.

3.03 SHOP APPLICATION OF FUSION-BONDED EPOXY LINING AND COATING TO JOINT AREAS OF DUCTILE-IRON AND CAST-IRON FITTINGS--ADDITIONAL REQUIREMENTS

Limit the protective coating thickness in the joints of ductile-iron and cast-iron fittings to maintain a leak-proof joint. However, the coating thickness in the joint area shall not be less than 4 mils.

3.04 QUALITY OF LINING AND COATING APPLICATIONS

The cured lining or coating shall be smooth and glossy, with no graininess or roughness. The lining or coating shall have no blisters, cracks, bubbles, underfilm voids, mechanical damage, discontinuities, or holidays.

3.05 FACTORY TESTING OF COATING--GENERAL

- A. Test linings and coatings with a low-voltage wet sponge holiday detector. Test pipe linings and coatings per AWWA C213, Section 5.3.3. If the number of holidays or pinholes is fewer than one per 20 square feet of coating surface, repair the holidays and pinholes by applying the coating manufacturer's recommended patching compound to each holiday or pinhole and retest. If the number of pinholes and holidays exceeds one per 20 square feet of coating surface, remove the entire lining or coating and recoat the item or pipe.
- B. Measure the coating thickness at three locations on each item or piece of equipment or pipe section using a coating thickness gauge calibrated at least once per eight-hour shift. Record each measured thickness value. Where individual measured thickness values are less than the specified minimum thickness, measure the coating thickness at three additional points around the defective area. The average of these measurements shall exceed the specified minimum thickness value, and no individual thickness value shall be more than 2 mils below or 3 mils above the specified minimum value. If a section of the pipe, item, or piece of equipment does not meet these criteria, remove the entire lining or coating and recoat the entire item or piece of equipment.

3.06 FACTORY INSPECTION OF LINING AND COATING OF PIPE--ADDITIONAL REQUIREMENTS

Check for coating defects on the weld seam centerlines. There shall be no porous blisters, craters, or pimples lying along the peak of the weld crown.

3.07 SHIPPING, STORAGE, AND HANDLING

- A. When loading piping, fittings, couplings, or other coated items for shipment to the project site, use spacers and other protective devices to separate pipes or other coated items to prevent damaging the coated surfaces during transit and unloading. If wood spacers are used, remove wood splinters and particles from the coated surfaces after separation. Use padded chains or ribbon binders to secure the loaded pipe or other coated items and minimize damage.

- B. Do not load or unload pipe, fittings, couplings, or other coated items by inserting forklift tines or lifting chains inside the pipe or item. Use nonmetallic slings, padded chains, or padded forklift tines to lift pipe or other coated items.
- C. Cover piping or other coated items 100% with protective coverings or tarpaulins to prevent deposition of road salts, fuel residue, and other contaminants in transit.
- D. Provide stulls, braces, and supports for piping during shipping and storage such that out-of-roundness or deflection does not exceed 0.5% of the pipe diameter.
- E. Handle piping and other coated items with care during the unloading, installation, and erection operations to minimize damage. Do not place or store pipe or other coated items on the ground or on top of other work unless ground or work is covered with a protective covering or tarpaulin. Place pipe or other coated items above the ground upon platforms, skids, or other supports.
- F. Store piping or other coated items at the site on pallets to prevent direct contact with ground or floor. Cover pipe or coated items during storage with protective coverings or tarpaulins to prevent deposition of rainwater, salt air, dirt, dust, and other contaminants.
- G. Do not allow piping or other coated items to contact metal, concrete, or other surfaces during storage, handling, or installation and erection at the site that could damage or scratch the coating.

3.08 FIELD REPAIRS

Patch scratches and damaged areas incurred while installing fusion-bonded epoxy coated items with a two-component, 80% solids (minimum), liquid epoxy resin. Wire brush or sandblast the damaged areas per SSPC SP-10. Lightly abrade or sandblast the coating or lining on the sides of the damaged area before applying the liquid epoxy coating. Apply an epoxy coating to defective linings and coatings to areas smaller than 20 square inches. Patched areas shall overlap the parent or base coating a minimum of 0.5 inch. If a defective area exceeds 20 square inches, remove the entire lining and coating and recoat the entire item or piece of equipment. Apply the liquid epoxy coating to a minimum dry-film thickness of 15 mils.

END OF SECTION

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DIVISION 26 – ELECTRICAL

260500	General Electric Requirements
260519	Wires and Cables Less than 600 Volts
260526	Grounding and Bonding
260534	Conduits, Boxes, and Fittings
260543	Underground Electrical Duct System
260573	Short Circuit, Protective Device Coordination, Arc-Flash Hazard Study
260590	Miscellaneous Electrical Devices
261216	Dry-Type Transformers
262410	Panelboards (Breakers)
262726	Wiring Devices
262923	Variable Frequency Drive (VFD)
263213	Standby Engine-Generators (100 KW and Smaller)
263623	Automatic Transfer Switch
264313	Surge Protective Devices (SPD)
265000	Lighting

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SECTION 260500 GENERAL ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes materials, installation, and testing of the electrical system.

1.02 SUBMITTALS

- A. Submit shop drawings in accordance with the General Conditions and Section 013300.
- B. In submitted catalog cuts, cross out items shown that are not pertinent to this project. Where catalog cuts list manufacturer's standard options, cross out those options not intended to be provided and clearly highlight those options that are to be provided.
- C. Submit electrical service changes work procedure.

1.03 REGULATORY AGENCIES AND STANDARDS

- A. See General Conditions.
- B. Electrical work shall comply with the NEC and local city code where applicable.

1.04 QUALITY CONTROL

Materials, appliances, equipment, and devices shall conform to the applicable UL standards. The label of, or listing by, UL is required for all electrical equipment.

1.05 UTILITY COMPANY REQUIREMENTS AND FEES

- A. Install electric service entrance equipment in accordance with the serving utility's requirements. Coordinate with the serving utility to ensure timely connection by the utility. Obtain utility company approval of service entrance and metering equipment shop drawings prior to starting fabrication.

1.06 ELECTRICAL SERVICE CHANGES

- A. These specifications and drawings delineate the remodeling of an existing structure and/or the addition to an existing structure. While the existing structure is occupied, keep the present services intact until the new construction, facilities, or equipment is installed.
- B. Prior to making revisions to the existing service, make certain that every item is thoroughly prepared. Do the actual work at an off-peak time, or overtime, as arranged with the Owner or as hereinafter specified. Once the work is started, vigorously prosecute it to completion to keep downtime to a minimum. Be prepared to temporarily serve the existing service or discontinue the necessary revisions in the event of an

emergency or other condition which makes it impossible to finish the scheduled work on time.

- C. Prepare a work procedure for work-interrupting service to the Owner's equipment. Include a step-by-step procedure that will be followed in the performance of this work and the time involved in each step. Submit this procedure to the Owner's Representative for review two weeks in advance of the performance of the work.

1.07 POWER FOR CONSTRUCTION

Provide for or purchase power for construction in accordance with Section 015100.

1.08 OPERATION AND MAINTENANCE MANUALS

Submit operation and maintenance manuals in accordance with Section 019310.

1.09 LOCATIONS

- A. General: Use equipment, materials, and wiring methods suitable for the types of locations in which they are located as defined below.
- B. Definitions of Types of Locations:
 - 1. Wet Locations: Locations exposed to the weather, whether under a roof or not, unless otherwise designated in the drawings.
 - 2. Damp Locations: Spaces wholly or partially underground or having a wall or ceiling forming part of a channel or tank, unless otherwise designated in the drawings.
 - 3. Hazardous Locations: Areas identified in drawings.

PART 2 - MATERIALS

2.01 GENERAL

- A. Similar materials and equipment shall be the product of a single manufacturer.
- B. Provide only products which are new, undamaged, and in the original cartons or containers.
- C. Materials and equipment shall be the standard products of manufacturers regularly engaged in the production of such material and shall be the manufacturer's current design.
- D. Materials and equipment shall be suitable for storage, installation, and operation at an ambient temperature of 0°C to 40°C except where more stringent conditions are stated in individual equipment specifications.

- E. Electrical equipment and panels shall be factory finished with manufacturer's standard primer and enamel topcoats, unless stated otherwise in the individual equipment specifications. Provide 1 pint of the equipment manufacturer's touchup paint per 500 square feet of painted surface for repair of damaged enamel topcoats.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. The drawings indicate connections for typical equipment only. If the equipment furnished is different from what is shown, provide the modifications necessary for a safe and properly operating installation in accordance with the equipment manufacturer's recommendations.
- B. The drawings diagrammatically indicate the desired location and arrangement of outlets, conduit runs, equipment, and other items. Field determine exact location based on physical size and arrangement of equipment, finished elevations, and obstructions.
- C. Work or equipment not indicated or specified which is necessary for the complete and proper operation of the electrical systems shall be accomplished without additional cost to the Owner.
- D. Review demolition methods with Owner's Representative prior to cutting or removing existing architectural and/or structural items or equipment. Repair damage to match existing.
- E. Accomplish work required to pierce any waterproofing after the part piercing the waterproofing has been set in place. Seal and make watertight the openings made for this purpose.
- F. Seal weathertight equipment or components exposed to the weather.
- G. Protect equipment outlets and conduit openings with factory-made plugs or caps whenever work is not in progress at that point.

3.02 REMOVAL OR RELOCATION OF MATERIALS AND EQUIPMENT

- A. Unless otherwise noted, remove existing electrical materials and equipment from areas indicated for demolition or where equipment is relocated. Remove materials no longer used, such as studs, straps, and conduits. Remove or cut off concealed or embedded conduit, boxes, or other materials and equipment to a point at least 3/4 inch below the final finished surface. Remove existing unused wires.
- B. Repair affected surfaces to conform to the type, quality, and finish of the surrounding surface.
- C. Removal shall comply with Section 024100.

3.03 NAMEPLATES

- A. Mark each individual pump controller, disconnect switch, main breaker and automatic transfer switch to identify each item with its respective service or function.
- B. Provide nameplates with engraved lettering not less than 1/4 inch high. Use black-on-white laminated plastic, attached with rivets or sheet metal screws. Do not use embossed plastic adhesive tape. For lift station control panel nameplates see drawing E-606.

3.04 WARNING SIGNS

- A. Install markings, identifications, warning, caution, or instruction signs where required by NEC, NFPA 70E, and NFPA 79 paragraph 4.5.1, where indicated, or where reasonably required to assure safe operation and maintenance of electrical systems and of the items to which they connect.
- B. The design of safety signs and labels shall conform to ANSI Z535.4. main breaker, industrial control panels shall be field marked to warn qualified persons of potential electric arc hazards. The marking shall be located so as to be clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment, in conformance with NEC 2011 Article 110.16.
- C. Install engraved plastic-laminated instruction signs with approved legend where instructions or explanations are needed for system or equipment operation. Install butyrate signs with metal backing for outdoor items.

END OF SECTION

SECTION 260519 WIRES AND CABLES LESS THAN 600 VOLTS

PART 1 - GENERAL

1.01 DESCRIPTION

This section describes materials and installation of wires and cables rated 600 volts and below.

1.02 SUBMITTALS

- A. Submit shop drawings in accordance with the General Conditions and Section 260500.
- B. Submit material list for each conductor type. Indicate insulation material, conductor material, voltage rating, manufacturer, and other data pertinent to the specific cable, such as shielding, number of pairs, and applicable standards.

PART 2 - MATERIALS

2.01 LOW-VOLTAGE BUILDING WIRE

- A. Conductor material shall be copper.
- B. Low-voltage building wire for use at 600 volts or less shall be 600-volt insulated, Type XHHW or THWN, and rated for continuous operation at 75°C.
- C. Use No. 12 AWG minimum conductor size for power and lighting circuits.
- D. Use No. 14 AWG minimum conductor size for control circuits.

2.02 TWISTED-SHIELDED CABLE

- A. Single-pair cables shall be two No. 18 AWG stranded tinned-copper conductors individually insulated with fully color-coded PVC rated at 300 volts; insulated conductors twisted together and shielded with a spiral-wound metal foil tape overlapped for 100% shielding. Outer jacket shall be PVC. Wet location rated.
- B. Multiple-pair cables shall have number of pairs specified with each pair being two No. 18 AWG stranded tinned-copper conductors individually insulated with PVC rated at 300 volts. Conductor pairs shall have insulation pigmented black and white with white conductor numerically printed for group identification. Each pair and its No. 20 AWG stranded tinned-copper drain wire shall be twisted together and shielded with an aluminum-polyester tape overlapped for 100% shielding. Provide a cable shield of 2.35-mil aluminum-polyester tape overlapped to provide 100% shielding and a No. 18 AWG copper drain wire. Provide a flame-retardant PVC jacket per UL 13, 105°C temperature rating. Wet location rated.

2.03 GROUNDING CONDUCTORS--BARE COPPER

Refer to Section 260526 for bare copper grounding conductors.

2.04 CONDUCTOR TAGS

Provide adhesive-type markers. Brady, Thomas & Betts, or equal.

2.05 PLASTIC ADHESIVES

Plastic adhesives for color coding shall be 7-mil minimum thick, flame-retardant, weather-resistant tape, resisting abrasion, UL rays, moisture, alkalies, solvents, and acids. Adhesives shall meet the requirements of UL 510 and CSA C22.2.

PART 3 - EXECUTION

3.01 LOW-VOLTAGE BUILDING WIRE INSTALLATION

- A. Install wiring and cable in conduit and terminate unless otherwise noted.
- B. To reduce pulling tension in long runs, coat cables with pulling compound recommended by the cable manufacturer before being pulled into conduits.
- C. Remove debris and moisture from the conduits, boxes, and cabinets prior to cable installation.
- D. Group conductors No. 1/0 and smaller in panelboards, cabinets, pull boxes, motor control centers, and switchboard wireways; tie with plastic ties; and fan out to terminals. Lace conductors No. 2/0 and larger with marline.

3.02 IDENTIFICATION

- A. Color Coding of Low-Voltage Building Wire: Provide color coding throughout the entire network of feeders and circuits as follows:

Phase	240/120 Volts	208/120 Volts	480/277 Volts
Phase A	Black	Black	Brown
Phase B	Red	Red	Orange
Phase C	---	Blue	Yellow
Neutral	White	White	Gray
Ground	Green	Green	Green

- B. Phase conductors No. 10 AWG and smaller and neutral/ground conductors No. 6 and smaller shall have factory color coding with solid color insulation. Do not use onsite coloring of ends of conductors or apply colored plastic adhesives in lieu of factory color

coding. Larger conductors may have onsite application of colored plastic adhesives at ends of conductors and at each splice.

- C. Control wires shall have colored insulation. Separate color codes for each wire shall be provided in each conduit that has up to seven wires. Conduits with more than seven wires shall have at least seven types of colored insulation.
- D. Tagging of Conductors: Tag control wires and instrument cables in panels, pull boxes, wireways, and at control device. Tag control wires and instrument cables with same wire numbers as on the shop drawing submittals. Tag power wires in pull boxes and wireways where there is more than one circuit. Tag power conductors with motor control center or panelboard number and circuit numbers.

3.03 LOW-VOLTAGE WIRE SPLICES

- A. Solid Conductors: Use 3M "Scotchlok," Ideal "Super Nut," Buchanan B-Cap, or equal. Seal splices in underground handholes and pull boxes and in light poles with individual sealing packs of Scotchcast Brand 400 Resin or equal.
- B. Stranded Conductors No. 8 and Larger: Use T & B "Locktite" connectors, Burndy Versitaps and heavy-duty connectors, O.Z. solderless connectors, or equal.
- C. Stranded Conductors No. 10 and Smaller: Use crimp connectors with tools by same manufacturer and/or UL listed for connectors of all stranded conductors.
- D. Retighten bolt-type connectors 24 to 48 hours after initial installation and before taping. Tape connections made with noninsulated-type connectors with rubber-type tape, one and one-half times the thickness of the conductor insulation, then cover with Scotch 33 tape.

3.04 LOW-VOLTAGE WIRE TERMINATIONS

- A. Terminate wires and cables at each end.
- B. Provide ring tongue, nylon- or vinyl-insulated copper crimp terminals for termination on screw-type terminals, except for light switches and receptacles. Utilize installation tools recommended by the crimp manufacturer.
- C. Terminal lugs shall be electro-tin plated copper compression type or spring compression type with a corrosion protection coating. Provide color-coded system on terminal and die sets to provide the correct number and location of crimps. Permanent die index number shall be embossed on completed crimp for inspection purposes.
- D. Tighten screws to the value recommended by the manufacturer.

3.05 FIELD TESTING

- A. Perform insulation resistance test on all circuits and feeders with No. 10 size conductors and larger. Utilize a 1,000-volt d-c megohmmeter for 600-volt insulated conductors.
- B. Test each complete circuit prior to energizing. Insulation resistance between conductors and between each conductor and ground shall not be less than 25 megohms. Repair or replace wires or cables in circuits that do not pass this test and repeat the test.
- C. Evaluate ohmic values by comparison with conductors of same length and type.
- D. Inspect shielded cables for proper shield grounding, proper terminations, and proper circuit identifications.
- E. Inspect control cables for proper termination and proper circuit identification.
- F. In cables terminated through window-type CTs, verify that neutrals and grounds are terminated for correct operation of protective devices.

END OF SECTION

SECTION 260526 GROUNDING AND BONDING

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes materials, testing, and installation of electrical grounding.

1.02 SUBMITTALS

- A. Submit shop drawings in accordance with the General Conditions and Section 260500.
- B. Submit material list for all grounding materials and equipment. Indicate size, material, and manufacturer.
- C. Submit test results. Indicate overall resistance to ground and resistance of each electrode.

1.03 PERFORMANCE REQUIREMENTS

- A. Grounding System Resistance:
 - 1. Separately Derived Sources (as Defined by NEC 250) Grounding Electrode: 10 ohms.
 - 2. Grounds Not Covered Above: 25 ohms.

PART 2 - MATERIALS

2.01 GROUND RODS

Ground rods shall be copper-clad steel, 3/4 inch in diameter, minimum 10 feet long, with hardened steel points.

2.02 CONNECTIONS

- A. Ground Clamps: Clamps for connection of ground wire to ground rod shall be bronze.
- B. Exothermic Connections: Provide Cadweld or equal.

2.03 CONDUCTORS

- A. Equipment Ground: Conductors shall be low-voltage building-wire type as specified in Section 260519.
- B. Bare Copper Conductors: Annealed bare copper, conforming to ASTM B3 and B8.

PART 3 - EXECUTION

3.01 EQUIPMENT GROUNDING

- A. Ground raceways and noncurrent-carrying parts of electrical equipment in accordance with NEC Article 250. Use the metallic conduit system for equipment and enclosure grounding.
- B. Additionally, all circuits shall carry one ground conductor for equipment grounding. Ground conductor shall be in excess of grounding through the metallic conduit system.

3.02 GROUND TEST WELL

- A. Provide a handhole and ground rod as detailed in the drawings to aid in performing ground testing and connecting additional ground rods if required by the test results. Connect ground wire from ground rod to main service ground bus as detailed in the drawings.

3.03 CONNECTIONS

Exothermic weld all underground connections.

3.04 TESTS

Before making connections to the ground electrode, measure the resistance of the electrode to ground using a ground resistance tester specifically designed for ground resistance testing. Perform testing in accordance with test instrument manufacturer's recommendations using fall-of-potential method. Perform the test not less than two days after the most recent rainfall and in the afternoon after any ground condensation (dew) has evaporated. If a resistance less than the performance requirements is not obtained, provide a ground rod driven 6 inches below grade spaced 10 feet away from the ground electrode and connect with No. 4 AWG bare copper wire and repeat the test. If the performance requirements are still not obtained, inform the Owner for resolution.

END OF SECTION

SECTION 260534 CONDUITS, BOXES, AND FITTINGS

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes material, installation, and testing for conduit, boxes, fittings, and cabinets.

1.02 SUBMITTALS

- A. Submit shop drawings in accordance with the General Conditions and Section 260500.
- B. Submit product data for the following:
 - 1. Conduit and fittings for each type specified.
 - 2. Boxes and cabinets.

1.03 QUALITY CONTROL

- A. NEMA Compliance: Comply with NEMA standards pertaining to conduits and components.
- B. UL Compliance and Labeling: Comply with requirements of UL standards pertaining to electrical conduits and components. Provide conduits and components listed and labeled by UL.

PART 2 - MATERIALS

2.01 RIGID ALUMINUM CONDUIT AND FITTINGS

- A. Conduit:
 - 1. Extruded from 6063 alloy in Temper Designation T-1 with maximum 0.1% copper content and conforming to ASME C80.5 and UL 6.
- B. Fittings:
 - 1. Locknuts: Copper-free (less than 0.5% copper) aluminum.
 - 2. Bushings: Threaded type, of copper-free (less than 0.5% copper) aluminum, with 105°C rated plastic insulated throat. Plastic bushings with a temperature rating of 105°C may be used for conduits 1 inch and smaller.

3. Box Connectors for Damp and Wet Locations: Provide a watertight cast aluminum threaded hub on enclosure consisting of sealing fitting with tapered conduit thread, neoprene O-ring, and 105°C rated insulating throat with grounding and bonding lug.
4. Couplings: Threaded, made of conduit material.
5. Conduit Bodies: Use copper-free (0.4% maximum) cast aluminum conduit bodies equipped with threaded covers or gasketed covers secured with at least two captive screws.

C. Long-Radius Elbows (90 Degrees):

Conduit Size (inches)	Minimum Radius (inches)
3/4 through 1 1/4	12
2 and 2 1/2	15

2.02 RIGID NONMETALLIC CONDUIT (PVC) AND FITTINGS

- A. Conduit: PVC Schedule 40, 90°C rise rating, conforming to NEMA TC-2 Type EC-40 and UL 651.
- B. Long-Radius Elbows (90 Degrees): PVC-coated rigid steel conduit of the same dimension as specified for aluminum conduit.
- C. Couplings, Adapters, End Bells, Expansion Couplings, Elbows, and Turns of 30 Degrees: Factory-made in accordance with NEMA TC-2 and TC-3.
- D. Joint Cement: As recommended by manufacturer as suitable for the climate, furnished with instructions to achieve watertight joints.
- E. Manufacturers: Carlon, Condux, or equal.

2.03 PVC-COATED RIGID STEEL CONDUIT AND FITTINGS

- A. Conduit:
 1. All conduits, prior to coating, shall conform to ASME C80.1 and UL 6. Conduits shall be hot-dipped galvanized inside and out with hot galvanized threads.
 2. The zinc surface shall be treated prior to coating to enhance the bond between metal and plastic.

3. Both interior and exterior of the conduit shall be coated with an epoxy acrylic primer of approximately 0.5-mil thickness.
4. The exterior coating shall be applied by dipping in liquid plastisol or other equal method that will produce a finished product conforming to NEMA 5-19-1986.
5. The thickness of the PVC coating shall be a minimum of 40 mils the full length of the conduit except the threads.
6. The bond between the PVC coating and the conduit surface shall be greater than the tensile strength of the plastic.
7. Apply a chemically cured urethane coating of a thickness of 2 mils to the interior of conduit.
8. The conduit shall be bendable without damage to the PVC or urethane coatings.
9. Threads shall have an added protection of a 2-mil clear urethane coating.
10. The PVC-coated rigid galvanized steel conduit shall be certified and authorized to apply the ETL verification mark "ETL Verified to PVC-001." ETL certified to Intertek ETL SEMKO High Temperature H2O PVC Coating Adhesion Test Procedure.

B. Fittings:

1. Coat fittings similar to the conduits.
2. Provide a loose coupling with each length of conduit. A PVC coating shall be bonded to the outer surface of the coupling, and a PVC sleeve equal to the outside diameter of the uncoated conduit shall extend beyond both ends of the coupling approximately one pipe diameter or 2 inches whichever is smaller. The wall thickness of the sleeve shall be the same as the plastic coating on the pipe.
3. The PVC coating on the coupling shall be ribbed to enhance installation.
4. Hubs shall have PVC sleeves equal to those on the couplings.
5. Screws on Form 8 fittings shall be of stainless steel with encapsulated plastic heads.
6. Size U bolts and RA clamps to fit conduit, and encapsulate the nuts in plastic.
7. Fittings shall otherwise be same as specified for rigid steel.
8. Elbows or bends exceeding 45 degrees shall be PVC coated and shall be of the same dimensions as specified for rigid steel long-radius elbows.

9. Conduit bodies, where applicable, shall be Form 8 with a tongue-in-groove (V-seal) gasket to effectively seal out corrosive elements.

C. Conduits and fittings shall conform to NEMA RN-1 and shall be manufactured by Robroy, Perma-coat, KorKap, or equal.

2.04 LIQUID-TIGHT FLEXIBLE METAL CONDUIT AND FITTINGS

A. Conduit: Steel, UL 360 listed, PVC jacketed.

B. Fittings:

1. Conform to ASME C33.84, UL listed for use with the conduit.

2. In sizes 1 1/4 inches and less, UL listed for grounding.

3. Made of steel or malleable iron, zinc plated, 105°C insulated throat, grounding and bonding lug.

2.05 CONDUIT BODIES

A. Provide types, shapes, and sizes to suit individual applications. Provide matching gasketed covers, secured with at least two captive corrosion-resistant screws.

B. Bodies connecting to rigid conduit shall be of the same material and material coating as the conduit, with metal threaded hubs. Provide with threaded covers or gasketed covers secured with at least two corrosion-resistant captive screws.

C. Bodies connecting to nonmetallic conduit shall be nonmetallic conduit bodies conforming to UL 514B.

2.06 SPECIALTY CONDUIT FITTINGS

A. Expansion/Deflection Fittings for Rigid Metal Conduit: Weatherproof with an internal bonding arrangement. Provide for 3/4-inch movement in all directions. Where used for angular movement, allow for a 30-degree deflection from normal in any direction.

B. Expansion Fittings for Rigid Nonmetallic Conduit: O-ring type with at least two rings, allowing for a minimum conduit movement of 6 inches.

2.07 OUTLET BOXES

A. Exposed Boxes:

1. Cast aluminum, with threaded hubs.

2. Conduit bodies may be used instead of boxes except where boxes contain devices.

3. Outlet boxes connecting to PVC-coated rigid conduit shall be of the same material and material coating as the conduit, with metal threaded hubs. Provide with gasketed covers secured with at least two corrosion-resistant capture screws.

2.08 JUNCTION AND PULL BOXES

- A. Provide factory-made standard sizes, and shop fabricate when nonstandard size boxes are shown or are required. Comply with UL and NEMA standards.
- B. NEMA Type 4X: Type 304 stainless steel, with gasketed covers and Type 304 stainless steel bolts or screws.
- C. Junction boxes shall be manufactured by Hoffman, Wiegmann, or equal.

2.09 HAZARDOUS LOCATIONS

- A. Conform to NEC Articles 501 and 502 for areas identified as "Hazardous Areas."
- B. Provide threaded cast boxes and fittings for junction boxes and pull boxes in Class I areas. Unless otherwise indicated, boxes and fittings shall be UL listed for installation in Class I, Groups A, B, C, and D.
- C. Use EYS-type sealing fittings suitable for Class I, Division 1 areas. Use EYD-type drain sealing fittings suitable for Class I, Division 1 areas where shown in the drawings. Use sealing fiber and compound approved for Class I, Division 1 areas.

2.10 CONDUIT SEALANT

- A. Moisture Barrier Types: Sealant shall be a nontoxic, nonshrink, nonhardening, putty-type hand-applied material providing an effective barrier under submerged conditions.
- B. Fire-Retardant Types: Fire stop material shall be a reusable, nontoxic, asbestos-free, expanding, putty-type material with a three-hour rating in accordance with UL 35L4.

PART 3 - EXECUTION

3.01 CONDUIT USAGE SCHEDULE

Install the following types of conduits and fittings in locations listed, unless otherwise noted in the drawings. Definitions and requirements of NEC apply unless specifically modified below. Refer to Section 260500 for definitions of locations.

- A. Exterior, Exposed:
 1. Material: Rigid aluminum conduit.
 2. Minimum Size: 3/4 inch.

- B. Exposed, Where Area is Indicated as Corrosive Location:
 - 1. Material: Rigid nonmetallic conduit.
 - 2. Minimum Size: 3/4 inch.
- C. Interior, Exposed, Dry, Wet, and Damp Locations:
 - 1. Material: Rigid aluminum conduit.
 - 2. Minimum Size: 3/4 inch.
- D. In Earth, Below Concrete Slabs or Underground:
 - 1. Material: Rigid nonmetallic conduit (PVC) or PVC coated Rigid steel conduit.
 - 2. Minimum Size: 1 inch.
 - 3. Conduit Stub-Ups: Provide PVC-coated rigid steel conduit long-radius elbows for stub-ups which connect to underground rigid PVC conduit. Extensions from elbows above grade shall be PVC-coated rigid steel for a minimum of 6 inches above grade. Aluminum shall not be used for underground installations.
- E. Final Connections to Vibrating Equipment, or Instruments:
 - 1. Material: Liquid-tight flexible conduit.
 - 2. Minimum Size: 3/4 inch.
 - 3. Length of liquid-tight flexible conduit shall be 5 feet or less, unless field conditions require longer lengths.
- F. Final Connections to Instruments in Hazardous locations:
 - 1. Material: Liquid-tight flexible conduit suitable for hazardous locations.
 - 2. Minimum Allowable Size: 3/4 inch.
- G. Hazardous (NEC-Classified) Locations:
 - 1. Material: PVC coated Rigid steel conduit.
 - 2. Minimum Allowable Size: 3/4 inch.

3.02 JUNCTION AND PULL BOXES--USAGE SCHEDULE

Install the following type of boxes in locations listed, unless otherwise noted in the drawings. Refer to Section 260500 for definitions of locations:

- A. Exterior: NEMA 4X.

3.03 CONDUIT FILL

For runs that are not sized in drawings, compute the maximum conduit fill using NEC requirements for Type THW conductors (larger if applicable), although the actual wiring may be with types of conductors having smaller cross-sections.

3.04 CONDUIT INSTALLATION, GENERAL

- A. Install conduit concealed unless specifically noted otherwise.
- B. Run exposed conduits parallel and perpendicular to surface or exposed structural members and follow surface contours as much as practicable to provide a neat appearance.
- C. Make right-angle bends in conduit runs with long-radius elbows or conduits bent to radii not less than those specified for long-radius elbows.
- D. Make bends and offsets so that the inside diameter of conduit is not effectively reduced. Unless otherwise indicated, keep the legs of a bend in the same plane and the straight legs of offsets parallel.
- E. Cap all conduits immediately after installation to prevent entrance of foreign matter.
- F. Do not use diagonal runs except when specifically noted in the drawings.
- G. Conduit Terminations:
 - 1. Terminate conduits with locknuts and bushings except where threaded hubs are specified.
 - 2. Install conduits squarely to the box and provide one locknut outside the box and one locknut and bushing inside the box.
 - 3. Install locknuts with dished side against the box.
 - 4. When terminating in threaded hubs, screw the conduit or fitting tight into the hub so that the end bears against the fire protection shoulder.
 - 5. When chase nipples are used, install conduits and coupling square to the box and tighten the chase nipple leaving no exposed threads.
- H. Install parallel, or banked conduits together. Make bends in parallel or banked runs from the same centerline so that the bends are parallel. Factory elbows may be used in banked runs only where they can be installed parallel.
- I. Conduit runs are shown schematically. Supports, pull boxes, junction boxes, and other ancillary equipment are not usually shown in drawings. If not shown, provide as required

by NEC except that there shall not be more than the equivalent of three quarter bends (270 degrees) total between underground pull points. Provide additional boxes to permit pulling of wires without damage to the conductors or insulation.

- J. Locations of conduit stub-ups shown in the drawings are schematic. Coordinate these locations with conduit entries of actual equipment served.
- K. Treat threaded joints of rigid steel conduit with T&B "Kopr-Shield" before installing fittings where conduit is in slabs and other damp or corrosive areas.
- L. For PVC-coated rigid conduits, use manufacturer's recommended installation tools and recommendations. The manufacturer shall certify the installer before installation can proceed.

3.05 REQUIREMENTS FOR RIGID NONMETALLIC (PVC) CONDUIT

- A. Comply with the installation provisions of NEMA TC-2, except as modified below.
- B. Make cuts with a fine tooth handsaw. For sizes 2 inches and larger, use a miter box or similar saw guide to assure a square cut.
- C. Use factory-made couplings for joining conduit.
- D. Cementing and joining operation shall not exceed 20 seconds. Do not disturb joint for 5 minutes, longer (up to 10 minutes) at lower temperatures. Make joints watertight. Joining procedure shall conform to the procedures of ASTM D2855.

3.06 CONDUIT SEALING

- A. Seal conduit entries with conduit sealant as follows:
 - 1. Where indicated in the drawings.

3.07 GROUNDING

- A. Provide grounding in accordance with Section 260526.
- B. Use grounding bushings for all conduits carrying a grounding conductor.
- C. Provide a grounding conductor in flexible conduit, size conforming to NEC Article 250.

3.08 CONDUITS EMBEDDED IN CONCRETE AND BELOW SLABS

- A. Install conduits and sleeves passing through slabs, walls so as not to impair the strength of construction. Secure conduit to prevent sagging or shifting during concrete pour.
- B. Conduits shown under slab-on-grade construction shall be installed below the floor slab and under curing or damp-proofing membranes.

3.09 CONDUIT SUPPORTS

- A. Support conduit at intervals and at locations as required by the NEC. Do not use perforated strap or plumber's tape for conduit supports.
- B. Aluminum Conduit on Concrete or Masonry: Use one-hole aluminum clamps with pipe spacers (clamp backs) or 6063-T3 extruded aluminum preformed channels. Coat aluminum surfaces which are in contact with concrete or masonry per Section 099000, System No. 51 before installation. Anchor with Type 304 stainless steel expansion anchors and screws or Type 304 stainless steel preset inserts. Use preset inserts in prestressed concrete.

3.10 CONDUIT PENETRATIONS

- A. Conduits passing vertically through concrete slabs shall be sleeved, except where sealing fittings are required. Nonrated penetrations may be packed with nonshrink grout.
- B. Buried conduit shall penetrate surface at right angle.
- C. Conduits transitioning from underground shall stub up adjacent to the structure and run exposed vertically.

3.11 DAMAGED CONDUIT

- A. Repair or replace conduit damaged during or after installation.
- B. Replace crushed or clogged conduit or any conduit whose inner surface is damaged or not smooth.

3.12 OUTLETS FOR GENERAL WIRING

- A. Install outlets and boxes securely and support them substantially.

3.13 EQUIPMENT SUPPORTS

Support wall-mounted boxes, enclosures, and panels in damp, wet, locations with Type 304 stainless steel preformed channels and Type 304 stainless steel concrete anchors.

3.14 HAZARDOUS LOCATIONS

- A. Provide conduit sealing fittings in Class I, Divisions 1 and 2 locations within 18 inches of each conduit entering an enclosure containing electrical devices, except for hermetically sealed switches and receptacles which are UL labeled for the purpose.
- B. Provide a conduit sealing fitting for each conduit leaving the hazardous location.

3.15 ADJUSTING AND CLEANING

Upon completion of installation of conduits and boxes, inspect interiors of conduits and boxes; clear blockages; and remove burrs, dirt, and construction debris.

3.16 CONDUIT IDENTIFICATION

Identify each conduit using the conduit number shown in the drawings by means of a stamped brass tag at each end and at junction boxes, pull boxes, manholes, handholes, etc. Stencil exposed conduits for identification at least once in each room.

END OF SECTION

SECTION 260543 UNDERGROUND ELECTRICAL DUCT SYSTEMS

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes materials, installation, and testing of ducts and related materials for power, control system, and signal system wiring on sites.

1.02 DEFINITIONS

- A. Duct: The general term for an electrical conduit or raceway, either metallic or nonmetallic, for use under ground, embedded in earth or in concrete.
- B. Duct Bank: A group of two or more ducts in a continuous run between two points.

1.03 SUBMITTALS

- A. Submit shop drawings in accordance with the General Conditions and Section 260500.
- B. Submit product data for the following:
 - 1. Ducts, fittings, and joining cement.
 - 2. Warning tape.

1.04 QUALITY CONTROL

- A. UL Compliance and Labeling: Comply with requirements of UL standards. Provide duct products and components listed and labeled by UL or Electrical Testing Laboratory, Inc. (ETL).
- B. Code Compliance: Comply with requirements of NEC.

1.05 DELIVERY, STORAGE, AND HANDLING

Deliver ducts to site with ends capped. Store nonmetallic ducts with supports to prevent bending, warping, and deforming.

PART 2 - MATERIALS

2.01 CONCRETE MATERIALS

- A. Comply with Section 033000 for cast-in-place concrete.

2.02 RIGID STEEL CONDUIT AND FITTINGS

- A. Rigid Steel Conduit and Fittings: As specified in Section 260534.
- B. Externally PVC-Coated Rigid Steel Conduit and Fittings: As specified in Section 260534.

2.03 RIGID NONMETALLIC CONDUIT (PVC) AND FITTINGS

As specified in Section 260534.

2.04 RIGID PVC UTILITY DUCT, EB

- A. Material: PVC, meeting NEMA TC-6.
- B. UL Listing: Listed as meeting UL 651 for concrete encasement in outdoor trenches, rated for 90°C wire and cable.
- C. Fittings: UL-listed products of the same manufacturer as the duct. Manufactured fittings shall include 90-, 45-, and 30-degree long-radius ells and sweeps, end bells, plugs, adapters to rigid steel conduit, expansion fittings, and spacers.
- D. Joint Cement: As recommended by the manufacturer of duct as suitable for the climate, furnished with instructions to achieve watertight joints.
- E. Manufacturers: Carlon, Can-Tex Industries, or equal.

2.05 WARNING TAPE

A 6-inch-wide magnetically detectable warning tape with red protective polyethylene jacket resistant to alkalis, acids, and other destructive elements. The polyethylene tape shall be continuously imprinted "CAUTION--ELECTRICAL CONDUIT BELOW" unless otherwise indicated or directed by the Owner's Representative.

2.06 CONCRETE

Provide concrete as specified in Section 033000.

PART 3 - EXECUTION

3.01 DUCT USAGE SCHEDULE

Install the following types of ducts and fittings in locations listed, unless otherwise noted in the drawings. Definitions and requirements of NEC and the National Electrical Safety Code apply unless specifically modified below. Duct entries into buildings and structures shall comply with Section 260534.

- A. Underground, Direct Burial:

1. Material: Rigid nonmetallic conduit (PVC) and fittings. Provide PVC-coated rigid steel conduit long-radius elbows or PVC Schedule 80 long-radius elbows for bends exceeding 45 degrees.
 2. Minimum Size: 1 inch.
- B. Underground, Concrete Encased:
1. Material: Rigid nonmetallic conduit (PVC) and fittings. For bends exceeding 45 degrees, provide the metal conduit as specified for "Underground, Direct Burial."
 2. Minimum Size: 1 inch.

3.02 TRENCHING AND BACKFILLING

See Section 312300.

3.03 DUCT LAYOUT

- A. Underground ducts shall be direct buried unless identified as concrete encased in the drawings.
- B. Limit the maximum change of direction in any plane between lengths of straight duct without use of bends to 5 degrees.
- C. Where other utility piping systems are encountered or are being installed along a duct route, maintain a 12-inch minimum separation between duct and other systems at crossings and when running in parallel.
- D. Do not place ducts over valves or couplings in other piping systems.
- E. Minimum Cover: 30-inch minimum cover over direct burial underground ducts and top of concrete for concrete-encased ducts.

3.04 DUCT INSTALLATION

- A. Comply with the installation provisions of NEMA TC2 and TC6, except as modified below.
- B. Use factory-made conduit spacers to provide 2-inch minimum separation between conduits. Locate spacers not less than 4 feet center-to-center along entire length of ducts. Secure ducts and spacers to prevent movement during placement of concrete or earth backfill.
- C. Place duct couplings side-by-side horizontally but staggered at least 6 inches vertically.
- D. Make joints in accordance with manufacturer's recommendations. In the absence of specific recommendations, make the joints as follows:

1. Brush a plastic solvent cement on the inside of the coupling and on the outside of the duct ends.
 2. Slip duct and fitting together with a quick one-quarter turn to set the joints.
- E. Install expansion fittings. Expansion fittings are required when the duct is left exposed in trenches for a period of time during which the duct temperature can vary more than 2 degrees. Install expansion fittings near the fixed end of the run and 100 feet on center.

3.05 CONCRETE ENCASEMENT OF CONDUITS

- A. Encase duct in Class C concrete with color additive for identification purposes as specified in Section 033000 with red stain or dye applied to the top surface of the concrete encasement. Make duct construction monolithic. Do not exceed the indicated outside dimensions of the duct by more than 1 inch vertically or 4 inches horizontally. Do not backfill for a period of at least 24 hours after pouring concrete.
- B. Provide separation between conduits and encasement around conduits as detailed in the drawings.
- C. Extend the concrete encasement under floor slabs or equipment mounting pads to the point of raceway termination.

3.06 IDENTIFICATION

- A. Bury warning tape approximately 12 inches above all concrete-encased duct banks, direct buried conduit.

3.07 ACCEPTANCE TEST

- A. Pull a mandrel of a diameter approximately 1/4 inch less than the duct inside diameter, through each new duct.
- B. Pull a bristle brush of a diameter approximately 1/4 inch greater than the duct inside diameter through each duct to remove debris.
- C. Repair or replace any portion of the new duct through which the mandrel and brush will not pass at the Contractor's expense.

END OF SECTION

SECTION 260573 SHORT-CIRCUIT, PROTECTIVE DEVICE COORDINATION, AND
ARC-FLASH STUDY

PART 1 - GENERAL

1.01 DESCRIPTION

This section describes the requirements for furnishing a short-circuit and protective device coordination study and arc-flash hazard analysis.

1.02 SUBMITTALS

Submit six copies of the study in accordance with the General Conditions and Section 013300.

PART 2 - MATERIALS

2.01 ARC FLASH LABEL

- A. Arc flash labels shall identify the following as a minimum (distances indicated shall be in inches):
1. Flash Hazard Boundary: Threshold at which burn level exceeds 1.2 cal/cm^2 .
 2. Calculated incident energy at indicated working distance (18 inches).
 3. Hazard risk category and personal protective equipment (PPE) description.
 4. Equipment rated voltage.
 5. Required electrical glove class.
 6. Shock Hazard Boundaries: Limited approach, restricted approach, and prohibited approach (based on equipment rated voltage).
 7. Location (name of board).
 8. Name of organization that performed the analysis, contact information, and date analysis was performed.
- B. Labels shall carry either a "DANGER" or "WARNING" header, depending on whether an accident will or can result in injury or death, as stated in ANSI Z534.4.f. Header shall also include the following: "QUALIFIED WORKERS ONLY – PPE REQUIRED."
- C. Labels shall carry a footer that reads "Warning: Changes in equipment settings or system configuration will invalidate the calculated values and PPE requirements."

SHORT-CIRCUIT, PROTECTIVE DEVICE COORDINATION,
AND ARC-FLASH STUDY

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- D. Labels shall be approximately 6 inches long by 4 inches wide, die-cut and shall come on industrial-quality adhesive-backed vinyl.

PART 3 - EXECUTION

3.01 GENERAL

- A. Perform study using commercially available computer software, such as Power Tools for Windows by SKM Systems Analysis, Inc.; ETAP by Operation Technology, Inc.; or equal.
- B. Perform study under the supervision of and signed by a registered professional electrical engineer.
- C. The study shall include scope, results, comments, and suggestions. Evaluation procedures shall follow applicable ANSI, NEMA, IEEE, and UL standards.
- D. Obtain referenced or required characteristics and data from pertinent equipment manufacturers for existing as well as new equipment and from serving utility company, as applicable. Collect any field data of existing equipment needed for the study.
- E. Do not perform study based on assumptions for lack of data.

3.02 SHORT-CIRCUIT STUDY

- A. Short-circuit study shall provide calculations for the maximum short-circuit currents produced by balanced 3-phase and unbalanced faults at each bus shown in the single line diagrams. Short-circuit study shall be performed for system connected to utility.
- B. Motor contributions to short circuit shall be included, except for those motors controlled by VFDs with no bypass starters. Actual motor subtransient reactances shall be used for motors larger than 50 horsepower. Subtransient reactances of smaller motors may be assumed to be 17%.
- C. Evaluation shall include status (pass/fail), calculated short circuit current, short circuit rating of device, ratio of calculated short-circuit current to short-circuit rating of device in percent.
- D. Where fuses or current limiting circuit breakers are provided to reduce short-circuit levels at existing equipment that would otherwise have underrated protective devices, study shall include current limiting characteristics superimposed on time-current curves of the existing protective devices to verify compliance with NEC 240.86(A).

3.03 PROTECTIVE DEVICE COORDINATION STUDY

- A. Provide time-current curves graphically indicating the coordination proposed for the system, centered on conventional, full-size log-log forms. Include with each curve sheet

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a complete title and single-line diagram with legend identifying the specific portion of the system covered by that particular curve sheet. Include a detailed description of each protective device identifying its type, function, manufacturer, and time-current characteristics. Tabulate recommended device tap, time dial, pick up, instantaneous, and time delay settings.

- B. Provide device coordination studies for both normal and standby source protection devices. Protective device settings shall optimize protection of equipment and, as much as practical, assure that downstream protective devices open prior to upstream protective devices.
- C. Include the following on the curve sheets:
 - 1. Motor protection devices for all motors 100 horsepower and larger.
 - 2. Trip device characteristics of low-voltage equipment main protective devices. Exclude systems below 480 volts.
 - 3. Pertinent motor starting and generator characteristics.
 - 4. Characteristics of other system load protective devices.
 - 5. Show transformer full load current and 125%, 250%, 400%, or 600% full load currents as applicable to the selected primary and secondary protective devices. In addition, show transformer magnetizing inrush and ANSI transformer withstand parameters.
 - 6. Include all adjustable setting ground fault protective devices. Terminate device characteristic curves at a point reflecting the maximum symmetrical fault current as shown in the drawings. Ground fault settings of main disconnecting device shall comply with NEC-230.95(A).
 - 7. Include cable damage curves.
- D. Highlight protective devices that could not be coordinated and provide recommendation.
- E. Identify where cables may not be protected against high short circuits, and make necessary recommendations for correction of problems. Statements such as “Using larger cables or changing the breaker size or type, in most instances, will resolve this problem” are not acceptable.
- F. Adjust protective device settings in accordance with values established by the study.

3.04 ARC-FLASH HAZARD ANALYSIS AND EQUIPMENT LABELING

Perform an arc-flash hazard analysis in compliance with the latest edition of NEC 110.16 and NFPA 70E 110.8(B)(1) for the electrical equipment in accordance with Annex D of NFPA 70E and IEEE 1584 to identify:

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- A. The arc-flash protection boundaries, defined in Article 130.3(A) as "an approach limit at a distance from exposed live parts within which a person could receive a second-degree burn if an electrical arc flash were to occur."
- B. The shock hazard boundaries.
- C. The PPE and protective clothing necessary, based on the incident energy present at the working distance for the task to be performed, as described in Article 130.3(B) and Article 130.7.
- D. Switchboards, panelboards, industrial control panels, stand-alone VFDs, motor control centers, individually mounted starters, and instrument control panels shall be included in the study and shall be provided with arc flash labels. Labels shall be provided for each section of switchboard, VFD, and motor control center. Arc flash study shall not exclude equipment exempted by NFPA 70(E) and IEEE 1585, which allow exclusion of equipment that operates at 240 volts maximum and is fed from a transformer smaller than 125 kVA.

3.05 REEVALUATION OF ANALYSIS

Owner will have the right to request reevaluation of any part of the coordination and arc flash analysis to improve coordination or to reduce arc flash risk category or to eliminate cable protection inadequacy. Owner reserves the right to contact the individual who performed the study or to witness the actual reevaluation at the premises of the organization performing the study and shall be allowed to make suggestions. All of these services shall be provided at no extra cost.

END OF SECTION

SECTION 260590 MISCELLANEOUS ELECTRICAL DEVICES

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes materials and installation of miscellaneous electrical devices and equipment, such as disconnect switch.

1.02 SUBMITTALS

- A. Submit shop drawings in accordance with the General Conditions and Section 260500.
- B. Submit ratings and characteristics including voltage ratings, continuous current ratings, conduit entry restrictions, and enclosure type and dimensions.

PART 2 - MATERIALS

2.01 DISCONNECT SWITCHES

- A. Provide non-fusible or fusible disconnect switches with ampere rating and number of poles as indicated in the drawings. Switches for use on 480-volt circuits shall be NEMA heavy-duty Type HD. Enclosures outdoors shall be weatherproof, in NEMA Type 4X stainless steel rain-tight enclosures. Mechanisms shall have quick-make and quick-break operating handles and provisions for padlocking in the "OFF" position. The switch shall have an interlock to prevent unauthorized opening of the hinged cover when the switch is in the "ON" position and an interlock to prevent closing the switch mechanism with the hinged cover open. Fusible switches shall be equipped with rejection feature. On the front of the enclosure, attach a nameplate that identifies the load per Section 260500. For heavy-duty applications, provide Square D 3110 series or equal.
- B. Provide time-delay, Class RK-5 fuses with 200,000-ampere rms symmetrical interrupting rating and continuous ampere rating as shown in the drawings. Fuses for 480-volt service shall be 600-volt.

2.02 COMBUSTIBLE GAS DETECTOR

- A. Type: Single-point, infrared, absorption principle system to measure and transmit percent LEL of petroleum or methane vapors per schedule below. Sensor and transmitter to be integral.
- B. Sensor: Temperature compensated with double-compensated optical bench (2 lamps, 2 detectors) and non-imaging optics. Provide splashguard.
- C. Sensor Housing: Material shall be hermetically sealed type 316 stainless steel with explosion proof ratings and U.L. approved for Class 1, Division I, Groups A, B, C and

D. Operating temperature range shall be -40 degrees F to +140 degrees F. Operating humidity range shall be 0 to 100% relative humidity, non-condensing. Unit shall carry a 2-year warranty.

D. Transmitter: Microprocessor-based with self-diagnostics, capable of non-intrusive calibration using a hand-held device.

E. Transmitter Output: 4 to 20 mA DC configured to represent 0-100% LEL.

F. Power: 24 VDC four-wire powered.

G. Accessories: Provide one calibration kit including zero and/or span gas as required, all required fittings, guards, caps, gauges, handheld calibration devices, etc.

H. Manufacturer's Services: Furnish the services of a factory representative for one, eight-hour day. The representative shall have complete knowledge of the operational and maintenance requirements of the gas detector system and shall instruct the Owner's personnel in the proper operation and maintenance of the equipment.

I. Manufacturer: Draeger (PIR 3000) or an approved equal.

2.03 ENCLOSED CIRCUIT BREAKERS:

A. Provide manually operated circuit breakers, ambient compensated, providing thermal magnetic inverse time limit overload and instantaneous short circuit protection. Provide overload protection on all poles; trip settings as indicated.

B. Provide circuit breakers as specified under Section 26 24 19.

C. Provide breakers that are rated 480 volt AC, 3 pole.

D. Provide time-current characteristic curves for each size of circuit breaker furnished.

E. Provide circuit breakers housed in NEMA 4X, 316 stainless steel type enclosure indicated, having external operating handles with provisions for padlocking.

PART 3 - EXECUTION

3.01 FIELD TESTING

A. Operate each disconnect switch three times, under load, and verify that all phases of the load are disconnected each time.

B. Calibrate and field test combustible gas detector per manufacturer's instructions.

END OF SECTION

SECTION 261216 DRY-TYPE TRANSFORMERS

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes materials and installation of transformers.

1.02 SUBMITTALS

- A. Submit shop drawings in accordance with the General Conditions and Section 260500.
- B. Submit ratings and characteristics including voltage, phases, connections, enclosure type and dimensions, and conduit entry restrictions.

PART 2 - MATERIALS

2.01 GENERAL

- A. Provide general-purpose, single-phase, individually mounted dry-type transformers of the two-winding, self-cooled type. Kva size, voltage, and phase of the transformers are indicated in the drawings.
- B. Within electric cabinets, provide core and coil, dry-type transformers.
- C. Transformers shall have copper windings and shall be UL listed and labeled where listing applies.
- D. Transformers shall be rated for continuous operation in a 40°C maximum ambient temperature.
- E. Transformers shall comply with the 2010 Department of Energy Efficiency Standards for Distribution Transformers.

2.02 DRY-TYPE TRANSFORMERS (10 KVA AND BELOW)

- A. Construct transformers in accordance with ANSI C89.2, NEMA ST-20, and UL listed under the requirements of UL 506.
- B. Transformers 5 kva and larger shall have two 5% FCBN taps on the primary side.
- C. Transformers rated 3 kva through 10 kva shall have 115°C rise, 185°C insulation system.
- D. Encapsulate core and coil in an insulating resin of the class equal to the temperature rise and embed in a resin and filler system to attenuate the sound level.

- E. Transformer shall be totally enclosed, nonventilated, suitable for indoor or outdoor installation.
- F. Transformers shall be Sorgel Electric Division, Square D Company "Quiet Quality".

2.03 FACTORY TESTS

Perform factory tests in accordance with the latest revisions of ANSI C57.12.91 for dry-type transformers.

PART 3 - EXECUTION

3.01 GENERAL

- A. Set taps under load conditions for correct voltage.

3.02 TESTS

Transformers shall have insulation resistance tests made on the windings prior to being connected. The measurements shall be from primary and secondary windings to ground and between primary and secondary windings. The minimum value shall be 10 megohms.

END OF SECTION

SECTION 262410 PANELBOARDS (BREAKERS)

PART 1 - GENERAL

1.01 DESCRIPTION

This section describes materials, testing, and installation of breakers.

1.02 SUBMITTALS

- A. Submit shop drawings in accordance with the General Conditions and Section 260500.
- B. Show ratings and characteristics including voltage ratings, fault current withstand ratings and arrangement of overcurrent protective devices, and mounting provisions.

PART 2 - MATERIALS

2.01 BREAKERS

- A. Breakers shall be molded-case type and shall comply with NEMA AB3 requirements. Provide quick-make and quick-break toggle mechanism, inverse-time trip characteristics, and trip-free operation on overload or short circuit. Automatic tripping shall be indicated by a handle position between the manual OFF and ON position. Provide trip ratings as indicated in the schedules.
- B. Single-pole breakers shall be full module size.

PART 3 - EXECUTION

3.01 TESTS

- A. Operate each circuit breaker and verify that all phases of each load are disconnected.

END OF SECTION

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SECTION 262726 WIRING DEVICES

PART 1 - GENERAL

1.01 DESCRIPTION

This section describes materials and installation of light switches and receptacles.

1.02 SUBMITTALS

- A. Submit shop drawings in accordance with the General Conditions and Section 260500.
- B. Submit material list for each type of wiring device and cover plate. Indicate type, ratings, material and manufacturer.

1.03 REFERENCES

- A. NEMA WD 1, General Purpose Wiring Devices.
- B. NEMA WD 6, Wiring Device Configurations.

PART 2 - MATERIALS

2.01 GENERAL

Provide wiring devices that are UL listed.

2.02 RECEPTACLES

- A. Duplex Receptacles: Provide NEMA WD 1, molded composition, ivory, specification grade receptacles. Duplex receptacles for 120-volt, single-phase, 3-wire circuit to be rated 20 amperes, 125 volts, NEMA Type 5-20R.
- B. Ground Fault Interrupter (GFI) Duplex Receptacles: Receptacles shall be rated 20 amperes and comply with UL 943, Class A. Provide Leviton 6398-HGI, 3M GFI-2701, or equal.
- C. All receptacles in damp or wet locations shall be listed weather resistant type and shall have covers that are weatherproof with the attachment plug cap inserted.

2.03 SWITCHES

Switches shall be NEMA WD 1, molded composition, ivory specification grade, single pole.

- A. 120-Volt Lighting: Provide switches rated 20 amperes, 120/277-volt ac. Provide quiet operation, toggle-type switches.

2.04 COVER PLATES

- A. In wet areas, areas use individually gasketed weatherproof cover plates. Provide outdoor receptacles with covers that provide weatherproof protection while outlet is in use. Provide Tay Mac Industrial Outlet Covers or equal.

PART 3 - EXECUTION

3.01 GROUNDING

Provide a bonding jumper between the grounded outlet box and the receptacle ground terminal.

3.02 TESTING

- A. Operate each switch and verify that the load is turned on and off.
- B. Test each receptacle with a circuit tester that checks voltage, polarity, and grounded conditions. Repair or replace defective receptacles and repeat the test.
- C. GFI receptacles shall be tested with the circuits energized. Devices shall be tested with a portable GFI receptacle tester capable of circulating 7.5 mA of current, when plugged in, between the "hot" line and "ground" to produce tripping of the receptacle. Resetting and tripping shall be checked at least twice at each GFI receptacle.

END OF SECTION

SECTION 262923 VARIABLE FREQUENCY DRIVE (VFD)

PART 1 - GENERAL

1.01 DESCRIPTION

This section describes materials, testing, and installation of VFDs for pumping applications. The pump manufacturers shall supply VFDs that are compatible with the pump motors.

1.02 SUBMITTALS

- A. Submit shop drawings in accordance with the General Conditions and Section 260500.
- B. Submit manufacturer's descriptive data including ratings, performance and operational features, dimensional data, conduit entry restrictions, and heat dissipation to ambient.
- C. A copy of this specification section with addenda and all referenced specification sections with addenda, with each paragraph check-marked to indicate specification compliance.
 - 1. Failure to include a copy of the marked-up specification sections will result in return of the entire submittal without further review and consideration until the marked-up specification are resubmitted with the entire package.
- D. Submit a schematic diagram for each drive showing field devices, wire numbers, terminal numbers, and interface with other panels.
- E. Submit harmonic analysis.
- F. Submit certified factory test report.
- G. Submit a confirmation of appropriate coordination with motor manufacturer regarding adequate mitigation against bearing damage caused by currents that may flow in the bearings due to shaft voltages imposed by the VFD controller.

1.03 OPERATION AND MAINTENANCE MANUALS

Submit operation and maintenance manuals in accordance with Section 260500.

1.04 MANUFACTURER'S SERVICES

Provide equipment manufacturer's services at the jobsite for the minimum labor days listed below, travel time excluded, for a certified technical representative:

- A. Three labor days to check the installation, calibrate the drives, and advise during start-up and testing of the drives.

- B. One labor day to instruct the Owner's personnel in the operation and maintenance of the equipment.

1.05 RATINGS

Motor horsepower ratings shown are minimum expected. This does not limit the equipment size. When motors furnished differ from the minimum ratings indicated, make the necessary adjustments to wiring, conduit, disconnect devices, VFD sizes, branch circuit protection, and other affected material or equipment to accommodate the motors actually installed, at no additional cost to the Owner.

PART 2 - MATERIALS

2.01 GENERAL

- A. VFDs shall consist of variable frequency controller and controls. Horsepower rating of each drive shall be sufficient to drive the motor as shown in the drawings or the motors actually provided, whichever is larger, under the specified operating conditions.
- B. All components shall be integral to the VFD lineup, factory wired, and tested as a complete system.
- C. Design equipment to operate under the following operating conditions:
 - 1. Elevation to 1,000 feet above sea level.
 - 2. Ambient 0°C to 40°C.
 - 3. Noncondensing relative humidity to 95%.
 - 4. A-C line frequency variation of ± 3 hertz.
- D. VFD shall maintain a 0.95 minimum true power factor throughout the entire speed range.
- E. VFD shall be suitable for use with submersible motor having a 1.0 service factor.
- F. Equipment shall comply with the requirements of ANSI, IEEE, and NEMA. The electrical equipment, design, and construction shall comply with the provisions of the NEC. The complete drive shall be UL listed.
- G. All drives shall be supplied by one manufacturer.
- H. VFDs shall be manufactured by Square D.

2.02 ENCLOSURES

- A. Equipment shall be included and installed within the LSCP as shown on the drawings.

2.03 VARIABLE FREQUENCY CONTROLLERS

- A. Controller for the 14 HP pump motor shall consist of an input line reactor, six-pulse converter section, and output inverter utilizing IGBT technology.
- B. Controller shall be pulse width modulated design.
- C. Controller shall be variable voltage/variable frequency (constant volts per hertz).
- D. The controller shall include the following features:
 - 1. 460-volt a-c, +10%, -10% (at rated load), 3-phase, 3-wire, 60-hertz input power.
 - 2. 460-volt a-c, 3-phase, 3-wire, ungrounded output power.
 - 3. Equipment fault current rating of 65,000 symmetrical amperes fault current.
 - 4. Input power surge protector.
 - 5. 20- to 60-hertz continuous operating range.
 - 6. 110% overload rating for 60 seconds, 100% rated current continuous.
 - 7. Output current limit, 50% to 110% adjustable. Limits motor inrush current during start-up.
 - 8. Regulation $\pm 3\%$ of base speed.
 - 9. Voltage Dip Ride-Through: Controller shall be capable of sustaining continued operation with a 40% dip in nominal line voltage. Output speed may decline only if current limit rating of the controller is exceeded.
 - 10. Power Loss Ride-Through: Controller shall be capable of a minimum three-cycle power loss ride-through without fault activation.
 - 11. Separately adjustable acceleration and deceleration rates.
 - 12. Maximum and minimum speed adjustments.
 - 13. 120-volt a-c control power for run/stop circuits.
 - 14. Blower cooled, with thermal switch cutout.
- E. Minimum controller efficiency shall be 95% at 100% speed and 100% torque and 88% at 50% speed and 25% torque based on nominal 1,800-rpm motor with load horsepower to vary as cube of speed.

- F. The controller shall include protective circuitry that initiates an orderly shutdown of the inverter without component failure. The controller shall shut down and require manual reset for the following fault conditions:
 - 1. Motor inverse time overload.
 - 2. Instantaneous overcurrent.
 - 3. Inverter fault.
 - 4. Over-frequency.
 - 5. D-C link overvoltage.
 - 6. Ground fault.
- G. The controller shall ride through or shut down for the following fault conditions.
 - 1. Incorrect phase sequence.
 - 2. Loss of an input phase.
- H. The controller shall shut down for input under-voltage. The controller shall automatically restart upon a cleared fault condition.
- I. The controller shall have not less than five restart capabilities. If the drive reaches the limits of restart, the restart circuit shall lock out and shall provide a fault signal.
- J. Provide a common failure contact for remote indication of fault conditions previously listed.
- K. The power circuit design shall be such that the following fault conditions can occur without damage to the power circuit components:
 - 1. Single-phase fault or 3-phase short circuit on VFD output terminals.
 - 2. Failure to commutate inverter transistor due to severe overload or other conditions.
 - 3. Disconnecting motor during VFD operation.
 - 4. Loss of input power due to opening of VFD input disconnect device or utility power failure during VFD operation.
 - 5. Loss of one phase of input power.
- L. VFD shall have integral Ethernet TCP/IP communication capability.

- M. Provide a critical speed avoidance circuit for selection of a critical speed with a rejection band centered on that speed. The drive shall ignore any speed signals requiring drive operation within the rejection band.
- N. The VFD controller shall operate satisfactorily when connected to a bus subject to a total harmonic voltage distortion caused by other sources of up to 10% and commutation notches of up to 36,500 microsecond-volts.

2.04 CONTROLS

- A. Provide control power transformers, indicating lights, selector switches, push buttons, analog dial-type speed indicator, digital keypad, and display as indicated in the schematic diagrams shown in the drawings.
- B. Provide 120-volt control power transformer where indicated or required. Provide spare capacity that is in addition to contactor load plus other loads including remote-mounted loads external to the VFD, such as motor space heaters, solenoids, etc., as applicable. Coordinate with suppliers of equipment of such loads to obtain necessary load data. Fuse one side of secondary winding and ground other side. Provide primary winding fuses. Transformer shall be NEMA ST1, machine tool grade with isolated secondary winding.
- C. Control relays shall be magnetically held and shall have convertible contacts. Control relays shall be UL listed with NEMA A300 rated contacts and coil voltage, number of poles, and pole arrangement as indicated in the drawings. Relays may be plug-in type in which case they shall have retaining clips, check button for test operation, and indicating light for coil power indication. Provide Square D relays.
- D. Time-delay relays shall be UL listed with contacts rated 10-ampere noninductive load, 120 volts, with coil voltage, number of poles, pole arrangement, and maximum timing adjustment as indicated in the drawings. Relays shall be solid-state nonplug-in industrial type. Provide Square D Class 9050.
- E. Provide relays with the number of contacts shown on the schematic diagrams. Utilize additional contact blocks or relays to satisfy the number of contacts shown at no additional cost to the Owner. Plug-in relays are acceptable and shall have retaining clips.
- F. Control switches shall be round, oiltight type, complete with legend plates and quantity of contact blocks required for the control function.
- G. Indicating lights shall be oiltight type, complete with color of lens indicated in drawings and legend plate. Lamps shall be 120-volt ac, 6S6 screw base. Indicating lights shall be push-to-test type.

2.05 FACTORY TESTING

- A. Subject the VFDs to a complete functionality test and a full-load operational test prior to shipment. Simulate remote inputs and outputs and verify correct operation. Submit certified factory test report.

- B. Set adjustable set points of the drives at motor manufacturer's recommended values. Coordinate with motor manufacturer and obtain recommended set point values in writing. Document information in O&M manual.

PART 3 - EXECUTION

3.01 FIELD TESTS

- A. Provide the services of a qualified factory-trained manufacturer's representative to assist in testing and start-up of the equipment specified under this section, in accordance with manufacturer's published start-up services. Additionally, perform the following minimum work under the technical direction of the manufacturer's service representative if not included in their published start-up services:
 1. Perform insulation tests on each phase and verify low-resistance ground connection on ground bus. Exclude such tests harmful to electronic components.
 2. Torque all bolted connections made in the field and verify all factory-bolted connections.
 3. Verify that factory-set adjustable set points of VFD are in accordance with the motor manufacturer's recommendations.
 4. A qualified factory-trained manufacturer's representative shall certify in writing that the equipment has been installed, adjusted, and tested in accordance with the manufacturer's recommendations. Drive and motor nameplate information, settings, and operating parameters shall be documented. Equipment shall be inspected prior to the generation of any reports.
- B. Adjust control set points and verify proper operation. Coordinate minimum speed with performance requirements of driven equipment.
- C. Test the operation of each interlock to verify that the interlock performs its function.
- D. Test the operation of each control feature to verify operation of the controls.
- E. Perform dynamic tuning tests with the facility controls.

3.02 CONTRACT CLOSEOUT

Provide in accordance with Section 017000.

3.03 WARRANTY

The equipment shall be warranted for three (3) years commencing from date of substantial completion.

3.04 CERTIFICATION

Provide a written certification from the equipment manufacturer that each pumping system has been properly installed according to the Contract Documents and the manufacturer's recommendations, and that the equipment is operating normally. Make all necessary corrections and adjustments including but not limited to parts, labor, or freight at no additional cost to the Owner.

END OF SECTION

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SECTION 263213 STANDBY ENGINE-GENERATORS (100 KW AND SMALLER)

PART 1 - GENERAL

1.01 DESCRIPTION

This section describes materials, installation, and testing of a diesel engine-generator set and associated equipment to be used for standby power in the event of a utility power failure.

1.02 STANDARDS

Construct equipment in accordance with the applicable requirements of the following standards:

- A. National Electrical Code (NEC).
- B. American National Standards Institute (ANSI).
- C. National Electrical Manufacturers Association (NEMA).
- D. Institute of Electrical and Electronic Engineers (IEEE).
- E. American Society for Testing and Materials (ASTM).
- F. Underwriters' Laboratories, Inc. (UL).

1.03 SUBMITTALS

- A. Submit shop drawings in accordance with the General Conditions and Section 260500.
- B. Submit shop and installation drawings and catalog data for the following equipment. Show applicable ratings, sizes, materials, manufacturers and part numbers, and overall dimensions and weights.
 - 1. Itemized bill of material.
 - 2. Engine-generator base with anchor bolt sizes and layout. Submit anchor bolt material listing. Submit catalog data for vibration isolators and calculations for size and number of anchor bolts.
 - 3. Engine.
 - 4. Generator.
 - 5. Sound attenuation enclosure.

6. Silencer.
7. Base fuel tank and spill basin.
8. Control panel.
9. Battery charger.
10. Jacket water heater.

- C. Submit system schematic diagram showing piping and wiring interconnections with sizes and quantities. Submit ladder-type schematic electrical diagrams with legend identifying devices on diagrams.
- D. Submit installation data sheet giving fuel, lubricating oil, and exhaust and ventilation requirements.
- E. Submit a start-up inspection report signed by the engine manufacturer's authorized field service representative.
- F. Submit factory test report including sound levels and exhaust emissions.
- G. Submit three copies of operation and maintenance manuals.

1.04 MANUFACTURER'S SERVICES

Provide equipment manufacturer's services at the jobsite for the minimum labor days listed below, travel time excluded:

Two labor days to check the installation and advise during start-up, testing, and adjustment of the equipment and to instruct the Owner's personnel in the operation and maintenance of the equipment. Submit operation and maintenance manuals prior to this instruction.

1.05 WARRANTY

Equipment furnished under this section shall be guaranteed against defective parts or workmanship for a period of 24 months from date of acceptance by the Owner.

PART 2 - MATERIALS

2.01 MANUFACTURERS

- A. The engine, generator, generator control panel, and fuel tank unit shall be manufactured in the U.S. by manufacturers currently engaged in the production of such equipment. An authorized distributor maintaining a parts depot and 168-hour-per-week service facility shall be located within a 75-mile radius of the jobsite.

- B. The engine-generator shall be manufactured by Baldor, ONAN, Olympian, or equal.

2.02 RATING

The rating of the standby engine-generator shall be as listed below and based on operation of the set when equipped with all operating accessories, such as air cleaners, lubricating oil pump, fuel injection pump, and cooling fan. The specified standby kw shall be for continuous electrical service during interruption of the normal utility source.

- A. Standby Rating: 60 kw (minimum).
- B. Engine Speed: 1,800 rpm (maximum).
- C. Voltage: 480/277 volts, 3 phase, 4 wire.
- D. Frequency: 60 hertz.
- E. Power Factor: 0.8.
- F. Elevation: 1000 feet above sea level.
- G. Air Temperature: 120°F maximum, 30°F minimum.
- H. Relative Humidity at Maximum Temperature: 100%.
- I. Instantaneous voltage dip shall not be greater than 30% when full rated load and power factor are applied to generator set in one step.

2.03 ENGINE

- A. General: The engine shall be the standard product of the manufacturer, a current production model, and have the following features:
 - 1. Naturally aspirated.
 - 2. Four-stroke cycle.
 - 3. Water-cooled.
 - 4. Capable of the rated output when operating on 2-D diesel fuel (ASTM D975).
- B. Provide the engine with the following accessories:
 - 1. Fuel, lube oil, and intake air filters.
 - 2. Flexible fuel lines.
 - 3. Jacket water heater.

4. Engine-mounted water pump.
5. Coolant shut-off valves for jacket water heater.
6. Lube oil cooler.
7. Combination intake filter/silencer.

C. Starting System:

1. Provide a 12- or 24-volt d-c electric starting system with positive engagement drive.
2. Provide lead-acid storage battery of the heavy-duty diesel-starting type. The battery shall have sufficient capacity to provide for one-and-one-half-minute total cranking time without recharging and shall be 20-hour rated. Provide a unit-mounted corrosion-resistant fiberglass battery box. Provide battery cables and replaceable connectors.
3. Provide a UL-listed, two rate, current-limiting battery charger to automatically recharge batteries. It shall include overload protection, silicon diode full wave rectifiers, voltage surge suppressors, d-c ammeter, and fused a-c input. A-C input voltage shall be 120 volts. Output shall be no less than 2 amperes. Provide a dry contact for monitoring common fault and alarm.

D. Lubrication System: Fix a pressure-type lubricating system with gear-type oil pump and full flow oil filter to the engine. Filters shall be threaded spin-on type or can type with replaceable filter elements, conveniently located for servicing. Provide filters with a spring-loaded bypass valve to ensure oil circulation if filters are clogged. Provide an oil drain with manual valve.

E. Safety Switches: Provide generator control panel with devices for indication and control of the following conditions at the generator control panel. Provide full NFPA 99 meter and alarm kit including the following.

1. Low oil pressure (shutdown) and lamp (red).
2. Overcrank (shutdown) and lamp (red).
3. High engine temperature (shutdown) and lamp (red).
4. Overspeed (shutdown) and lamp (red).

Overspeed trip and cranking termination shall be by a dual element electronic-type speed switch that operates on magnetic impulses from the flywheel ring gear or other engine-timed gear. Overspeed trip setting shall be 118% of synchronous speed. The low setting shall be used to automatically ensure continued engine

cranking until the engine has reached 600 rpm, even if the oil pressure is up to an acceptable level at a lower speed.

F. Governing System:

1. Provide an adjustable isochronous governor of the electrical-hydraulic or all electric type with electrical speed sensing. Governor shall provide adjustable speed setting from 58- to 62-hertz adjustable speed regulation, adjustable load limit from 100% to 110% of unit rating, and shall also control the engine at recommended idle speed. The governor shall be capable of maintaining the frequency constant within $\pm 0.5\%$ for any constant load from no load to full generator rating. After a sudden load change of 25% of rated load, the governor shall reestablish stable operating conditions in not less than two seconds. Stable operation is defined as operation at a frequency that is constant within $\pm 1\%$ of rated frequency. The maximum change of frequency during the two-second surging period shall not exceed 1.5 hertz.
2. Governor shall be Woodward, Barber Colman, DYNALCO, or equal.

2.04 JACKET WATER HEATER

Jacket water heater shall be factory installed on the engine with thermostat controls. Heater shall be 120 volts, 1 phase, 60 hertz.

2.05 GENERATOR

A. General:

1. The generator shall be a 3-phase, 60-hertz, single-bearing, dripproof, rotating field, synchronous type, with 3-phase rotating armature brushless exciter. Provide Class F or H insulation on the stator and rotor. Further protect both with 100% epoxy varnish impregnation and an overcoat of resilient epoxy asphalt insulating material to increase resistance to abrasive dust or sand, high humidity, and light acidic, oil, or salt-laden atmospheres, as well as prevent fungus growth.
2. The wave form deviation factor of the line-to-line voltage at no load and balanced rated load at 0.80 power factor shall not exceed 5%. The rms of all harmonics shall be less than 3% and that of any one harmonic less than 2% at full rated load.
3. Conform to the applicable NEMA standards for motors and generators, MG 1. Base rating of generator on continuous operation at 0.80 power factor.

- B. Regulator: The voltage regulator shall be a static type and shall maintain a constant and stable generator output voltage within $\pm 2\%$ of nominal for all steady-state loads from no load to full load. A 5% variation in frequency and the effects of field heating shall not affect the unit's regulation performance. Provide stability and voltage range adjustments.

2.06 STRUCTURAL STEEL BASE

- A. Mount the engine-generator on a structural steel base. Provide holes for mounting bolts. Provide the structural steel base with means for lifting the unit for shipment and installation. Clearly identify lift points and total weight and permanently mark on the base.
- B. Isolate the structural steel base from the equipment pad by fiberglass pad-type isolators with bonded steel load plate and separate snubber washers. Isolators shall be Peabody Noise Control, Inc.; Kinetics brand, Type SN; or equal.
- C. Mount double-wall secondary containment fuel tank inside the steel base enclosure. Fuel tank shall be of sufficient size to operate generator set at full standby rating for a period of not less than 72 hours. Provide leakage detector with an SPDT contact for remote annunciation. Provide opening in top of fuel tank for fuel level sensor.

2.07 EXHAUST SYSTEM

- A. Exhaust system shall consist of a silencer, flexible exhaust fitting, exhaust piping, insulation, and mounting hardware.
- B. Provide a chamber-type critical grade silencer constructed of carbon steel. Silencer shall include a condensate drain tapping. Exhaust noise shall not exceed 55 dBA at 25 feet. Provide brackets, companion flanges, gaskets, and fasteners for mounting inside of enclosure. Silencer shall be as manufactured by Universal, GT Exhaust Systems, Riley-Beard, or equal.
- C. Silencer and exhaust pipe size shall be sufficient to ensure that measured exhaust backpressure does not exceed the maximum limitations specified by the generator set manufacturer.
- D. Exhaust piping shall be carbon steel pipe per ASTM A106, Grade B. Provide flanged or welded type fittings. Provide sufficient flanged fittings to permit the system to be entirely dismantled in sections. Elbows shall be smooth long-radius type.
- E. To maintain a surface temperature not to exceed 150°F, insulate indoor exhaust piping and fittings with FIRWIN Diesel-Tech blanket, GT Exhaust Systems reusable thermal insulation blanket, or equal. Blanket shall consist of an aluminized fiberglass cloth jacket, minimum 1-inch thick insulation with a K factor of 0.52 at 700°F, 0.095-inch stainless steel mesh liner, and blanket fastening pins with stainless steel wire lacing. Terminate the insulation 6 inches below the ventilated roof thimble.
- F. Mount the exhaust system in a manner to allow for thermal expansion and contraction over a temperature range of -20°F to 1200°F.

2.08 CONTROL PANEL, ENGINE MOUNTED (DIGITAL TYPE)

- A. Demonstrate (by factory testing) that the panel can operate at ambient air temperatures up to 158°F and down to -40°F and that the panel operates normally while subjected to a rigorous vibration test.
- B. The generator control panel shall be standard Caterpillar Electronic Modular Control Panel (EMCP 4.3) or equal, consisting of full-featured power metering, protective relaying, simultaneous engine and generator parameter viewing, and expanded a-c metering. Engine and generator control, diagnostics, and operating information shall be accessible via the control panel keypads.
- C. Fabricate housing from environmentally sealed die-cast aluminum that isolates and protects electrical components against failures caused by moisture and dirt contamination. Panel shall maintain metering accuracy from -40°C (-40°F) to 70°C (158°F).
- D. Panel shall have electrical noise immunity of no less than 100 volts/meter. True rms sensing shall ensure a-c metering accuracy of 0.5% for a-c volts, amperes, and power parameters.
- E. Unit shall be digital, 32-bit microprocessor-based eliminating the need for switches, meters, transducers, relays, and sensing units. Panel shall have full-featured power metering, keypad control for viewing generator set kw, kva, kvar, kwh, kvar-hours, percent rated power, and power factor.
- F. Panel shall have programmable protective relaying, available as alarm and shutdown, to provide protection against undervoltage, overvoltage, underfrequency, overfrequency, overcurrent, and reverse power. Provide simultaneous viewing of engine and generator parameters with toggle between auto parameter scrolling and individual parameter display.
- G. Simultaneous viewing of L-L voltages, phase current, or frequency shall be possible.
- H. Keypad Programmability:
 - 1. Keypad shall have programmability for logical parameter groups: a-c metering, protective relaying, engine monitoring.
 - a. Digital (LCD) Indication:
 - a-c voltage (L-L and L-N)
 - a-c amperes.
 - kw (total and per phase).
 - kva (total).
 - kvar (total).
 - kwh (total).
 - kvar-hr (total).

PF (average total and per phase).
Percent of rated (total).
Frequency.
d-c voltage.
Coolant temperature (60°F to 240°F).
Oil pressure (0 to 80 psi).
Oil temperature.
Fuel level.
rpm.
Hours run.
System diagnostics.

b. Controls:

Auto start/stop.
Emergency stop.
Lamp test.
Cycle crank.
Voltage control.
Cooldown timer, adjustable.
Phase selector switch.
Load demand relay.
Spare relay – programmable.

c. Enclosure:

NEMA 1, IP22.
Vandal door.

d. Indicator Lights:

Low oil pressure, shutdown.
High coolant temperature, shutdown.
Overspeed, shutdown.
Overcrank, shutdown.
Emergency stop.
Fault shutdown.
Fault alarms.
Three spare lights/four spare inputs, used for battery charger,
high/low/fail, customer programmable (shutdown or alarm).
Two spare alarm or fault LEDs.

e. Protective Relaying:

(1) Programmable Relays:

Over/undervoltage.
Reverse power relay.

Over/underfrequency.
Overcurrent.

(2) Programmable for:

Alarm enable/disable.
Alarm threshold level.
Alarm time delay.
Shutdown enable/disable.
Shutdown threshold level.
Shutdown time delay.

(3) Set point values may be viewed with the engine running or stopped.

(4) Protective Devices:

Low coolant level alarm/programmed for shutdown.
Alarm modules - local (with horn and silence switch).
Frequency control.
Common alarm/shutdown dry contact.
Generator running dry contact.
Panel, auxiliary relay contacts, for interlocking of fan
motors or louvers.

2. Provide dry contacts for remote indication of the following for the purpose of monitoring generator alarms and functions remotely:

- a. Generator breaker trip.
- b. Pre-high oil temperature.
- c. High oil temperature.
- d. Loss of cooling water flow.
- e. Battery charger malfunction.
- f. Pre-low oil pressure.
- g. Low oil pressure.
- h. Low coolant temperature.
- i. Low water temperature.
- j. Pre-high water temperature.
- k. High water temperature.

- l. Fail to synchronize.
- m. Overspedd.
- n. Emergency stop.
- o. Low fuel shutdown.

2.09 MAIN LINE CIRCUIT BREAKER

Provide a main line molded case circuit breaker sized in accordance with the NEC. Install on the generator in a NEMA 1 enclosure or in the generator control panel to function as a load circuit interrupting and protection device. It shall operate both manually for normal switching function and automatically during overload and short-circuit conditions. Circuit breaker shall trip free of the handle. The handle position, or a luminescent flag, shall indicate "Off," "On," or "Tripped" breaker positions. The trip unit for each pole shall have elements providing inverse time delay during overload conditions and instantaneous magnetic tripping for short-circuit protection. Provide and mark insulated neutral terminals and a ground terminal. The circuit breaker shall meet standards established by UL, NEMA, and NEC. Do not use generator exciter field circuit breakers in lieu of a main line circuit breaker.

2.10 SOUND ATTENUATION ENCLOSURE

Provide a weatherproof enclosure fabricated of aluminum with baked enamel finish. Enclosure shall have lockable, hinged access doors, stainless steel hardware, sound attenuating interior insulation and noise reduction type air louvers. The enclosure shall be constructed per the following wind load: wind loading per FBC 2010, ultimate wind speed = 175 MPH, Exposure ‘C’, Risk Category III.

The sound attenuating enclose shall be design so that the maximum allowable sound level limit for the individual octave bands shall comply with table below during full load conditions; the sound levels shall be equal or less when measured at the property line.

Octave Band Center Frequency, Hz	dB
31.5	64
63	64
125	61
250	57
500	53
1,000	48
2,000	44
4,000	41

8,000	37
dBA	55

PART 3 - EXECUTION

3.01 INSTALLATION

- A. The Contractor shall coordinate the construction of engine-generator set foundations, piping systems, and conduit stub-ups with the generator set manufacturer's written requirements. Foundation blocks, anchor bolt layouts, and piping and quantity and locations of conduit stub-ups may have to be modified from those shown in the drawings. Such work shall be at the Contractor's expense.
- B. Fill the tank with low-sulfur No. 2 diesel fuel (per ASTM D975). After field testing is complete, refill the tank.
- C. Engine cooling system shall be charged with inhibited ethylene-glycol solution to provide antifreeze protection to 0 degrees F.
- D. The entire unit and other equipment shall be completely installed, wired, and plumbed by the engine supplier prior to shipment to the installation site.

3.02 PIPING

Pitch horizontal runs of exhaust pipe away from the engine. Provide condensate traps with petcocks or valves at low spots in the exhaust system. Fit pipe penetrating walls or roofs with a ventilated thimble.

3.03 PAINTING AND COATING

- A. Coat the exterior enclosure and base, color to be selected by owner. Interior shall be White or Hi-Way Yellow.

3.04 START-UP

- A. On completion of the installation, the initial start-up shall be performed by a factory-trained service representative of the engine supplier, who shall thoroughly inspect, activate the jacket water heater, operate, test, and adjust the equipment. The inspection shall include the soundness of all parts, completeness of all details, proper operation of all components with special emphasis on safety devices, correctness of settings, proper alignments, and correct phase rotation to match other sources.
- B. Field tests shall include the following:

1. Simulate power failure by tripping the main breaker and demonstrate complete manual and automatic start, load, unload, and stop sequence of the engine-generator.
 2. Conduct a two-hour run. The generator supplier shall provide load banks and make necessary connections for the test.
- C. Perform start-up in presence of the Engineer. Provide notification of start-up date a minimum of three days prior to the date.

END OF SECTION

SECTION 263623 AUTOMATIC TRANSFER SWITCH

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes materials and installation of automatic transfer switches.

1.02 SUBMITTALS

- A. Submit shop drawings in accordance with the General Provisions Conditions and Section 260500.
- B. Submit manufacturer's descriptive data including ratings, circuit diagrams, dimensional data, conduit entry restrictions, and a list of accessories.

1.03 OPERATION AND MAINTENANCE MANUALS

Submit operation and maintenance manuals in accordance with Section 260500.

1.04 MANUFACTURER'S SERVICES

Provide manufacturer's services at the jobsite for the minimum labor days listed below, travel time excluded:

One labor day to check the installation and advise during start-up, testing, and adjustment of the transfer switch.

PART 2 - MATERIALS

2.01 TRANSFER SWITCH

- A. Transfer switch shall be mounted in a free-standing wall-mounted NEMA 4X, 316 stainless steel lockable enclosure. Transfer switch shall have number of poles, amperage, and voltage ratings as shown in the drawings. Withstand current rating shall not be less than 30,000-ampere rms symmetrical.
- B. Switch shall be listed per UL 1008 as a recognized component for emergency systems and rated for all classes of loads.
- C. Transfer switch shall be electrically operated and mechanically held in each direction by a single operating mechanism momentarily energized from the source to which the load shall be transferred. Accomplish mechanical locking in each direction without the aid of latching solenoids, toggle mechanisms, or gear arrangements. Total operating transfer time shall not exceed one-sixth of a second.

- D. Operation shall be inherently double throw where normal and emergency contacts operate simultaneously with no momentary delay in a midposition. Operation shall allow for delayed transition. An overload or short circuit shall not cause the switch to go to a neutral position. Do not use main contact structures not originally manufactured for transfer switch service (molded case circuit breakers or contactors). Inspection and replacement of all contacts (stationary and arcing) shall be possible from the front of the switch without any disassembly of operating linkages or power conductors. Provide a handle to permit no-load manual operation.

2.02 ACCESSORIES

- A. Provide a solid-state sensing and control logic panel. Include the following operational characteristics:
 - 1. Adjustable (0.5 to 6.0 seconds) time delay on engine starting to override momentary dips in normal source, set at 1 second.
 - 2. Full phase voltage relay supervision of the normal source with at least one close differential relay to detect "brownout" condition, set at 70% dropout and 90% pickup.
 - 3. Voltage/frequency lockout relay to prevent premature transfer, set at 90% voltage and 90% frequency.
 - 4. Engine starting control contacts (one normally open and one normally closed).
 - 5. Adjustable (2 to 25 minutes) time delay on retransfer to normal, set at 20 minutes.
 - 6. Unloaded running time delay for generator cool down (adjustable 0.1 to 10 minutes), set at 5 minutes.
 - 7. Transfer to emergency time delay (adjustable 1 to 300 seconds), set at 1 second.
- B. Provide a system test switch (lockable momentary type) on the front of the enclosure.
- C. Manual push button to bypass the time delay on retransfer located in inner panel.
- D. Indicating lights to indicate source to which the load is connected located on outer panel.
- E. Indicating light to indicate presence of normal power source located on outer panel.
- F. Control switches shall be round, oiltight type, complete with legend plates and quantity of contact blocks required for the control function.
- G. Indicating lights shall be oiltight type, complete with color of lens indicated in drawings and legend plate. Lamps shall be 120-volt ac, 6S6 screw base. Indicating lights shall be push-to-test type.
- H. Provide engine excersizer switch located in inner panel.

- I. Auxiliary contacts for remote indication of switch position, one normally open and one normally closed contact for normal and emergency position.
- J. An in-phase monitor shall control transfer/retransfer operation between live sources when the sources are approaching and are sufficiently close to a zero-phase angle difference so as to avoid excessive motor inrush currents. The monitor shall cause in-phase transfer/retransfer to take place over engine-generator frequency ranges of 58 to 62 hertz with a utility source of 60 hertz. Normal transfer/retransfer operation shall automatically occur, without the use of manual overrides, in the event of a complete failure of the load-carrying source.
- K. Transfer switch shall include four pilot contacts (10 amperes at 480-volt ac) that open three seconds (nominal) prior to transfer and reclose three seconds (nominal) after transfer. These contacts will deenergize motor loads during the transfer time of the switch.

2.03 MANUFACTURERS

The transfer switch shall be as manufactured by Automatic Switch Company (Bulletin 940), Russelectric Co. (RMT), or Zenith (ZTS).

PART 3 - EXECUTION

3.01 INSTALLATION

Secure transfer switch rigidly to rack with Type 304 stainless steel bolts.

3.02 FIELD TESTING

- A. Field test and calibrate timing and monitoring logic. All adjustments shall be within 5% of the previously specified set points.
- B. Field test and calibrate the in-phase monitor. Demonstrate that the switch transfers when source phase differences are within 20 degrees under varying generator speeds.

END OF SECTION

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SECTION 264313 SURGE PROTECTIVE DEVICES (SPD)

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes materials and installation of SPD for the protection of electrical and electronic circuits and equipment.

1.02 SUBMITTALS

- A. Submit shop drawings in accordance with the General Conditions and Section 013300.
- B. Submit product data on each suppressor type, indicating component values, part numbers, and conductor sizes. Include dimensional drawing for each, showing mounting arrangements.
- C. Submit manufacturer's UL certified test data and nameplate data for each SPD.
- D. Provide copy of extended warranty.

1.03 QUALITY ASSURANCE

- A. UL Compliance and Labeling:
 - 1. For power and signal circuits, SPD devices shall comply with UL 1449 3rd Edition and UL 1283 as an electromagnetic interference filter. Provide units that are listed and labeled by UL.
- B. ANSI Compliance: Use SPD devices that comply with ANSI/IEEE C62.41 and ANSI/IEEE C62.33.
- C. NEC Compliance: Use SPD devices that comply with NEC Article 285.

1.04 EXTENDED WARRANTY

Provide written warranty, signed by the manufacturer, agreeing to replace any surge suppressor which fails in service within one year following the guarantee period specified in the General Conditions.

PART 2 - MATERIALS

2.01 GENERAL

- A. SPD devices for power circuits shall be the product of a single manufacturer.

- B. SPD devices shall be capable of performance at ambient temperatures between 40°C and 60°C, at relative humidity ranging from 0% to 95%, and at elevations ranging from sea level to 3,000 feet.
- C. SPD devices shall be fused to disconnect the suppressor from the electrical source should the suppressor fail. The fusing shall allow full surge handling capabilities and afford safety protection from thermal overloads and short circuits.
- D. Design SPD devices for the specific type and voltage of the electrical service. Single-phase systems shall have L-N, L-G, and N-G protection.

2.02 MANUFACTURER

SPD devices shall be products of one of the following manufacturers:

- A. Advanced Protection Technologies.
- B. Current Technology, Inc.
- C. Atlantic Scientific Corporation.

2.03 SPD LOCATION CATEGORY C.

- A. Provide SPD meeting ANSI/IEEE C62.41.
- B. Maximum single impulse current rating shall be not less than the following:
 - 1. L-L Capacity: 150 kA.
 - 2. L-N Capacity: 150 kA.
 - 3. L-G Capacity: 100 kA.
 - 4. N-G Capacity: 100 kA.
- C. Suppressor housing shall be in an enclosure that has the same NEMA rating as the panel it protects.
- D. UL 1449 maximum suppression voltage shall not be more than:

System Voltage	Phase	L-L or L-N Suppression Voltage
480Y/277	3	800

2.04 SPD LOCATION CATEGORY B.

- A. Provide SPD meeting ANSI/IEEE C62.41.

- B. Maximum single impulse current rating shall be not less than 80 kA.
- C. Suppressor shall be in an enclosure that has the same NEMA rating as the panel it protects or the SPD may be integral to a panelboard.
- D. UL 1449 maximum clamp voltage shall not be more than:

System Voltage	Phase	L-L or L-N Clamp Voltage
120	1	500

2.05 SHORT-CIRCUIT RATING

- A. Provide SPD with short-circuit rating permanently marked on the enclosure.
- B. Provide SPD with the same or greater short-circuit rating as the equipment with which they are installed.

2.06 PAIRED CABLE DATA LINE INTERIOR SUPPRESSORS

- A. Provide units meeting ANSI/IEEE C62.41, Location Category A.
- B. Use bipolar 1,500-watt silicon avalanche diodes between the protected conductor and earth ground.
- C. Provide units with a maximum single impulse current rating of 80 amperes (10 x 1,000 microsecond--waveform).
- D. Breakdown voltage shall not exceed 36 volts.
- E. Manufacturers: Advanced Protection Technologies Model TE/RS2321.5kw or Atlantic Scientific ISP/CIP/MJS series devices.

2.07 PAIRED CABLE DATA LINE EXTERIOR SUPPRESSORS

- A. Provide units meeting ANSI/IEEE C62.41, Location Category A.
- B. Suppressors shall be a hybrid design with a minimum of three stages, utilizing solid-state components and operating bi-directionally.
- C. Suppressors shall meet or exceed the following criteria:
 1. Maximum single impulse current rating of 10,000 amperes (8x20 microsecond--waveform).
 2. Pulse Life Rating: 3,000 amperes (8x20 microsecond--waveform); 2,000 occurrences.

3. Maximum clamping voltage at 10,000 amperes (8x20 microsecond current waveform) shall not exceed the peak of the normal applied signal voltage by 200%.

- D. Manufacturers: Advanced Protection Technologies Series CEP, Atlantic Scientific Corporation Series CEP, Square D Surgelologic or equal.

PART 3 - EXECUTION

3.01 APPLICATION REQUIREMENTS

- A. Install SPD as indicated and:
 1. Power supply to instrumentation and control system cabinets.
 2. Install SPD for circuits sensing, powering, and controlling devices located or mounted external to a building.

3.02 GENERAL INSTALLATION REQUIREMENTS

- A. Install suppressors according to manufacturer's recommendations.
- B. Install suppressors directly to the cabinet which houses the circuit to be protected so that the suppressor leads are straight and short, with all conductors laced, running directly to the point of connection within the panel, without loops or bends. If bends are unavoidable, no bend may exceed 90 degrees and bending radius may not be less than 6 inches.
- C. Provide at least 3 inches of separation between line-side and load-side connecting wires. Do not bundle line-side and load-side conductors together or run them in the same raceway.
- D. Field installed conductors shall be the same as specified for building wire, not smaller than No. 8 AWG. Device leads shall not be longer than the length recommended by the manufacturer, unless specifically reviewed and approved by the manufacturer.

3.03 SPARE PARTS

- A. Provide six fuses of each type and rating installed.

END OF SECTION

SECTION 265000 LIGHTING

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes materials and installation of lighting fixtures.

1.02 SUBMITTALS

- A. Submit shop drawings in accordance with the General Conditions and Section 260500.
- B. Submit manufacturer's catalog data including complete catalog number, photometric data, and descriptive literature.
- C. Submit pole dimensions, anchor bolt details, wind loading data, materials, and finish.

PART 2 - MATERIALS

2.01 GENERAL

- A. Furnish lighting fixtures of the type indicated in the drawings, complete with lamps, sockets, wiring, and mounting hardware.
- B. The use of a manufacturer's name and model or catalog number in the drawings is for the purpose of establishing the standard of quality, photometrics, and general appearance desired only. Products of other manufacturers will be considered in accordance with the General Conditions, provided they are the cataloged and manufactured products of such manufacturers. Custom designed and/or fabricated fixtures will not be considered.

2.02 LAMPS

- A. See light fixture schedule on drawing E-601.

2.03 ALUMINUM POLES

- A. Fabricate pole shaft from square extruded 6063-T6 aluminum alloy.
- B. Design poles, including handholes and luminaires, per the following wind load: wind loading per FBC 2010, ultimate wind speed = 175 MPH, Exposure 'C', Risk Category III. In addition, limit the deflection to 5% of pole length under these conditions.
- C. Equip with handhole of sufficient size to permit the pulling and splicing of wires and grounding of the pole. Provide a grounding lug accessible through the handhole to accept a 1/2-inch-diameter copper conductor. Equip handhole with a cover.

- D. Concrete for Pole Foundations:
 - a. Comply with Section 03 30 00.
 - b. Use 3000 psig (20 MPa) strength, 28 day concrete.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install lighting fixtures as close as possible to the locations shown in the drawings, making adjustments only for the purpose of avoiding interferences.
- B. Install lighting fixtures plumb and level, with fixture surfaces parallel and perpendicular to walls and other major structures.
- C. Set fixture poles on anchor bolts and secure with double nuts on each bolt. Dry-pack fixture base, after fixture has been leveled and plumbed. Where aluminum poles are used, coat bottom of base and any part that will come in contact with grout, per Section 099000, System No. 54.
- D. Concrete Foundations: Construct according to Section 03 30 00.
 - a. Comply with details and manufacturer's recommendations for reinforcing, anchor bolts, nuts, and washers. Verify anchor bolt templates by comparing with actual pole bases furnished.
 - b. Finish: Trowel and rub smooth parts exposed to view.

END OF SECTION

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

282318 Remote Video Surveillance System

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SECTION 282318 REMOTE VIDEO SURVEILLANCE SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes design, materials, and installation of a remote video surveillance or closed-circuit television (CCTV) camera monitoring system including copper networks, interface hardware, and software. From remote locations via the Internet Service Provider, the system shall provide viewing via IP video security technology.

1.02 RELATED WORK SPECIFIED ELSEWHERE

NONE

1.03 SUBMITTALS

- A. Submit shop drawings in accordance with the General Conditions.
- B. Submit product data for each type of product specified. Product data shall include:
 - 1. Corresponding specifications item.
 - 2. Manufacturer's name and model number.
 - 3. Manufacturer's specification sheet.
- C. Submit wiring diagrams detailing wiring for power, signal, and control differentiating clearly between manufacturer-installed wiring and field-installed wiring. Identify terminal numbers and wiring color codes to facilitate installation, operation, and maintenance.
- D. Submit equipment enclosure elevation drawings, including equipment designation, manufacturer's name, and model number.
- E. Submit complete scaled floor plans indicating all equipment and wiring, completely identified, including cable and device designations and locations.

1.04 OPERATION AND MAINTENANCE MANUALS

Operation and maintenance manuals shall include:

- A. Manufacturer's Instruction Manuals: Submit brochures, manuals, and service sheets published by the manufacturers of the components, devices, and equipment provided. Include instructions for operating and maintaining the system and source information for spare and replacement parts.

- B. Performance, Test, and Adjustment Data: Include comprehensive documentation of performance verification and correction procedures and measurements.
- C. Wiring diagrams and floor plans.

1.05 INSTALLER QUALIFICATION

- A. The Contractor shall require that this work be performed by a CCTV systems specialist having at least five years' direct experience with devices, equipment, and systems of the type and scope specified herein, maintaining a fully staffed and equipped maintenance and repair facility within 100 miles of the jobsite.
- B. Supervisors shall have at least five years' direct experience in similar work.
- C. Installation, adjustment, and testing personnel shall have at least three years' direct experience in similar work.

1.06 MANUFACTURER'S SERVICES

Provide equipment manufacturer's services at the jobsite for the minimum labor days listed below, travel time excluded:

- A. One-half labor day to check the installation and advise during start-up, testing, and adjustment of the equipment.
- B. One-half labor day to instruct the Owner's personnel in the operation and maintenance of the equipment.

PART 2 - MATERIALS

2.01 SURVEILLANCE SYSTEM

The remote video surveillance system shall be the Digital Watchdog VMAXHD4 or equal. This remote video surveillance system is hereinafter referred to as the RVSS.

- A. The RVSS system shall incorporate the following hardware and software:
 - 1. Digital Video Recorder (DVR): Integrated hardware and software unit for capturing and transmitting video streams.
 - 2. Remote Personal Computer (RPC): Hardware and software for live video monitoring, playback, and remote configuration.

- B. The system shall incorporate the following operational features and characteristics:
1. The system shall provide the collection, analysis, and storage of video images locally with remote backup capability via internet.
 2. The system shall include hardware and software to interface with fixed network cameras, pan/tilt/zoom network cameras, digital inputs.
 3. The system shall provide the following hardware characteristics:
 - a. 4 channel HD-SDI camera video inputs.
 - b. Four digital inputs NO/NC. One channel output.
 - c. Permanent storage of 8 Terabytes.
 4. The system shall provide for the transfer of video, event, and configuration information between the DVR system and the RPC via internet communications network. The network interface shall be Ethernet rj-45, 10/100/1000Base-T, PTZ, Auto MDI/MDIX.
 5. The DVR shall have these specification.
 - a. Video Input:
 - (1) Channel Input Level: 4 channel 2.1 Megapixels (1920 x 1080) at 30fps
 - b. Video Output:
 - (1) Main Monitor: HDMI (1280 x 720)
 - (2) Sub Monitor: VGA (1280 x 720)
 - (3) CVBS: 1
 - c. Audio:
 - (1) Input: 4 channel Line Input
 - (2) Output: 1 channel Line Output
 - (3) Audio Code; G.711
 - d. Alarm:
 - (1) Sensor Inputs: 4 channel, NO/NC Selectable

- (2) Alarm Out: 1 channel out by Sensor, Motion and Video Loss
- e. Pentaplex Operations: Live/record/Playback/Backup/Network
- f. Live digital Zoom of specific area, 3 ~ 60 second Channel Sequencing.
- g. Recording: Event clip generation around the detection of security events.
 - (1) Video Compression H.264
 - (2) Resolution up to 1920 x 1080
 - (3) Recoding Quality Grade on 5 levels
 - (4) Recording Mode: Continuous, Schedule, Motion, Sensor, Manual
 - (5) Motion Detection shall be Setup by Grid
 - (6) Pre-recording: Minimum 15 seconds, Maximum 20 minutes
 - (7) Post-recording: 1~20 seconds
- h. Playback shall digital zoom specific area.
 - (1) Fast Forward Speeds: x1/4, x1/2, x2, x4, x8, x16, and Frame by Frame
 - (2) Fast Reverse Speeds: x1, x2, x4, x8, x16, and Frame by Frame
 - (3) Search Mode: Timeline, Event, Archive, Log, Specific Time
- i. Backup shall consist of:
 - (1) File Format: JPEG/Proprietary Format
 - (2) Media: USB/External HDD/Network
 - (3) Built-in Viewer
- j. Network:
 - (1) Dual Live Streaming @ 1280 x 720 / 640 x 360, 120/100fps
 - (2) Playback shall codec H.264 HD 120/100fps
 - (3) Streaming formats: RTP/RTPS/RTCP
 - (4) Protocols: HTTP, DDNS, NTP, SMTP
- k. Storage:

- (1) HDD Data Storage
 - (a) Interface: SATA, e-SATA
 - (b) Maximum Capacity: 2TB
 - (c) Maximum Internal HDD's: Four (4)

External Storage Data: (1) e-SATA for RAID (redundant array of independent disks)

- (2) File System shall be Self Developed, Reliable and Stable File System
- (3) S.M.A.R.T. criteria for HDD error check and reporting
- l. User Menus shall be Graphic User interface
- m. Interface Input Method: Front Buttons, IR Remote Control, Mouse, and Keyboard Controller
- n. Serial Ports: POS (1) RS-232C, PTZ & Controller (2) RS-485
- o. Network
 - (1) Connection by Ethernet, RJ-45, 10/100/1000Base-T, Auto MDI/MDIX
 - (2) Access (Live, Search/playback, Backup, remote Setup/Upgrade)
 - (a) Web Viewer
 - (b) Single-Site monitoring Software
 - (c) Multi- Sites monitoring Software
- p. Features to include:
 - (1) (DST) Daylight Savings Time,
 - (2) Internal Beep (by video loss or HDD error)
 - (3) Software Upgrade (by USB, Network Remote Upgrade)
 - (4) Watermarking
 - (5) 3G Mobile (iPhone, Android)
- q. General:
 - (1) Operation Temperature: 0 ~ 104 F

- (2) Operating Humidity: 20% ~ 80%
- (3) Power: 120 VAC, 60Hz

6. Equipment Enclosure

- a. The DVR shall be in a lockable wall mounted enclosure equal to Middle Atlantic Products Model DLBX, with pair of wall mount brackets DLBX-WM, Front Security Kit DLBX-FSK, Proportional Speed Thermostatic Fan Control with (2) 15-ampere receptacle outlets.

2.02 PAN/TILT/ZOOM NETWORK DOME CAMERA

Each camera shall meet the following requirements:

- A. Functions: BLC (Back Light Compression), AGC (Automatic Gain Control), WDR (Wide Dynamic Range), AWB (Auto White Balance), Mirror, Privacy Zone, 3D-DNR (3 Dimensional-Digital Noise Reduction), HME, Digital Zoom, RS-485, TDN with IR cut filter, (True Day/Night), Auto Zoom, Mirror image, DSS (Data Security Standard)

- B. General: The dome camera shall:

- 1. Provide pan and tilt functions, containing day/night functionality, and be equipped with 1 ~ 112 digital zoom.
- 2. Polycarbonate dome with Aluminum housing IP68 Certified (Waterproof)

- C. Hardware: The dome camera shall:

- 1. Range of 70ft IR-sensitive with Intelligent Camera Synchronization.
- 2. Be equipped with a removable IR-cut filter, providing so-called day/night functionality.
- 3. Be equipped with a high resolution 2.1 megapixel lens with 4.5x optical zoom.
- 4. Be equipped with accurate pan-tilt functionality with 360-degree endless pan range.

- D. Video:

- 1. Resolution:

The dome camera shall be able to deliver high-definition digital video in at least five different resolutions up to 1920 x 1080 @ 2.1 megapixels over SDI network.

2. Transmission Speed: The dome camera shall allow the transmission of images at up to 30 frames per second (NTSC) in all resolutions, using motion JPEG.
3. Image Control: The dome camera shall incorporate:
 - a. Automatic gain control (AGC).
 - b. Automatic and manual white balance.
 - c. Backlight compensation.
 - d. Components such as Active X downloaded from the dome camera shall be signed by an organization providing digital trust services, such as Verisign, Inc.
4. PTZ Functionality: The dome camera shall:
 - a. Provide Panning of 360 degrees.
 - b. Provide 360 degree rotation.
 - c. Provide 75 degree tilt.
5. Event Functionality:
 - a. The dome camera shall be equipped with an integrated event functionality, which can be triggered by:
 - (1) External inputs.
 - (2) Video motion detection.
 - (3) Preset position.
 - (4) Schedule.
 - b. Response to triggers shall include:
 - (1) Notification, using TCP, SMTP, or HTTP.
 - (2) Image upload, using FTP, SMTP, or HTTP.
 - (3) Preset call up.
 - (4) Activating external output.
 - c. Event functions shall be configurable via the web interface.
6. Security:

- a. Access to the built-in web server shall be restricted by user names and passwords.
- E. Enclosure: The dome camera enclosure shall include the following:
 - 1. An all-metal body.
 - 2. Polycarbonate Dome Cover.
- F. Power Requirements: 12 VDC (10V ~ 16V), maximum 2.0 watts.
- G. Environmental: The dome camera shall:
 - 1. Operate in a temperature range of -29°C to +55°C (-20.2°F to +131°F).
 - 2. Operate in a humidity range of <90% RH (Non-condensing).
- H. Manufacturer: The camera shall be Digital Watchdog Vandal Proof Dome Model DWC-HV421TIR Camera.

PART 3 - EXECUTION

3.01 PRELIMINARY TESTING

Upon completing installation of the system, align, adjust, and balance the system and perform complete pretesting. Determine, through pretesting, the conformance of the system to the requirements of the drawings and specifications. Correct deficiencies observed in pretesting. Replace or repair malfunctioning or damaged items, and retest until satisfactory performance and conditions are achieved. Camera lens shall provide full fixed coverage of areas being monitored. Provide proper lens at no cost to Owner to provide proper area coverage.

3.02 ACCEPTANCE TEST

Conduct acceptance test in presence of Engineer in accordance with manufacturer's recommendations.

END OF SECTION

DIVISION 31 – EARTHWORK

311100 Clearing, Stripping and Grubbing
312300 Earthwork and Trenching

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SECTION 311100 CLEARING, STRIPPING, AND GRUBBING

PART 1 - GENERAL

1.01 DESCRIPTION

This section describes the work included in clearing, stripping, grubbing, and preparing the project site for construction operations.

1.02 CLEARING

Remove and dispose of trees, snags, stumps, shrubs, brush, limbs, sticks, branches, and other vegetative growth. Remove rocks, tiles, and lumps of concrete. Remove all evidence of their presence from the surface. Remove and dispose of trash piles, rubbish, and fencing. Protect structures and piping above and below ground, trees, shrubs, and vegetative growth and fencing which are not designated for removal.

All trees, bushes, and other vegetation shall be marked by flagging prior to removal. Contractor shall notify Owner three (3) days prior to clearing. Vegetation shall not be removed until Contractor has received Owner's consent.

1.03 STRIPPING

- A. Remove and dispose of organic sod, grass and grass roots, and other objectionable material remaining after clearing from the areas designated to be stripped.
- B. Retain topsoil material onsite for dressing backfill areas before planting.

1.04 GRUBBING

After clearing and stripping, remove and dispose of wood or root matter, including stumps, logs, trunks, roots, or root systems greater than 1 inch in diameter or thickness to a depth of 12 inches below the ground surface.

PART 2 - MATERIALS

2.01 TREES AND SHRUBBERY

Existing trees, shrubbery, and other vegetative material may not be shown in the drawings. Inspect the site as to the nature, location, size, and extent of vegetative material to be removed or preserved, as specified herein.

2.02 PRESERVATION OF TREES, SHRUBS, AND OTHER PLANT MATERIAL

- A. Save and protect plant materials (trees, shrubbery, and plants) beyond the limits of clearing and grubbing from damage resulting from the work. No filling, excavating,

trenching, or stockpiling of materials will be permitted within the drip line of these plant materials. The drip line is defined as a circle drawn by extending a line vertically to the ground from the outermost branches of a plant or group of plants. To prevent soil compaction within the drip line area, no equipment will be permitted within this area.

- B. When trees are close together, restrict entry to area within drip line by fencing. In areas where no fence is erected, protect the trunks of trees 2 inches or greater in diameter by encircling the trunk entirely with boards held securely by 12-gauge wire and staples. This protection shall extend from ground level to a height of 6 feet.
- C. Cut and remove tree branches where necessary for construction. Remove branches other than those required for a balanced appearance of any tree. Treat cuts with a tree sealant.

PART 3 - EXECUTION

3.01 CLEARING, STRIPPING, AND GRUBBING AREAS AND LIMITS

- A. Clear, strip, and grub excavation and embankment areas associated with new structures, slabs, walks, and roadways.
- B. Clear and strip stockpile areas.
- C. Limits of clearing, stripping, and grubbing:
 - 1. Excavation, Excluding Trenches: 5 feet beyond tops of cut slopes.
 - 2. Trench excavation for piping and electrical conduits: 3 feet from edge of trench.
 - 3. Earth Fill: 5 feet beyond toe of permanent fill as indicated in the drawings.
 - 4. Structures: 3 feet beyond footings.
 - 5. Streets, Roadways, and Parking Areas: 10 from toe of fill or top of cut.
 - 6. Sidewalks: 2 feet beyond edges.
 - 7. Landscaped Areas: 2 feet beyond areas designated to receive landscaping.

3.02 DISPOSAL OF CLEARING AND GRUBBING DEBRIS

Do not burn combustible materials. Remove cleared and grubbed material from the worksite and dispose.

3.03 DISPOSAL OF STRIPPED MATERIAL

Remove stripped material and dispose offsite.

END OF SECTION

SECTION 312300 EARTHWORK AND TRENCHING

PART 1 - GENERAL

1.01 Description

This section includes materials, testing, and installation of earthwork for excavations, fills, and embankments for structures, pavements, rights-of-way, and sites; and for trench excavating, backfilling, and compacting for underground pipelines and electrical raceways, wires and cables with appurtenant structures.

1.02 Standards

1. The Contractor will test for compaction and relative density as described below.
2. Determine the density of soil in place by the sand cone method, ASTM D1556; by nuclear methods, ASTM D2922; by the rubber balloon method, ASTM D2167; or by the drive-cylinder method, ASTM D2937.
3. Determine laboratory optimum moisture-density relations of cohesive and non-cohesive soils by ASTM D1557 (modified Proctor).
4. Sample backfill materials by ASTM D75.
5. For cohesive and non-cohesive soils, "relative density" is the ratio, expressed as a percentage, of the in-place dry density to the laboratory maximum dry density as determined by ASTM D1557 (modified Proctor).
6. Determine the relative density of cohesionless soils by ASTM D2049.

1.03. Definitions

1. Subgrade: The undisturbed material immediately below the bottom of an excavation, below an area of fill, or below a structure.
2. Excavation and Trenching: Removal of earth or buried material, either temporarily or permanently, as specified or as necessary for construction of the project.
3. Over-excavation: Excavation exceeding that specified or shown on the plans.
4. Backfill: Earth material placed permanently in an excavated area or trench.
5. Fill: Earth material placed permanently above the existing grade.
6. Borrow: Earth material brought from off the site to be used as fill or backfill.
7. Structures: Buildings, foundations, and other man-made, stationary features above and below ground.
8. Cables: Includes electrical raceways, wires and cables.

1.04. Submittals

1. Submit six (6) copies of a certification from a testing laboratory that the material used for all backfills, fills and structural backfills meets the specified criteria and contain less than 1% by weight asbestos.
2. Submit certification for sheeting, shoring and bracing.
3. Submit dewatering plan including disposition of groundwater.

1.05 Sequencing/Scheduling

1. Notify Engineer and Owner three (3) working days in advance of construction of a requirement to check layout.
2. Limit open track to 200 feet in advance of pipe layout, or the length of pipe that can be installed and backfilled by the end of the work day, whichever is less.
3. Contractor shall, by the end of each work day, backfill all trenches, holes, or other excavations to provide a compacted surface level with the existing ground surface at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 Backfill and Fill

1. Backfill and fill shall be excavated material or borrow that is free from clayballs larger than 2 inches in their largest dimension and contains no more than 15% by weight passing the No. 200 sieve, no more organic matter (peat, humus, leaves, and carbon compounds) than 1% by weight, and no cobbles larger than 2 inches in their largest dimension. The gradation of this sand or well graded sand and gravel mixture shall be such as to achieve the specified compaction.
2. In the event there is insufficient satisfactory material from the excavation to meet the requirements for backfill or fill material, obtain borrow which meets the requirements for backfill material from sources secured by the Contractor.
3. All material shall contain less than 1% by weight asbestos.

2.02 Structural Backfill

1. Structural backfill shall consist of clean, fine to medium sand, contain less than 1% by weight asbestos or organic matter (peat, humus, leaves, and carbon compounds), and conform to the following gradation requirements:

<u>Sieve Size</u> <u>(Square Openings)</u>	<u>Weight Percent Passing</u> <u>Square Mesh Sleeves</u>
No. 4 (4.75 mm)	95 to 100
No. 10 (2.00 mm)	90 to 100
No. 40 (0.420 mm)	70 to 95
No. 60 (0.250 mm)	40 to 80

No. 100 (0.149 mm)	5 to 40
No. 200 (0.074 mm)	less than 5

- The structural backfill material may consist of either on-site granular material free of any sludge material, imported fill from sources secured by the Contractor or a blend of suitable on-site and imported fill material satisfying the requirements for structural backfill.

2.03 Flowable Backfill

Where approved for use by the Owner, flowable backfill shall be a ready-mixed material composed of cement, fly ash, fine aggregate and water to produce a flowable mixture with a 28-day compressive strength between 50 and 100 psi that does not shrink. Use materials as specified in Section 03000 and proportion them according to the following:

<u>Component</u>	<u>Pounds per Cubic Yard</u>
Cement, Type I	50-100
Admixture (Fly Ash)	0-600
Fine Aggregate, 3/8", maximum	2,750
Water	500

The weights for fine aggregate and water may be adjusted to yield one cubic yard and to match the cementitious content.

2.04 Backfill Material for Trenches

- Materials for refilling over-excavations or subgrade shall meet the requirements for backfill or structural backfill and pipe backfill.
- Pipe Bedding: From the excavation grade to a level 12 inches above the top of the pipeline. Use material meeting the requirements for backfill and exclude material with fragments larger than the following:

<u>Pipe Type</u>	<u>Fragment Size (Greatest Dimension-Inches)</u>
Concrete, steel, cast or ductile iron & corrugated metal	2
Vitrified clay	1-1/2
Plastic pipe	1
Cables	1/2

- Trench Backfill: From the top of the First Lift to the ground surface. Use material meeting the requirements for backfill.

2.05 Water for Compaction

Water shall be free of acid, alkali, or organic materials and shall have a pH of 7.0 to 9.0. Provide all water needed for earthwork. Provide temporary piping, valves, and trucks to convey water from the source to the point of use. Provide any meters required if the water is taken from a public water system.

PART 3 - EXECUTION

3.01 Dewatering

1. Provide and operate equipment adequate to keep excavations and trenches free of water. Dewater subgrade to a minimum of 2 feet below the bottom of the excavation. Remove water during periods when concrete is being deposited, when pipe and cable are being laid, during the placing of backfill, and for proper inspection and/or testing of the exposed subgrade. These provisions shall apply during the noon hour as well as overnight. Do not drain trench water through the pipe and cable under construction. Avoid settlement or damage to adjacent property.
2. When dewatering open excavations, dewater from outside the structural limits and from a point below the bottom of the excavation.
3. Obtain and comply with all required discharge permits from appropriate regulatory authorities. Dispose of water in a manner that will not damage adjacent property or interfere with normal drainage.

3.02 Excavation

1. Excavate to the elevations shown on the drawings, to the bottom elevations of the slabs, structures, and foundations or the bottom of the roadway subbase (top of subbase if only to be compacted), whichever is the lowest elevation.
2. Perform all excavation regardless of the type, nature, or condition of the material encountered to accomplish the construction. Excavate for foundations to a point at least 3 feet horizontally beyond the outside face of footings and base mats.
3. After the excavation has been completed, the Owner or his representative will observe the exposed subgrade to determine the need for any additional excavation beyond that specified above. It is intended that additional excavation be conducted in all areas within the influence of the structure where unacceptable subgrade materials exist at the exposed subgrade. Over-excavation shall include the removal of all such unacceptable material that exists directly beneath the hole or structure for part or the full width of the hole or structure and to a depth required to reach suitable foundation material. Refill the over-excavated areas with structural backfill. All such over-excavation and refilling for an unforeseen condition shall be executed in accordance with a change order. Payment for over-excavation and refill shall be made in accordance with the General Conditions.
4. No additional payment will be received for over-excavation or refill material used for convenience or which is not authorized by the Owner or his representative.

5. Review and be aware of existing conditions and locate all structures and utilities within the project area in order to avoid conflicts.
6. Protect any pipes, cables, mains, footings or other underground structures encountered in trenching/ excavating/backfilling from damage or displacement. Replace any pipes, cables, mains, footings or other structures disturbed during construction.
7. Contact all utility companies with underground utilities in the project area and obtain their assistance in locating facilities prior to excavation.
8. Excavate sufficiently in advance of pipe laying to discover obstructions in time to modify alignment, if necessary, to avoid the obstruction. The Owner or his representative must review such alignment modifications.

3.03 Limits of Excavation for Placing Foundations

Excavate to the depths and widths specified, shown on the plans, or necessary to accomplish the construction. Allow space for forms, working space, structural backfill, and site grading. Do not carry excavation for footings and slabs deeper than the elevations shown on the plans. Backfill over-excavations below the elevations shown to the proper elevation with compacted structural backfill material. Correct cuts below grade by similarly cutting adjoining areas and creating a smooth transition.

3.04 Preparation of Subgrade

1. Excavate, shape and compact the subgrade to line, grade, and cross section. Remove soft material encountered and replace with structural backfill. Fill holes and depressions to the required line, grade, and cross sections with structural backfill. The finished subgrade shall be within a tolerance of ± 0.08 feet of the grade and cross section shown, smooth and free from irregularities, and at the specified relative density.
2. Proof roll the in-situ subsoils by surface rolling with a large vibratory compactor Dynapacca-25 or equal. Each section of the subgrade shall be subjected to overlapping coverages of the compactor, with the compactor operated at its full vibrational frequency and a travel speed not more than 2 fps. The rolling shall continue until no further settlement can be visually discerned at the subgrade surface. However, in no case shall any section of the subgrade receive less than 10 overlapping coverages with the compactor. Densification operations shall extend at least 5 feet beyond the toe of the embankment and 10 feet beyond the sides of the structures 10 feet beyond the edge of the pavement. Make observations of the subgrade during the densification process for signs of weaving and/or pumping. Should such conditions be observed, remove any compressible soils and replace with compacted backfill.

3.05 Placing Fill or Backfill

1. Remove loosened and disturbed materials at the subgrade.
2. Remove form materials and trash before placing any fill or backfill. Obtain the specified compressive strength and finish of concrete work before backfilling.

3. Do not operate earthmoving or excavation equipment within 5 feet of existing structures or newly completed structures. Place and compact fill or backfill adjacent to concrete walls with hand-operated tampers or other equipment that will not damage the structure.
4. Fill or backfill around water-holding basins and channels only after specified leakage tests have been conducted.
5. Use material meeting the requirements for backfill and fill, and use structural backfill where shown on the drawings or specified.

3.06 Pipe Encasement

Install concrete encasement by placing concrete on both sides, the top, and bottom of pipe with a minimum thickness of 6 inches (unless otherwise shown) in locations shown in the drawings.

3.07 Trench Widths and Utility Bedding

1. Cut trenches to a minimum width equal to the outside diameter of the pipe or cable at the joint plus eight inches for unsheeted trenches, or 12 inches for sheeted trenches. The maximum width of trench, measured at the top of the pipe or cable, shall not exceed the outside pipe barrel or cable diameter plus two feet, unless otherwise shown on the drawings.
2. Maintain vertical trench walls from the bottom of the trench to a line measured 12 inches above the top of the pipe or cable.
3. Bedding: The minimum bedding allowable shall consist of a shaped trench bottom which provides firm bedding for the pipe or cable. Bed the pipe or cable in undisturbed firm soil of hand-shaped unyielding material, so that the pipe or cable will be in continuous contact therewith for its full length and provide a minimum bottom segment support for the pipe or cable equal to 0.6 of the outside diameter of the barrel.
4. Construct special bedding as called for on the drawings or in the contract documents.
5. Excavate bell holes at each joint to permit proper assembly and inspection of the entire joint.

3.08 Trench Grade

1. Excavate and grade the trench to the lines and grades shown on the drawings with allowance for pipe and cable thickness and for pipe base or special bedding. Remove hard spots that would prevent a uniform thickness of bedding. Before laying each section of the pipe, check the grade with a straightedge and correct any irregularities found. The trench bottom shall form a continuous and uniform bearing and support for the pipe at every point between bell holes, except that the grade may be disturbed for the removal of lifting tackle.
2. If the trench is excavated below the required grade, refill any part of the trench excavated below the grade at no additional cost to the Owner. Place the refilling

material over the full width of trench in compacted layers not exceeding six inches deep to the established grade with allowance for the pipe base or special bedding.

3.09 Length of Open Trench

Limit the length of open trench to 100 feet (per crew, if applicable), or the length that can be installed in one workday, whichever is less. Trenches shall not be left open over night without prior approval of the Owner.

3.10 Trench Excavation in Backfill and Fill Areas

1. Construct trench excavation for pipe(s) and cable(s) in backfill or fill areas in accordance with the following procedures:
 - a. Construct and compact the backfill or fill to an elevation of one foot minimum over the top of the pipe or cable to be installed.
 - b. Excavate trench in the compacted backfill or fill. Place pipe cable base material, install pipe or cable, and backfill to 12 inches above the pipe or cable as specified. Compact backfill above this point to the same relative density as the adjacent embankment.

3.11 Trench Backfilling

1. Place backfill material in maximum 12 inch lifts and compact each lift to the specified relative density.
2. Backfill the trench in accordance with the following procedures:
 - a. After pipe or cable has been bedded, place "Pipe Bedding" material simultaneously on both sides of the pipe or cable, keeping the level of backfill the same on each side. Carefully place the material around the pipe or cable so that the barrel is completely supported and that no voids or uncompacted areas are left beneath the pipe or cable.
 - b. Compact material placed within 12 inches of the outer surface of the pipe or cable by hand tamping only.
 - c. Place "Trench Backfill" material and push the backfill material carefully onto the backfill previously placed in the "Pipe Bedding." Do not permit free fall of the material until at least two feet of cover is provided over the top of the pipe or cable. Do not drop sharp, heavy pieces of material directly onto the pipe, cable or the tamped material around the pipe or cable.

3.12 Placing Flowable Backfill

1. Produce and deliver flowable backfill using concrete construction equipment and place by chute or pumping. Place without vibration or other means of compaction. Do not place during rain or when the ambient temperature is below 40°F. Take precautions during placement to not damage or move pipes installed in the trench.

Do not disturb the flowable backfill or open the area to traffic until it has attained a strength of 250 psi penetration resistance as measured by a handheld penetrometer.

2. Flowable backfill may be used in place of backfill and shall be used when shown in the drawings. When flowable backfill is placed under pavements, bring the top to within 2 inches of the surrounding surface and cover with 2 inches of asphaltic concrete to match the surrounding surface. When flowable backfill is used in other areas, bring the top to within 12 inches of the surface and cover within 12 inches of backfill.

3.13 Sidewalk, Pavement, and Curb Removal

Cut and remove bituminous and concrete pavements, curbs and sidewalks prior to excavation of the trenches. Width of the pavement or brick pavement cut shall be at least one foot wider than the required width of the trench at ground surface. Haul pavement and concrete materials from the site to disposal site secured by Contractor. Do not use for trench backfill.

3.14 Excavated Material

1. During excavation, place the excavated material only within the project area. Do not obstruct any roadways or streets. Conform to federal, state, and local codes governing the safe loading of trenches with excavated material. Separate suitable and unsuitable material.
2. Remove excess, unsuitable or cleared material resulting from the facility installation from the work site and dispose of at locations secured by the Contractor.
3. Stockpile excess suitable material on the site.

3.15 Drainage, Erosion and Sedimentation

Maintain all existing drainage patterns and control run-off from the construction area to prevent erosion, sedimentation, or flooding due to the construction.

3.16 Sheeting, Shoring, and Bracing of Trenches

1. Install adequate sheeting, shoring and bracing to prevent damage to property and injury to persons. Comply with all applicable safety regulations and laws.
2. Remove sheeting when the trench has been backfilled to at least one-half its depth or when removal will not endanger proper pipe alignment or support.
3. When conditions or plans and specifications require that sheeting be left in place, cut off the top at an elevation 2.5 feet below finished grade, unless otherwise specified.
4. When the performance of the Work requires the use of shoring, sheet piling, bracing and other special construction related to excavation, the Contractor shall cause the design of said shoring, sheet piling and other special construction to be performed by a registered professional engineer licensed in the State of Florida. The Contractor shall submit, as a shop drawing, a certification by the registered engineer, stating that he has complied with this requirement.

3.17 Compaction

1. Unless otherwise specified or shown on the drawings, compact backfill and fill areas (except within trenches) to at least the following minimum compaction requirements:
 - a. Structural Backfill: 95% relative density in 6-inch maximum layers.
 - b. Subgrade Under Fill or Backfill: 95% relative density to a depth of 12 inches.
 - c. Subgrade Under Structural Backfill or Structures: 98% relative density to a depth of 24 inches.
 - d. Backfill or Fill Under Pavement and Structures: 98% relative density in 12-inch maximum layers.
 - e. All Other Areas: 95% relative density in 12-inch maximum layers.
2. Unless otherwise specified or shown on the drawings, compact soil in trenches to the following minimum compaction requirements:
 - a. Pipe Bedding: 95% relative density.
 - b. Trench Backfill not Under Pavement and Structures: 95% relative density.
 - c. Trench Backfill Under Pavement and Structures: 98% relative density.
 - d. Refill for Over-excavation: 95% relative density.
3. Compact the first 2 feet of backfill over pipe either by hand-operated tamping devices or with powered equipment which will not damage the pipe. Flooding or puddling with water to consolidate backfill is not acceptable, except where sand is encountered and the specified density can be obtained using this method.
4. During the compacting operations, maintain material within +2% of optimum moisture. Aerate material containing excessive moisture by blading, discing, or harrowing to hasten the drying process.

3.18 Site Grading

Perform earthwork to the lines and grades shown on the drawings. Round tops of banks to circular curves to not less than a 6-foot radius. Neatly and smoothly trim rounded surfaces. Shape the surface of earthwork and trenches to conform to lines, grades and cross sections that existed prior to beginning work or as shown on the drawings, within one-tenth (1/10) of a foot.

3.19 Protection of Property

1. Protect the trunks of trees adjacent to this work by enclosure with padding or wood. Operate excavating machinery and cranes with care to prevent damage to trees, particularly to overhanging branches and limbs.
2. Do not cut branches, limbs and roots unless they are within six inches of the facility under construction. Make all necessary cuts smoothly and neatly without splitting or crushing. Neatly trim the tree at all cut or damaged portions.

3. Do not operate on paved surface any equipment with treads or wheels, which will cut or otherwise damage paved surfaces. Provide adequate protective measures to avoid damages to the paved surfaces.
4. As promptly as practicable, restore existing property or structures. Do not leave restoration until the end of the construction period.

3.20 Testing

1. Field density tests will be made in locations reviewed by the Owner, or the representative normally in each vertical layer, and using the following approximate spacing:
 - a. Under structures, pavements, and slabs, one per 2,500 square feet with at least two per structure or area.
 - b. In trenches, one (1) every 300 feet in continuous trenches under pavements or future pavements plus one (1) at each intersection or one (1) every 500 feet in continuous trenches not under pavements, plus one (1) at each pavement or driveway crossing.
 - c. In all other areas, one per 7,500 square feet.
2. If any field density tests are below the specified relative density, re-compact or re-excavate, re-backfill and re-compact the area until the specific density is obtained. Make a minimum of two (2) field density tests per re-compacted and/or re-excavated area, but do not exceed the spacing specified above.

3.21 Acceptance

After the specified density tests have been successfully completed, the Owner or his representative may cross section the excavation and/or fill area to verify that the excavation or fill area conforms to the lines and grades shown on the plans and to determine quantities of material. Correct deviations from line and grade in excess of the tolerances specified at no expense to the Owner.

END OF SECTION

DIVISION 32- EXTERIOR IMPROVEMENTS

321116 Compacted Sub-Base

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SECTION 321116 COMPACTED SUB-BASE

PART 1 - GENERAL

1.01 Description

This section includes materials, labor and equipment, unless otherwise specified, to construct a compacted sub-base.

1.02 Submittals

Submit shop drawings in accordance with Division 01 General Requirements, Section 013300, and the General Conditions.

PART 2 - PRODUCTS

2.01 Material

Use local or hauled-in clean sand or sand and clay.

PART 3 - EXECUTION

3.01 General

Compact the sub-base in both cuts and fill to a density of 95 percent of the maximum density as required by AASHTO T-180 (modified). Shape the sub-base to within 1/4 inch of the cross-section grade shown on the plans prior to making the density tests. **MAKE THE DENSITY TESTS BEFORE OTHER WORK PROCEEDS.** Maintain the required density and cross section until the base or pavement has been laid or until the base or pavement has been laid or until the aggregate materials for the base or pavement course have been spread in place.

3.02 Tests

Make density tests by an independent testing laboratory and make tests in locations spaced not more than 300 feet apart. The Owner may designate specified locations where tests shall be made. If any test results are unsatisfactory, re-excavate and re-compact the backfill until the desired compaction is obtained. Make additional compaction tests to each side of an unsatisfactory test at locations determined by the Owner to determine the extent of re-excavation and re-compaction necessary.

END OF SECTION

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DIVISION 33- UTILITIES

330134 Pump Station Bypass Pumping

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SECTION 330134 PUMP STATION BYPASS PUMPING

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes materials, equipment, and operational requirements for temporarily bypassing stormwater around a pump station in which work is to be performed.

1.02 SUBMITTALS

- A. Submit shop drawings in accordance with the General Conditions, Section 013300, and the following.
- B. Submit a written plan describing type of pump(s) to be used for bypass pumping at least 30 days before the application.
- C. Provide description of procedures and list of equipment for level control to ensure stormwater overflow prevention.

PART 2 - MATERIALS

2.01 PUMPS AND OTHER EQUIPMENT

- A. Provide the necessary pumps, conduits, and other equipment to divert the flow of stormwater around the pump station in which work is to be performed. The bypass system shall be of sufficient capacity to handle existing flows that might occur during periods of rainstorms. These flows are estimated to be:
 1. Minimum 24-Hour Stormwater Flow: 0 mgd.
 2. Maximum 24-Hour Stormwater Flow: 7.2 mgd.
- B. Furnish the necessary labor and supervision to set up and operate the pumping and bypassing system. A "setup" consists of the necessary pumps, conduits, and other equipment to divert the flow of stormwater around the pump station, from the start to finish of work performed in the pump station. Pumps and equipment shall be continuously monitored by a control panel.
- C. Engines and pumps shall be equipped with a control panel to provide automatic starting and stopping based on the water level located in the upstream manhole where the stormwater is being drawn. Provide level transducers and floats. Control panel shall include an auto dialer to call the Superintendent to notify him of a high water condition and/or if the pumping equipment has tripped.

- D. Engines and pumps shall be housed in an acoustically silenced enclosure. The sound attenuating enclosure shall be designed so that the maximum allowable sound level limit for the individual octave bands shall comply with table below during full load conditions; the sound levels shall be equal or less when measured at the property line.

Octave Band Center Frequency, Hz	dB
31.5	64
63	64
125	61
250	57
500	53
1,000	48
2,000	44
4,000	41
8,000	37
dBA	55

- E. Engines and pumps shall be placed on elastic skids, pads, or tires to limit vibrations transmitted into the ground.

PART 3 - EXECUTION

3.01 METHOD

- A. Bypass the stormwater around the pump station being repaired. Plug the influent line to the pump station and pump stormwater flow from the upstream manhole into the manhole downstream of the pump station. Provide pumps, piping, controls and other equipment to accomplish this task.
- B. Obtain all permits.

3.02 SURCHARGING STORMWATER MAINS

- A. The stormwater will be allowed to surcharge the stormwater mains.
- B. Where the stormwater flow is blocked or plugged, take sufficient precautions to protect the public health. Protect the existing stormwater mains and sewers from damage. The following occurrences will not be allowed:

1. The lakes located at N 26°7'2.11" W 81°48'0.56" and N 26°6'54.30" W 81°48'0.37" shall not exceed a high water predetermined by the City.
 2. No stormwater shall overflow any manholes, storm inlets, or any other access to the mains.
- C. If any of the above occur or are expected to occur, the Contractor shall bypass pump to alleviate all of the conditions. Additionally, the Contractor is required to observe the local weather conditions and be prepared to immediately start bypass pumping if a rain event is on the horizon.

3.03 TRAFFIC CONTROL

Ensure that pumps, piping, and hoses that carry stormwater are protected from traffic. Traffic control shall be performed in accordance with Section 015070.

END OF SECTION

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DIVISION 40 – PROCESS INTEGRATION

400500	General Piping Requirements
400515	Pressure Testing of Piping
400762	Wall Penetrations
400775	Equipment, Piping, Duct, and Valve Identification
402097	HDPE Pipe and Fittings
405000	Process Control and Instrumentation System (PCIS) General Requirements
405020	Instrumentation Equipment
405050	Remote Terminal Unit (RTU) System

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SECTION 400500 GENERAL PIPING REQUIREMENTS

PART 1 - GENERAL

1.01 DESCRIPTION

This section describes the general requirements for selecting piping materials; selecting the associated bolts, nuts, and gaskets for flanges for the various piping services in the project; and miscellaneous piping items.

1.02 SUBMITTALS

- A. Submit shop drawings in accordance with the General Conditions, Section 013300, and the following.
- B. Submit affidavit of compliance with referenced standards (e.g., AWWA, ANSI, ASTM, etc.).
- C. Submit certified copies of mill test reports for bolts and nuts, including coatings if specified. Provide recertification by an independent domestic testing laboratory for materials originating outside of the United States.
- D. Submit manufacturer's data sheet for gaskets supplied showing dimensions and bolting recommendations.

1.03 DEFINITIONS OF BURIED AND EXPOSED PIPING

- A. Buried piping is piping buried in the soil, commencing at the wall or beneath the slab of a structure. Where a coating is specified, provide the coating up to the structure wall. Unless detailed otherwise, coating shall penetrate wall no less than 1 inch. Piping encased in concrete is considered to be buried. Do not coat encased pipe.
- B. Exposed piping is piping in any of the following conditions or locations:
 - 1. Above ground.
 - 2. Inside buildings, vaults, or other structures.
 - 3. In underground concrete trenches or galleries.

1.04 PIPING SERVICE

Piping service is determined by the fluid conveyed, regardless of the pipe designation. For example, pipes designated "Air Low Pressure," "Air High Pressure," and "Air" are all considered to be in air service.

1.05 DEFAULT PIPING MATERIALS

If no material is shown in the drawings or in the Piping Schedule, use the following piping materials:

Service	Size Range (inches)	Material	Specification Section
Buried	3 and smaller	HDPE	402097
	4 and larger	HDPE	402097
Exposed	3 and smaller	HDPE	402097
	4 and larger	HDPE	402097

PART 2 - MATERIALS

2.01 MATERIALS SELECTION AND ALTERNATIVE MATERIALS

- A. The Piping Schedule in the drawings lists the material and specification for each piping service in the project. In locations where the piping material referenced on the Piping Schedule is not appropriate, the piping material is indicated in the drawings. Materials called out in the drawings shall govern over materials stated in the Piping Schedule.
- B. The Piping Schedule in the drawings may show alternative piping materials for certain services. In such cases, the same pipe material shall be used for all pipe sizes in all locations for the given piping service. Do not intermix piping materials.

2.02 THREAD FORMING FOR STAINLESS STEEL BOLTS

Form threads by means of rolling, not cutting or grinding.

2.03 BOLTS AND NUTS FOR FLANGES FOR STEEL AND DUCTILE-IRON PIPING

- A. Bolts and nuts for Class 125 or 150 flanges (including AWWA C207, Class D) located indoors, shall be carbon steel, ASTM A307, Grade B, hot-dipped galvanized per ASTM F2329.
- B. Bolts and nuts for buried or submerged Class 125 or 150 flanges and Class 125 or 150 flanges located outdoors above ground or in vaults and structures shall be Type 316 stainless steel conforming to ASTM A193, Grade B8M for bolts and ASTM A194, Grade 8M for nuts.
- C. Hex head machine bolts for use with lugged valves shall comply with ASTM A193, Grade B7.
- D. Fit shall be Classes 2A and 2B per ASME B1.1 when connecting to cast-iron valves having body bolt holes.

- E. Bolts for AWWA C207 Classes E and F flanges and ASME B16.5 and B16.47 Class 300 flanges located indoors, outdoors above ground and in vaults and structures shall conform to ASTM A193, Grade B7, with nuts conforming to ASTM A194, Grade 2H.
- F. Bolts and nuts for buried or submerged Class 300 flanges and Class 300 flanges located outdoors above ground or in vaults and structures shall be Type 316 stainless steel conforming to ASTM A193, Grade B8M, Class 2, for bolts and ASTM A194, Grade 8M, for nuts.
- G. Bolts used in flange insulation kits shall conform to ASTM A193 (Grade B7). Nuts shall conform to ASTM A194 (Grade 2H).
- H. Provide washers for each nut. Washers shall be of the same material as the nuts.

2.04 BOLTS AND NUTS FOR FLANGES FOR PVC PIPE

- A. Bolts and nuts for flanges located indoors, shall be carbon steel, ASTM A307, Grade B, hot-dipped galvanized per ASTM F2329.
- B. Bolts and nuts for buried and submerged flanges and flanges located outdoors above ground or in vaults and structures shall be Type 316 stainless steel conforming to ASTM A193, Grade B8M for bolts and ASTM A194, Grade 8M for nuts.

2.05 ANTI-SEIZE FOR STAINLESS STEEL BOLTS AND NUTS

Anti-seize shall be nickel grade meeting MIL Spec MIL-A-907D; apply to all steel and stainless steel nuts and bolts.

2.06 GASKETS FOR FLANGES FOR DUCTILE-IRON PIPING AND FITTINGS IN WATER SERVICE

Gaskets shall be full face, 1/8-inch thick, cloth-inserted rubber, with a Shore "A" hardness of 75 to 85. Gaskets shall be suitable for a water pressure of 200 psi at a temperature of 180°F. Gaskets shall have "nominal" pipe size inside diameters not the inside diameters per ASME B16.21. Products: Garlock Style 19 or equal.

2.07 GASKETS FOR FLANGES FOR PVC PIPING

Gaskets for flanged joints shall be full faced, 1/8-inch thick, having a hardness of 50 to 70 durometer A. Gasket material shall be EPR.

2.08 THREADED CAPS FOR PROTECTION OF NUTS AND BOLT THREADS

Caps shall be high-density polyethylene, color orange. The caps shall be filled with an anticorrosive lubricant to prevent nuts and bolts from rusting and corroding. Lubricant shall be suitable for use in potable water. Caps shall withstand temperatures from -40°F to 200°F. Caps shall be suitable to use in exposed, buried, and submerged service

conditions. Products: Sap-Seal Products, Inc.; Advance Products and Systems, Inc., "Radolid"; or equal.

2.09 MOLDABLE FILLER TAPE FOR PIPE SURFACE TRANSITION AREAS

- A. Filler tape shall be a 100% solids mastic-like butyl-rubber filler designed to fill and smooth the transition areas between adjacent coating surfaces such as step-down weld areas, surface irregularities beneath heat-shrink sleeves, pipefittings, and exothermic welds for cathodic protection bonding wire connections. Characteristics:
 - 1. Thickness per ASTM D1000: 1/8 inch minimum.
 - 2. Peel adhesion to primed pipe: 300 ounces per inch minimum.
 - 3. Elongation: 600% minimum.
- B. Products: Tapecoat "Moldable Sealant," Polyken No. 939 Filler Tape, or equal.

PART 3 - EXECUTION

3.01 INSTALLING PIPE SPOOLS IN CONCRETE

Install pipes in walls and slabs before placing concrete.

3.02 RAISED FACE AND FLAT FACE FLANGES

Where a raised face flange connects to a flat-faced flange, remove the raised face of the flange.

3.03 INSTALLING ABOVEGROUND OR EXPOSED PIPING

- A. Provide pipe hangers and supports as detailed in the drawings.
- B. Install pipe without springing, forcing, or stressing the pipe or any adjacent connecting valves or equipment.

3.04 INSTALLING FLANGED PIPING

- A. Set pipe with the flange bolt holes straddling the pipe horizontal and vertical centerline. Install pipe without springing, forcing, or stressing the pipe or any adjacent connecting valves or equipment. Before bolting up, align flange faces to the design plane within 1/16 inch per foot measured across any diameter. Align flange bolt holes within 1/8-inch maximum offset.
- B. Inspect each gasket to verify that it is the correct size, material, and type for the specified service and that it is clean and undamaged. Examine bolts or studs, and washers for defects such as burrs or cracks and rust and replace as needed.

- C. Clean flanges by wire brushing before installing flanged fittings. Clean flange bolts and nuts by wire brushing, lubricate carbon steel bolts with oil and graphite, and tighten nuts uniformly and progressively.
- D. Bolt lengths shall extend completely through their nuts. Any that fail to do so shall be considered acceptably engaged if the lack of complete engagement is not more than one thread.
- E. Do not use more than one gasket between contact faces in assembling a flanged joint.
- F. Tighten the bolts to the manufacturer's specifications, using the recommended cross bolt pattern in multiple steps of increasing torque, until the final torque requirements are achieved. Do not over torque.
- G. If flanges leak under pressure testing, loosen or remove the nuts and bolts, reset or replace the gasket, reinstall or retighten the bolts and nuts, and retest the joints. Joints shall be watertight.
- H. Install threaded nut and bolt thread protection caps after completing the bolt, nut, and gasket installation. Install on buried piping.

3.05 INSTALLING BLIND FLANGES

- A. At outlets not indicated to be connected to valves or to other pipes and to complete the installed pipeline hydrostatic test, provide blind flanges with bolts, nuts, and gaskets.
- B. Coat the inside face of blind flanges per Section 099000, System No. 7.

3.06 INSTALLING GROOVED-END PIPING

- A. Install grooved-end pipe and fittings in accordance with the coupling manufacturer's recommendations and the following.
- B. Clean loose scale, rust, oil, grease, and dirt from the pipe or fitting groove before installing coupling. Apply the coupling manufacturer's gasket lubricant to the gasket exterior including lips, pipe ends, and housing interiors.
- C. Fasten coupling alternately and evenly until coupling halves are seated. Use torques as recommended by the coupling manufacturer.
- D. Provide separate hangers and supports at both sides of flexible joints.

3.07 INSTALLATION OF STAINLESS STEEL BOLTS AND NUTS

Prior to assembly, coat threaded portions of stainless steel bolts and nuts with lubricant.

END OF SECTION

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SECTION 400515 - PRESSURE TESTING OF PIPING

PART 1 - GENERAL

1.01 DESCRIPTION

This section specifies the cleaning and hydrostatic and leakage testing of pressure piping for pumping stations, water piping systems.

1.02 SUBMITTALS

- A. Submit shop drawings in accordance with the General Conditions, Section 013300, and the following.
- B. Submit test bulkhead locations and design calculations, pipe attachment details, and methods to prevent excessive pipe wall stresses.
- C. Submit six copies of the test records to the Owner's Representative upon completion of the testing.

1.03 TEST PRESSURES

Test pressures for the various services and types of piping are shown in the Piping Schedule in the drawings.

1.04 TESTING RECORDS

Provide records of each piping installation during the testing. These records shall include:

- A. Date and times of test.
- B. Identification of process, pipeline, or pipeline section tested or retested.
- C. Identification of pipeline material.
- D. Identification of pipe specification.
- E. Test fluid.
- F. Test pressure at low point in process, pipeline, or pipeline section.
- G. Remarks: Leaks identified (type and location), types of repairs, or corrections made.
- H. Certification by Contractor that the leakage rate measured conformed to the specifications.

PART 2 - MATERIALS

2.01 MANUAL AIR-RELEASE VALVES FOR BURIED PIPING

Provide temporary manual air-release valves for pipeline test. Construct the pipe outlet in the same manner as for a permanent air valve and after use, seal with a blind flange, pipe cap, or plug and coat the same as the adjacent pipe.

2.02 TESTING FLUID

- A. Testing fluid shall be water.
- B. For potable water pipelines, obtain and use only potable water for hydrostatic testing.
- C. Submit request for use of water from waterlines of Owner 48 hours in advance.
- D. The Contractor may obtain the water from the Owner at the Owner's rate of charges.

2.03 TESTING EQUIPMENT

Provide calibrated pressure gauges, pipes, bulkheads, pumps, chart recorder, and meters to perform the hydrostatic testing.

PART 3 - EXECUTION

3.01 TESTING PREPARATION

- A. Pipes shall be in place, backfilled, and anchored before commencing pressure testing.
- B. Conduct pressure tests on exposed and aboveground piping after the piping has been installed and attached to the pipe supports, hangers, anchors, expansion joints, valves, and meters.
- C. For buried piping, the pipe may be partially backfilled and the joints left exposed for inspection during an initial leakage test. Perform the final pressure test, however, after completely backfilling and compacting the trench.
- D. Provide any temporary piping needed to carry the test fluid to the piping that is to be tested. After the test has been completed and demonstrated to comply with the specifications, disconnect and remove temporary piping. Do not remove exposed vent and drain valves at the high and low points in the tested piping; remove any temporary buried valves and cap the associated outlets. Plug taps or connections to the existing piping from which the test fluid was obtained.
- E. Provide temporary drain lines needed to carry testing fluid away from the pipe being tested. Remove such temporary drain lines after completing the pressure testing.
- F. Prior to starting the test, the Contractor shall notify the Owner's Representative.

3.02 CLEANING

- A. Before conducting hydrostatic tests, flush pipes with water to remove dirt and debris. Maintain a flushing velocity of at least 3 fps for water testing. Flush pipes for time period as given by the formula

$$T = \frac{2L}{3}$$

in which:

T = flushing time (seconds)

L = pipe length (feet)

3.03 TESTING AND DISINFECTION SEQUENCE FOR POTABLE WATER PIPING

- A. Perform required disinfection after hydrostatic testing, except when pipeline being tested is connected to a potable waterline.
- B. Locate and install test bulkheads, valves, connections to existing pipelines, and other appurtenances in a manner to provide an air gap separation between existing potable water pipelines and the pipeline being tested. Disinfect water and pipeline being tested before hydrostatic testing when connected to a potable waterline.

3.04 LENGTH OF TEST SECTION FOR BURIED PIPING

The maximum length of test section for buried pipe of 12 inches or smaller in diameter is 3,500 feet; for buried pipe larger than 12 inches, 1 mile. Provide intermediate test bulkheads where the pipeline length exceeds these limits.

3.05 INITIAL PIPELINE FILLING FOR HYDROSTATIC TESTING

Maximum rate of filling shall not cause water velocity in pipeline to exceed 1 fps. Filling may be facilitated by removing automatic air valves and releasing air manually.

3.06 TESTING NEW PIPE WHICH CONNECTS TO EXISTING PIPE

Prior to testing new pipelines that are to be connected to existing pipelines, isolate the new line from the existing line by means of test bulkheads, spectacle flanges, or blind flanges. After successfully testing the new line, remove test bulkheads or flanges and connect to the existing piping.

3.07 HYDROSTATIC TESTING OF ABOVEGROUND OR EXPOSED PIPING

- A. Open vents at high points of the piping system to purge air while filling the pipe with water. Venting during system filling may also be provided by temporarily loosening flanges.

- B. Subject the piping system to the test pressure indicated on the Piping Schedule in the drawings. Maintain the test pressure for a minimum of four hours. Examine joints, fittings, valves, and connections for leaks. The piping system shall show zero leakage or weeping. Correct leaks and retest until zero leakage is obtained.

3.08 HYDROSTATIC TESTING OF BURIED PIPING

- A. Where any section of the piping contains concrete thrust blocks or encasement, do not perform the pressure test until at least 10 days after placing the concrete. When testing mortar-lined, PVC, or HDPE piping, fill the pipe to be tested with water and allow it to soak for at least 48 hours to absorb water before conducting the pressure test.
- B. Apply and maintain the test pressure by means of a positive displacement hydraulic force pump.
- C. Maintain the test pressure for the following duration by restoring it whenever it falls an amount of 5 psi:

Pipe Diameter (inches)	Hours
18 and less	4
20 to 36	8
Greater than 36	24

- D. After the test pressure is reached, use a meter to measure the additional water added to maintain the pressure. This amount of water is the loss due to leakage in the piping system. The allowable leakage volume is defined by the formula

$$L = \frac{HND(P)^{1/2}}{C}$$

in which:

- L = allowable leakage (gallons)
- H = specified test period (hours)
- N = number of rubber-gasketed joints in the pipe tested
- D = diameter of the pipe (inches)
- P = specified test pressure (psig)
- C = 7,400

- E. The allowable leakage for buried piping having threaded, brazed, or welded (including solvent welded) joints shall be zero.

- F. Repair and retest any pipes showing leakage rates greater than that allowed in the above criteria.

3.09 REPETITION OF TEST

If the actual leakage exceeds the allowable, locate and correct the faulty work and repeat the test. Restore the work and all damage resulting from the leak and its repair. Eliminate visible leakage.

3.10 BULKHEAD AND TEST FACILITY REMOVAL

After a satisfactory test, remove the testing fluid, remove test bulkheads and other test facilities, and restore the pipe coatings.

END OF SECTION

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SECTION 400762 WALL PENETRATIONS

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes materials, installation, and testing of steel, cast-iron, and ductile-iron wall pipes and sleeves (including wall collars and seepage rings) and penetrations.

1.02 SUBMITTALS

- A. Submit shop drawings in accordance with the General Conditions, Section 013300, and the following.
- B. List materials of construction, with ASTM material reference and grade.
- C. Submit manufacturer's instructions for installing rubber annular hydrostatic sealing devices.

PART 2 - MATERIALS

2.01 GENERAL

- A. Use rubber annular hydrostatic sealing devices for pipe penetrations through existing concrete walls and slabs.
- B. See Section 400500 for flange bolts and gaskets.

2.02 RUBBER ANNULAR HYDROSTATIC SEALING DEVICES

- A. Rubber annular hydrostatic sealing devices shall be of the modular mechanical type, utilizing interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe sleeve and the passing pipe. Assemble links to form a continuous rubber belt around the pipe, with a pressure plate under each bolthead and nut.
- B. Materials of construction shall be as follows:

Compound	Material
Pressure plate	Reinforced Nylon Polymer
Bolts and nuts for links	Type 316 stainless steel
Sealing element	EPDM or Nitrile rubber

- C. The size of the wall sleeve needed to accommodate the passing pipe shall be as recommended by the rubber annular seal manufacturer.

- D. Provide centering blocks in 25% of the sealing elements on pipelines larger than 12 inches in diameter.
- E. The rubber annular hydrostatic sealing devices shall be Link Seal as manufactured by Thunderline Corporation; Innerlynx as manufactured by Advance Products & Systems, Inc.; or equal.

2.03 POLYETHYLENE FOAM FILLER FOR PIPE PENETRATIONS

Packing foam shall be an extruded closed-cell polyethylene foam rod, such as Minicel backer rod, manufactured by Industrial Systems Department, Plastic Products Group of Hercules, Inc., Middletown, Delaware; Ethafoam, as manufactured by Dow Chemical Company, Midland, Michigan; or equal. The rod shall be 1/2 inch larger in diameter than the annular space.

2.04 POLYURETHANE SEALANT FOR PIPE PENETRATIONS

Sealant shall be multipart, polyurethane sealant, to cure at ambient temperature, for continuous immersion in water. Install as recommended by the manufacturer. Products: SIKA Sikaflex 2C or equal.

PART 3 - EXECUTION

3.01 INSTALLATION OF RUBBER ANNULAR HYDROSTATIC SEALING DEVICES

Install in accordance with the manufacturer's instructions.

3.02 FIELD TESTING

Check each wall penetration for leakage at the time the hydraulic structure is tested for leakage; penetrations shall show zero leakage.

END OF SECTION

SECTION 400775 EQUIPMENT, PIPING, DUCT, AND VALVE IDENTIFICATION

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes materials and installation of markers, labels, and signs for pipes, ducts, and valves; for mechanical equipment; for hazardous materials warnings; and for miscellaneous plant services.

1.02 SUBMITTALS

- A. Submit shop drawings in accordance with the General Conditions, Section 013300, and the following.
- B. Submit manufacturer's catalog data and descriptive literature describing materials, colors, letter size, and size of labels.

PART 2 - MATERIALS

2.01 LABELS FOR EXPOSED PIPING

- A. Labels for piping shall bear the full piping system name as shown in the Piping Schedule in the drawings. Provide separate flow directional arrows next to each label. Color, size, and labeling shall conform to ANSI A13.1 and Z535.1. Labels for piping inside buildings shall be vinyl cloth: W. H. Brady Co. B-500 vinyl cloth, Seton Name Plate Corporation Pipe Markers, or equal. Labels for piping located outdoors shall be weather- and UV-resistant acrylic plastic and shall be W. H. Brady Co. B-946, Seton Name Plate Corporation Pipe Markers, or equal.
- B. Alternatively, provide preprinted, semirigid, snap-on, color-coded pipe markers. Color, size, and labeling shall conform to ANSI A13.1 and Z535.1. Label shall cover 360 degrees (minimum). Labels shall be fabricated of weather- and UV-resistant acrylic plastic. Labels shall be Seton Nameplate Corporation SetMark pipe marks or equal.

2.02 LABELS FOR EXPOSED VALVES

Provide each valve of size 4 inches and larger with an identification tag. Tag shall be 2-inch-square or circular aluminum or 1/16-inch-thick fiberglass: W. H. Brady B-60, Seton Name Plate Corp. Series SVT, or equal. Aluminum tags shall have black-filled letters. Tag shall show the valve tag number and/or name or designation as given in the drawings.

2.03 LABELS FOR MECHANICAL EQUIPMENT

Provide a label for each pump, blower, compressor, tank, feeder, flocculator, flash mixer, clarifier mechanism, or other piece of mechanical equipment. Label shall show the equipment name and tag number as shown in the drawings. Labels shall be 1 1/2 inches (minimum) by 4 inches (minimum) brass, aluminum, or 1/8-inch-thick fiberglass tags: Brady B-120 Fiber-Shield, Seton Style 2065, or equal.

2.04 LABELS FOR EXPOSED TANKS

Signs shall be weather and UV-resistant. Labels shall be Brady B-946, Seton Name Plate Corporation PSPL, or equal. Minimum size shall be 7 inches by 10 inches. Provide a sign on each tank bearing the tank tag number and the name of the liquid stored.

2.05 LAMINATED PLASTIC WALL SIGNS

Wall signs shall be 1 1/2 inches by 4 inches (minimum dimensions), 1/16-inch-thick satin-surfaced material conforming to ASTM D709 (Grades ES-1, ES-2, or ES-3). Lettering shall be 1/2-inch-high white letters on black background. Do not provide mounting holes. Legends shall be as shown in the drawings.

2.06 UNDERGROUND PLASTIC WARNING TAPE FOR METALLIC PIPE

Provide permanent, bright-colored, continuous-printed plastic tape, intended for direct burial service, not less than 6 inches wide by 3.5 mils thick. Provide tape with printing which most accurately indicates type of service of buried pipe. Provide the following colored tape for the various piping services:

Service	Color
Cable TV	Orange
Chemical	Yellow
Electric	Red
Fuel Oil, Gasoline	Yellow
Gas	Yellow
Reclaimed Water	Violet
Sewer	Green
Telephone	Orange
Water	Blue

2.07 UNDERGROUND DETECTABLE METALLIC PIPE WARNING TAPE FOR NONMETALLIC PIPE

Provide permanent, bright-colored, continuous-printed tape consisting of an aluminum or steel foil sheathed in a plastic laminate, not less than 2 inches wide by 3 mils thick. Provide tape with printing which most accurately indicates type of buried service. Provide the following colored tape for the various piping services:

Service	Color
Cable TV	Orange
Chemical	Yellow
Electric	Red
Fuel Oil, Gasoline	Yellow
Gas	Yellow
Reclaimed Water	Violet
Sewer	Green
Telephone	Orange
Water	Blue

PART 3 - EXECUTION

3.01 INSTALLING PIPE LABELS

- A. Provide label and flow arrow at each connection to pumps or other mechanical equipment, at wall boundaries, at tees and crosses, and at 20-foot centers on straight runs of piping.
- B. On piping having external diameters less than 6 inches (including insulation, if any), provide full-band pipe markers, extending 360 degrees around pipe at each location.
- C. On piping having external diameters of 6 inches and larger (including insulation, if any), provide either full-band or strip-type pipe markers but not narrower than three times letter height (and of required length), fastened by one of the following methods:
 - 1. Laminated or bonded application of pipe marker to pipe or insulation.
 - 2. Strapped-to-pipe or insulation application of semirigid type with Type 304 or 305 stainless steel bands.

3.02 INSTALLING VALVE AND EQUIPMENT LABELS

- A. Attach labels to the valve or piece of equipment with Type 304 or 316 stainless steel chains or wires.

- B. Attach valve labels to the valve handwheels. If the valve has no handwheel, attach the label to the valve by tying the tag wire or chain around the operating shaft or nut.

3.03 INSTALLING HOSE BIBB SIGNS

Install signs for hose bibs on the adjacent wall for hose bibs installed on water supply lines running on walls. Install signs on the risers of hose bibs installed outdoors or on the exterior casing pipe or top stock of yard and post hydrants.

3.04 INSTALLING MISCELLANEOUS SIGNS

Attach per sign manufacturer's recommendations and per OSHA requirements.

3.05 INSTALLING WALL AND DOOR SIGNS

Attach to walls and doors using epoxy adhesive.

3.06 INSTALLING LABELS FOR AUTOMATIC START/STOP EQUIPMENT AND HAZARDOUS MATERIALS WARNING SIGNS FOR EQUIPMENT

- A. Attach signs for exposed equipment directly to the equipment.
- B. Attach signs for sump pumps on the adjacent wall.

3.07 INSTALLING UNDERGROUND PLASTIC WARNING TAPE FOR METAL PIPE

During backfilling of each exterior underground piping system, install continuous underground-type plastic line marker, located directly over buried line at 6 to 8 inches above the top of the pipe. Where multiple small lines are buried in common trench and do not exceed overall width of 16 inches, install single line marker.

3.08 INSTALLING UNDERGROUND DETECTABLE METALLIC PIPE WARNING TAPE

Install tape 4 to 6 inches below finished ground surface, located directly over buried pipelines. Where multiple small pipelines are buried in a common trench and do not exceed an overall width of 16 inches, install a single marker tape.

END OF SECTION

SECTION 402097 HDPE PIPE AND FITTINGS

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes materials, installation and testing of PE4710 high-density, very high molecular weight polyethylene pipe and fittings having a hydrostatic design basis of 1,600 psi at a temperature of 73°F. Pipe diameter basis is IPS, with dimension ratio (DR) as shown in the drawings.

1.02 SUBMITTALS

- A. Submit shop drawings in accordance with the General Conditions, Section 013300, and the following.
- B. Submit materials list for review.
- C. Submit manufacturer's recommended method of installing HDPE pipe including procedures for butt-fusing joints and manufacturer's recommended method for electro-fusing joints.
- D. The polyethylene pipe manufacturer shall provide certification that stress regression testing has been performed on the specific product. Certification shall include a stress life curve per ASTM D2837.
- E. Provide certification that the material is listed by the Plastics Pipe Institute in PPI TR-4 with a 73°F hydrostatic design stress rating of 800 psi and a 140°F hydrostatic design stress rating of 400 psi. The PPI listing shall be in the name of the pipe manufacturer and shall be based on ASTM D2837 and PPI TR-3 testing and validation of samples of the pipe manufacturer's production pipe.
- F. The manufacturer's certification shall state that the pipe was manufactured from one specific resin in compliance with these specifications. The certificate shall state the specific resin used, its source, and list its compliance to these specifications.
- G. Submit certified lab data to verify specified physical properties. Certify that tests are representative of pipe supplied for this project.
- H. Submit affidavit of compliance with referenced standards (e.g., AWWA C906, ASTM F714, etc.).
- I. Submit qualification certificates for operators of heat fusion and electro-fusion equipment.
- J. Submit record of each fused joint demonstrating compliance with manufacturer's written fusion recommendations.

PART 2 - MATERIALS

2.01 PIPE

- A. Pipe and fittings shall conform to AWWA C906 and ASTM F714 and the following requirements.
- B. Pipe shall have a nominal IPS outside diameter.
- C. The minimum wall thickness (inches) for pipe shall be in accordance with for the DR shown in the drawings. If no DR is shown in the drawings, use a DR of 11, minimum. Produce the pipe to the dimensions and tolerances specified in ASTM F714.
- D. The pipe shall be homogeneous throughout and free of visible cracks, holes, voids, foreign inclusions, or other deleterious defects and shall be identical in color, density, melt index, and other physical properties throughout.
- E. Pipe shall have a minimum hydrostatic design basis (HDB) of 1,600 psi, as determined in accordance with ASTM D2837.
- F. Pipe Material:
 - 1. Materials used for the manufacture of polyethylene pipe and fittings shall be very high molecular weight, high-density ethylene/hexene copolymer PE 4710 polyethylene resin meeting the physical property and pipe performance requirements listed below.

Property	Specification	Units	Minimum Values
Material Designation	PPI/ASTM	---	PE4710
Material Classification	ASTM D1248	---	III C 5 P34
Cell Classification	ASTM D3350	---	445574C
Hardness	ASTM D2240	Shore "D"	64
Compressive Strength (Yield)	ASTM D695	psi	1,600
Tensile Strength @ Yield (Type IV Spec.)	ASTM D638 (2"/min)	psi	3,200
Elongation @ Yield	ASTM D638	%, min.	8
Tensile Strength @ Break (Type IV Spec.)	ASTM D638	psi	3,500 psi
Elongation @ Break	ASTM D638	%, min.	600
Modulus of Elasticity	ASTM D638	psi	110,000
ESCR:			
(Cond A, B, C: Mold. Slab)	ASTM D1693	Fo, Hrs	Fo>5,000

Property	Specification	Units	Minimum Values
(Compressed Ring Pipe)	ASTM F1248	F50, Hrs	F50>1,000
Slow Crack Growth	Battelle Method	Days to Failure	Fo>32
Impact Strength (IZOD) (0.125-Inch Thick)	ASTM D256 (Method A)	in-lb/in Notch	42
Linear Thermal Expansion Coefficient	ASTM D696	in/in/°F	1.2 x 10 ⁻⁴
Thermal Conductivity	ASTM C177	BTU, in/Ft ² /hrs/°F	2.7
Brittleness Temp.	ASTM D746	°F	<-180°F
Vicat Soft. Temp.	ASTM D1525	°F	257
NSF Listing	Standard 14	---	"Listed"
*Standard deviation 0.01.			

2. The pipe shall be extruded from precompounded resin. In-plant re-blending of resin is unacceptable.
3. Color shall be black.

2.02 NIPPLES AND FLANGED STUB ENDS

Short nipples, flange adapters, bulkheads and stub ends shall be of the same material as the pipe.

2.03 FITTINGS

Fittings up to 8-inch shall be molded polyethylene fabricated per AWWA C901/C906. Fittings 10-inch to 24-inch shall be fabricated fittings per AWWA C906. Fittings 26-inch and larger shall be manufacturer by Independent Pipe Products, Inc or equal. All fitting shall meet the requirements of the pipe and have a SDR that matches the mating pipe.

2.04 JOINTS

- A. Join sections of polyethylene pipe into continuous lengths on the jobsite above ground. The joining method shall be the butt fusion method performed in accordance with the pipe manufacturer's recommendations. Butt fusion joining shall result in a joint weld strength equal to or greater than the tensile strength of the pipe. Socket fusion shall not be used. Extrusion welding or hot gas welding of HDPE shall not be used.
- B. The butt fusion equipment used in the joining procedures shall be capable of meeting all jobsite and material conditions as recommended by the pipe manufacturer.
- C. Flanges, unions, grooved-couplers, electro-fusion transition fittings, and some ductile iron mechanical couplers may be used to connect HDPE pipe mechanically without butt fusion where shown in the drawings.

2.05 BOLTS, NUTS, AND GASKETS FOR FLANGES

See Section 40 05 00.

2.06 LUBRICANT FOR STAINLESS STEEL BOLTS AND NUTS

See Section 40 05 00.

PART 3 - EXECUTION

3.01 SHIPPING, STORAGE, AND HANDLING

- A. Limit onsite pipe storage to a maximum of one week.
- B. Transport pipe to the jobsite on padded bunks with nylon tie-down straps or padded bonding to protect the pipe. Protect the pipe from sharp objects. Anchor pipe securely to prevent slippage.
- C. Store pipe on earth berms or timber cradles adjacent to the trench or lay-down area for pullback. When the pipe is received, visually inspect to verify that the correct product was received. Check for damage that may have occurred during transit. Examine for fractures, kinking, gouges, or cuts. Remove and dispose off-site pipe with gouges or cuts in excess of 10% of the nominal pipe wall thickness.
- D. Cover pipe 100% with protective coverings or tarpaulins to prevent deposition of road salts, diesel smoke, fuel residue, and other contaminants while in transit.
- E. Hook lifting equipment, such as cranes, extension boom cranes, and side boom tractors, to wide web choker slings that are secured around the load or to lifting lugs on the fitting. Use only wide web slings. Do not use wire rope slings or chains which can damage pipe and fittings. Use spreader bars when lifting pipe or fittings longer than 20 feet.

- F. Unload large fabrications using a wide web choker sling and lifting equipment such as an extension boom crane, crane, or lifting boom. Do not use stub outs, outlets, or fittings as lifting points, and avoid placing slings where they will bear against outlets or fittings.
- G. Protect the pipe from stones and sharp objects.
- H. Store fittings in their original cartons.

3.02 HANDLING PIPE DURING INSTALLATION

- B. Lift pipes with handling beams or wide belt slings near the middle of joints as recommended by the pipe manufacturer. Do not use cable slings, chains, or hooks.
- C. Before installation, check pipe and fittings for cuts or scratches exceeding 5% of the pipe wall thickness, gouges, buckling, kinking, or splitting. Remove and dispose off-site such defective pipe.

3.03 SANITATION OF PIPE INTERIOR

- A. During fusion operations and laying operations, do not place tools, clothing, or other materials in the pipe.
- B. When pipelaying is not in progress, including the lunch hour, close the ends of the pipe by a vermin- and child-proof plug.

3.04 QUALIFICATION OF FUSION OPERATORS

Each operator performing fusion joining shall be qualified in the use of the manufacturer's recommended fusion procedure(s) by the following:

- A. Appropriate training or experience in the use of the fusion procedure.
- B. Making a sample joint according to the procedure that passes the following inspections and tests:
 1. The joint shall be visually examined during and after joining and found to have the same appearance as a photograph or sample of an acceptable joint that was joined in accordance with the procedure; and
 2. Test or examine the joint by one of the following methods:
 - (a) Pressure and tensile test as described in 49 CFR 192.283;
 - (b) Ultrasonic inspection and found to be free of flaws that would cause failure; or
 - (c) Cut into at least three longitudinal straps, each of which is:

- (1) Visually examined and found to be free of voids or unbonded areas on the cut surface of the joint, and
 - (2) Deformed by bending, torque, or impact and if failure occurs, it must not initiate in the joint area.
3. Each operator shall be re-qualified under the procedure, if, during any 12-month period he:
 - (a) Does not make any joints under the procedure; or
 - (b) Has three joints or three percent of the joints he has made, whichever is greater, that are found unacceptable by testing under 49 CFR 192.513.

3.05 HEAT FUSION

- A. Comply with ASTM F2620, except as modified below.
- B. Use fusion equipment specially designed for heat fusion of HDPE such as offered by McElroy Manufacturing, Inc., Tulsa, Oklahoma or equal. The equipment utilized shall be regulated for the different melt strength materials. Compatibility fusion techniques shall be used when polyethylenes of different melt indexes are fused together.
- C. Maintain the proper temperature of the heater plate as recommended by the pipe manufacturer. Check it with a tempilstik or pyrometer for correct surface temperature.
- D. Clean pipe ends inside and outside with a clean cotton cloth to remove dirt, water, grease, and other foreign materials.
- E. Square (face) the pipe ends using facing tool of the fusion machine. Remove burrs, chips, and filings before joining pipe or fittings.
- F. Check line-up of pipe ends in fusion machine to see that pipe ends meet squarely and completely over the entire surface to be fused. Make sure the clamps are tight so that the pipe does not slip during the fusion process.
- G. Insert clean heater plate between aligned ends and bring ends firmly in contact with plate but do not apply pressure while achieving melt pattern. Allow pipe ends to heat and soften.
- H. Carefully move the pipe ends away from the heater plate and remove the plate (if the softened material sticks to the heater plate, discontinue the joint, clean heater plate, resquare pipe ends, and start over).
- I. Bring melted ends together rapidly. Do not slam. Apply enough pressure to form a double roll-back bead to the body of the pipe around the entire circumference of the pipe about 1/8- to 3/16-inch wide. Pressure is necessary to cause the heated material to flow together.

- J. Allow the joint to cool and solidify properly prior to release of pressure. After the fused joint is cool to the touch, remove the pipe from the clamps and inspect the joint appearance.
- K. Use a data logging device with the hydraulic joining equipment to record fusion parameters of pressure, temperature, and time for each joint.
- L. Fusion joint shall produce a joint weld with strength equal to or greater than the tensile strength of the pipe itself.

3.06 SIDEWALL FUSION

- A. Accomplish side fusion procedure for HDPE in the field using 2- through 12-inch McElroy (or equal) fusion units and proper heater plate adapters. Where branch outlets are larger than 12 inches in outside diameter, accomplish sidewall fusion in a fitting fabrication shop.
- B. Clean the pipe with a clean cotton cloth. Prepare surface of pipe (main) by roughing with 60 grit or coarser utility cloth.
- C. Prepare the base of the branch by roughing with 60 grit or coarser utility cloth.
- D. Align branch on the main and tighten clamp.
- E. Check branch for square alignment.
- F. Retract moveable clamp, roll in, and center heater plate with adapter between base of branch and main.
- G. For all sizes, apply a strong, firm, continuous pressure until complete melt bead can be seen on main. Release pressure to light pressure. Continue heat soak cycle on branch and main. Watch base of branch for:

Main Sizes (inches)	Heat Soak Cycle Fitting Base Bead
1-1/4 and smaller	1/16-inch Melt Bead
2	1/8-inch Melt Bead
3 and Larger	1/8- to 3/16-inch Melt Bead

- H. Retract moveable clamp and cleanly remove heater plate.
- I. Bring melted surfaces together rapidly. Do not slam. Apply continuous progressive pressure until proper fusion bead is formed. Maintain pressure until joint has cooled.

3.07 COMPATIBILITY FUSION

- A. Manufacturer of pipe shall provide technical personnel to instruct and demonstrate the fusion procedure for joining dissimilar HDPE materials.
- B. Compatibility heat fusion and sidewall fusion shall be accomplished in the same manner as described above except that to achieve proper melt pattern, insert the heater plate and place a compatibility insulator between the heater plate and the lower melt material. After the higher melt achieves proper melt, then remove the insulator and bring the heater plate in contact with the lower melt material for proper melt. Continue heating both surfaces until proper melt develops. For manually operated fusion equipment, form a double roll-back bead as previously described in the fusion procedures.

3.08 COLD-BENDING OF CURVED SEGMENTS

HDPE may be cold-bent to a minimum radius of no less than 30 times the pipe diameter as it is installed along curved alignment. The minimum bending radius that can be applied to the pipe without kinking it varies with the diameter and wall thickness of the pipe and shall not exceed the recommendations of the manufacturer. If adequate space is not available for the required radius, fuse a fitting of the required angle into the piping system to obtain the necessary change in direction.

3.09 ELECTRO-FUSION SADDLES (LOW PRESSURE APPLICATIONS)

Use electro-fusion saddles to install branch saddles on larger diameter host pipe. Electro-fusion saddles shall be rated by the manufacturer at the pressure rating or greater of the pipe to which it joins. Electro-fusion saddle shall be designed to match the melt index of the adjacent pipe to which it is joined.

3.10 SERVICE SADDLES (HIGH PRESSURE APPLICATIONS)

Provide JCM model #404 service saddle with double stainless steel straps. Coordinate outlet size with service size from drawings. Apply sufficient torque evenly to the bolts to prevent leaks. After initial installation and tightening, allow the connections to set for at least two days. Then conduct a final tightening of the bolts.

3.11 STATIC ELECTRICITY DISCHARGING

- A. Static electricity charges are generated on polyethylene pipe by friction, particularly during the handling of pipe in storage, shipping, and installation. The flow of air or gas containing dust or scale will also build up significant static charges, as will the flow of dry materials through the pipe. These charges are a safety hazard, particularly in areas where there is leaking gas or an explosive atmosphere.
- B. Plastic pipe is a nonconductor of electricity and the static charge will remain in place until some grounding device comes close enough to allow it to discharge.
- C. The discharge of these static electric charges is the responsibility of the Contractor.

- D. Do not drag HDPE pipe over the ground, drop it onto the ground, or drop objects on it.

3.12 FLANGED CONNECTIONS

- A. Accomplish mechanical joining to other piping materials (fittings, valves, tanks, pumps, etc.) with factory-made flange adapters and stainless steel backup flanges.
- B. Flange adapters shall be pressure rated the same as the pipe. Flange adapters shall be heat fused to the pipe as specified in the heat fusion section.
- C. Use gaskets between the polyethylene flange adapters only when recommended by the HDPE pipe manufacturer. Apply sufficient torque evenly to the bolts to prevent leaks. After initial installation and tightening, allow the connections to set for at least two days. Then conduct a final tightening of the bolts.
- D. Lubricate nuts and bolts with oil or graphite prior to installation.
- E. Wrap buried flanges, bolts, and metal with the sheet polyethylene film or tape specified for the valves and equipment. Extend the wrap or tape over the flanges and bolts and secure it around the adjacent pipe circumference with tape.
- F. Check operation of valves connected to molded stub end flange adapters. Insert polyethylene spacer if recommended by pipe manufacturer for clearance.

3.13 MJ CONNECTIONS

- A. Accomplish mechanical joining to other piping materials with factory-made mechanical joint adapters.
- B. MJ adapters shall be pressure rated the same as the pipe. MJ adapters shall have the same DR and size of the pipe. MJ adapters shall be heat fused to the pipe as specified in the heat fusion section.
- C. Use gaskets between the polyethylene flange adapters recommended by the HDPE pipe manufacturer. Apply sufficient torque evenly to the bolts to prevent leaks. After initial installation and tightening of flanged connections, allow the connections to set for at least two days. Then conduct a final tightening of the bolts.
- D. Lubricate nuts and bolts with oil or graphite prior to installation.
- E. Wrap buried adapter, bolts, and metal with the sheet polyethylene film or tape specified for the valves and equipment. Extend the wrap or tape over the joint and bolts and secure it around the adjacent pipe circumference with tape.
- F. Check operation of valves connected to molded stub end adapters. Insert polyethylene spacer if recommended by pipe manufacturer for clearance.

3.14 THREADED CONNECTIONS

- A. Provide IPS Male Threaded Transition Fitting manufactured by ISCO. Threaded material shall be stainless steel.

3.15 PNEUMATIC PRESSURE TESTING

- B. Perform Pneumatic Pressure Testing prior to burying and hydrostatic pressure testing of fused pipe.
- C. Perform pressure and visual test on the pipe with an air test to 5 psi and not exceeding 10 psi.
- D. Compressed air shall be used for the test medium. The test medium shall be non-flammable and non-toxic.
- E. Build and release pressure slowly.
- F. Hold pressure for 10 to 60 minutes but not longer than 60 minutes.
- G. Ambient temperature shall be above 32 degrees F for air test.
- H. Detect leaks with mild soap solution (avoid strong detergents) or other non-deleterious leak detecting fluids applied to the joint. Bubbles indicate leakage. Rinse soap solution from pipe surface with clean water after leak testing.

3.16 HYDROSTATIC TESTING

- A. Perform hydrostatic testing for leakage in accordance with ASTM F2164 and Section 400515. The test period and allowable leakage rate shall be as defined in ASTM F2164, Section 9.
- B. Allow the water, pipe, and soil to thermally stabilize. Fill the pipeline, vent the air, and allow the filled pipeline to sit overnight (in above freezing weather) to thermally stabilize.
- C. Examine exposed pipe or fittings carefully during the leak test for damage. Repair any damaged or defective pipe, fittings, valves, or hydrants discovered during the leak test and repeat the test. During the test period, add makeup water to keep the pressure constant.
- D. The total time for initial pressurization and time at test pressure shall not exceed eight hours at 1.5 times the system pressure rating. If the test is not completed because of leakage, equipment failure, or any other reason within this total time, depressurize the test section and allow the pipe to “relax” for at least eight hours before starting the next testing sequence.

END OF SECTION

SECTION 405000 PROCESS CONTROL AND INSTRUMENTATION SYSTEM (PCIS)
GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 Description

1. This section of the specifications includes materials, testing, and installation of process control and instrumentation system as specified herein and indicated on the drawings.
2. These specifications shall not be interpreted as permission or direction to violate any governing code or ordinance. Equipment, materials, and workmanship shall comply with the latest revisions of the following codes and standards:
 - a. Instrumentation: ISA - The International Society of Automation.
 - b. Wiring: NFPA 70 National Electrical Code (NEC), ISA S5.3 (Graphic symbols for Distributed Control/Shared display instrumentation, Logic and Computer Systems), and S5.4 (Instrument Loop Diagrams).
 - c. Control Panels: NEMA Standards Publication 250-2003.
 - d. Control Logic: NFPA 79.

1.02 Scope of Work

1. The work involves furnishing all hardware, programming, installation, labor, material, equipment, and engineering in strict compliance with the contract documents for the City of Naples Port Royal Pump Station, for interfacing with the existing SCADA system.

1.03 Submittals

1. Detailed System Drawings and Data: The submittal shall consist of six sets of detailed drawings and data prepared and organized by the Contractor. All drawings, schematics, layouts, and diagrams shall be done on 11" x 17" sheets utilizing AutoCAD 2007. Two sets of submittals will be returned to the Contractor.
2. Submit these drawings and data as a complete package at the same time.
3. Submittals shall be in three-ring hardcover binders and arranged for convenient use including tab sheets, all indexed, and cross referenced with a separate index for each item.

4. Provide manufacturers cut sheets and manuals for all hardware to be provided.
5. Provide ISA type instrumentation data sheets for each component, together with a technical product brochure or bulletin. The data sheets, as a minimum, shall show:
 - a. Instrument tag designation.
 - b. Component name.
 - c. Manufacturer's model number.
 - d. Calibrated range.
 - e. Instrument location.
 - f. Input and output characteristics.
 - g. Scale range and units (if any) and multiplier (if any).
 - h. Requirements for electric supply.
6. Group the data sheets together in the submittal by type. Provide individual data sheets for each instrument with one brochure or bulletin to cover all identical uses of that component.
7. The detailed construction drawing submittal shall include, as a minimum, the following types of drawings and diagrams required for the construction of this project:
 - a. Legend, Symbols, and Index.
 - b. System Block Diagrams.
 - c. Power Distribution Diagrams.
 - d. Instrument Control Panel Layouts/Construction Drawings/Details. The drawings shall include the following:
 - 1) Dimensions
 - 2) Location of all components
 - 3) Identification of all components
 - 4) Bill of Materials
 - 5) Conduit entry area.
 - e. RTU Rack Elevation Drawing.

- f. Internal Panel Wiring Diagrams.
- g. Digital I/O Module Wiring Diagrams.
- h. Analog I/O Module Wiring Diagrams.
- i. Detailed NFPA 79-style Ladder Diagrams (for discrete wiring) to meet the following minimum requirements:
 - 1) Each subassembly shall be shown as a rectangle in the diagram with all external terminals identified. Terminals unknown at the time of the submittal shall be left blank, to be filled later. Single contacts internal to the subassemblies shall be shown in the rectangle connected to their terminal points.
 - 2) Where the internal wiring diagrams of subassemblies are furnished on separate sheets, they shall be shown as a rectangle in the schematic diagram with all external points identified and cross-referenced to the separate sheets of the control circuit. Coils and contacts internal to the subassemblies shall be shown in the rectangle connected to their terminal points.
 - 3) Show unique rung numbers on left side of each rung. A cross-referencing system shall be used in conjunction with each relay coil so that associated contacts may be readily located on the diagram. The contacts shall be referenced to coils as well, so that associated coils may be readily located on the diagram. Where a relay contact appears on a sheet separate from the one on which the coil is shown, the purpose of the contact shall be described on the same sheet. Spare contacts shall be shown.
 - 4) Contacts of multiple contact devices, e.g., selector switches, shall be shown on the line of the schematic diagram where they are connected in a circuit. A mechanical connection between the multiple contacts shall be indicated by a dotted line or arrow. This does not apply to control relays, starters, or contactors. Additional charts or diagrams may be used to indicate the position of multiple contact devices such as drum, cam, and selector switches.
 - 5) The purpose or function of all switches shall be shown adjacent to the symbols. The purpose or function of controls such as relays, starters, contactors, subassemblies, and timers on the diagram shall be shown adjacent to their respective symbols.
- j. Detailed Loop Interconnection Wiring Diagrams (DCS Graphic Symbols) for the entire system showing all control equipment, instrumentation, electrical equipment, components, wiring, routing, boxes (pull, junction, and terminal

junction), terminations, wire tags, and wire colors. The diagrams shall show the detailed interconnection of all electrical equipment, instrumentation, panels, enclosures, components and the like provided under this contract.

- k. Installation, mounting, and anchoring details for all field instruments and panel mounted components.
 - l. An instrument list including all instruments provided under this project.
 - m. An I/O List for each RTU in the project.
8. Complete detailed bills of material: Detailed bill of material for all components shall be provided including complete manufacturers name and model number, quantity to be provided, and cross references to data sheet sections.
9. Operation, Maintenance, and Repair Manuals (OMM):
- a. The organization of the initial submittal required above shall be compatible to eventual inclusion as one volume of the operation, maintenance, and repair manuals.
 - b. Operation manuals shall be prepared and submitted to the Owner's Representative for preliminary review in six copies. When the Owner's Representative is satisfied that these are complete and properly prepared, six final sets shall be delivered to the Owner's Representative.
 - c. The complete OMM shall contain the following:
 - 1) All the information included in the preliminary equipment submittal, the detailed installation submittal, and the additional information required herein, all bound in hard-cover binders and arranged for convenient use including tab sheets, all indexed and cross referenced with a separate index for each item.
 - 2) All final "as-built" drawings with the AutoCAD electronic files.
 - 3) Electronic files for the Devar #3020-4, and Operator Interfaces.
 - 4) Calibration and maintenance instructions.
 - 5) Trouble-shooting instructions.
 - 6) Instructions for ordering replacement parts.

1.04 Qualifications and Responsibility of Contractor

- 1. The Contractor shall furnish and install all proposed hardware as shown on the drawings and as specified herein. The Devar #3020-4 control system installation and

wiring connections to peripheral equipment and instruments shall be the responsibility of the system supplier using qualified personnel possessing the necessary equipment and having experience in making similar installations. Evidence of such qualification, as well as notification of the system supplier assuming unit responsibility, shall be furnished to the Owner in writing prior to commencement of the work.

2. Qualification Evidence: The qualification evidence shall include the following:
 - a. Verification that the system supplier shall have had a minimum of five years' experience with the installation and programming of industrial control systems similar in type to those to be installed in this project.
 - b. A list of completed similar installations including name, address, and telephone number of the owner, name of project, and date of completion.
3. Under this section, the Contractor shall furnish the following:
 - a. Instrumentation equipment (Section 405020).
 - b. Surge protection for instrumentation from lightning strikes and power supply spikes.
 - c. Special tools and test equipment required by the supplier.
 - d. Installation, integration and testing.
 - e. Documentation.
 - f. Operator training.
 - g. Warranty (one year).
 - h. Shipping and receiving.
4. All calibration and final checkout of the process control and instrumentation system shall be witnessed by the Owner's Representative to determine if the system complies with the contract documents.
5. The Contractor shall be responsible for coordinating and interfacing with equipment supplied under these contract documents, which are an integral part of the system. Interfacing shall be incorporated in the detailed systems drawings and data section of the contract documents.
6. The system supplier shall be experienced in the design, programming, and service of this type of equipment. In the event of a dispute as to the acceptability of the system supplier, the Owner's Representative shall make the final determination.

1.05 Guarantee

1. The Contractor shall repair or replace defective components, rectify malfunctions, correct faulty workmanship, all at no additional cost to the Owner during the guarantee.
2. To fulfill this obligation, he shall utilize technical service personnel designated by the Contractor who was originally assigned project responsibility. Services shall be performed within five calendar days after notification by the Owner's Representative.

PART 2 - MATERIALS

2.01 Designations of Components

1. In these specifications and on the plans, all systems, and other elements are represented schematically and are designated by numbers, as derived from criteria in International Society of America Automation. The nomenclature and numbers designated herein and on the plans shall be employed exclusively throughout shop drawings, data sheets, and the like. Any other symbols, designations, and nomenclature unique to a manufacturer's standard methods shall not replace those prescribed above, as used herein, and on the plans. All products and materials shall be new.

2.02 Instrument System Power

1. Power provided for the instrument system at the facility shall be 120-volt a-c, single phase, 60 Hz.
2. Where d-c power supplies are not furnished integral with any one instrument system loop, provide separate solid-state power supplies.

PART 3 - EXECUTION

3.01 Uniformity of Components

1. Components, which perform the same or similar functions, shall, to the greatest degree possible, be of the same or similar type, the same manufacture, the same grade of construction, the same size, and the same appearance.

3.02 Mounting of Equipment and Accessories

1. Coordinate the installation of the electrical service to components related to the system to assure a compatible and functionally correct system. All accessories shall be coordinated and installation supervised by the Contractor.
2. Test the completed system after installation to assure that all components are operating with the specified range and all interlocks are functioning properly.

3.03 Calibration

1. Each instrument requiring factory calibration shall be furnished with calibration data. The calibration data shall be factory certified. All instrumentation to be installed in accordance with manufacturer's instructions.
2. Calibrate systems after installation in conformance with the component manufacturer's 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, which cannot achieve proper calibration or accuracy, either individually or within a system, shall be replaced. Accomplish this calibration work by a technical field representative of the single instrument supplier. He shall certify in writing to the Owner's Representative that all calibrations have been made and that all systems are ready to operate.

3.04 Field Testing

1. Exercise systems through field tests in the presence of the Owner and Engineer in order to demonstrate achievement of the specified performance.
2. Coordinate field tests dependent upon completion of work specified elsewhere. Schedule tests among all parties involved so that the tests may proceed without delays or disruption by uncompleted work.
3. The results of all field testing are to be documented and submitted prior to closing out the project.

3.05 Operator Training

1. Setup system in conjunction with the City of Naples requirements.

END OF SECTION

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SECTION 405020 INSTRUMENTATION EQUIPMENT

PART 1 - GENERAL

1.01 Designations of Components

In these specifications and on the plans, all systems, meters, instruments, and other elements are represented schematically and are designated by numbers, as derived from criteria in ISA standards. The nomenclature and numbers designated herein and on the plans shall be employed exclusively throughout shop drawings, data sheets, and the like. Any other symbols, designations, and nomenclature unique to a manufacturer's standard methods shall not replace those prescribed above, as used herein, and on the plans.

1.02 Signal Characteristics

Wherever possible and feasible, components shall be of electronic solid-state design and systems shall utilize the same signal characteristics throughout each and all of the several systems; transmission signals shall be 4 mA to 20 mA. The combined power supply and transmitter loops shall, when tested with appropriate precision resistors, present a voltage signal of 1- to 5-volt DC. Signal isolators shall be provided where required.

PART 2 - MATERIALS

2.01 Liquid Level Transmitter--Submersible

1. The submersible stainless steel pressure transmitter shall provide an electrical 2-wire d-c current signal proportional to the pressure applied to the unit's diaphragm-sensing element. The pressure sensing element shall be diffused silicon semiconductor with a process media operating temperature range of -4°F to 140°F . Provide the pressure transmitter with the following features:
 - a. Waterproof cable with internal vent to atmosphere rated for transmitter suspension up to 300 feet.
 - b. Conduit adapter, cable/conduit junction box.
 - c. Cable strain relief, clamp.
 - d. 15 PSI pressure range
 - e. Anti-clog attachment.
 - f. A separate suspension cable for transmitters suspended over 20 feet.

2. Accuracy of the pressure transmitter shall be $\pm 0.125\%$ of calibrated span.
3. The liquid level transmitter shall be that manufactured by Keller America Corporation, Model Level Gage Drawing 81355.

2.02 Tipping Bucket Rain Gauge

1. The Tipping Bucket rain gauge shall collect rain water passed through a debris-filtering screen funneled into one of two tipping buckets inside the gauge.
 - a. Collector diameter 7.87 in.
 - b. Weight 6.4 lbs.
 - c. Switch – Momentary reed (proximity).
 - d. Output – 0.1 second switch closure.
 - e. Accuracy - $\pm 0.5\%$ at 0.5 in./hr
 $\pm 2\%$ at 2 in./hr
 - f. Sensitivity – 0.01 inches.
2. The rain gauge shall be constructed entirely of stainless steel.
3. The rain gauge shall be manufactured by Sutron Co., model no. 5600-0425-6 with drain kit, model no. 6661-1137-1 or equal.

2.03 Float Switch

1. Submersible float chemical resistant polypropylene casing with a firmly bonded electrical cable shall be permanently connected to an enclosed mercury free switch.

The entire assembly shall be encapsulated to form a completely water-tight and impact-resistant unit. UL listed for pilot duty and industrial control equipment.

Cable – 600 volt Type STO #18

Provide Gold Contacts

The float switch assembly shall be manufactured by Anchor Scientific, Inc.

Model Type SE or approved equal.

2.04 Diesel Fuel Oil Tank Level Sensor/Transmitter

1. Level sensor/transmitter shall replace existing clock gauge on top of existing tank.

- a. Stem material – 316 stainless steel.
 - b. Mounting Material – 316 stainless steel.
 - c. Operating Temperature – 40°F to +230°F.
 - d. Length – To suit depth of tank.
 - e. Input Voltage 10 – 40 VDC.
 - f. Output signal 4 – 20 mA.
2. Level sensor shall be manufactured by Gems Sensors. Model no. XT-800, Type 3 mounting, Float model no. 156790 or approved equal.

2.05 Intrusion Notification System

1. See insertion points at RTU.
 - a. RTU & LSCP have built-in intrusion door switches
 - b. Provide (2) non-metallic magnetic door switched for wet well.
 - c. All equipment shall be NEMA 4X rated.
 - d. Contractor shall provide complete system as required to suit by a qualified security system contractor and approved by engineer.

END OF SECTION

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SECTION 405050 REMOTE TERMINAL UNIT (RTU) SYSTEM

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Work includes engineering, furnishing, installing, testing, documenting and placing in operation the instrumentation Remote Terminal Unit (RTU). Training of the OWNER'S personnel is also included. The work is specified in this section and as further specified in the following sections:
 - 1. Section 260500: General Electrical Requirements
 - 2. Section 260519: Wires and Cables Less than 600 Volts
 - 3. Section 260534: Conduits, Boxes, and Fittings
- B. The specific attention of the contractor is directed to the fact that the Owner has an existing TAC II SCADA System manufactured by Data Flow Systems (DFS) of Melbourne, Florida (321) 259-5009. For compatibility purposes, the bidder is required to obtain the Remote Terminal Unit (RTU) as specified herein from DFS.
- C. The Contractor shall replace existing antenna and cabling. A complete radio survey shall be conducted to verify antenna requirements.
- D. These specifications are intended to cover the furnishing, the shop testing, the delivery, complete installation and field testing of all equipment and appurtenances for the complete RTU system herein specified, whether specifically mentioned in the Specifications or not. This includes all discrete and analog signal isolation necessary for interfacing with the Owner's existing telemetry system.
- E. For all units there shall be furnished and installed all necessary and desirable accessory equipment and auxiliaries whether specifically mentioned in these specifications or not. This installation shall include field-testing of the entire installation and instruction of the regular operating personnel in the care, operation, and maintenance of all equipment.

PART 2 - PRODUCTS

2.01 REMOTE TERMINAL UNIT

- A. The Remote Terminal Unit (RTU) shall be properly sized to accommodate all modules. The configuration of RTU I/O and HMI screens in the existing SCADA HMI shall be provided by the owner. The RTU shall incorporate a Radio Transceiver compatible with the owner's existing frequency and Input / Output (I/O) function modules required to meet the monitor and control requirements. Function module card connectors shall be gold-over-nickel plated to inhibit corrosion. The RTU shall be capable of operating in a temperature ranging from -10 to 60 Degrees Celsius (14 to 140 Degrees Fahrenheit).
- B. SERVICE PORT

The RTU shall support a local serial interface service port for access to all the functions of the unit and local monitoring of the radio communications link. The RTU shall support an automatic antenna alignment function utilizing the local serial interface.

C. POWER SUPPLY MODULE

All function modules in the RTU shall run off DC voltage from +7.5 volts to +13 volts. The Power Supply Module (PSM) shall supply +12 volts. A battery backup shall be provided to operate the system in event of power failure. The PSM shall be surge protected. The PSM shall be short circuit protected by current limiting. Normal operation shall automatically resume when the short circuit overload is removed. The PSM shall be sized to operate the system with the battery removed. The PSM shall provide a battery backed, isolated bias voltage source. The circuit breaker for the PSM shall be part of the module. Neither the use of tools nor the disconnection of any wires shall be required to replace the PSM.

D. SURGE PROTECTION

Multiple staged surge protection shall be provided for all power supply and power monitoring circuits. This design shall provide a very high level of non-destructive transient immunity. With the exception of a direct lightning strike, the device shall protect the RTU power supply and power monitoring circuits from damage due to voltage transients. The unit shall provide circuit protection to withstand multiple transients in excess of 6,500 volts, 3,250 amps, without damage. Damage shall be limited to a blown fuse when exposed to larger transients. The device shall be transient-tested to ANSI standard C62.41. The unit shall be the Transient Filter Shield TFS001 as manufactured by Data Flow Systems. The AC power input protection shall be the Single Phase Suppressor, SPS001 as manufactured by Data Flow Systems. All surge protection shall be UL Listed.

E. BACKUP BATTERY

The RTU shall have the uninterruptible power supply (UPS) function built in. The unit's internal power supply module shall keep the battery at a float charge. The battery shall not be damaged by deep discharges.

F. RADIO INTERFACE MODULE

The RTU shall require one radio interface module (RIM). The RIM shall control the terminal radio during the polling sequence. The RIM shall have a service port to provide communications link monitoring. The service port shall also provide the capability to directly monitor and/or control each module in the RTU. The RIM utilized at the RTU shall be interchangeable with the RIM at the central site. All radio communications shall be in ASCII and utilize an error detecting data transfer protocol. Each RIM shall have an FM radio transceiver mounted to it. Replacement of the RIM shall trigger an automatic configuration of the new module to accommodate the site address and function (plug & play).

G. FUNCTION MODULES

The function modules shall be designed so they do not have configuration switches or straps. The function modules shall be designed with surge suppression on all inputs and outputs. Replacement of a function module shall not require the use of tools or the removal of any interface wires. There shall be no components associated with the function module mounted to the motherboard (passive backplane). The function modules shall be backward compatible with all older modules of same type. All the

function modules shall support central site computer access to the revision level of the module over the radio communications link.

H. DIGITAL MONITOR MODULE

The digital monitor module (DMM) shall accept 12 on/off or pulsed inputs of 12 to 30 volts AC or DC. Other AC or DC voltages shall be accommodated with the use of an inline voltage converter device. Status reporting of the digital inputs shall have an accuracy of +/- 2 seconds to the time the event occurred at the RTU. The DMM shall have LEDs to indicate: the status of each input point; receive communications; transmit communications; CPU fault; and power status. The configuration of the monitor points as alarm points, monitor points (pump run time monitors), or pulsed input points shall be operator changeable at the central site. The custom configuration of the DMM shall not require any software or firmware changes in the RTU. Replacement of the DMM shall trigger an automatic configuration of the new module by the central site (plug & play).

I. DIGITAL CONTROL MODULE

The digital control module (DCM) shall be available in two configurations, providing eight (8) digital outputs and four (4) digital inputs, or four (4) digital outputs and eight (8) digital inputs. Each control point shall accommodate 60 to 280 volt AC devices. Each control point shall be capable of driving a 0.5 amp load @ 280 volts AC (140 VA), with inrush current of 5 amps. Any discrete control point shall have the capability of being automatically controlled by any discrete monitor point, at the same RTU or at any other RTU. This shall be accomplished during configuration at the central site and shall be available for an unlimited number of control points. Each input shall accept ON/OFF inputs of 12 to 30 volts AC or DC. Other AC or DC voltages shall be accommodated with the use of an inline voltage converter device. Status reporting of the digital inputs shall have an accuracy of +/- 2 seconds to the time the event occurred at the RTU. The configuration of the monitor points as alarm points or monitor points (pump run time monitors) shall be operator selectable. The configuration shall not require any software or firmware changes in the system. The DCM shall have LEDs to indicate: the status of each output point; receive communications; transmit communications; CPU fault; and power status. Replacement of the DCM shall trigger an automatic configuration of the new module by the central site (plug & play).

J. ANALOG MONITOR MODULE

The analog monitor module (AMM) shall monitor up to 4 analog inputs, each capable of accepting 4-20 ma or 0-5 VDC. The analog input shall provide 12-bit accuracy. The analog inputs shall be individually optically isolated. The AMM shall have support-configurable reporting granularity and alarm thresholds. All configurable parameters shall be operator-controlled. The AMM shall have LEDs to indicate: the status of receive communications; transmit communications; CPU fault; and power status. The AMM shall be capable of supplying 24 VDC power source for 4-20 ma transmitters. Replacement of the AMM shall trigger an automatic configuration of the new module by the central site (plug & play).

K. ANALOG CONTROL MODULE

The analog control module (ACM) shall control up to 4 analog outputs, each capable of producing 4-20 ma output driving a 0 to 1000 ohm load. The analog output shall have 12-bit accuracy. Each analog control shall have configurable engineering units. All configurable parameters shall be operator controlled. ACM shall have LEDs to

indicate: receive communications; transmit communications; CPU fault; and power status. Any analog control point shall have the capability of being automatically controlled by any analog monitor point, at the same RTU or at any other RTU. This shall be accomplished during configuration at the central site and shall be available for an unlimited number of control points. The ACM shall be capable of supplying 24 VDC power source for 4-20 ma transmitters. Replacement of the analog control module shall trigger an automatic configuration of the new module by the central site computer (plug & play).

L. ENCLOSURE

The RTU shall be housed in a NEMA 4X 316 stainless steel powder coated white enclosure. The enclosure shall be sized to accommodate the backplanes and functions modules needed to meet the requirements. All mounting hardware utilized shall be stainless steel. The enclosure shall be capable of being locked.

M. ANTENNA SUBSYSTEM

A new antenna system shall replace the existing equipment. Contractor shall perform a radio path analysis. The path analysis shall provide a minimum of 15 dB of fade margin. The 15 dB fade margin shall be demonstrated by inserting a 15 dB pad into the RTU coax cable, and thereafter maintaining communications with the central site. A high gain directional antenna shall be used to transmit and receive data at the RTU. The directional antenna shall have all welded aluminum elements, and a single radiator element connected to a type N female connector. The antenna shall be the RTA series as provided by Data Flow Systems, Inc. The antenna mast/pole shall be hot dipped galvanized for corrosion protection. All mounting hardware shall be made of stainless steel. The coax cable shall be the type that utilizes an inert semi-liquid compound to flood the copper braid. The coax cable shall be of the RG-8 construction type and have the RF-loss characteristic of foam flex. The coax cable shall be RTC 400 as supplied by Data Flow Systems, Inc. Type N connectors shall be utilized at both ends of the coax. The Type N connectors shall be sealed with 3-inch sections of Alpha FIT321-1-0 sealant shrink-tubing. The coax cable shall be secured to the mast/pole with EVA-coated 316 stainless steel cable ties. The cable ties shall be AE112 cable ties manufactured by Band-It. The RTU shall be protected from electrical surge or transients entering through the coaxial cable by use of a coaxial cable surge protector. The coaxial cable surge protector shall be IS-B50LN-C2 manufactured by Polyphaser.

2.02 TAC II SCADA SYSTEM UPDATE (EXISTING)

- A. The existing TAC II SCADA System shall be modified to incorporate a new graphical HMI screen for this new station. Provided by owner. Contractor shall provide assistance and information as required.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. The Contractor shall install and place into operation a complete new RTU System at the site. This work shall include the new antenna system, all interconnecting wiring, conduit,

and circuitry necessary to provide the owner with a fully operable control system/RTU. The configuration of RTU I/O and HMI screens in the existing SCADA HMI shall be provided by the owner.

- B. The Contractor shall install the equipment in accordance with the Contract Documents, manufacturer's instructions and shop drawings. Rigidly support and mount equipment level and plumb, and in such a manner as to provide accessibility; protection from damage; isolation from heat, shock, and vibration; and freedom from interference with other equipment, piping, and electrical components.
- C. Include the services of a factory trained and qualified employee of the equipment manufacturer to inspect the complete equipment installation to assure that it is installed in accordance with the manufacturer's recommendations, make all adjustments necessary to place the system into trouble-free operation and instruct the operating personnel in the proper care and operation of the equipment furnished. Provide services at both the field installation site as well as the central site.
- D. All workmanship utilized in the manufacture and installation of this system shall be of the highest quality and performed in a manner consistent with all accepted industry practices.

3.02 FIELD TESTS AND ACCEPTANCE

- A. Field tests shall consist of installation check-out, and a field acceptance test, in sequence. Each stage of testing shall not be commenced until the preceding stage is substantially complete as determined by the Engineer.
- B. Field Test: When the facility is complete and ready for operation, the RTU and associated components shall be inspected and tested for compliance with the Contract Documents. Testing of the equipment shall be made by the Contractor in the presence of the Owner, Engineer, the Electrical Subcontractor, the Instrumentation Subcontractor, and the equipment manufacturer's representative. The test shall include, but not be limited to the following:
 - 1. Electrical: Contractor shall record readings of the voltage and amperage on all electrical components at start and at steady state operating conditions. The results of the tests, including the serial number of the accessories tested, shall be given to the engineer.
 - 2. Inspection: A thorough inspection of all mechanical and electrical equipment and controls, fittings, brackets, mountings, seals, conduit, painting, components, and features shall be made while the facility is being tested to determine performance and compliance with design requirements and specifications.
 - 3. Repairs, Adjustments, and Replacements: The Contractor shall make any and all necessary repairs, adjustments, and replacements until performance has been demonstrated to the satisfaction of the Engineer. The Contractor shall bear the cost of any repair, adjustment, and replacement.

3.03 WARRANTY

- A. The RTU manufacturer shall warrant all hardware and software provided under this contract against all defects in material and workmanship for a period of one year from owner acceptance. The I/O function modules, RIM, PSM, and PLC shall carry an additional 2-year return-to-factory warranty. The I/O function modules, RIM, PSM, and PLC shall be warranted against lightning and surge damage the entire three year

period.

3.04 SERVICE

- A. The RTU manufacturer shall offer full factory support and service of the installed product through the use of factory employees. Service representatives who are not direct employees of the manufacturer, or who are not specifically trained in the service of the owner's existing SCADA System shall be unacceptable. The customer shall have 24 hour per day access to service personnel through the use of a pager and/or cell phone.
- B. Furnish the services of a manufacturer's representative onsite during start-up and system commissioning.

3.05 SPARES RTU PARTS

- A. One spare RIM, PSM, and each type of I/O Function Module utilized in the RTU shall be supplied to the owner.

END OF SECTION 405050

DIVISION 43 – PROCESS GAS AND LIQUID HANDLING, PURIFICATION, AND STORAGE EQUIPMENT

432140 Submersible Raw Wastewater Pumps

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SECTION 432140 SUBMERSIBLE RAW WASTEWATER PUMPS

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes materials, installation, and testing of submersible raw wastewater pumps designed to operate in a wet well under submerged conditions.

1.02 SUBMITTALS

- A. Submit shop drawings in accordance with the General Conditions, Section 013300, and the following.
- B. Submit dimensional drawings.
- C. Submit manufacturer's catalog data and detail drawings showing all pump parts and describe by material of construction, specification (such as AISI, ASTM, SAE, or CDA), and grade or type. Show linings and coatings. Show outline dimensions and weights of pumps, bases, and motors. Identify each pump by tag number to which the catalog data and detail sheets pertain.
- D. Submit pump curves from manufacturer's catalog data on which the specified operating points are marked. Show efficiency, brake horsepower, and NPSH required for the selected pump curve for each specified operating point. Show maximum operating speed.
- E. Show impeller diameter, eye area, sphere size, and number of vanes.
- F. Submit setting drawings. Show anchor bolt layout and anchor bolt dimensions.
- G. Submit manufacturer's reports on hydrostatic tests and performance tests.
- H. Submit manufacturer's sample form for reporting the performance test results. Submit at least two weeks before the tests. The test form shall contain the data presented in the sample form in Section 6 of ASME PTC 8.2 or ANSI/HI 1.6 or API 610, Annex M.
- I. Submit manufacturer's certified performance curves for review at least two weeks prior to shipping the units from the factory.

1.03 DEFINITIONS

Terms shall be as defined in ANSI/HI 11.6-2001 and ASME PTC 8.2. If there is a discrepancy in definitions between the two publications, the definitions given in ANSI/HI 11.6-2001 shall govern.

1.04 MANUFACTURER'S SERVICES

Provide equipment manufacturer's services at the jobsite for the minimum labor days listed below, travel time excluded:

- A. One labor days for each service listed in the subsection on "Service Conditions" to check the installation and advise during start-up, testing, and adjustment of the pumps.
- B. One labor day to instruct the Owner's personnel in the operation and maintenance of the pumps.

PART 2 - MATERIALS

2.01 PUMP DESIGN

- A. The Contractor shall assign unit responsibility to the pump supplier for the complete pump system, including motors and cooling system control assembly.
- B. Each pump shall be of the vertical, non-clog, single-suction, centrifugal type and shall be suitable for pumping unscreened raw sewage.
- C. The pump, with its appurtenances and electric cable, shall be capable of continuous submergence under water without loss of watertight integrity to a minimum depth of 65 feet.
- D. Design the casing to withstand a hydrostatic test of at least 150% of the pump discharge pressure (suction pressure plus pump differential pressure) at shutoff.
- E. Each pump shall be capable of at least a 5% head increase at normal operating conditions by installing a larger impeller or an impeller of different hydraulic design.
- F. Pump curve shall be continuously rising and shall be free of dips and valleys from the design point to the shutoff head. The shutoff head shall be at least 110% of the head that occurs at the design point.
- G. The NPSH required shall be at least 5 feet less than the minimum NPSH available at all points on the pump curve up to 120% of the flow at the BEP.
- H. Design the pump and its components to operate continuously over a flow range of 70% to 120% of the flow at the BEP.

2.02 DISCHARGE CONNECTIONS

- A. Suction and discharge connections shall be flanged, ASME B16.1, Class 125. Flanges shall be flat faced. Bolt holes shall straddle the horizontal and vertical centerlines.
- B. The pump shall be automatically connected to the discharge connection elbow when lowered into place and shall be easily removed for inspection or service. Sealing of the

pumping unit to the discharge elbow shall be accomplished by a simple linear downward motion of the pump. A sliding guide bracket shall be an integral part of the pump unit. The entire weight of the pump unit shall be guided by no less than two stainless steel guide bars or stainless steel guide wire pressed tightly against the discharge connection elbow. No portion of pump shall bear directly on the floor of the sump.

2.03 POWER SUPPLY

Power supply will be 480 volts, 60 hertz, 3 phase.

2.04 VIBRATION AND RESIDUAL UNBALANCE

- A. The maximum vibration level shall not exceed that shown in Figure 11.6.16B in ANSI/HI 11.6-2001.
- B. Maximum residual unbalance in impellers shall not exceed that shown in Figure 9.6.4.15B in ANSI/HI 9.6.4.

2.05 VOLUTE CASING

Volute casing shall be of a single piece, nonconcentric design with smooth fluid passages at all points to pass any size solids which can pass through the impeller. Casing shall be accurately machined to fit the mechanical seal and suction cover assemblies. Fit the bottom of the volute with a Type 316 or 420 stainless steel or rubber-lined carbon steel replacement wear ring. The volute shall have a center discharge nozzle. Provide a 3/4-inch drain with plug in the volute.

2.06 IMPELLER

- A. Impeller shall be enclosed type with a maximum of two or three vanes. Each impeller shall be cast in one piece and shall be statically and dynamically balanced, double-shrouded thrulet with smooth water passage to prevent clogging by stringy or fibrous materials and other matter found in normal raw wastewater applications.
- B. Each impeller shall be keyed to the shaft, and the fastening of the impeller to the shaft shall be made by a locking device. The locking device shall be sealed from the liquid by means of an O-ring and covered and secured to the end face of the shaft by a single bolt.
- C. Fit each impeller with a replaceable wear ring for pumps.

2.07 SHAFTS

- A. Pump shaft diameter shall be such that it will not deflect more than 0.002-inch at the mechanical seal face with the largest impeller installed while operating at the maximum pump speed. Tolerance on the shaft diameter shall not exceed 0.002 inch. Dynamic shaft deflection at the stuffing box face shall not exceed 0.002 inch.

- B. The first lateral critical speed of the rotating assembly shall be at least 120% of the maximum pump operating speed.
- C. Surface finish of the shafts or sleeves through the mechanical seal and at the rubbing contact-bearing housing seals shall not exceed a roughness of 32 microinches.
- D. If a carbon steel shaft is used, provide Type 420 stainless steel shaft sleeves having a minimum hardness of 450 Brinell.

2.08 PUMP SEAL

- A. Provide each pump with a tandem mechanical shaft seal system. The upper of the tandem set of seals shall operate in an oil chamber located just below the stator housing. This set shall contain one stationary tungsten carbide or cast chromium ring and one positively driven rotating carbon ring functioning as an independent secondary barrier between the pumped liquid and the stator housing. The lower of the tandem set of seals shall function as the primary barrier between the pumped liquid and the stator housing. This set shall consist of a stationary ring and a positively driven rotating ring, both of which shall be tungsten carbide.
- B. Each interface shall be held in contact by its own spring system supplemented by external liquid pressures. The seals shall require neither maintenance nor adjustment but shall be easily inspected and replaceable.
- C. Shaft seals without positively driven rotating members or conventional double mechanical seals with a common single or double spring acting between the upper and lower units requiring a substantial pressure differential to offset external pressure and effect sealing shall not be considered acceptable or equal to the dual independent seal system specified.
- D. The shaft sealing system shall be capable of operating submerged to depths of or pressures equivalent to a minimum of 65 feet. No seal damage shall result from operating the pumping unit out of its liquid environment. The seal system shall not rely upon the pumped media for lubrication.

2.09 OIL CHAMBER

Provide each pump with an oil chamber for the shaft sealing system. Design the oil chamber to assure that air is left in the oil chamber to absorb the expansion of the oil due to temperature variations. The drain and inspection plug, with positive anti-leak seal, shall be easily accessible from the outside.

2.10 BEARINGS

- A. Each pump shaft shall rotate on two permanently lubricated bearings. The upper bearing, providing for radial thrust, shall be a single row, roller bearing. The lower bearing shall consist of one double row or two single row angular contact bearing(s) for combined axial and radial loads.

- B. Pump bearings shall be of the antifriction type designed to give 40,000 hours minimum life by L-10 calculations at maximum speed and operating load in continuous operation.

2.11 CABLE ENTRY

Each cable entry shall be comprised of a single cylindrical elastomer grommet, flanked by stainless steel washers, all having a close tolerance fit against the cable outside diameter and the entry inside diameter and compressed by the entry body containing a strain relief function, separate from the function of sealing the cable. The assembly shall bear against a shoulder in the pump top. The cable entry system shall utilize one of the two designs specified below.

- A. The cable entry junction chamber and motor shall be separated by two terminal boards, which shall isolate the motor interior from foreign material gaining access through the pump top. Both the terminal boards shall be bolted to the interior of the motor housing and sealed by O-rings.
- B. Provide cast-iron, pressure-tight cable entry gland, which shall be sealed by a nitrile rubber ring and compression gland. Design the compression gland to conform to the allowable bending radius of the power cable. In addition, cast each individual conductor wire in resin in such a manner to avoid any water leakage into the motor through capillary action, because of external cable damage or other causes.

2.12 MATING SURFACES

- A. Machine and fit mating surfaces of major parts with nitrile O-rings where watertight sealing is required. Machining and fitting shall be such that sealing is accomplished by automatic compression in two planes and O-ring contact made on four surfaces, without the requirement of a specific torque limit. Rectangular cross-sectioned gaskets requiring specific torque limits to achieve compression shall not be considered adequate or equal.
- B. Tolerances of parts shall be such that they allow replacement of any part without additional machining required to ensure sealing as described above. No secondary sealing compounds, greases, or other devices shall be used.

2.13 COOLING SYSTEM

- A. Pumps equipped with water-cooling system consisting of a water jacket are also acceptable. The water-cooling jacket system shall encircle the stator housing. Provide the water jacket with a separate circulation of the pumped liquid. Cooling water shall enter the cooling jacket by way of the pumping vanes, integral with the impeller design, and exit with the pumping media. Cooling media channels and ports shall be non-clogging by virtue of their dimensions. Alternatively, ambient cooling of the motor may be utilized.

2.14 ELECTRIC MOTORS

- A. Each pump shall be driven by a vertical, submersible squirrel cage induction motor, shell type design, housed in an air-filled, watertight chamber. The stator winding and stator leads shall be insulated with moisture-resistant Class F insulation which will resist a temperature of 155°C, 40°C ambient plus 115°C rise, and designed for continuous duty, capable of sustaining a minimum of 10 starts per hour.
- B. The stator shall be dipped and baked three times in Class F varnish and shall be shrink-fitted into the stator housing. The use of bolts, pins, or other fastening devices requiring penetration of the stator housing shall be rejected.
- C. The motor shall be sized to be non-overloading when the pump is operated at any point on the pump performance characteristic curve drawn through the design point and shall have a minimum service factor of 1.10. Motor service factor shall not be used in satisfying pumping requirement.
- D. Equip the stator with three sensors or thermistors embedded in the end coils of the stator winding to monitor stator temperature. Provide one sensor or thermistor in each stator phase, to switch off the unit if a winding temperature of 285°F is exceeded.
- E. If the pump manufacturer uses thermistors in the motor windings, the pump manufacturer shall provide the motor winding thermistor relay and any motor bearing thermistor relays and shall arrange for their installation in the pump motor starter. Both relays shall operate in a 120-volt control circuit and have contacts as shown in the electrical drawings. Adjust and arrange relays to properly respond to the thermistors mounted within the pump-motor housing.
- F. Each pump motor shall have a sensor system to monitor moisture in the stator cavity and temperature sensors within the motor stator windings. Provide a supervision relay for connection to the pump motor drive to trip an alarm if moisture content indicates a failure of the outer mechanical seal or if high temperature is detected in the stator. Supervision relay system shall be Flygt MiniCAS II or equal.
- G. Connect sensors and thermistor relays to the pump motor starter in such a manner that their signal can actuate an alarm or provide for immediate shutdown or both.

2.15 MOTOR CABLES

Pump motor power cables installed shall be made of a Hypalon or Protolon synthetic rubber-jacketed, Type SPC multiconductor cable, suitable for submersible pump applications and heavy mechanical stresses. The power cable shall also be sized according to NEC and ICEA standards and also meet with P-MSHA approval or equivalent. Use a separate Hypalon or Protolon synthetic rubber-jacketed, Type SPC cable for temperature and moisture pilot protection signals. The total length of each cable shall be a minimum of 40 feet.

2.16 MATERIALS OF CONSTRUCTION

A. Materials of construction shall be as listed below:

Component	Material	Specification
Casing, volute, suction and discharge elbows	Cast iron	ASTM A48, Class 30 (minimum)
Impeller	Cast iron	ASTM A48, Class 35B
Shaft	Stainless steel	AISI 420
Impeller wear ring	Stainless steel	ASTM A743, Grade CF8M
Drain and vent plugs	Malleable iron	ASTM A197
Cap screws, bolts, and nuts	Stainless steel	AISI Type 316
Any bronze components in contact with water		See paragraph C below

B. Do not construct the impeller wear ring and case wear ring of the same material. Impeller and bowl wear ring materials shall have a minimum Brinell hardness difference of 50 unless both the stationary and the rotating wear surfaces have Brinell hardness numbers of at least 50.

C. Bronze shall have the following chemical characteristics:

Constituent	Content
Zinc	7% maximum
Aluminum	2% maximum
Lead	8% maximum
Copper + Nickel + Silicon	83% minimum

2.17 GUIDE ASSEMBLY:

A. Provide Schedule 40 Type 316L stainless steel guide rails or Type 316 cables for each pump discharge assembly.

1. Guide Rail: Pump manufacturer’s standard size but not less than 1.25-inch diameter.

B. Provide Type 316L stainless steel intermediate supports for guide rails with a maximum spacing of 10 feet between supports.

- C. Provide Type 316L stainless steel top guide rail retainer brackets to support the guide rails or cables. Bracket to be attached to top slab of wet well.
- D. Provide Type 316 stainless steel chain of sufficient length, to reach from pump to top of wet well plus 10 feet and of length for lifting pump and motor. Provide chain designed for attachment to lifting bail provided on motor and to the guide rail retainer bracket.

2.18 PUMP LIFTING/DOCKING DEVICE

- A. Provide a chain and latch mechanism to allow the pumps and motors to be removed in one pull without re-rigging the system. Provide a device that is lowered along the guide cables or rails and can be remotely latched to the pump lifting bail without the need to enter the wet well.
- B. Materials:
 - 1. Lifting Bail: Stainless Steel
 - 2. Hook, Shackle, Counterweight and Chain: Stainless Steel
 - 3. Guide Ropes: Stainless Steel
 - 4. Latch Operating Rope: Polyamide
- C. Mechanism Lifting Capacity to be suitable for equipment provided.

2.19 ANCHOR BOLTS, NUTS, AND WASHERS

- A. Anchor bolts, nuts, and washers for pumps shall be 316 stainless steel.

2.20 SPARE PARTS

- A. Provide the following spare parts for each model or size of pump:

Quantity	Description
1	Set of wear rings for impeller and volute
1	Complete set of seals, primary and secondary
2	Sets of radial bearings
2	Sets of thrust bearings
1	Complete set of O-rings or gaskets, whichever applies to the supplied pump unit

- B. Pack spare parts in a wooden box; label with the manufacturer’s name and local representative’s name, address, and telephone number; and attach list of materials contained within.

PART 3 - EXECUTION

3.01 SERVICE CONDITIONS

- A. Pump hydraulic performance conditions and design data shall be as shown below.
- B. Pump Tag Numbers: P-1, P-2, and P-3

Location	Port Royal Pump Station
Liquid pumped	Storm Water
Service	Outdoors environmental temperature range of 32°F to 100°F
Altitude	0 feet above mean sea level
Relative humidity	0% to 100%
Fluid temperature range	50°F to 100°F

Pump Data

Capacity (gpm)	Pump Total Head (feet)	Minimum Pump Efficiency (%)
0	32	0
2,500*	16	60
4,000	6	40
*Design point.		

Maximum pump speed	1160 rpm
Minimum NPSH available	Flooded
Motor horsepower (maximum)	14
Motor Type	Inverter Rated
Discharge nozzle size	10 inches
Impeller Diameter	244 mm
Manufacturers and models	Flygt Model CP 3152 LT

- C. The specified impeller shall be capable of passing a 3-inch sphere.

3.02 FACTORY PERFORMANCE TESTING

- A. Each pumping unit shall be subjected to a non-witnessed laboratory performance test. Conduct tests in accordance with the ASME PTC 8.2 or ANSI/HI 1.6, using the actual job driver. The performance test shall be equivalent to Level "A" per ANSI/HI 1.6.
- B. No motor overload above nameplate rating will be allowed at any flow up to 120% of the flow at the BEP.
- C. Perform an NPSHR test on one pump of each size or model specified.
- D. Deviations and fluctuations of test readings shall conform to ASME PTC 8.2, 1.11 (Type A), or ANSI/HI 1.6, paragraph 1.6.5.4.2.
- E. Measure flow by the "Capacity Measurement by Weight," the "Capacity Measurement by Volume," or the "Capacity Measurement by Venturi Meter, Nozzle, or Thin Plate Orifice" methods in ASME PTC 8.2 or ANSI/HI 1.6.
- F. For pumps in variable speed service, conduct a test at each operating speed necessary to attain the design points described in the subsection on "Service Conditions."
- G. Perform tests and record data, including head, flow rate, speed, and power, at a minimum of seven points. These points shall include shutoff, minimum flow, midway between minimum flow and design flow, design flow, 120% of design flow, and maximum flow.
- H. Perform a hydrostatic test on pump pressure-containing components per ANSI/HI 1.6, paragraph 1.6.4.

3.03 PAINTING AND COATING

- A. Coat submerged or immersed pumps, motors, and pump base with ITT Flygt Duasolid Epoxy. Apply the coating at the factory.
- B. Line volute, interior wetted surfaces, line/coat impeller, line pump base per 099000 System No. 6, apply the lining at the factory.

3.04 SHIPMENT AND STORAGE

- A. Prepare equipment for shipment including blocking of the rotor when necessary. Identify blocked rotors by means of corrosion-resistant tags attached with stainless steel wire. The preparation shall make the equipment suitable for six months of outdoor storage from the time of shipment, with no disassembly required before operation, except for inspection of bearings and seals.
- B. Identify the equipment with item and serial numbers and project equipment tag numbers. Material shipped separately shall be identified with securely affixed, corrosion-resistant metal tags indicating the item and serial number and project equipment tag numbers of

the equipment for which it is intended. In addition, ship crated equipment with duplicate packing lists, one inside and one on the outside of the shipping container.

- C. Pack and ship one copy of the manufacturer's standard installation instructions with the equipment. Provide the instructions necessary to preserve the integrity of the storage preparation after the equipment arrives at the jobsite and before start-up.
- D. Store and protect pumps per API 686 (first edition), Chapter 3, paragraphs 1.4 through 1.9, 1.15, 1.16, 1.20, and 1.21 and as described below.
- E. Coat exterior machined surfaces with a rust preventative.
- F. The interior of the equipment shall be clean and free from scale, welding spatter, and foreign objects.
- G. Provide flanged openings with metal closures at least 3/16-inch thick, with elastomer gaskets and at least four full-diameter bolts. Provide closures at the place of pump manufacture prior to shipping. For studded openings, use all the nuts needed for the intended service to secure closures.
- H. Provide threaded openings with steel caps or solid-shank steel plugs. Do not use nonmetallic (such as plastic) plugs or caps. Provide caps or plugs at the place of pump manufacture prior to shipping.
- I. Clearly identify lifting points and lifting lugs on the equipment or equipment package. Identify the recommended lifting arrangement on boxed equipment.
- J. Wrap exposed shafts and shaft couplings with waterproof, moldable waxed cloth or volatile-corrosion-inhibitor paper. Seal the seams with oil-proof adhesive tape.
- K. If electric motors are stored or installed outside or in areas subject to temperatures below 40°F or are exposed to the weather prior to permanent installation, provide the manufacturer's recommended procedures for extended storage. Provide temporary covers over the motor electrical components.

3.05 INSTALLING TENSIONING SYSTEM

- A. Attach cable bracket to the lip of the equipment opening. Use epoxy stainless steel bolts.
- B. Attach the flange discharge elbow to the floor of the wet well using epoxy stainless steel anchor bolts.
- C. Install the guide cable/rail per manufacturer's recommendations.
- D. Provide and attach the stainless steel lift chain or cable.

3.06 FIELD TESTING

- A. Bump motor to ensure that motor has been connected for proper rotation.

- B. Perform field tests for 1 hour on each pump. Measure flows at the following head points:
1. Tag Numbers: P-1, P-2, and P-3
 2. Location: Port Royal Pump Station
 3. Service: Stormwater
 4. Maximum rpm: 1200
 5. Test Points (Feet): 12, 14, 16
- C. If the measured flows at the above-tabulated pump heads are more than 5% below the flows obtained on the laboratory or factory test, adjust the impellers or provide new impellers or otherwise repair or replace the pumps or calibrate meters or pressure gauges.
- D. Operate each pump one at a time. Manually adjust the speed for each pump (one at a time) via the respective speed control unit such that the pump output is 30%, 40%, 50%, 60%, 80%, and 100% of the maximum capacity specified. The duration at each flow rate shall be at least one hour.
- E. Assure that in the automatic mode each pump responds to its flow signal. Assure that each pump operates at a steady rate ($\pm 5\%$ of set point) at any given flow for 30%, 40%, 50%, 60%, 80%, and 100% of the maximum capacity specified.
- F. Demonstrate that the pumping units, motors, and control system meet the following requirements:
1. The pumping units operate as specified without excessive noise, cavitation, vibration, and without overheating of the bearings.
 2. Automatic and manual controls function in accordance with the specified requirements.
 3. Drive equipment operates without being overloaded.

3.07 CONTRACT CLOSEOUT

Provide in accordance with Section 017000.

3.08 WARRANTY

The equipment shall be warranted for three (3) years commencing from date of substantial completion.

3.09 CERTIFICATION

Provide a written certification from the equipment manufacturer that each pumping system has been properly installed according to the Contract Documents and the manufacturer's recommendations, and that the equipment is operating normally. Make all necessary corrections and adjustments including but not limited to parts, labor, or freight at no additional cost to the Owner.

END OF SECTION

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