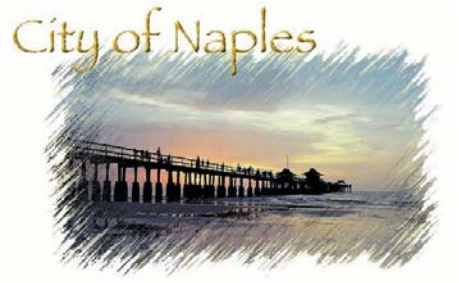

INVITATION TO BID

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

NOTIFICATION DATE:	TITLE	NUMBER:	OPENING DATE & TIME:
04/09/14	**WWTP Reuse Pump Replacement**	14-037	04/25/14 2:00 PM

PRE-BID DATE, TIME AND LOCATION:
None

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

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.**

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, Statues, 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.

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 _____

Name and Title of individual completing this form:

_____
(Printed Name) (Title)

_____
(Signature) (Date)

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: _____

Name of Vendor_____

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

SUBMISSION CHECKLIST

Bidder should check off each of the following items as completed and submit with bid response:

CHECKLIST ELEMENTS	INCLUDED
• Submit one (1) original signature and one (1) copy of your original bid proposal / document AND a Windows© compatible PDF of the original document on a CD or Flash Drive that is clearly labeled.	
• Include any required drawings; descriptive literature; qualifications; schedules; product compliance / exceptions; alternatives; questionnaire; references, forms, tabs, pricing/cost; and any information required of the proposer identified in the text of the bid including information for bid evaluation.	
• Include any delivery information.	
• Mandatory FORMS from this document to be included are: Cover Sheet, References Sheet, Submission Checklist Sheet, and Cost / Bid Form. Also include an IRS W-9 form for you firm.	
• Have an authorized individual sign the appropriate pages including the Cover Sheet with any bid addendums initialed. Also, examples of vendor contracts used by the City can be found on the Naples Purchasing web site and should be reviewed by the vendor.	
• Bid proposal / document needs to be received by the OPENING DATE & TIME indicated on the Cover Sheet. The mailing envelope must be addressed to: City of Naples Purchasing Division 735 8th Street South Naples, Florida 34102	
The mailing envelope should be sealed and marked with: BID Number: BID Title: BID Opening Date:	

ALL COURIER DELIVERED PROPOSALS MUST HAVE THE BID NUMBER AND TITLE ON THE OUTSIDE OF THE COURIER PACKET.

At the discretion of the Purchasing Manager, bids or proposals with minor irregularities may be accepted and allowed to be corrected when in the best interest of the City.

CITY OF NAPLES
WASTEWATER TREATMENT PLANT
REUSE PUMP REPLACEMENT

Prepared for:

CITY OF NAPLES
380 RIVERSIDE CIRCLE
NAPLES, FL 34102

Prepared by:

TETRA TECH
10600 CHEVROLET WAY, SUITE 300
ESTERO, FLORIDA 33928

FEBRUARY, 2014

Tt # 200-08516-13002

CITY OF NAPLES
WASTEWATER TREATMENT PLANT
REUSE PUMP UPGRADES

TABLE OF CONTENTS

CITY OF NAPLES
WASTEWATER TREATMENT PLANT
REUSE PUMP UPGRADES

TABLE OF CONTENTS (Continued)

Technical Data Under Seperate Cover - EXHBIT A

CITY OF NAPLES
WASTEWATER TREATMENT PLANT
REUSE PUMP UPGRADES

BID FORM

Item No.	Description	Estimated Quantity	Units	Unit Price	Price
Schedule 1:	General				
1.1	Mobilization/Demobilization	1	LS	$_____	$_____
1.2	General Requirements	1	LS	$_____	$_____
1.3	Indemnification	1	LS	$ 100.00	$ 100.00
Subtotal for Schedule 1:					**$_____**
Schedule 2:	Reuse Pump Upgrades				
2.1	350 Hp Pump Replacement	1	LS	$_____	$_____
2.2	Pipe/Appurtenance Replacement	1	LS	$_____	$_____
Subtotal for Schedule 2:					**$_____**
Schedule 3:	Electrical/Mechnical Upgrades				
3.1	Remove/Replace Controls	1	LS	$_____	$_____
3.2	Remove/Replace HVAC	1	LS	$_____	$_____
3.3	Programming Allowance	1	LS	$25,000	$ 25,000
3.4	I/O Module Allowance	1	LS	$ 5,000	$ 5,000
Subtotal for Schedule 3:					**$_____**

Total Base Bid Price for the Contract (Sum of Schedules 1 through 3):

_____

_____ **$_____**

(In Words) **(in Figures)**

All Bid items shall include all materials, equipment, labor, permit fees, taxes, tests, miscellaneous costs of all types, overhead, and profit for the item to be complete, in place, and ready for operation in the manner contemplated by the Contract Documents.

SECTION 01000

PROJECT REQUIREMENTS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: The Work to be done consists of the furnishing of all labor, materials, and equipment, and the performance of all Work included in this Contract. The summary of the Work is presented in Section 01010: Summary of Project.

B. Work Included:

1. The Contractor shall furnish all labor, superintendence, materials, plant power, light, heat, fuel, water, tools, appliances, equipment, supplies, and means of construction necessary for proper performance and completion of the Work. The Contractor shall obtain and pay for all necessary local building permits. The Contractor shall perform and complete the Work in the manner best calculated to promote rapid construction consistent with safety of life and property and to the satisfaction of the Engineer, and in strict accordance with the Contract Documents. The Contractor shall clean up the Work and maintain it during and after construction, until accepted, and shall do all Work and pay all costs incidental thereto. He shall repair or restore all structures and property that may be damaged or disturbed during performance of the Work.

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

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

C. Public Utility Installations and Structures:

1. Public utility installations and structures shall be understood to include all poles, tracks, pipes, wires, conduits, vaults, manholes, and all other appurtenances and facilities pertaining thereto whether owned or controlled by the Owner, other governmental bodies, or privately owned by individuals, firms, or corporations, used to serve the public with transportation, traffic control, gas, electricity, telephone, sewerage, drainage, water, or other public or private property which may be affected by the Work shall be deemed included hereunder.

2. The Contract Documents contain data relative to existing public utility installations and structures above and below the ground surface. These data are not guaranteed as to their completeness or accuracy and it is the responsibility of the Contractor to make his own investigations to inform himself fully of the character, condition, and extent of all such installations and structures as may be encountered and as may affect the construction operations.

3. The Contractor shall protect all public utility installations and structures from damage during the Work. Access across any buried public utility installation or structure shall be made to avoid any damage to these facilities. All required protective devices and construction shall be provided by the Contractor at his expense. All existing public utilities damaged by the Contractor shall be repaired by the Contractor, at his expense. No separate payment shall be made for such protection or repairs to public utility installations or structures.

4. Public utility installations or structures owned or controlled by the Owner or other governmental body which are shown on the Drawings to be removed, relocated, replaced, or rebuilt by the Contractor shall be considered as a part of the general cost of doing the Work and shall be included in the prices bid for the various Contract Items. No separate payment shall be made therefor.

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

relocation, replacement, or rebuilding as required. If such work is accomplished by the Contractor, it will be paid for as extra work as provided in the Agreement.

6. The Contractor shall, at all times in performance of the Work, employ acceptable methods and exercise reasonable care and skill so as to avoid unnecessary delay, injury, damage, or destruction of public utility installations and structures; and shall, at all times in the performance of the Work, avoid unnecessary interference with, or interruption of, public utility services, and shall cooperate fully with the owners thereof to that end.

7. The Contractor shall give written notice to Owner and other governmental utility departments and other owners of public utilities of the location of his proposed construction operations, at least 48-hours in advance of breaking ground in any area or on any unit of the Work.

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

1.02 DRAWINGS AND PROJECT MANUAL

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

B. Supplementary Drawings:

1. When, in the opinion of the Engineer, it becomes necessary to explain more fully the Work to be done or to illustrate the Work further or to show any changes which may be required, drawings known as Supplementary Drawings, with specifications pertaining thereto, will be prepared by the Engineer, and the Contractor will be furnished one (1) complete set of reproducible mylar sepias (24 inches by 36 inches) and one (1) reproducible copy of the specifications.

2. The Supplementary Drawings shall be binding upon the Contractor with the same force as the Contract Drawings. Where such Supplementary Drawings require either less or more than the estimated quantities of Work, credit to the Owner or compensation therefor to the Contractor shall be subject to the terms of the Agreement.

C. Contractor to Check Drawings and Data:

1. The Contractor shall verify all dimensions, quantities, and details shown on the Drawings, Supplementary Drawings, schedules, Specifications, or other data received from the Engineer, and shall notify him of all errors, omissions, conflicts, and discrepancies found therein. Failure to discover or correct errors, conflicts, or discrepancies shall not relieve the Contractor of full responsibility for unsatisfactory work, faulty construction, or improper operation resulting therefrom, nor from rectifying such conditions at his own expense. He will not be allowed to take advantage of any errors or omissions, as full instructions will be furnished by the Engineer, should such errors or omissions be discovered.

2. All schedules are given for the convenience of the Engineer and the Contractor and are not guaranteed to be complete. The Contractor shall assume all responsibility or the making of estimates of the size, kind, and quality of materials and equipment included in work to be done under the Contract.

D. Specifications: The Technical Specifications consist of three (3) parts: General, Products, and Execution. The General part of a Specification contains General Requirements which govern the Work. The Products and Execution parts modify and supplement the General Requirements by detailed requirements for the Work and shall always govern whenever there appears to be a conflict.

E. Intent:

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

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

1.03 MATERIALS AND EQUIPMENT

A. Manufacturer:

1. All transactions with the manufacturers or subcontractors shall be through the Contractor.

2. Any two (2) or more pieces of material or equipment of the same kind, type, or classification, and being used for identical types of service, shall be made by the same manufacturer.

B. Delivery:

1. The Contractor shall deliver materials in ample quantities to ensure the most speedy and uninterrupted progress of the Work so as to complete the Work within the allotted time.

2. The Contractor shall also coordinate deliveries in order to avoid delay in, or impediment of, the progress of the work of any related Contractor.

C. Tools and Accessories:

1. The Contractor shall, unless otherwise stated in the Contract Documents, furnish with each type, kind, or size of equipment, one (1) complete set of suitably marked high grade special tools and appliances which may be needed to adjust, operate, maintain, or repair the equipment. Such tools and appliances shall be furnished in approved painted steel cases, properly labeled and equipped with good grade cylinder locks and duplicate keys.

2. Spare parts shall be furnished as specified herein and as recommended by the manufacturer necessary for the operation of the equipment, not including materials required for routine maintenance.

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

D. Service of Manufacturer's Engineer:

1. The Contract Prices for equipment shall include the cost of furnishing a competent and experienced engineer or superintendent who shall represent the manufacturer and shall assist the Contractor, when required, to install, adjust, test, and place in operation, the equipment in conformity with the Contract Documents.

2. After the equipment is placed in permanent operation by the Owner, such engineer or superintendent shall make all adjustments and tests required by the Engineer to prove that such equipment is in proper and satisfactory operating condition, and shall instruct such personnel as may be designated by the Owner in the proper operation and maintenance of such equipment.

1.04 INSPECTION AND TESTING

A. General:

1. For tests specified to be made by the Contractor, the testing personnel shall make the necessary inspections and tests, and the reports thereof shall be in such form as will facilitate checking to determine compliance with the Contract Documents. Five (5) copies of the reports shall be submitted, and authoritative certification thereof must be furnished to the Engineer as a prerequisite for the acceptance of any material or equipment.

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

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

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

B. Costs:

1. All inspection and testing of materials furnished under this Contract will be provided by the Contractor, unless otherwise expressly specified.

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

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

C. Certificate of Manufacture:

1. Contractor shall furnish to Engineer authoritative evidence in the form of a certificate of manufacture that the materials to be used in the Work have been manufactured and tested in conformity with the Contract Documents.

2. These certificates shall be notarized and shall include copies of the results of physical tests and chemical analyses, where necessary, that have been made directly on the product or on similar products of the manufacturer.

D. Shop Tests:

1. Each piece of equipment for which pressure, duty, capacity, rating, efficiency, performance, function, or special requirements are specified shall be tested in the shop of the maker in a manner which shall conclusively prove that its characteristics comply fully with the requirements of the Contract Documents.

2. Five (5) copies of the manufacturer's actual test data and interpreted results thereof, accompanied by a certificate of authenticity sworn to by a responsible official of the manufacturing company and/or independent laboratory, shall be submitted to the Engineer for approval.

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

E. Start-up Tests:

1. As soon as conditions permit, the Contractor shall furnish all labor, materials, and instruments and shall make start-up tests of equipment.

2. If the start-up tests disclose any equipment furnished under this Contract which does not comply with the requirements of the Contract Documents, the Contractor shall, prior to demonstration tests, make all changes, adjustments, and replacements required. The furnishing Contractor shall assist in the start-up tests as applicable.

F. Demonstration Tests:

1. Prior to Contractor's request for a Substantial Completion inspection, all equipment and piping installed under this Contract shall be subjected to demonstration tests as specified or required to prove compliance with the Contract Documents.

2. The Contractor shall furnish labor, fuel, energy, water, and all other materials, equipment, and instruments necessary for all demonstration tests, at no additional cost to the Owner. Contractor shall assist in the demonstration tests as applicable.

1.05 LINES AND GRADES

A. Grade:

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

2. The Engineer will establish bench marks and baseline controlling points. Reference marks for lines and grades as the Work progresses will be located by the Contractor to cause as little inconvenience to the prosecution of the Work as possible. The Contractor shall so place excavation and other materials as to cause no inconvenience in the use of the reference marks provided. He shall remove any obstructions placed by him contrary to this provision.

B. Surveys:

1. The Contractor shall furnish and maintain, at his own expense, stakes and other such materials.

2. The Contractor shall check such reference marks by such means as he may deem necessary and, before using them, shall call the Engineer's attention to any inaccuracies.

3. The Contractor shall, at his own expense, establish all working or construction lines and grades as required from the reference marks set by the Engineer, and shall be solely responsible for the accuracy thereof. He shall, however, be subject to the check and review by the Engineer.

C. Safeguarding Marks:

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

2. The Contractor shall safeguard all existing and known property corners, monuments, and marks adjacent to but not related to the Work and shall bear the cost of re-establishing them if disturbed or destroyed.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01010

SUMMARY OF PROJECT

PART 1 - GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS

A. This Contract is for the construction of the City of Naples Wastewater Treatment Plant Reuse Pump Upgrades as shown on the Drawings and specified herein. The Work consists of furnishing all labor, equipment, and materials for the construction of the facilities consisting of, but not limited to, the following:

The City currently uses two (2) 600 Hp and two (2) 350 Hp vertical turbine pumps to deliver reclaimed water to its customers for irrigation and fire protection. Through this project, the Contractor is to replace one (1) of the existing 350 Hp pumps (and associated piping) with a rebuilt 600 Hp pump (**to be provided by the City**) and to replace the pump controls with new controls for all four (4) pumps. The new controls will all be sized for 600 Hp pumps, although only one (1) 350 Hp pump is being upgraded at this time (resulting in three (3) 600 Hp pumps and one (1) 350 Hp pump). In addition, the City intends to replace the two (2) HVAC units in the generator room where the reuse pump controls are located with new units to allow proper fitting and placement of all new pump controls and air handlers. Conduit and wire as specified to the pumps shall be included along with all other work required to produce a working product. Integration of the new VFD controls shall be performed as an allowance by Tetra Tech.

All work for the Project shall be constructed in accordance with the Drawings and Specifications prepared by Tetra Tech and the proposed improvements will be awarded and constructed, if award is made, under one Contract. Bids shall be submitted for furnishing, delivering and installing all materials, equipment and services, including labor, for the Work. The City reserves the right to direct purchase materials at their discretion.

1.02 PROJECT SEQUENCE

A. The Contractor shall establish his work sequence based on the use of crews to facilitate completion of construction and testing within the specified Contract Time(s). The proposed project sequence, including Contractor's plans for provision of temporary facilities, shall be submitted to the Engineer prior to construction. The work sequence shall be such that no more than one (1) pump is out of service at a single time and such that two (2) 600 Hp pumps are in service at all times. In addition, Contractor shall be responsible for coordinating startup

and testing services with the pump manufacturer's representative for the City supplied pump. City to provide contact information for pump representative. Contractor to provide at least a 2-week notification to the City in advance of startup activities.

B. The Contractor will be required to meet the substantial and final completion dates.

1. All Work included in the Contract Documents will be substantially completed within one hundred eighty (180) days and finally complete two hundred ten (210) days after the date when Contract Times commence to run.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1- GENERAL

1.01 DESCRIPTION

A. This section describes the method used to determine quantities of Work performed or materials supplied for which a price is given in the Bid. It establishes the basis upon which payment will be made for Payment Items.

B. Subject to the provisions in General Conditions, all Work and payment for the Work is represented by Payment Items and associated unit prices.

1.02 PAYMENT

A. Subject to all other contract requirements, the Contractor shall be paid for "as-built" quantities of Work for which a price is given in the bid.

B. Quantities on the Bid Form are for comparison in competitive bidding only and do not constitute the basis for payment or measurement of quantities.

C. Quantities on the Bid Form are estimated and may be increased or decreased without limit.

D. No separate payment will be made for one Payment Item as Work incidentally required to complete the Work of another.

E. Payment for Work performed shall be made in accordance with the unit prices in the Bid. Retainage shall apply to all Contractor payments prior to final acceptance.

1.03 MEASUREMENT FOR PAYMENT

A. Payment Limit Lines:

1. Where payment limit lines are shown on the Contract Drawings, measurements of a Payment Item quantity will be made up to, but not beyond such lines.

2. Where the actual Work of a Payment Item falls short of the payment limit line, measurement will be made to the line of the actual Work.

3. No payment will be made for quantities outside of payment limit lines unless authorized in writing by the Owner.

B. Methods of Measurement:

1. Measurements of lengths, widths, slope angles, and depths or elevations shall be made to determine "as-built" quantities of lengths, areas and volumes pertinent to Payment Items.

a. Unless otherwise specified, all lengths shall be horizontal distances.

b. Slope angles and elevations shall be measured using land surveying equipment.

2. Graphic representations of measured quantities shall be drafted to scale using the Drawings where convenient and appropriate. Additional drawings shall be drafted if required.

a. Irregular shapes representing areas and volumes shall be measured using a compensating polar planimeter or a computer digitizer.

b. Regular shapes shall be scaled.

3. Use of Drawings:

a. Unless otherwise agreed upon between the Contractor and Owner, the Drawings shall be used as the basis to establish existing grades and other existing topographic features.

C. Payment limits where Payment Lines are not shown on the Drawings:

1. Pipe Length: Measurement of pipe shall be made along the top of pipe, excluding fittings, valves and manholes, in place, taken as the laying length.

2. Except as specified otherwise, measurements of Payment Item quantities of weights, lengths, areas and volumes shall be made:

a. On "as-built" and in-place completed Work, during construction or at the time of Substantial Completion.

b. If no other feasible and practical methods of measurements are available, by delivery slips delivered to the Engineer.

3. Adjustments shall be made to eliminate overlaps in area and volume measurements.

1.04 PAYMENT ITEMS

A. Separate payment will be made for the Unit Price and Lump Sum items listed on the Bid Form. Related work not specifically listed or identified below in 1.04 B and C, but evidently necessary for satisfactory completion of the Item shall be considered to be included.

B. No separate payment will be made for the following Work, and its cost shall be included in the Bid Price of the Payment Item to which it is associated:

1. Trench excavation, sheeting, shoring and bracing.
2. De-watering, erosion and sedimentation control, and turbidity screening.
3. Fill, backfill and grading.
4. Removal, replacement and restoration of driveways, mailboxes, sod, seed, and plantings.
5. Removal, replacement and restoration of culverts and storm sewer pipe crossings of driveways and roads.
6. Cleanup.
7. Testing, including all materials and equipment.
8. Maintenance of utility service.
9. Appurtenant work.
10. Removal and replacement of fencing and other structures.
11. Record Drawings.
12. Field Office.
13. Saw cutting.
14. Coordination with other contractors.
15. Layout of the work.
16. Notifications to property owners of construction schedule and service interruptions.
17. Coordination of activities and work hours with Airport Operations.

C. Measurement and Payment Items as listed in the Bid Schedule:

1. Mobilization/Demobilization (Bid Item No. 1.1)

Preparatory Work and operations in mobilizing for beginning work on the Project and demobilizing for ending work on the Project. The establishment of field offices, buildings, safety equipment, first aid supplies, sanitary and other facilities, as required by these Specifications, State and local laws and any other preconstruction expense necessary for the state of the Work; the cost of field engineering, including permits and fees, construction schedules, construction photographs, project signs, shop

drawings, temporary facilities, lay down storage area, construction aids, erosion control, work associated with Contractor support during Owner/Engineer testing, reviews and inspection, re-inspection and any rework resulting from same, cleaning, project records documents, operating and maintenance data. The Contractor shall submit invoices substantiating the cost of mobilization with each pay request. Fifteen percent (15%) of the cost for mobilization and demobilization will be withheld until substantial completion acceptance.

2. General Requirements (Bid Item No. 1.2)

a. Measurement of various items for General Requirements will not be made for payment and all items shall be included in the lump sum price.

b. Payment for General Requirements shall include Insurance requirements costs, the costs of all bonds, and all administrative costs associated with acquiring and maintaining the necessary coverage as described in the Contract Documents.

3. Indemnification (Bid Item No. 1.3)

In consideration of the Contractor's indemnity agreement as set out in the Contract Documents, the Owner specifically agrees to give the Contractor a minimum of $100.00 and other good and valuable consideration, receipt of which is acknowledged upon signing of the Agreement.

4. 350 Hp Pump Replacement (Bid Item 2.1)

a. Measurement of various items for General Requirements will not be made for payment and all items shall be included in the lump sum price.

b. Payment for the pump replacement will be made at the lump sum price for all work required to remove one (1) existing 350 Hp vertical turbine pump and install a City-provided 600 Hp VFD controlled vertical turbine pump in its place and to provide proper startup demonstration and testing. Upon removal of the existing pump, the City will inspect the pump and determine if they desire to retain it. If so, the City will take the pump in its possession. If not, the pump shall be removed from the site and disposed of by the Contractor. The lump sum price shall be full compensation for all labor, equipment, and materials required for a complete installation including all coatings and restoration related items.

5. Pipe/Appurtenance Replacement (Bid Item 2.2)

a. Measurement of various items for General Requirements will not be made for payment and all items shall be included in the lump sum price.

b. Payment for this item shall be at the lump sum price for all work required to remove and replace all 12-inch diameter pipe, valves and appurtenances associated with the Pump No. 3 upgrade with new 24-inch ductile iron pipe, valves and appurtenances as displayed on the drawings and specified within the technical specifications. The lump sum price shall be full compensation for all labor, equipment, and materials required for a complete installation, all painting and all restoration activities associated with this item.

6. Remove/Replace Controls (Bid Item No. 3.1)

a. Measurement of controls replacement will not be made for payment and all items shall be included in the lump sum price.

b. Payment shall include the costs for furnishing and installing the new controls for the four (4) vertical turbine high service reuse pumps, including the removal and sequencing of removal of the existing controls and furnish/installation of the new controls; installation of proposed conduit and wire; connection of the pumps and all other related items necessary to complete the work associated with this item. If the City desires to retain the controls, they shall be delivered to an on-site location for the City's future use. Otherwise, the existing controls and related items shall be removed and disposed of by the Contractor. The lump sum price shall be full compensation for all labor, equipment, and materials required for a complete installation, all painting and all restoration activities associated with this item.

7. Remove/Replace HVAC (Bid Item No. 3.2)

a. Measurement of HVAC replacement will not be made for payment and all items shall be included in the lump sum price.

b. Payment shall include the costs for furnishing and installing the new HVAC units, including the removal and sequencing of removal of the existing HVAC units; furnish and installation of the new HVAC units and associated appurtenances; startup testing and all other related items necessary to complete the work associated

with this item. If the City desires to retain the existing HVAC units, they shall be delivered to an on-site location for the City's future use. Otherwise, the existing units and related items shall be removed and disposed of by the Contractor. The lump sum price shall be full compensation for all labor, equipment, and materials required for a complete installation, all painting and all restoration activities associated with this item.

8. Programming Allowance (Bid Item No. 3.3)

a. Measurement of the Programming Allowance will not be made for payment and all items shall be included in the lump sum price.

b. An allowance in the sum of $25,000 has been established for Tetra Tech to perform (through the Contractor) Control Development Services. Mark-ups, retainage and adjustments to monthly invoices for software programming shall not be allowed. Monies unused under this allowance by Tetra Tech shall not be billed and will be retained by the City. The Contractor will retain a Cash Allowance for Software Development Services which shall be for the Contractor's exclusive use to pay, as directed by the City, for development of programmable logic controller and operator interface graphic programs to monitor and control the inputs and outputs necessary to control the four variable frequency drives related to the WWTP Reclaimed System. Software configurations, including screen displays necessary to control and monitor the below listed items will be covered in this Allowance.

Items included:

- Development of a Software Operations Manual
  - Details automatic & manual control logic sequence for each pump
  - Includes graphic depictions of control screens
  - System configuration documentation
- Graphic additions to the existing iFIX HMI software.
- Programming of existing Rockwell PLC-5 controller.
- Owner review meetings (total 1)
- Owner Training on use of system (4hrs total)
- Onsite startup and commissioning of PLC and graphic interface system

9. I/O Module Allowance (Bid Item No. 3.4)

a. Measurement of the I/O Module Allowance will not be made for payment and all items shall be included in the lump sum price.

b. An allowance of $5,000 has been established for the Contractor to coordinate with the Owner for the analog input and output modules required and for the purchase and installation of required modules. Monies unused under this allowance shall not be billed and will be retained by the City. All purchases shall be pre-approved by the City prior to purchase.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01027

APPLICATIONS FOR PAYMENT

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: Submit Applications for Payment to the Engineer in accordance with schedule established by Conditions of the Contract and Agreement between Owner and Contractor. Contractor shall use the City's standard Application and Certificate for Payment Form.

B. Related Requirements Described Elsewhere:

1. Construction Progress Schedules: Section 01310.

2. Schedule of Values: Section 01370.

3. Contract Closeout: Section 01700.

4. Project Record Documents: Section 01720.

1.02 FORMAT REQUIRED

A. Submit applications typed on the form provided by the City with itemized data typed on 8-1/2 inch x 11 inch or white paper continuation sheets.

B. Provide itemized data on continuation sheets of format, schedules, line items, and values specified on the Application and Certificate for Payment Form. The Contractor shall use the item descriptions and contract values included in schedule of values, approved and accepted by the Engineer as a basis for preparation of the Application for Payment Form.

1.03 PREPARATION OF APPLICATION FOR EACH PROGRESS PAYMENT

A. Application Form:

1. Fill in required information, including that for Change Orders executed prior to date of submittal of application.

2. Fill in percent complete for each activity and dollar values to agree with respective percents.

3. Execute certification with signature of a responsible officer of Contractor.

B. Continuation Sheets:

1. Fill in total list of all scheduled component items of the Work, with item number and scheduled dollar value for each item.

2. Fill in dollar value in each column for each scheduled line item when Work has been performed or products stored. Round off values to nearest dollar, or as specified for Schedule of Values.

3. List each Change Order executed prior to date of submission, at the end of the continuation sheets. List by Change Order Number, and description, as for an original component item of the Work.

4. To receive approval for payment on component material stored on site, submit copies of the original invoices with the Application and Certificate for Payment.

5. As provided for in the Application and Certificate for Payment Form, the Contractor shall certify, for each current pay request, that all previous progress payments received from the Owner, under this Contract, have been applied by the Contractor to discharge in full, all obligations of the Contractor in connection with Work covered by prior Applications for Payment, and all materials and equipment incorporated into the Work are free and clear of all liens, claims, security interest, and encumbrances. Contractor shall attach to each Application and Certificate for Payment like affidavits by all Subcontractors.

1.04 SUBSTANTIATING DATA FOR PROGRESS PAYMENTS

A. Contractor shall submit suitable information, with a cover letter identifying:

1. Project.

2. Application number and date.

3. Detailed list of enclosures.

4. For stored products:

a. Item number and identification as shown on application.

b. Description of specific material.

B. Submit one (1) copy of data and cover letter for each copy of application.

C. The Contractor is to maintain an updated set of drawings to be used as record drawings in accordance with Section 01720: Project Record Documents. As a prerequisite for monthly progress payments, the Contractor is to exhibit the updated record drawings for review by the Owner and the Engineer.

D. Each monthly application for payment shall incorporate the corresponding "monthly progress status report" and updated construction schedule, prepared in accordance with the requirements of Section 01310: Construction Progress Schedules.

E. As a prerequisite for payment, Contractor shall submit a duly executed letter from surety consenting to payment due and progress to date.

1.05 PREPARATION OF APPLICATION FOR FINAL PAYMENT

A. Fill in application form as specified for progress payments. Provide information as required by the General Conditions and Section 01700: Contract Closeout.

B. Furnish evidence of completed operations and insurance in accordance with the General Conditions.

C. Provide Contractor's Final Release of Lien and other close-out submittals as required by the General Conditions.

1.06 SUBMITTAL PROCEDURE

A. Submit Applications for Payment to the Engineer between the first (1^{st}) and the tenth (10^{th}) day after the end of each calendar month for which payment is requested as stipulated in the Agreement. Review the percents complete with the Engineer and resolve any conflicts or discrepancies.

B. Number of copies for each Application for Payment: Five (5) copies plus additional copies for Contractor's needs.

C. When the Engineer finds the Application and Certificate for Payment Form is properly completed and correct, he will execute the Certificate for Payment and transmit the forms to the Owner, with a copy to the Contractor.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01041

PROJECT COORDINATION

PART 1 - GENERAL

1.01 WORK INCLUDED

Furnish personnel and equipment that will be efficient, appropriate and large enough to secure a satisfactory quality of work and a rate of progress that will ensure the completion of the work within the Contract Time. If at any time such personnel appears to the Engineer to be inefficient, inappropriate or insufficient for securing the quality of work aforementioned, he may order the Contractor to increase the efficiency, change the character or increase the personnel and equipment, and the Contractor shall conform to such order. Failure of the Engineer to give such order shall in no way relieve the Contractor or his obligations to secure the quality of the work and rate of progress.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 CONSTRUCTION COORDINATION

A. The Contractor shall coordinate construction activities with the Owner and Engineer in order to maintain sufficient progress in the work.

B. The Contractor shall be responsible for coordinating all sub-contractors and trades and in incorporating the work of all subcontractors or trades where necessary and as required.

C. Cutting and patching, drilling and fitting shall be carried out where required by the trade or subcontractor having jurisdiction; however, the Contractor shall be solely responsible for this work.

D. Contractor shall provide all temporary power, pipe, and by-pass pumping as required for the performance of the work. By-pass pumping shall be capable of handling peak hour flows.

E. Contractor shall coordinate with odor control manufacturer (BioWay or US Filter) for actual slab dimensions and reinforcement for the odor control equipment slab at Lakeshore Drive PS.

3.02 PROTECTION OF CONSTRUCTION AND EQUIPMENT

A. All newly constructed work shall be carefully protected from damage in any way. All portions damaged shall be reconstructed by the Contractor at no additional cost to the Owner.

B. Protect all structures in a suitable manner to prevent damage. Should any part of a structure become heaved, cracked or otherwise damaged, all such damaged portions of the work shall be completely repaired and made good by the Contractor at his own expense and to the satisfaction of the Engineer. If in the final inspection of the work, any defects, faults or omissions are found, the Contractor shall cause the same to be repaired or removed and replaced by proper materials and workmanship without extra compensation for the materials and labor required. Further, the Contractor shall be fully responsible for the satisfactory maintenance and repair of the construction and other work undertaken herein and any damages caused by the performance of the Work, for at least the warranty period described in the Contract.

C. The Contractor shall completely restore all pavement, landscaping, or other areas disturbed by construction activities.

3.03 PIPE LOCATIONS

A. Pipelines shall be located substantially as indicated on the Drawings, but the Engineer reserves the right to make such modifications in locations as may be found desirable to avoid interference with existing structures or for other reasons. Where fittings are noted on the Drawings, such notation is for the Contractor's convenience and does not relieve him from laying and jointing different or additional items where required.

3.04 OPEN EXCAVATIONS

A. Contractor shall adequately safeguard all open excavations by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons, and damage to property. The Contractor shall provide suitable and safe bridges and other crossings for accommodating travel by workmen. All open excavations shall comply with applicable OSHA Standards.

3.05 TEST PITS

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

3.06 CARE AND PROTECTION OF PROPERTY

A. The Contractor shall be responsible for the preservation of all public and private property, and shall use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work on the part of the Contractor, such property shall be restored by the contractor, at his expense, to a condition similar or equal to that existing before the damage was done, or he shall make good the damage in other manner acceptable to the Engineer.

3.07 COOPERATION WITHIN THIS CONTRACT

A. The Contractor shall, prior to interrupting a utility service (water, sewer, etc.) for the purpose of making cut-ins to the existing lines or for any other purposes, contact the Owner and make arrangements for the interruption which will be satisfactory to the Owner.

3.08 LOCATION OF UTILITIES

A. The Contractor shall be solely responsible for locating all existing utilities and pipelines. It will be necessary for the Contractor to plan his work and to coordinate with the Utility Owner, when needed, prior to construction activities.

END OF SECTION

SECTION 01050

FIELD ENGINEERING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: Provide and pay for field engineering service for Project.

1. Survey work required in execution of Work.

2. Civil, structural, or other professional engineering services specified or required to execute Contractor's construction methods.

3. The method of field staking for the construction of the Work shall be at the option of the Contractor. The Owner has provided the engineering survey necessary to establish reference points which in his judgement are necessary to enable the Contractor to proceed with his work.

4. The accuracy of any method of staking shall be the responsibility of the Contractor. All engineering for vertical and horizontal control shall be the responsibility of the Contractor.

5. The Contractor shall be held responsible for the preservation of all stakes and marks. If any stakes or marks are carelessly or willfully disturbed by the Contractor, the Contractor shall not proceed with any work until he has established such points, marks, lines, and elevations as may be necessary for the prosecution of the Work.

6. The Contractor shall retain the services of a registered land surveyor licensed in the State of Florida to identify existing control points and maintain a survey during construction.

B. Related Requirements Described Elsewhere:

1. Summary of Project: Section 01010.

2. Project Record Documents: Section 01720.

1.02 QUALIFICATIONS OF SURVEYOR OR ENGINEER

A. Qualified engineer or registered land surveyor, acceptable to the Owner and the Engineer.

B. Registered professional engineer of the discipline required for the specific service on the Project, currently licensed in the State of Florida.

1.03 SURVEY REFERENCE POINTS

A. Locate and protect control points prior to starting site work, and preserve all permanent reference points during construction.

1. Make no changes or relocations without prior written notice to the Engineer.

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

3. Require surveyor to replace Project control points which may be lost or destroyed at no additional cost to the Owner. Establish replacement based on original survey control.

1.04 PROJECT SURVEY REQUIREMENTS

A. Establish a minimum of two (2) permanent bench marks on site, referenced to data established by survey control points.

1. Record locations, with horizontal and vertical data, on Project Record Documents.

B. Establish lines and levels, locate and lay out, by instrumentation and similar appropriate means:

1. Site improvements:

a. Stakes for grading, fill, and topsoil replacement.

b. Utility slopes and invert elevations.

2. Batter boards for structure.

3. Building foundation, column locations, and floor levels.

4. Controlling lines and levels required for mechanical and electrical trades.

C. From time to time, verify layouts by same methods.

1.05 RECORDS

A. Maintain a complete, accurate log of all control and survey work as it progresses.

B. At the end of the project, submit a certified site survey at 1 inch equals 20 feet scale on reproducible tracing sheets 24 inches by 36 inches, indicating the new building corners and location of all new structures.

C. At the end of the project, submit a certified survey at the same scale as the Engineer's line drawings indicating elevations and stationing at 100-foot pipe increments and at all valve and fitting locations.

D. At the end of the project, submit an electronic copy of the surveyed improvements in AutoCAD (dwg) format, 2011 or later version.

1.06 SUBMITTALS

A. Submit name and address of surveyor and professional engineer to the Engineer.

B. On request of the Engineer, submit documentation to verify accuracy of field engineering work.

C. Submit certificate signed by a registered engineer or surveyor certifying that elevations and locations of improvements are in conformance with the Contract Documents, or if not in conformance, certify as to variances from the Contract Documents.

D. Submit drawings showing locations of all structures constructed. This drawing shall be included with the Project Record Documents.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01065

PERMITS AND FEES

PART 1 - GENERAL

A. Permits by Contractor:

1. Comply with all conditions specified in each of the permits and licenses.

2. A copy of the permits obtained by the Owner will be furnished to the Contractor.

3. No work shall begin until all permits listed below have been obtained by the Owner.

4. Contractor is responsible for obtaining any permits not listed below, including dewatering permits, if required, building permits, electrical permits, and related permits for the proposed improvements.

B. Permits by Owner:

1. The following permits have been obtained or will be obtained by the Owner prior to construction:

Permit	Permit No.	Issue Date
FDEP Minor Modification Permit	FL0026271-010-DW1/MR	1/17/14

END OF SECTION

SECTION 01070

ABBREVIATIONS AND SYMBOLS

PART 1 - GENERAL

1.01 STANDARDS AND ABBREVIATIONS

A. Referenced Standards: Any reference to published specifications or standards of any organization or association shall comply with the requirements of the specification or standard which is current on the date of Advertisement for Bids. In case of a conflict between the referenced specifications or standards, the one having the more stringent requirements shall govern.

In case of conflict between the referenced specifications or standards and the Contract Documents, the Contract Documents shall govern.

B. Abbreviations:

AA	Aluminum Association
AAA	American Arbitration Association
AABC	Associated Air Balance Council
AAMA	Architectural Aluminum Manufacturers Association
AASHO	The American Association of State Highway Officials
ABA	American Bar Association
ABMA	American Boiler Manufacturers Association
ABPA	Acoustical and Board Products Association
ACI	American Concrete Institute
ACPA	American Concrete Pipe Association
AEIC	Association of Edison Illuminating Companies
AFBMA	Anti-Friction Bearing Manufacturers Association
AGA	American Gas Association
AGC	Associated General Contractors of America
AGMA	American Gear Manufacturers Association
AHA	American Hardboard Association
AI	The Asphalt Institute
AIA	American Institute of Architects
AIA	American Insurance Association
AIEE	American Institute of Electrical Engineers (Now IEEE)
AIMA	Acoustical and Insulating Materials Association
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMCA	Air Moving and Condition Association

ANSI	American National Standard Institute
APA	American Plywood Association
API	American Petroleum Institute
APWA	American Public Works Association
AREA	American Railway Engineering Association
ARI	American Refrigeration Institute
ASA	American Standards Association (Now ANSI)
ASAHC	American Society of Architectural Hardware Consultants
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASSCBC	American Standard Safety Code for Building Construction
ASSHTO	American Association of State Highway Transportation Officials
ASTM	American Society for Testing and Materials
AWG	American Wire Gauge
AWI	Architectural Woodwork Institute
AWPA	American Wood Preservers Association
AWPB	American Wood Preservers Bureau
AWPI	American Wood Preservers Institute
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Institute of America (formerly SCPI)
CDA	Copper Development Association
CFS	Cubic Feet Per Second
CMAA	Crane Manufacturers Association of America
CRSI	Concrete Reinforcing Steel Institute
CS	Commercial Standard
DHI	Door and Hardware Institute
DIPRA	Ductile Iron Pipe Research Association
DOT Spec	Standard Specification for Road and Bridge Construction Florida Department of Transportation, 1982
E/A	Engineer and/or Architect
EDA	Economic Development Association
EEI	Edison Electric Institute
EPA	Environmental Protection Agency
FCI	Fluid Control Institute
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
Fed Spec	Federal Specification
FPS	Feet Per Second
FS	Federal Standards
GPM	Gallons Per Minute
HMI	Hoist Manufacturers Institute

HP	Horsepower
HSBII	Hartford Steam Boiler Inspection and Insurance Co.
ID	Inside Diameter
IEEE	Institute of Electrical and Electronic Engineers
IFI	Industrial Fasteners Institute
IPCEA	Insulated Power Cable Engineers Association
IPS	Iron Pipe Size
MGD	Million Gallons Per Day
MHI	Materials Handling Institute
MMA	Monorail Manufacturers Association
NBFU	National Board of Fire Underwriters
NBHA	National Builders' Hardware Association
NBS	National Bureau of Standards
NCSA	National Crushed Stone Association
NCSPA	National Corrugated Steel Pipe Association
NEC	National Electrical Code
NECA	National Electrical Contractors' Association
NEMA	National Electrical Manufacturers' Association
NFPA	National Fire Protection Association
NLA	National Lime Association
NPC	National Plumbing Code
NPT	National Pipe Threads
NSC	National Safety Council
NSF	National Sanitation Foundation
OD	Outside Diameter
OSHA	U.S. Department of Labor, Occupational Safety and Health Act
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute
PS	United States Products Standards
PSI	Pounds per Square Inch
PSIA	Pounds per Square Inch Absolute
PSIG	Pounds per Square Inch Gauge
RAS	Return Activated Sludge
RPM	Revolutions Per Minute
SAE	Society of Automotive Engineers
SDI	Steel Decks Institute
SJI	Steel Joists Institute
SJRWMD	St. Johns River Water Management District
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SSI	Scaffolding and Shoring Institute
SSPC	Steel Structures Painting Council
SSPC	Structural Steel Painting Council
STA	Station (100 feet)
TDH	Total Dynamic Head

TH	Total Head
UBC	Uniform Building Code
UL	Underwriter's Laboratories, Inc.
USASI or	United States of America Standards Institute
WAS	Waste Activated Sludge

C. Additional abbreviations and symbols are shown on the Drawings.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01091

REFERENCE SPECIFICATIONS

PART 1 - GENERAL

1.01 GENERAL

A. Applicable Publications. Whenever in these Specifications references are made to published specifications, codes, standards, or other requirements, it shall be understood that wherever no date is specified, only the latest specifications, standards, or requirements of the respective issuing agencies which have been published as of the date that the Work is advertised for bids, shall apply; except to the extent that said standards or requirements may be in conflict with applicable laws, ordinances, or governing codes. No requirements set forth herein or shown on the Drawings shall be waived because of any provision of or omission from said standards or requirements.

B. Assignment of Specialists. In certain instances, specification test requires (or implies) that specific work is to be assigned to specialist or expert entities who must be engaged for the performance of the Work. Such assignments shall be recognized as special requirements over which the Contractor has no choice or option. These requirements shall not be interpreted so as to conflict with the enforcement of building codes and similar regulations governing the Work. They are not intended to interfere with local union jurisdiction settlements and similar conventions. Such assignments are intended to establish which party or entity involved in a specific unit of Work is recognized as "expert" for the indicated construction processes or operations. Nevertheless, the final responsibility for fulfillment of the entire set of Contract requirements remains with the Contractor.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of other requirements of the Specifications, all Work specified herein shall conform to or exceed the requirements of such referenced documents which are not in conflict with the requirements of these Specifications or applicable codes.

B. References herein to "Building Code" shall mean the Southern Standard Building Code (SSBC) of the Southern Building Code Congress (SBCC). The latest edition of the code as approved and used by the local agency as of the date of award as adopted by the agency having jurisdiction shall apply to the Work herein, including all addenda, modifications, amendments, or other lawful changes thereto.

C. In case of conflict between codes, reference standards, Drawings, and the other Contract Documents, the most stringent requirements shall govern. All conflicts shall be brought to the attention of the Engineer for clarification and directions prior to ordering or providing any materials or labor. The Contractor shall bid the most stringent requirements.

D. Applicable Standard Specifications. The Contractor shall construct the Work specified herein in accordance with the requirements of the Contract Documents and the referenced portions of those referenced codes, standards, and specifications listed.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01200

PROJECT MEETINGS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. The Contractor shall cooperate and coordinate with the Engineer to schedule and administer the preconstruction meeting, periodic progress meetings, and specifically called meetings throughout the progress of the Work. The Contractor shall:

a. Prepare agenda for meetings.

b. Make physical arrangements for meetings.

c. Preside at meetings.

d. Take and distribute meeting minutes.

2. Representatives of Contractor, subcontractors, and suppliers attending meetings shall be qualified and authorized to act on behalf of the entity each represents.

3. The Owner shall attend meetings to ascertain that the Work is expedited consistent with Contract Documents and construction schedules.

4. The Contractor shall record the preconstruction meeting and each progress meeting in its entirety, and shall provide the Engineer with a regular cassette copy of such recording, having good quality and clarity, and a typed transcript of the minutes of each meeting. A copy of the minutes of each progress meeting shall be available five business days after the meeting.

B. Related Requirements Described Elsewhere:

1. Construction Progress Schedules: Section 01310.

2. Shop Drawings, Working Drawings, and Samples: Section 01340.

3. Project Record Documents: Section 01720.

1.02 PRECONSTRUCTION MEETING

A. Engineer will schedule a preconstruction meeting no later than twenty (20) days after date of Notice to Proceed. The meeting shall be scheduled at the convenience of all parties.

B. Location: A local site, convenient for all parties, designated by the Engineer.

C. Attendance:

1. Owner's representative.

2. Engineer and his professional consultants.

3. Resident project representative.

4. Contractor and his superintendent.

5. Major subcontractors.

6. Representatives of major suppliers and manufacturers as appropriate.

7. Governmental representatives as appropriate.

8. Others as requested by the Contractor, Owner, and Engineer.

D. The Engineer shall preside at the preconstruction meeting. The Contractor shall provide for keeping minutes and distribution of minutes to the Owner, Engineer and others. The purpose of the preconstruction meeting is to designate responsible personnel and establish a working relationship. Matters requiring coordination will be discussed and procedures for handling such matters established.

E. The suggested agenda for the preconstruction meeting would include the following:

1. Distribution and discussion of:

a. List of major subcontractors and suppliers.

b. Projected schedules.

c. Schedule of Values.

2. Critical work sequencing: Relationships and coordination with other contracts and/or work.

3. Major equipment deliveries and priorities.

4. Project coordination: Designation and responsible personnel.

5. Procedures and processing of:

    a. Field decisions.

    b. Proposal requests.

    c. Request for Information.

    d. Submittals.

    e. Change Orders.

    f. Applications for Payment.

6. Submittal of Shop Drawings, project data and samples.

7. Adequacy of distribution of Contract Documents.

8. Procedures for maintaining Record Documents

9. Use of premises:

    a. Office, work, and storage areas.

    b. Owner's requirements.

    c. Access and traffic control.

10. Construction facilities, controls, and construction aids.

11. Temporary utilities.

12. Safety and first aid procedures.

13. Check of required Bond and Insurance certifications.

14. Completion time for contract and liquidated damages.

15. Request for extension of Contract Time.

16. Procedures for periodic monthly (or whatever interval is deemed appropriate or necessary, however, a minimum of monthly meetings will be required) progress meetings, for all involved.

17. Security procedures.

18. Procedures for making partial payments.

19. Guarantees on completed work.

20. Equipment to be used.

21. Project layout and staking of work.

22. Project inspection.

23. Labor requirements.

24. Laboratory testing of material requirements.

25. Provisions for material stored on site and monthly inventory of materials stored.

26. Requirements of other organizations such as utilities, railroads, highway departments, building departments.

27. Rights-of-way and easements.

28. Housekeeping procedures.

29. Liquidated damages.

30. Posting of signs and installation of Project Sign.

31. Pay request submittal dates.

32. Equal opportunity requirements.

1.03 PROGRESS MEETINGS

A. The Engineer shall schedule regular periodic meetings. The progress meetings will be held a minimum of once every thirty (30) days and at other times as required by the progress of the Work. The first meeting shall be held within thirty (30) days after the preconstruction meeting or thirty (30) days or less after the date of Notice to Proceed.

B. Hold called meetings as required by progress of the Work.

C. Location of the meetings: Utility Office – 380 Riverside Circle, Naples, FL 34102).

D. Attendance:

1. Engineer and his professional Subconsultants as needed.

2. Resident Project Representative.

3. Contractor and his Superintendent.

4. Owner's representatives.

5. Subcontractors (active on the site, as appropriate to the agenda).

6. Others as appropriate to the agenda (suppliers, manufacturers, other subcontractors, etc.).

E. The Contractor shall preside at the meetings and provide for keeping minutes and distribution of the minutes to the Owner, Engineer, and others. The purpose of the meetings will be to review the progress of the Work.

F. The suggested agenda for the progress meetings will include but not be limited to the following:

1. Review approval of minutes of previous meeting.

2. Review of Work progress since previous meeting and Work scheduled (3-week look ahead schedule).

3. Field observations, problems, conflicts.

4. Problems which impede construction schedule.

5. Review of off-site fabrication, delivery schedules.

6. Corrective measures and procedures to regain projected schedule.

7. Status of approved Construction Schedule and revisions to the Construction Schedule as appropriate.

8. Progress schedule during succeeding work period.

9. Coordination of schedules.

10. Review status of submittals and submittal schedule, expedite as required.

11. Maintenance of quality standards.

12. Pending changes and substitutions.

13. Shop drawing problems.

14. Review proposed changes for:

    a. Effect on Construction Schedule and on completion date.

    b. Effect on other contracts of the Project.

15. Critical/long lead items.

16. Other business.

G. The Contractor is to attend progress meetings and is to study previous meeting minutes and current agenda items, and be prepared to discuss pertinent topics and provide specific information including but not limited to:

1. Status of all submittals and what specifically is being done to expedite them.

2. Status of all activities behind schedule and what specifically will be done to regain the schedule.

3. Status of all material deliveries, latest contact with equipment manufacturer, and specific actions taken to expedite materials.

4. Status of open deficiencies and what is being done to correct the same.

H. The Contractor is to provide a current submittal log at each progress meeting in accordance with Section 01340: Shop Drawings, Working Drawings, and Samples.

PART 2- PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01310

CONSTRUCTION PROGRESS SCHEDULES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. Promptly after award of the Contract, prepare and submit to the Engineer estimated construction progress schedules demonstrating complete fulfillment of all Contract requirements utilizing a Critical Path Method (hereinafter referred to as CPM) in planning, coordinating, and performing the Work under this Contract (including all activities of subcontractors, equipment vendors, and suppliers). The principles and definition of CPM terms used herein shall be as set forth in the Associated General Contractors of America (AGC) publication, Construction Planning & Scheduling Manual, Copyright 1984, but the provisions of this Specification shall govern the planning, coordinating, and performance of the Work.

2. Submit revised progress schedules on a monthly basis. No partial payments shall be approved until there is an approved construction progress schedule on hand.

B. Related Requirements Described Elsewhere:

1. Summary of Project: Section 01010.

2. Applications for Payment: Section 01027.

3. Project Meetings: Section 01200.

4. Shop Drawings, Working Drawings, and Samples: Section 01340.

5. Schedule of Values: Section 01370.

1.02 QUALIFICATIONS

A. A statement of computerized CPM capability shall be submitted in writing prior to the award of the Contract and shall verify that either Contractor's organization has in-house capability to use the CPM technique or that Contractor will employ a CPM consultant who is so qualified.

B. In-house capability shall be verified by description of construction projects to which Contractor or Contractor's consultant has successfully applied computerized CPM and shall include at least two (2) projects valued at least half the expected value of this project.

1.03 FORM OF SCHEDULES

A. Prepare schedules in the form of a horizontal bar chart.

1. Provide a separate horizontal bar for each trade or operation within each structure or item.

2. Horizontal time scale:

a) Show starting and completion dates for each activity in terms of the number of days after Notice to Proceed. All completion dates shown shall be within the period specified for contract completion.

b) Identify the first work day of each month.

3. Scale and Spacing: Sufficient to allow space for notations and future revisions.

4. Maximum Sheet Size: 24 inches by 36 inches.

B. Format of Listings: The chronological order of the start of each item of work for each structure.

C. Identification of Listings: By major specification section numbers as applicable and by structure.

D. Construction Progress Schedules shall be computer generated using software equal to Primavera Project Planner for Windows by Primavera Systems, Inc., Bala Cynwyd, P.A., or approved equal.

1.04 CONTENT OF SCHEDULES

A. Construction Progress Schedule:

1. Show the complete sequence of construction by activity and by structure.

2. Show the dates for the beginning and completion of each major element of construction in no more than a two (2) week increment scale. Specifically list, but do not limit to:

   a. Shop Drawing Schedule.

   b. Installation of raw water main.

   c. Site clearing.

   d. Building Construction.

   e. Well Installation/Development.

   f. Subcontractor work.

   g. Equipment installations.

   h. Finishings.

   i. Painting.

   j. Equipment Testing.

   k. Equipment and process start-up.

   l. Project closeout.

3. Show projected percentage of completion for each item, as of the first day of each month.

4. Show projected dollar cash flow requirements for each month of construction and for each activity as indicated by the approved Schedule of Values.

B. Submittals for construction progress schedules shall be in accordance with Section 01340: Shop Drawings, Work Drawings, and Samples. Indicate on the schedule the following:

1. The dates for Contractor's submittals.

2. The dates submittals will be required for Owner-furnished products, if applicable.

3. The dates approved submittals will be required from the Engineer.

C. A typewritten list of all long lead items (equipment, materials, etc.).

D. To the extent that the progress schedule or any revised progress schedule shows anything not jointly agreed upon or fails to show anything jointly agreed upon, it shall not be deemed to have been approved by the Engineer. Failure to include any element of work required for the performance of this Contract shall not excuse the Contractor from completing all work required within any applicable completion date, notwithstanding the Engineer's approval of the progress schedule.

E. Scheduling Constraints: The work within Owner's property must be completed within the maximum number of days start to finish, as indicated in the Contract. Additionally, work must proceed on a continuous basis, without stoppages, except for nights and weekends. There shall be no lapses between phases of construction.

1.05 PROGRESS REVISIONS

A. Indicate progress of each activity to date of submission.

B. Show changes occurring since previous submission of schedule:

1. Major changes in scope.

2. Activities modified since previous submission.

3. Revised projections of progress and completion.

4. Other identifiable changes.

C. Provide a narrative report as needed to define:

1. Problem areas, anticipated delays, and the impact on the schedule.

2. Corrective action recommended, and its effect.

3. The effect of changes on schedules of other prime contractors.

D. If the Work falls behind the critical path schedule by two (2) weeks or more, the Contractor shall prepare a recovery schedule.

1.06 SUBMISSIONS

A. Submittal Requirements.

1. Logic network and/or time-phased bar chart, computer generated.

2. Computerized network analysis:

a. Sort by early start

b. Sort by float

c. Sort by predecessor/successor

3. Narrative description of the logic and reasoning of the schedule.

B. Time of Submittals.

Within ten (10) working days after Notice to Proceed, Contractor shall submit a network diagram describing the activities to be accomplished in the project and their dependency relationships, (predecessor/successor) as well as a tabulated schedule as herein defined. The total length of time indicated on the initial CPM schedule shall equal the exact number of days in the Contract Time as defined in Section 00500: Agreement. The schedule produced and submitted shall also indicate calendar dates, including project starting and completion dates, based on the Contract Commencement and completion dates indicated in the Notice to Proceed. The Engineer will complete the review of the complete schedule within fifteen (15) working days after receipt. During the review process, the Engineer may meet with a representative of Contractor to review the proposed plan and schedule to discuss any clarifications that may be necessary.

C. Within ten (10) working days after the conclusion of the Engineer's review period, Contractor shall revise the network diagram as required and resubmit the network diagram and a tabulated schedule produced therefrom. The revised network diagram and tabulated schedule shall be reviewed and accepted or rejected by the Engineer within fifteen (15) working days after receipt. The network diagram and tabulated schedule, when accepted by the Engineer, shall constitute the project work schedule unless a revised schedule is required due to substantial changes in the Work, a change in Contract Time or a recovery schedule is required and requested.

D. Acceptance. The finalized schedule will be acceptable to the Engineer when, in the opinion of the Engineer, it demonstrates an orderly progression of the Work to completion in accordance with the Contract Documents. Such acceptance will neither impose on the Engineer responsibility for the progress or scheduling of the

Work nor relieve Contractor from full responsibility therefore. The finalized schedule of shop drawing submittals will be acceptable to the Engineer when, in the opinion of the Engineer, it demonstrates a workable arrangement for processing the submittals in accordance with the requirements. The finalized Schedule of Values (lump sum price breakdown), as applicable, will be acceptable to the Engineer as to form and content when, in the opinion of the Engineer, it demonstrates a substantial basis for equitably distributing the Contract Price. When the network diagram and tabulated schedule have been accepted, the Contractor shall submit to the Engineer six (6) copies of the time-scaled network diagram, six (6) copies of a computerized tabulated schedule in which the activities have been sequenced by numbers, six (6) copies of a computerized tabulated schedule in which the activities have been sequenced by early starting date, and six (6) copies of a computerized, tabulated schedule in which activities have been sequenced by total float, and six (6) copies sorted by predecessor/successor.

E. Revised Work Schedules. Contractor, if requested by the Engineer, shall provide a revised work schedule if, at any time, the Engineer considers the completion date to be in jeopardy because of "activities behind schedule." The revised work schedule shall include a new diagram and tabulated schedule conforming to the requirements of Paragraph 1.09 herein, designed to show how Contractor intends to accomplish the Work to meet the completion date. The form and method employed by Contractor shall be the same as for the original work schedule. No payment will be made if activities fall more than two (2) weeks behind schedule and a revised work schedule is not furnished.

F. Schedule Revisions. The Engineer may require Contractor to modify any portions of the work schedule that become infeasible because of "activities behind schedule" or for any other valid reason. An activity that cannot be completed by its original latest completion date shall be deemed to be behind schedule. No change may be made to the sequence, duration, or relationships of any activity without approval of the Engineer.

1.07 DISTRIBUTION

A. Distribute copies of the reviewed schedules to:

1. Engineer.

2. Jobsite file.

3. Subcontractors.

4. Other concerned parties.

5. Owner (two copies).

B. Instruct recipients to report promptly to the Contractor, in writing, any problems anticipated by the projections shown in the schedules.

1.08 CHANGE ORDERS

A. Upon approval of a change order, the approved changes shall be reflected in the next scheduled revision or update submittal of the construction progress schedule by the Contractor.

1.09 CPM STANDARDS

A. CPM, as required by this Section, shall be interpreted to be generally as outlined in the Associated General Contractor's (AGC) publication, Construction Planning & Scheduling Manual, Copyright 1984.

B. Work schedules shall include a graphic network and computerized, tabulated schedules as described below. To be acceptable the schedule must demonstrate the following:

1. A logical succession of work from start to finish.

2. Definition of each activity. Activities shall be identified by major specification section numbers, as applicable, and by major structure.

3. A logical flow of work crews/equipment (crews are to be defined by manpower category and man-hours; equipment by type and hours).

4. Show all work activities and interfaces including submittals as well as major material and equipment deliveries.

C. Networks.

1. The CPM network, or diagram, shall be in the form of a time-scaled diagram of the customary activity-on-type and may be divided into a number of separate pages with suitable notation relating the interface points among the pages. Notation on each activity line shall include a brief work description and a duration, as described in Paragraph 1.09, D. herein.

2. All construction activities and procurement shall be indicted in a time-scaled format, and a calendar shall be shown on all sheets along the entire sheet length. Each activity arrow shall be plotted so the beginning and completion dates of said activity can be determined graphically by

comparison with the calendar scale. All activities shall be shown using the symbols that clearly distinguish between critical path activities, non-critical path activities, and float for each non-critical activity. All non-critical path activities shall show estimated performances time and float time in scaled form.

D. The duration indicated for each activity shall be in calendar days and shall represent the single best time considering the scope of the work and resources planned for the activity including time for inclement weather. Except for certain non-labor activities, such as curing concrete or delivering materials, activity durations shall not exceed fourteen (14) days nor be less than one (1) day unless otherwise accepted by the Engineer.

E. Tabulated Schedules. The initial schedule shall include the following minimum data for each activity.

1. Activity Beginning and Ending Numbers (i-j numbers) (single activity numbers may be used).

2. Duration.

3. Activity Description.

4. Early Start Date (Calendar Dated).

5. Late Start Date (Calendar Dated).

6. Early Finish Date (Calendar Dated).

7. Late Finish Date (Calendar Dated).

8. Identified Critical Path.

9. Total Float (Note: No activity may show more than 20 days float).

10. Cost of Activity.

11. Equipment Hours, by type; Man-Power Hours, by crew or trade.

F. Project Information. Each tabulation shall be prefaced with the following summary data.

1. Project Name.

2. Contractor.

3. Type of Tabulation (Initial or Updated).

4. Project Duration.

5. Project Scheduled Completion Date.

6. Effective or Starting Date of the Schedule.

7. New Project Completion Date and Project Status (if an updated or revised schedule).

8. Actual Start Date and Actual Finish Date (for all updated schedules.)

1.10 SCHEDULE MONITORING

A. At not less than monthly intervals or when specifically requested by Engineer, Contractor shall submit to the Engineer a computer printout of an updated schedule for those activities that remain to be completed. Typically, the updated schedule will be submitted with the application for payment as specified below.

B. The updated schedule shall be submitted in the form, sequence, and number of copies requested for the initial schedule.

1.11 PROGRESS MEETINGS

For the monthly progress meeting, Contractor shall submit a revised CPM schedule and a three-week look-ahead schedule, showing all activities completed, in progress, uncompleted, or scheduled to be worked during the weeks. The three weeks include the current week plus the next two weeks. All activities shall be from the approved CPM and must be as shown on the CPM unless behind or ahead of schedule. One copy of the revised CPM schedule shall be submitted with each copy of that month's application for payment, six (6) copies minimum.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01340

SHOP DRAWINGS, WORKING DRAWINGS, AND SAMPLES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. The Contractor shall submit to the Engineer for review and approval, such Shop Drawings, Test Reports, and Product Data on materials and equipment (hereinafter in this Section called Data), and material samples (hereinafter in this Section called Samples) as are required for the proper control of work, including but not limited to those Shop Drawings, Data, and Samples for materials and equipment specified elsewhere in the Specifications and in the Drawings. **All submittals shall be made electronically in PDF format.**

2. Within fourteen (14) calendar days after the Notice to Proceed, the Contractor shall submit to the Engineer a complete list of preliminary Data on items for which Shop Drawings are to be submitted. Included in this list shall be the names of all proposed manufacturers furnishing specified items. Review of this list by the Engineer shall in no way expressed or implied relieve the Contractor from submitting complete Shop Drawings and providing materials, equipment, etc., fully in accordance with the Contract Documents. This procedure is required in order to expedite final review of Shop Drawings.

3. The Contractor is to maintain an accurate updated submittal log and will bring this log to each scheduled progress meeting with the Owner and the Engineer. This log should include the following items:

a. Submittal description and number assigned.

b. Date to Engineer.

c. Date returned to Contractor (from Engineer).

d. Status of submittal (Approved, Approved as Noted, Amend and Resubmit, and Rejected).

e. Date of resubmittal and return (as applicable).

f. Date material release (for fabrication).

g. Projected date of fabrication.

h. Projected date of delivery to site.

i. Status of O&M manuals submittal.

j. Specification Section.

k. Drawings sheet number.

B. Related Requirements Described Elsewhere:

1. Construction Progress Schedules: Section 01310.

2. Material and Equipment: Section 01600.

3. Project Record Documents: Section 01720.

4. Operating and Maintenance Data: Section 01730.

1.02 CONTRACTOR'S RESPONSIBILITY

A. It is the responsibility of the Contractor to check all drawings, data and samples prepared before submitting them to the Engineer for review. Each and every copy of the Drawings and data shall bear the Contractor's stamp showing that they have been so checked. Shop drawings submitted to the Engineer without the Contractor's stamp will be returned to the Contractor for conformance with this requirement. Shop drawings shall indicate any deviations in the submittal from requirements of the Contract Documents. If the Contractor takes exception to the specifications, the Contractor shall note the exception in the letter of transmittal to the Engineer.

B. Determine and verify:

1. Field measurements.

2. Field construction criteria

3. Catalog numbers and similar data.

4. Conformance with Specifications.

C. The Contractor shall furnish the Engineer a schedule of Shop Drawing submittals fixing the respective dates for the submission of shop and working drawings, the beginning and ending of manufacture, testing, and installation of materials, supplies, and equipment. This schedule shall indicate those that are critical to the progress schedule.

D. The Contractor shall not begin any of the work covered by a Shop Drawing, Data, or a Sample returned for correction until a revision or correction thereof has been reviewed and returned to him, by the Engineer, with approval.

E. The Contractor shall submit to the Engineer all drawings and schedules sufficiently in advance of construction requirements to provide no less than thirty (30) calendar days for checking and appropriate action from the time the Engineer receives them.

F. All submittals shall be accompanied with a transmittal letter containing the following information:

1. Date.

2. Project Title and Number.

3. Contractor's name and address.

4. The number of each Shop Drawings, Project Data, and Sample submitted.

5. Notification of Deviations from Contract Documents.

   a. The Contractor shall indicate in **bold type** at the top of the cover sheet of submittal of shop drawing if there is a deviation from the Drawings, Specifications, or referenced specifications or codes.

   b. The Contractor shall also list any deviations from the Drawings, Specifications, or referenced specifications or codes and identify in green ink prominently on the applicable Shop Drawings.

6. Submittal Log Number conforming to Specification Section Number.

G. The Contractor shall submit a PDF electronic copy to the Engineer for review and approval.

H. The Contractor shall be responsible for and bear all costs of damages which may result from the ordering of any material or from proceeding with any part of Work prior to the completion of the review by the Engineer of the necessary Shop Drawings.

I. The Contractor shall be fully responsible for observing the need for and making any changes in the arrangement of piping, connections, wiring, manner of installation, etc., which may be required by the materials/equipment he proposes to supply both as pertains to his own work and any work affected under other parts, headings, or divisions of the Drawings and Specifications.

J. The Contractor shall not use Shop Drawings as a means of proposing alternate items to demonstrate compliance with the Drawings and Specifications.

K. Each submittal will bear a stamp indicating that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal as illustrated below.

(OWNER'S NAME)
(PROJECT NAME)
(PROJECT NUMBER)

SHOP DRAWING NO.:_____

SPECIFICATION SECTION:_____ DRAWING NO._____

WITH RESPECT TO THIS SHOP DRAWING OR SAMPLE, I HAVE DETERMINED AND VERIFIED ALL QUANTITIES, DIMENSIONS, SPECIFIED PERFORMANCE CRITERIA, INSTALLATION REQUIREMENTS, MATERIALS, CATALOG NUMBERS, AND SIMILAR DATA WITH RESPECT THERETO AND REVIEWED OR COORDINATED THIS SHOP DRAWING OR SAMPLE WITH OTHER SHOP DRAWINGS AND SAMPLES AND WITH THE REQUIREMENTS OF THE WORK AND THE CONTRACT DOCUMENTS.

_____ NO VARIATION FROM CONTRACT DOCUMENTS

_____ VARIATION FROM CONTRACT DOCUMENTS AS SHOWN

(CONTRACTOR'S NAME)
(CONTRACTOR'S ADDRESS)

BY: _____DATE:_____
AUTHORIZED SIGNATURE

L. Drawings and schedules shall be checked and coordinated with the work of all trades and sub-contractors involved, before they are submitted for review by the Engineer and shall bear the Contractor's stamp of approval as evidence of such checking and coordination. Drawings or schedules submitted without this stamp of approval shall be returned to the Contractor for resubmission.

1.03 ENGINEER'S REVIEW OF SHOP DRAWINGS

A. The Engineer's review of Shop Drawings, Data, and Samples as submitted by the Contractor will be to determine if the items(s) generally conforms to the information in the Contract Documents and is compatible with the design concept.

The Engineer's review and exceptions, if any, will not constitute an approval of dimensions, connections, quantities, and details of the material, equipment, device, or item shown.

B. The review of drawings and schedules will be general, and shall not be construed:

1. As permitting any departure from the Contract Documents.

2. As relieving the Contractor of responsibility for any errors, including details, dimensions, and materials.

3. As approving departures from details furnished by the Engineer, except as otherwise provided herein.

C. If the drawings or schedules as submitted describe variations and show a departure from the Contract Documents which the Engineer finds to be in the interest of the Owner and to be so minor as not to involve a change in Contract Price or contract time, the Engineer may return the reviewed drawings without noting an exception.

D. "Approved As Noted" - Contractor shall incorporate Engineer's comments into the submittal before release to manufacturer. The Contractor shall send a letter to the Engineer acknowledging the comments and their incorporation into the Shop Drawing.

E. "Amend And Resubmit" - Contractor shall resubmit the Shop Drawing to the Engineer. The resubmittal shall incorporate the Engineer's comments highlighted on the Shop Drawing.

F. "Rejected" - Contractor shall correct, revise and resubmit Shop Drawing for review by Engineer.

G. Resubmittals will be handled in the same manner as first submittals. On resubmittals the Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, to revisions other than the corrections requested by the Engineer on previous submissions. The Contractor shall make any corrections required by the Engineer.

H. If the Contractor considers any correction indicated on the drawings to constitute a change to the Drawings or Specifications, the Contractor shall give written notice thereof to the Engineer.

I. When the Shop Drawings have been completed to the satisfaction of the Engineer, the Contractor shall carry out the construction in accordance therewith and shall

make no further changes therein except upon written instructions from the Engineer.

J. No partial submittals will be reviewed. Submittals not deemed complete will be stamped "Rejected" and returned to the Contractor for resubmittal. Unless otherwise specifically permitted by the Engineer, make all submittals in groups containing all associated items for:

1. Systems.

2. Processes.

3. As indicated in specific Specifications Sections.

All drawings, schematics, manufacturer's product Data, certifications, and other Shop Drawing submittals required by a system specification shall be submitted at one time as a package to facilitate interface review.

K. Only the Engineer shall utilize the color "red" in marking Shop Drawing submittals.

L. Shop drawing and submittal data shall be reviewed by the Engineer for each original submittal and first resubmittal; thereafter review time for subsequent resubmittals shall be charged to the Contractor and the Contractor shall reimburse the Owner for services rendered by the Engineer as specified in the Supplementary Conditions.

1.04 SHOP DRAWINGS

A. When used in the Contract Documents, the term "Shop Drawing" shall be considered to mean Contractor's plans for materials and equipment which become an integral part of the Project. Shop Drawings shall be complete and detailed and shall consist of fabrication, erection, setting and schedule drawings, manufacturer's scale drawings, and wiring and control diagrams. Catalogs cuts, catalogs, pamphlets, descriptive literature, and performance and test data shall be considered only as supportive information to required Shop Drawings as defined above. As used herein, the term "manufactured" applies to standard units usually mass-produced; and "fabricated" means items specifically assembled or made out of selected materials to meet individual design requirements.

B. Manufacturer's catalog sheets, brochures, diagrams, illustrations, and other standard descriptive data shall be clearly marked to identify pertinent materials, products, or models. Delete information which is not applicable to the Work by striking or cross-hatching.

C. Each Shop Drawing shall be submitted with an 8-1/2" by 11" cover sheet which shall include a title block for the submittal. Each Shop Drawing cover sheet shall have a blank area 3-1/2 inches high by 4-1/2 inches wide, located adjacent to the title block. The title block/cover sheet shall display the following:

1. Project Title and Number.

2. Name of project building or structure.

3. Number and title of the Shop Drawing.

4. Date of Shop Drawing or revision.

5. Name of Contractor and subcontractor submitting drawing.

6. Supplier/manufacturer.

7. Separate detailer when pertinent.

8. Specification title and Section number.

9. Applicable Drawing number.

D. Data on materials and equipment shall include, without limitation, materials and equipment lists, catalog data sheets, catalog cuts, performance curves, diagrams, verification of conformance with applicable standards or codes, materials of construction, and similar descriptive material. Materials and equipment lists shall give, for each item thereon, the name and location of the supplier or manufacturer, trade name, catalog reference, size, finish, and all other pertinent Data.

E. For all mechanical and electrical equipment furnished, the Contractor shall provide a list including the equipment name, and address, and telephone number of the manufacturer's representative and service company so that service and/or spare parts can be readily obtained.

F. If drawings show variations from Contract requirements because of standard shop practice or for other reasons, the Contractor shall describe such variations in his letter of transmittal. If acceptable, proper adjustment in the Contract shall be implemented where appropriate. If the Contractor fails to describe such variations, he shall not be relieved of the responsibility for executing the Work in accordance with the Contract, even though such drawings have been reviewed.

G. All manufacturers or equipment suppliers who propose to furnish equipment or products shall submit an installation list to the Engineer along with the required shop drawings. The installation list shall include at least five (5) installations

where identical equipment has been installed and has been in operation for a period of at least two (2) years unless specified otherwise in the Specification Section applicable.

1.05 WORKING DRAWINGS

A. When used in the Contract Documents, the term "Working Drawings" shall be considered to mean the Contractor's plan for temporary structures such as temporary bulkheads, support of open cut excavation, support of utilities, ground water control systems, forming and falsework for underpinning, and for such other work as may be required for construction but does not become an integral part of the Project.

B. Copies of working drawings as noted in paragraph 1.05 A. above, shall be submitted to the Engineer where required by the Contract Documents or requested by the Engineer, and shall be submitted at least thirty (30) calendar days (unless otherwise specified by the Engineer) in advance of their being required for the Work.

C. Working Drawings shall be signed by a registered Professional Engineer, currently licensed to practice in the State of Florida, and shall convey, or be accompanied by, calculation or other sufficient information to completely explain the structure, machine, or system described and its intended manner of use. Prior to commencing such work, working drawings must have been reviewed without specific exceptions by the Engineer, which review will be for general conformance and will not relieve the Contractor in any way from his responsibility with regard to the fulfillment of the terms of the Contract. All risks to new or existing work are assumed by the Contractor; the Owner and Engineer shall have no responsibility therefor.

1.06 SAMPLES

A. The Contractor shall furnish, for the approval of the Engineer, samples required by the Contract Documents or requested by the Engineer. Samples shall be delivered to the Engineer as specified or directed. The Contractor shall prepay all shipping charges on samples. Materials or equipment for which samples are required shall not be used in the Work until approved by the Engineer.

B. Samples shall be of sufficient size and quantity to clearly illustrate:

1. Functional characteristics of the product, with integrally related parts and attachment devices.

2. Full range of color, texture, and pattern.

3. A minimum of three (3) samples of each item shall be submitted.

C. Each sample shall have a label indicating:

1. Name of Project.

2. Name of Contractor and subcontractor.

3. Material or equipment represented.

4. Place of origin.

5. Name of producer/supplier and brand (if any).

6. Location in Project.

7. Submittal and specification numbers.

(Samples of finished materials shall have additional marking that will identify them under the finished schedules.)

D. The Contractor shall prepare a transmittal letter and a description sheet for each shipment of samples. The description sheet shall contain the information required in Paragraphs 1.06B and C above. He shall enclose a copy of the letter and description sheet with the shipment and send a copy of the letter and description sheet to the Engineer. Approval of a sample shall be only for the characteristics or use named in such approval and shall not be construed to change or modify any Contract requirements.

E. Approved samples not destroyed in testing shall be sent to the Engineer or stored at the site of the Work. Approved Samples of the hardware in good condition will be marked for identification and may be used in the Work. Materials and equipment incorporated in the Work shall match the approved Samples. Samples which failed testing or were not approved will be returned to the Contractor at his expense, if so requested at time of submission.

PART 2 - PRODUCTS (NOT USED)
PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01370

SCHEDULE OF VALUES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. Submit to the Engineer a Schedule of Values allocated to the various lump sum portions of the Work, at the Preconstruction Conference, and as otherwise specified or requested to be submitted earlier as evidence of the Apparent Low Bidder's qualifications.

2. Upon request of the Engineer support the values with data which will substantiate their correctness. The data shall include, but not be limited to quantity of materials, all sub-elements of the activity, and their units of measure.

3. The Schedule of Values shall establish the actual value for each activity of the Work to be completed taken from the approved Critical Path Method (CPM) Construction Schedule, and shall be used as the basis for the Contractor's Applications for Payment.

B. Related Requirements Described Elsewhere:

1. Conditions of the Construction Contract.

1.02 FORM AND CONTENT OF SCHEDULE OF VALUES

A. Type schedule on 8-1/2 inch x 11 inch white paper. Contractor's standard forms and computer printouts may be considered for approval by the Engineer upon Contractor's request. Identify schedule with:

1. Title of project and location.

2. Owner and purchase order number.

3. Engineer and project number.

4. Name and address of Contractor.

5. Contract designation.

6. Date of submission.

B. Schedule shall list the installed value of the component parts of the Work in sufficient detail to serve as a basis for computing item prices for progress payments during construction.

C. Identify each line item with the number and the title of the respective section of the Specifications.

D. For each major item of the Work, list sub-values of major products or operations under the major item.

E. For the various portions of the Work:

1. The amount for each item shall reflect a total installed cost including a directly proportional amount of the Contractor's overhead and profit.

2. For items on which progress payments will be requested for stored materials, break down the value into:

a. The cost of the materials, delivered and unloaded, with taxes paid. Paid invoices are required for materials. Payment for materials shall be limited to the invoiced amount only.

b. The total installed value.

F. Round off figures to nearest dollar amount.

G. The sum of the costs of all items listed in the schedule shall equal the total Contract Price.

H. For each item which has an installed value of more than $15,000, provide a breakdown of costs to list major products or operations under each item.

1.03 SUBSCHEDULE OF UNIT MATERIAL VALUES

A. Submit a separate schedule of unit prices for materials to be stored on site and for those materials incorporated into the Work for which progress payments will be requested.

B. Format shall parallel that shown in Section 00846: Materials Stored On Site Form and Section 00845: Schedule of Values Form.

C. The unit values for the materials shall be broken down into:

1. Cost of the material, delivered and unloaded at the site, with taxes paid.

2. Copies of paid invoices for component material shall be included with the payment request in which the material first appears.

D. Only materials unique to the project may be billed when stored on site. Materials of standard use such as conduit, wire, small-diameter pipe, steel, etc., shall not be accepted for payment.

E. The installed unit value multiplied by the quantity listed shall equal the cost of that item in the Schedule of Values.

1.04 REVIEW AND RESUBMITTAL

A. After review by Engineer, revise and resubmit Schedule of Values and Schedule of Unit Material Values as required.

B. Resubmit revised schedules in same manner.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01505

MOBILIZATION

PART I - GENERAL

1.01 DEFINITION AND SCOPE

A. Mobilization shall include the costs of obtaining all permits, insurance and bonds, moving onto the site of all plant and equipment; furnishing and erecting plants, temporary buildings, and other construction facilities; all as required for the proper performance and completion of the Work. Mobilization shall include, but not be limited to, the following principal items.

1. Move onto the site all Contractor's equipment required for first month operations.

2. Install temporary construction power, wiring, and lighting facilities as needed.

3. Establish fire protection plan and safety program.

4. Secure construction water supply.

5. Provide on-site sanitary facilities and potable water facilities as specified.

6. Arrange for and erect Contractor's work and storage yard and employee's parking facilities.

7. Submit all required insurance certificates and bonds.

8. Obtain all required permits.

9. Post all OSHA, EPA, Department of Labor, and all other required notices.

10. Have Contractor's superintendent at the job site full time.

11. Submit a detailed construction CPM schedule acceptable to the Engineer as specified.

12. Submit a schedule of values of the Work.

13. Submit a schedule of submittals.

1.02 DEMOBILIZATION

A. Demobilization is the timely and proper removal of all contractor owned material, equipment or plant, from the job site and the proper restoration or completion of work necessary to bring the site into full compliance with the contract documents.

1.03 PAYMENT FOR MOBILIZATION/DEMOBILIZATION

A. The Contractor's attention is directed to the condition that payment for mobilization or any part thereof, shall not exceed 3 percent (%) of the total contract price.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01525

CONSTRUCTION AIDS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: Furnish, install and maintain required construction aids, remove on completion of Work.

B. Related Requirements Described Elsewhere:

1. Summary of Project: Section 01010.

C. Comply with applicable requirements specified in Sections of Divisions 2 through 16.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Materials may be new or used, suitable for the intended purpose, but must not violate requirements of applicable codes and standards.

2.02 CONSTRUCTION AIDS

A. Provide construction aids and equipment required by personnel and to facilitate execution of the Work: scaffolds, staging, ladders, stairs, ramps, runways, platforms, railings, hoists, cranes, chutes and other such facilities and equipment such as temporary valves and fittings. Refer to respective Sections for particular requirements for each trade.

B. When permanent stair framing is in place, provide temporary treads, platforms and railings, for use by construction personnel.

C. Maintain facilities and equipment in first-class condition.

PART 3 - EXECUTION

3.01 PREPARATION

A. Consult with the Engineer, review site conditions and factors which affect construction procedures and construction aids, which may be affected by execution of the Work.

3.02 GENERAL

A. Comply with applicable requirements specified in sections of Divisions 2 through 16.

B. Relocate construction aids as required by progress of construction, by storage of work requirements and to accommodate legitimate requirements of Owner and other contractors employed at the site.

3.03 REMOVAL

A. Completely remove temporary materials, equipment and services:

1. When construction needs can be met by use of permanent construction.

2. At completion of work.

B. Clean and restore areas damaged by installation by use of temporary facilities.

1. Remove foundations and underground installations for construction aids.

2. Grade and grass areas of site affected by temporary installations to required elevations, slopes, ground cover and clean the area.

C. Restore permanent facilities used for temporary purposes to specified condition or in kind if not specified.

END OF SECTION

SECTION 01600

MATERIAL AND EQUIPMENT

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: Material and equipment incorporated into the Work:

1. Manufactured and fabricated products:

a. Design, fabricate and assemble in accord with the best engineering and shop practices.

b. Manufacture like parts of duplicate units to standard sizes and gauges, to be interchangeable.

c. Two (2) or more items of the same kind shall be identical, by the same manufacturer.

d. Products shall be suitable for service conditions.

e. Equipment capacities, sizes and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.

2. Do not use material or equipment for any purpose other than that for which it is designed or specified.

1.02 MANUFACTURER'S INSTRUCTIONS FOR INSTALLATION

A. When Contract Documents require that installation of work shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in the installation, including five copies of the Engineer.

1. Maintain one (1) set of complete instructions at the job site during installation and until completion.

B. Handle, install, connect, clean, condition and adjust products in strict accord with such instructions and in conformity with specified requirements.

1. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with Engineer for further instructions.

2. Do not proceed with work without clear instructions.

C. Perform work in accordance with manufacturer's instructions. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.

1.03 TRANSPORTATION AND HANDLING

A. Arrange deliveries of products in accordance with progress schedules, coordinate to avoid conflict with work and conditions at the site.

1. Deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.

2. Immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and approved submittals, and that products are properly protected and undamaged.

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

1.04 STORAGE AND PROTECTION

A. The Contractor shall furnish a covered, weather-protected storage structure providing a clean, dry, noncorrosive environment for all mechanical equipment, valves, architectural items, electrical and instrumentation equipment, and special equipment to be incorporated into this Project. Storage or equipment shall be in strict accordance with the "instructions for storage" of each equipment supplier and manufacturer including connection of heaters, placing of storage lubricants in equipment, etc. Corroded, damaged or deteriorated equipment and parts shall be replaced before acceptance of the project. Equipment and materials not properly stored will not be included in a payment estimate.

B. Store products in accord with manufacturer's instructions, with seals and labels intact and legible.

1. Store products subject to damage by the elements in weather-tight enclosures.

2. Maintain temperature and humidity within the ranges required by manufacturer's instructions.

3. Store fabricated products above the ground, on blocking or skids, prevent soiling or staining. Cover products which are subject to deterioration with impervious sheet coverings, provide adequate ventilation to avoid condensation.

4. Store loose granular materials in a well-drained area on solid surfaces to prevent mixing with foreign matter.

C. All materials and equipment to be incorporated in the work shall be handled and stored by the Contractor before, during and after shipment in a manner to prevent warping, twisting, bending, breaking, chipping, rusting, and any injury, theft or damage of any kind whatsoever to the material or equipment.

D. Cement, sand and lime shall be stored under a roof and off the ground and shall be kept completely dry at all times. All structural and miscellaneous steel, and reinforcing steel shall be stored off the ground or otherwise to prevent accumulations of dirt or grease, and in a position to prevent accumulations of standing water and to minimize rusting. Beams shall be stored with the webs vertical. Precast concrete beams shall be handled and stored in a manner to prevent accumulations of dirt, standing water, staining, chipping or cracking. Brick, block and similar masonry products shall be handled and stored in a manner to reduce breakage, chipping, cracking and spalling to a minimum.

E. All materials, which, in the opinion of the Engineer, have become so damaged as to be unfit for the use intended or specified shall be promptly removed from the site of the work, and the Contractor shall receive no compensation for the damaged material or its removal.

F. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions, and free from damage or deterioration.

G. Protection After Installation: Provide substantial coverings as necessary to protect installed products from damage from traffic and subsequent construction operations. Remove covering when no longer needed.

H. The Contractor shall be responsible for all material, equipment and supplies sold and delivered to the Owner under this Contract until final inspection of the work and acceptance thereof by the Owner. In the event any such material, equipment and supplies are lost, stolen, damaged or destroyed prior to final inspection and acceptance, the Contractor shall replace same without additional cost to the Owner.

I. Should the Contractor fail to take proper action on storage and handling of equipment supplied under this Contract within seven (7) days after written notice

to do so has been given, the Owner retains the right to correct all deficiencies noted in previously transmitted written notice and deduct the cost associated with these corrections from the Contractor's Contract. These costs may be comprised of expenditures for labor, equipment usage, administrative, clerical, engineering and any other costs associated with making the necessary corrections.

1.05 STORAGE AND HANDLING OF EQUIPMENT ON SITE

A. Because of the long period allowed for construction, special attention shall be given to the storage and handling of equipment on site. As a minimum, the procedure outlined below shall be followed:

1. Materials shall not be shipped until approved by the Engineer. The intent of this requirement is to avoid unnecessary delivery of unapproved materials and to reduce on-site storage time prior to installation and/or operation. Under no circumstances shall major equipment or finish products be delivered to the site more than one month prior to installation without written authorization from the Engineer. Materials shipped to the site, or temporarily stored off-site in approved locations, shall be stored in accordance with Paragraph 1.04, herein.

2. All equipment having moving parts such as gears, electric motors, etc. and/or instruments shall be stored in a temperature and humidity controlled building approved by the Engineer, until such time as the equipment is to be installed.

3. All equipment shall be stored fully lubricated with oil, grease, etc. unless otherwise instructed by the manufacturer.

4. Manufacturer's storage instructions shall be carefully studied by the Contractor and reviewed with the Engineer by him. These instructions shall be carefully followed and a written record of this kept by the Contractor.

5. Moving parts shall be rotated a minimum of once weekly to insure proper lubrication and to avoid metal-to-metal "welding". Upon installation of the equipment, the Contractor shall start the equipment, at least half the load, once weekly for an adequate period of time to insure that the equipment does not deteriorate from lack of use.

6. Lubricants shall be changed upon completion of installation and as frequently as required thereafter during the period between installation and acceptance. Mechanical equipment to be used in the work, if stored for longer than ninety (90) days, shall have the bearings cleaned, flushed and lubricated prior to testing and startup, at no extra cost to the Owner.

7. Prior to acceptance of the equipment, the Contractor shall have the manufacturer inspect the equipment and certify that its condition has not been detrimentally affected by the long storage period. Such certifications by the manufacturer shall be deemed to mean that the equipment is judged by the manufacturer to be in a condition equal to that of equipment that has been shipped, installed, tested and accepted in a minimum time period. As such, the manufacturer will guarantee the equipment equally in both instances. If such a certification is not given, the equipment shall be judged to be defective. It shall be removed and replaced at the Contractor's expense.

1.06 SPARE PARTS

A. Spare parts for certain equipment provided under Divisions 11: Equipment; 13: Special Construction; 15: Mechanical; and 16: Electrical have been specified in the pertinent sections of the Specifications. The Contractor shall collect and store all spare parts so required in an area to be designated by the Engineer. In addition, the Contractor shall furnish to the Engineer an inventory listing all spare parts, the equipment they are associated with, the name and address of the supplier, and the delivered cost of each item. Copies of actual invoices for each item shall be furnished with the inventory to substantiate the delivered cost.

1.07 GREASE, OIL AND FUEL

A. All grease, oil and fuel required for testing of equipment shall be furnished with the respective equipment. The Owner shall be furnished with a year's supply of required lubricants including grease and oil of the type recommended by the manufacturer with each item of equipment supplied.

B. The Contractor shall be responsible for changing the oil in all drives and intermediate drives of each mechanical equipment after initial break-in of the equipment, which in no event shall be any longer than three (3) weeks of operation.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01650

START-UP AND DEMONSTRATION

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: Demonstrate to Owner and Engineer that the Work functions as a complete and operable system under normal and emergency operating conditions.

B. Contractor shall provide all materials, personnel, equipment and expendables as needed and as specified to perform the required start-up and demonstration tests.

PART 2 - PRODUCTS

2.01 START-UP PLAN

A. Submit for approval by the Engineer a detailed start-up plan outlining the schedule and sequence of all tests and start-up activities, including submittal of checkout forms, submittal of demonstration test procedures, start-up, demonstration and testing, submittal of certification of completed demonstration and training. Start-up and commissioning may not begin until the plan is approved by the Engineer.

PART 3 - EXECUTION

3.01 COMPONENT TEST AND CHECK-OUT

A. Start-up Certification: Prior to system start-up, successfully complete all the testing required of the individual components of the Work. Submit six (6) copies of CHECK-OUT MEMO'S for each individual component or piece of equipment, signed by the Contractor or the subcontractor and the manufacturer's representative. All copies of the Operation and Maintenance Manuals must be provided before start-up may begin. These forms shall be completed and submitted before Instruction in Operation to Owner or a request for initiating any final inspections. Insert one (1) copy of this form into the applicable section of each Operation and Maintenance Manual.

B. Demonstrate to the Engineer and the Owner's representative, that all temporary jumpers and/or bypasses have been removed and that all of the components are operating under their own controls as designated.

C. Coordinate start-up activities with the Owner and with the Engineer prior to commencing system start-up.

3.02 START-UP

A. Confirm that all equipment is properly energized, that the valves are set to their normal operating condition and that the flow path through the new Work is unobstructed.

B. Slowly fill each hydrostatic structure in the process flow stream with water.

C. Initiate start-up and training in accordance with and with the use of the plant operation and maintenance manuals.

D. Observe the component operation and make adjustments as necessary to optimize the performance of the Work.

E. Coordinate with Owner for any adjustments desired or operational problems requiring debugging.

F. Make adjustments as necessary.

3.03 START-UP DEMONSTRATION AND TESTING

A. After all Work components have been constructed, field tested, and started up in accordance with the individual Specifications and manufacturer requirements, and after all Check-Out Forms have been completed and submitted, perform the Start-Up Demonstration and Testing in the presence of the Engineer and Owner. The demonstration period shall be held upon completion of all systems at a starting date to be agreed upon in writing by the Owner or his representative.

B. The Start-Up Demonstration Testing will be conducted for seven (7) consecutive days. The Work must operate successfully during the seven (7) day testing period in the manner intended. If the Work does not operate successfully, or if the start-up is interrupted due to other contracts, the problems will be corrected and the test will start over from day one. The party causing the interruption will be subject to the assessment of actual damages due to delay.

C. During the start-up demonstration period, operate the Work, instruct designated plant operating personnel in the function and operation of the Work, and cause various operational circumstances to occur. Demonstrate the essential features of the equipment and its relationship to other equipment. The approved schedule of operational circumstances and Demonstration Test Procedures Forms will be used as the agenda during the Start-Up Demonstration Testing period for all equipment

and sections of the Work. Coordination of the demonstration test schedule will be accomplished through the Engineer.

D. Acceptability of the Work's performance will be based on the Work performing as specified under these actual and simulated operating conditions, to provide water treatment facilities functioning as intended and as defined in the Contract Documents. The intent of the start-up demonstration and testing is for the Contractor to demonstrate to the Owner and the Engineer that the Work will function as a complete and operable system under normal, as well as emergency operating conditions, and is ready for final acceptance.

E. Demonstrate the essential features of the whole system as it applies to the Work, including the mechanical equipment, piping, structures, finishes, controls, instrumentation, power distribution and lighting systems. Use the approved procedures and circumstances to demonstrate the system. Any minor deficiencies found shall be noted and included on a punch list attached to the Certificate of Completed Demonstration. The system shall be demonstrated only once, after completion of start-up tests. If circumstances arise that interrupt the test procedures (such as weather, unforeseen process problems, or problems caused by the Contractor whether or not the problems are the fault of the Contractor, etc.,) then the test shall be terminated and rescheduled to a later date after the problem is corrected. The test shall be run in its entirety if so directed by the Engineer.

F. Upon successful completion of the Start-up, Demonstration and Testing, the Owner's personnel will receive the specified training for each system. Training of the Owner's personnel will not be considered valid unless it takes place using a system that has successfully passed the Start-up, Demonstration and Testing.

G. Upon completion of all specified operator training, the Contractor shall submit to the Engineer six (6) copies of the Certificate of Completed Demonstration Form, for each item of equipment or system in the Work, signed by the Contractor, Subcontractor, Engineer, and the Owner. Insert one (1) copy of this form in the applicable section of each Operation and Maintenance Manual. A sample Certificate of Completed Demonstration Form is provided in Section 00866.

END OF SECTION

SECTION 01700

CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: Comply with requirement stated in Conditions of the Contract and in Specifications for administrative procedures in closing out the Work.

B. Related Requirements Described Elsewhere:

1. Start-Up and Demonstration: Section 01650

2. Cleaning: Section 01710.

3. Project Record Documents: Section 01720.

4. Operating and Maintenance Data: Section 01730.

5. Warranties and Bonds: Section 01740.

1.02 SUBSTANTIAL COMPLETION

A. The Work will not be substantially complete, and Contractor may not request substantial completion inspection unless the following submittals and work is completed:

1. All Operation and Maintenance manuals have been submitted and approved to the requirements of Section 01730.

2. All equipment has been checked-out by the equipment manufacturer and Certificates of Manufacturer's Check-Out have been submitted as required by Section 01650.

3. All start-up and demonstration testing completed and Certificates of Completed Demonstration submitted to the requirements of Section 01650.

4. Project Record Documents are complete and have been submitted and reviewed to the requirements of Section 01720.

5. All training of Owner's personnel completed.

6. All areas to be used and occupied are safe, operable in automatic and complete.

7. All painting, finishes, fencing, cleanup, final grading, grassing, planting, sidewalk construction, and paving shall have been completed and ready for inspection.

8. All deficiencies noted on inspection reports or nonconformances are corrected or the correction plan approved.

B. When the conditions of paragraph 1.02 A. are met the Contractor shall submit to the Engineer:

1. A written notice that he considers the Work, or portion thereof, is substantially complete, and request an inspection.

2. A punchlist of items to be corrected. (Uncompleted work which is not related to the safe, effective, efficient use of the Project may be allowed on the punchlist with the Engineer's approval.)

C. Within a reasonable time after receipt of such notice, the Engineer will make an inspection to determine the status of completion.

D. Should the Engineer determine that the Work is not substantially complete:

1. The Engineer will promptly notify the Contractor in writing, giving the reasons therefor.

2. Contractor shall remedy the deficiencies in the Work and send another written notice of substantial completion to the Engineer.

3. The Engineer will within reasonable time, reinspect the Work. The Contractor will be liable for reinspection fees as described in paragraph 1.04, herein.

E. When the Engineer finds that the Work is substantially complete, he will:

1. Schedule a walk-through of the facility to include the Owner. Engineer shall determine the completeness of the punchlist and readiness of the facility for occupancy by the Owner.

2. Prepare and deliver to Owner a tentative Certificate of Substantial Completion with the tentative punchlist of items to be completed or corrected before final inspection.

3. After consideration of any objections made by the Owner as provided in Conditions of the Contract, and when the Engineer considers the Work substantially complete, he will execute and deliver to the Owner and the Contractor a definite Certificate of Substantial Completion with a revised tentative list of items to be completed or corrected. Any incomplete work allowed on a punchlist must be reinspected upon completion and any deficiencies found will be added to the punchlist.

1.03 FINAL INSPECTION

A. Prior to Contractor's request for a final inspection the following submittals and work must be complete:

1. Project Record Documents must be approved.

2. All spare parts and maintenance materials must be suitably delivered to the Owner per the requirements of the Technical Sections of the Specifications.

3. Contractor to submit evidence of compliance with requirements of governing authorities.

B. After satisfying the requirements of paragraph 1.03 A. and when Contractor considers the Work complete, he shall submit written certification that:

1. Contract Document requirements have been met.

2. Work has been inspected for compliance with Contract Documents.

3. Work has been completed in accordance with Contract Documents.

4. Equipment and systems have been tested in the presence of the Owner's representative and are operational.

5. All punchlist items have been corrected or completed and the Work is ready for final inspection.

C. The Engineer will, within reasonable time, make an inspection to verify the status of completion with reasonable promptness after receipt of such certification.

D. Should the Engineer consider that the Work is incomplete or defective:

1. The Engineer will promptly notify the Contractor in writing, listing the incomplete or defective work.

2. Contractor shall take immediate steps to remedy the stated deficiencies, and send another written certification to the Engineer that the Work is complete.

3. The Engineer will, within a reasonable amount of time, reinspect the Work and the Contractor shall be liable for reinspection fees as described in paragraph 1.04, herein.

D. When the Engineer finds that the Work is acceptable under the Contract Documents, the Contractor may make closeout submittals.

1.04 REINSPECTION FEES

A. Should the Engineer perform reinspections due to failure of the Work to comply with the claims of status of completion made by the Contractor:

1. Contractor will compensate the Owner for such additional services.

2. Owner will deduct the amount of such compensation from the final payment to the Contractor.

1.05 CONTRACTOR'S CLOSEOUT SUBMITTALS

A. Warranties and Bonds: Section 01740.

B. Evidence of Payment and Release of Liens: To requirements of General and Supplementary Conditions.

C. Certificate of Insurance for Products and Completed Operations.

1.06 FINAL ADJUSTMENT OF ACCOUNTS

A. Submit a final statement of accounting to the Engineer.

B. Statement shall reflect all adjustments to the Contract Sum:

1. The original Contract Sum.

2. Additions and deductions resulting from:

a. Previous change orders or written amendment.

b. Allowances.

c. Unit prices.

d. Deductions for uncorrected work.

e. Penalties and bonuses.

f. Deductions for liquidated damages.

g. Deductions for reinspection payments.

h. Other adjustments.

3. Total Contract Sum, as adjusted.

4. Previous payments.

5. Sum remaining due.

C. Engineer will prepare a final Change Order, reflecting approved adjustments to the Contract Sum which were not previously made by Change Orders.

1.07 FINAL APPLICATION FOR PAYMENT

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

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01710

CLEANING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: Execute cleaning, during progress of the Work and at completion of the Work.

1.02 DISPOSAL REQUIREMENTS

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

PART 2 - PRODUCTS

2.01 MATERIALS

A. Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces.

B. Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned.

C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 - EXECUTION

3.01 DURING CONSTRUCTION

A. Execute daily cleaning to keep the Work, the site and adjacent properties free from accumulations of waste materials, rubbish and windblown debris, resulting from construction operations or personal activities.

B. Provide on-site containers for the collection of waste materials, debris and rubbish.

C. Remove waste materials, debris and rubbish from the site periodically, or as directed by the Owner, and dispose of at legal disposal areas away from the site.

3.02 DUST CONTROL

A. The Contractor shall employ construction techniques that minimize the production and distribution of dust.

B. Clean interior spaces prior to the start of finish painting and continue cleaning on an as-needed basis until painting is finished.

C. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly-coated surfaces.

3.03 FINAL CLEANING

A. Employ skilled workmen for final cleaning.

B. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from sight-exposed interior and exterior surfaces.

C. Prior to final completion, or Owner occupancy, Contractor shall conduct an inspection of sight-exposed interior and exterior surfaces and all work areas, to verify that the entire Work is clean.

END OF SECTION

SECTION 01720

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: Maintain at the site for the Owner one (l) record copy of:

1. Drawings.

2. Specifications.

3. Addenda.

4. Change Orders and other modifications of the Contract.

5. Engineer's Field Orders or written instructions.

6. Approved Shop Drawings, Working Drawings and Samples.

7. Field Test records.

B. Related Requirements Described Elsewhere:

1. Field Engineering: Section 01050.

2. Shop Drawings, Working Drawings and Samples: Section 01340.

1.02 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. Store documents and samples in Contractor's possession apart from documents used for construction.

1. Provide files and racks for storage of documents.

2. Provide locked cabinet or secure storage space for storage of samples.

B. File documents and samples in accordance with CSI format with section numbers as provided herein.

C. Maintain documents in a clean, dry, legible, condition and in good order. Do not use record documents for construction purposes.

D. Make documents and samples available at all times for inspection by the Engineer or the Owner.

E. As a prerequisite for monthly Progress payments, the Contractor is to exhibit the currently updated "Record Documents" for review by the Engineer and Owner. Payment may be withheld if record documents are not satisfactorily maintained.

1.03 MARKING DEVICES

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

1.04 RECORDING

A. Label each document "PROJECT RECORD" with a rubber stamp having one (1) inch high letters.

B. Record information concurrently with construction progress.

1. Do not conceal any work until required information is recorded.

C. Drawings: Legibly and clearly mark, to scale, each drawing to record actual construction:

1. All underground piping with elevations and dimensions. Changes to piping location. Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements. Actual installed pipe material, class, etc.

2. Location of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure.

3. Field changes of dimension and detail.

4. Changes made by Field Order or by Change Order.

5. Details not on original Contract Drawings.

6. Equipment and piping relocations.

D. Specifications and Addenda: Legibly mark each section to record:

1. Manufacturer, trade name, catalog number of Supplier of each product and item of equipment actually installed.

2. Changes made by Field Order or by Change Order.

E. Shop Drawings (after final review and approval): Provide six (6) sets of record shop drawings within the Operation and Maintenance Manual, for each process equipment, piping, electrical system and instrumentation system (see Section 01730).

1.05 SUBMITTAL

A. At Contract closeout, deliver Record Documents to the Engineer for the Owner in electronic format (AutoCAD (dwg) 2011 or later edition and Microsoft word as applicable).

B. Accompany submittal with transmittal letter in duplicate, containing:

1. Date.

2. Project title and number.

3. Contractor's name and address.

4. Title and number of each Record Document.

5. Signature of Contractor or his authorized representative.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED

END OF SECTION

SECTION 01730

OPERATING AND MAINTENANCE DATA

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. Compile product data and related information appropriate for Owner's operation and maintenance of products furnished under Contract.

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

2. Instruct Owner's personnel in maintenance of products and in operation of equipment and systems.

B. Related Requirements Described Elsewhere:

1. Contract Closeout: Section 01700

2. Project Record Documents: Section 01720

1.02 QUALITY ASSURANCE

A. Preparation of data shall be done by personnel:

1. Trained and experienced in maintenance and operation of described products.

2. Familiar with requirements of the Section.

3. Skilled as technical writer to the extent required to communicate essential data.

4. Skilled as draftsman competent to prepare required drawings.

1.03 FORM OF SUBMITTALS

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

B. Format:

1. Size: 8-1/2 inches x 11 inches.

2. Paper: 20 pound minimum, white, for typed pages.

3. Text: Manufacturer's printed data, or neatly typewritten.

4. Drawings:

a. Provide reinforced punched binder tab, bind in with text.

b. Reduce larger drawings and fold to size of text pages but not larger than 14 inches x 17 inches.

5. Provide fly-leaf for each separate product, or each piece of operating equipment.

a. Provide typed description of projects and major component parts of equipment.

b. Provide identified tabs.

6. Cover: Identify each volume with typed or printed title "OPERATING AND MAINTENANCE MANUAL". List:

a. Title of Project.

b. Identity of separate structure as applicable.

c. Identity of general subject matter covered in the manual.

d. Identity of consulting engineer for the project.

e. Identity of general contractor for the project.

C. Binders:

1. Commercial quality , three D-ring type binders with durable and cleanable white plastic covers. Binders shall be presentation type with clear vinyl covers on front, back and spine. Binders shall include two sheet lifters and two, horizontal inside pockets.

2. Maximum D-ring width: 2 inches.

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

1.04 CONTENT OF MANUAL

A. Each volume of the operation and maintenance manual shall include:

1. A neatly typewritten table of contents for each volume, arranged in systematic order by division, as listed within the product specifications.

2. Contractor, name of responsible principal, address and telephone number.

3. A list of each project required to be included, indexed to content of the volume.

4. List, with each project, name, address and telephone number of:

a. Subcontractor, manufacturer and installer name, addresses and telephone numbers.

b. A list of each product required to be included, indexed to content of the volume.

c. Identify area of responsibility of each product.

d. Local source of supply for parts and replacement equipment including name, address and telephone number.

5. Identify each product by product name and other identifying symbols as set forth in Contract Documents.

B. Product Design

1. Provide hydraulic and engineering design criteria for each product as it pertains to a particular unit process.

2. Provide a general description of each normal product operation as it pertains to a particular unit process.

C. Product Data:

1. Include only those sheets which are pertinent to the specific product. Hydraulic and engineering design criteria, information and procedures required for normal control, process control and performance evaluations, listing of spare parts required, maintenance and repair instructions, safety

and personnel requirements and a "trouble shooting" problem guide shall be included in the manual. References to related products, manufacturer and equipment histories, product catalogs, etc. shall not be included within the content of the operation and maintenance manual.

2. Annotate each sheet to:

   a. Clearly identify specific product or part installed.

   b. Clearly identify data applicable to installation.

   c. Delete references to inapplicable information.

3. Operation and maintenance information as herein specified.

4. Record shop drawings as submitted and approved with all corrections made for each product.

D. Drawings:

1. Supplement product data with drawings as necessary to clearly illustrate:

   a. Relations of component parts of equipment and systems.

   b. Product assembly and disassembly for maintenance and repair procedures.

   c. Control and flow diagrams.

   d. Representation of manufacturer's recommended spare parts.

2. Coordinate drawings with information in Project Record Documents to assure correct illustration of completed installation.

3. Do not use Project Record Documents as maintenance drawings.

E. Written test, as required to supplement product data for the particular installation:

1. Organize in consistent format under separate headings for different procedures.

2. Provide logical sequence of instruction of each procedure.

F. Copy of each warranty, bond and service contract issued.

1. Provide information sheet for Owner's personnel, give:

a. Proper step-by-step procedures in the event of product failure.

b. Safety instructions for plant personnel in handling of failed equipment.

c. Instances which might affect validity of warranties or bonds.

1.05 MANUAL FOR MATERIALS AND FINISHES

A. Submit six (6) copies of complete manual in final form.

B. Content: for architectural products, applied materials and finishes:

1. Manufacturer's data, giving full information on products.

a. Catalog number, size, composition.

b. Color and texture designations.

c. Information required for reordering special manufacturing products.

2. Instructions for care and maintenance.

a. Manufacturer's recommendation for types of cleaning agents and methods.

b. Cautions against cleaning agents and methods which are detrimental to product.

c. Recommended schedule for cleaning and maintenance.

C. Content, for moisture protection and weather-exposed products:

1. Manufacturer's data, giving full information on products.

a. Applicable standards.

b. Chemical composition.

c. Details of installation.

2. Instructions for inspection, maintenance and repair.

D. Additional requirements for maintenance data: Respective sections of Specifications.

1.06 MANUAL FOR EQUIPMENT AND SYSTEMS

A. Submit six (6) copies of complete manual in final form.

B. Provide table of contents for each unit of equipment and system.

1. List in entirety all sections pertinent to equipment operation and maintenance.

2. Provide fly-leaf for each individual section identified by corresponding section number.

C. Content, for each unit of equipment and system, as appropriate:

1. Description of unit and component parts.

a. Provide general mechanical and process descriptions, normal operating characteristics, and limiting conditions.

b. Performance curves, engineering data and tests as pertains to the performance requirements as listed in the respective specifications.

c. Complete nomenclature and commercial number of replaceable parts.

d. Summary of information listed on equipment and motor data plates.

2. Operating procedures:

a. Start-up, break-in, routine and normal operating instructions.

b. Regulation, control, stopping, shut-down and emergency instructions.

c. Summer and winter operating instructions.

d. Special operating instructions in the event of equipment failure or emergency situations to insure uninterrupted plant operation. Provide step-by-step instruction to initiate process alternatives.

3. Maintenance procedures:

   a. Provide instructions for maintenance procedures during routine operations.

   b. Provide "trouble-shooting" guide.

   c. Disassembly, repair and reassembly.

   d. Alignment, adjusting and checking.

4. Servicing and lubrication schedules required, to insure maximum product performance.

5. Manufacturer's printed operating and maintenance instructions.

6. Description of sequence of operation by control manufacturer.

7. Original manufacturer's parts list, illustrations, assembly drawings and diagrams required for maintenance.

   a. Predicted life of parts subject to wear.

   b. Items recommended to be stocked as spare parts with manufacturers part number.

8. As-installed control diagrams by controls manufacturer.

9. Each Contractor's coordination drawings.

   a. As-installed color coded piping diagrams.

10. Charts of valve tag numbers, with location and function of each valve.

11. List of original manufacturer's spare parts, manufacturer's current prices and recommended quantities to be maintained in storage.

12. Other data as required under respective sections of specifications.

13. Approved record shop drawings with all corrections made, and a copy of the warranty statement, checkout memo, demonstration test procedures and demonstration test certification.

D. Content, for each electric and electronic systems, as appropriate:

1. Description of system and component parts.

a. Function, normal operating characteristics, and limiting conditions.

b. Performance curves, engineering data and tests.

c. Complete nomenclature and commercial number of replaceable parts.

2. Circuit directories and panelboards.

a. Electrical service

b. Controls

c. Communications

3. As installed color coded wiring diagrams.

4. Operating procedures:

a. Routine and normal operating instructions.

b. Sequences required.

c. Special operating instructions.

5. Maintenance procedures:

a. Routine operations.

b. Guide to "trouble-shooting".

c. Disassembly, repair and reassembly.

d. Adjustment and checking.

6. Manufacturer's printed operating and maintenance instructions.

7. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.

8. Other data as required under pertinent sections of specifications.

E. Prepare and include additional data when the need for such data becomes apparent during instruction of Owner's personnel.

F. Additional requirements for operating and maintenance data:

1. Respective sections of Specifications.

1.07 SUBMITTAL SCHEDULE

A. Submit two copies of preliminary draft of proposed formats and outlines of contents of Operation and Maintenance Manuals within 150 days after Notice to Proceed.

B. Submit two copies of completed data in preliminary form no later than 30 days following Engineer's review of the last shop drawing of a product and/or other submittal specified under Section 01340, but no later than delivery of equipment. One copy will be returned with comments to be incorporated into the final copies and the other copy will be retained on-site for use in any early training.

C. Submit six (6) copies of approved manual in final form directly to the offices of the Engineer, Hartman & Associates, Inc., within 10 days after the reviewed copy or last item of the reviewed copy is returned.

D. Provide six (6) copies of addenda to the operation and maintenance manuals as applicable and certificates as specified within 30 days after final inspection.

1.08 INSTRUCTION OF OWNER'S PERSONNEL

A. Prior to demonstration test, fully instruct Owner's designated operating and maintenance personnel in operation, adjustment and maintenance of products, equipment and systems.

B. Operating and maintenance manual shall constitute the basis of instruction. Review contents of manual with Owner's operating and maintenance personnel in full detail to explain all aspects of operations and maintenance.

C. Instructors shall be fully qualified personnel as outlined within the individual equipment specifications. If no specific training specifications are listed with the equipment, the Contractor shall provide the instruction with qualified Contractor personnel.

D. The Contractor shall provide a list to the Owner indicating the date, time and instructors that will be present for all training sessions.

E. The instructors shall provide for and prepare lesson scopes and handouts for up to five individuals designated by the Owner that outline the items to be covered. Separate sessions for operation and maintenance instruction shall be provided consecutively. Handouts shall be submitted to the Owner with at least one week's notice prior to the training sessions.

F. All instruction sessions shall be video taped with portable video recording cameras and tapes supplied by the Contractor. Video taping shall be made by the Contractor under the direction of the Owner using VHS compatible video taping equipment.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01740

WARRANTIES AND BONDS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. Compile specified warranties and bonds, as specified by the City.

B. Related Work Described Elsewhere:

1. Contract Closeout: Section 01700.

1.02 SUBMITTAL REQUIREMENTS

A. Assemble warranties, bonds and service and maintenance contracts, executed by each of the respective manufacturers, suppliers, and subcontractors.

B. Number of original signed copies required: Two (2) each.

C. Table of Contents: Neatly typed, in orderly sequence. Provide complete information for each item.

1. Product of work item.

2. Firm, with name of principal, address and telephone number.

3. Scope.

4. Date of beginning of warranty, bond or service and maintenance contract.

5. Duration of warranty, bond or service maintenance contract.

6. Provide information for Owner's personnel:

a. Proper procedure in case of failure.

b. Instances which might affect the validity or warranty or bond.

7. Contractor, name of responsible principal, address and telephone number.

1.03 FORM OF SUBMITTALS

A. Prepare in duplicate packets.

B. Format:

1. Size 8-1/2 inches by 11 inches, punch sheets for standard three (3) ring binder.

a. Fold larger sheets to fit into binders.

2. Cover: Identify each packet with typed or printed title "WARRANTIES AND BONDS". List:

a. Title of Project.

b. Name of Contractor.

C. Binders: Commercial quality, three (3) D-ring type binders with durable and cleanable white plastic covers and maximum D-ring width of two (2) inches. Binders shall be presentation type with clear vinyl covers on front, back, and spine. Binders shall include two sheet lifters and two horizontal inside pockets.

1.04 WARRANTY SUBMITTALS REQUIREMENTS

A. For all major pieces of equipment, submit a warranty from the equipment manufacturer. The manufacturer's warranty period shall be concurrent with the Contractor's for one (1) year, unless otherwise specified, commencing at the time of final acceptance by the Owner.

B. The Contractor shall be responsible for obtaining certificates for equipment warranty for all major equipment specified under Divisions 11: Equipment; 13: Special Construction; 15: Mechanical; and 16: Electrical and which has at least a 1 hp motor or which lists for more than $1,000. The Engineer reserves the right to request warranties for equipment not classified as major. The Contractor shall still warrant equipment not considered to be "major" in the Contractor's one-year warranty period even though certificates of warranty may not be required.

C. In the event that the equipment manufacturer or supplier is unwilling to provide a one (1) year warranty commencing at the start of the Correction Period, the Contractor shall obtain from the manufacturer a two (2) year warranty commencing at the time of equipment delivery to the job site. This two (2) year warranty from the manufacturer shall not relieve the Contractor of the one (1) year warranty, starting at the time of Owner's acceptance of the equipment.

D. The Owner shall incur no labor or equipment cost during the guarantee period.

E. Guarantee shall cover all necessary labor, equipment, materials, and replacement parts resulting from faulty or inadequate equipment design, improper assembly or erection, defective workmanship and materials, leakage, breakage or other failure of all equipment and components furnished by the manufacturer or the Contractor.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01800

MISCELLANEOUS WORK AND CLEANUP

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. This Section includes operations which cannot be specified in detail as separate items but can be sufficiently described as to the kind and extent to work involved. The Contractor shall furnish all labor, materials, equipment and incidentals to complete the work under this Section.

2. The work of this Section includes, but is not limited to, the following:

a. Cleaning up.

b. Incidental work.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Materials required for this Section shall be of the same quality as materials that are to be restored. Where possible, the Contractor shall reuse existing materials that are removed and then replaced.

PART 3 - EXECUTION

3.01 CLEAN UP

A. The Contractor shall remove all construction material, buildings, equipment and other debris remaining on the job as the result of construction operations and shall render the site of the work in a neat and orderly condition. All suitable excess excavated material shall remain on site.

3.02 INCIDENTAL WORK

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

END OF SECTION

SECTION 09900

PAINTING

PART I - GENERAL

1.01 DESCRIPTION OF WORK

A. The Contractor shall furnish all materials, labor, equipment, and incidentals required to provide a protective coating system for the surfaces listed herein and not otherwise excluded. All surfaces described shall be included within the scope of this Section.

B. The work includes painting and finishing of interior and exterior exposed items and surfaces such as ceilings, walls, floors, miscellaneous metal, pipes, fittings, valves, equipment, and all other work obviously required to be painted unless otherwise specified herein or on the Drawings. The omission of minor items in the schedule of work shall not relieve the Contractor of his obligation to include such items where they come within the general intent of the Specifications as stated herein. The following major items of the Project shall be coated:

1. Exterior of buried concrete structures.

2. Any ferrous metal and aluminum components of equipment, piping, fittings and valves (except stainless steel).

3. Exposed ferrous surfaces of equipment, pumps, motors, and ferrous or galvanized metal fittings and accessories.

4. Exposed surfaces of PVC components of piping, fittings, valves, electrical conduit, and equipment.

5. Exposed exterior surfaces of all metallic piping, fittings, and valves located on the interior and exterior of buildings and structures.

6. Embedded aluminum or aluminum in contact with dissimilar metals or in contact with corrosive atmospheres.

7. Exposed exterior surfaces of new metallic piping, fittings, and valves located on the interior and exterior of buildings and structures. This shall include new piping, fittings, and valves for the project only.

8. Masonry and gypsum portions of well house.

C. "Paint" as used herein means all coating systems, materials, including primers, emulsions, enamels, epoxies, sealers and fillers, and other applied materials whether used as a prime, intermediate, or finish coats.

D. The following items will not be painted unless otherwise noted:

1. Any code-requiring labels, such as Underwriters' Laboratories and Factory Mutual, or any equipment identification, performance rating, name or nomenclature plates.

2. Any moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sensing devices, motor and fan shafts, unless otherwise indicated.

3. Traffic stripes on paving are specified in Division 2: Site Work.

4. Aluminum or fiberglass handrails, walkways, toeboards, windows, louvers, grating, checker plate, hatches, and stairways.

5. Stainless steel angles, tube, pipe, etc.

6. Products with polished chrome, aluminum, nickel, or stainless steel finish.

7. Stainless steel, brass, bronze, and aluminum other than exposed utility tubing.

8. Flexible couplings, lubricated bearing surfaces, insulation, and plastic pipe or duct interiors.

9. Plastic switch plates and receptacle plates.

10. Signs and nameplates.

11. Finish hardware.

12. Packing glands and other adjustable parts, unless otherwise indicated.

13. Portions of metal, other than aluminum, embedded in concrete. This does not apply to the back face of items mounted to concrete or masonry surfaces, which shall be painted before erection. Aluminum to be embedded in, or in contact with, concrete shall be coated to prevent electrolysis.

1.02 RELATED WORK

A. Paint piping and equipment for identification purposes in accordance to Section 09905: Piping and Equipment Identification System.

1.03 QUALITY ASSURANCE

A. Provide the best quality grade of the various types of coatings as regularly manufactured by approved paint materials manufacturers. Materials not displaying the manufacturer's identification as a standard, best-grade product will not be acceptable.

B. Provide undercoat paint produced by the same manufacturer as the finish coats. Undercoat and finish coat paints shall be compatible. Use only thinners approved by the paint manufacturer, and use only within recommended limits.

C. Painting shall be accomplished by experienced painters specializing in industrial painting familiar with all aspects of surface preparations and applications required for this project. Work shall be done in a safe and workmanlike manner.

D. Standards:

1. ASTM.

2. OSHA.

3. NFPA.

4. SSPC.

5. NACE.

6. NSF.

7. AWWA.

E. Acceptable Manufacturers:

1. Carboline Company.

2. Tnemec Company, Inc.

3. Keeler & Long, Inc.

4. Porter International.

1.04 SUBMITTALS

A. Materials and Shop Drawings: Submit to the Engineer as provided in the General Conditions and Section 01340: Shop Drawings, Working Drawings and Samples, shop drawings, manufacturer's specifications and data on the proposed paint systems and detailed surface preparation, application procedures and dry film thickness (DFT).

B. Schedule:

1. The Contractor shall submit for approval a complete typewritten Schedule of Painting Operations within 90 days after the Notice to Proceed. This Schedule is imperative so that the various fabricators or suppliers may be notified of the proper ship prime coat to apply. It shall be the Contractor's responsibility to properly notify and coordinate the fabricators' or suppliers' surface preparation and painting operations with these specifications. This Schedule shall include for each surface to be painted, the brand name, generic type, solids by volume, application method, the coverage and the number of coats in order to achieve the specified dry film thickness, and color charts. When the Schedule has been approved, the Contractor shall apply all material in strict accordance with the approved Schedule and the manufacturer's instructions. Wet and dry paint film gauges may be utilized by the Owner or Engineer to verify the proper application while work is in progress.

2. It is the intent of this Section that as much as possible all structures, equipment, and piping utilize coating systems specified herein supplied by a single manufacturer. All exceptions must be noted on the Schedule. For each coating system, only one (1) manufacturer's product shall be used.

3. Requests for substitutions shall be made within ten (10) days of Bid and shall include all of the information required in the Schedule plus a signed and notarized statement from the Chief (Manufacturing) Chemist that the products listed are equal to the specified products, test results, and a list of ten (10) municipal wastewater plant projects where each product has been used and provided satisfactory service for at least ten years. No request for substitution shall be considered that would change the generic type of coating, decrease DFT, or decrease number of coats.

Test result submittals shall be certified by a qualified testing laboratory. A quality of paint that is measured by analytical written ASTM/Federal test procedures will provide assurances that quality products are utilized.

The results from the following testing procedures shall be submitted for determining quality:

a. Abrasion: Federal Test Method Std. No. 141, Method 6192, CS-17 Wheel, 1,000 gram load.

b. Adhesion: Elcometer Adhesion Tester (0 to 1000 psi).

c. Exterior Exposure: Exposed at 45 degrees facing ocean (South Florida Marine Exposures).

d. Hardness: ASTM D-3363, latest revision.

e. Humidity: ASTM D-2247, latest revision.

f. Salt Spray (Fog): ASTM B-117, latest revision.

C. Color Samples: Manufacturer's standard color charts for color selection by Owner.

D. Samples- Painting:

1. Paint colors will be selected by Owner. Compliance with all other requirements is the exclusive responsibility of the Contractor.

2. Samples of each finish and color shall be submitted to the Owner or Engineer for approval before any work is started.

3. Samples shall be prepared so that an area of each sample indicates the appearance of the various coats. For example, where three (3) coat work is specified, the sample shall be divided into three (3) areas:

a. One (1) showing the application of one (1) coat only.

b. One (1) showing the application of two (2) coats.

c. One (1) showing the application of all three (3) coats.

4. Such samples when approved in writing shall constitute a standard, as to color and finish only, for acceptance or rejection of the finish work.

5. For piping, valves, equipment and miscellaneous metal work, provide sample chips or color charts of all paint selected showing color, finish, and general characteristics.

6. Rejected samples shall be resubmitted until approved.

E. The Contractor shall submit to the Owner, immediately upon completion of the job, certification from the manufacturer indicating that the quantity of each coating purchased was sufficient to coat all surfaces, in accordance with the requirements or

this Section. Such certification shall make reference to square footage figures provided to the manufacturer by the Contractor.

1.05 DELIVERY, HANDLING AND STORAGE

A. Deliver all materials to the job site in original, unopened packages and containers bearing manufacturer's name and label in accordance with Section 01600: Materials and Equipment.

1. Provide labels on each container with the following information:

a. Name or title of material.

b. Fed. Spec. number if applicable.

c. Manufacturer's stock number, date of manufacture and expiration date (shelf life).

d. Manufacturer's formula or specification number.

e. Manufacturer's batch number.

f. Manufacturer's name.

g. Generic type.

h. Contents by volume, for major pigment and vehicle constituents.

i. Application instructions: thinning, ambient conditions, etc.

j. Color name and number.

2. Containers shall be clearly marked to indicate any hazards connected with the use of the paint and steps, which should be taken to prevent injury to those handling the product.

B. All containers shall be handled and stored in such a manner as to prevent damage or loss of labels or containers.

C. The Owner shall designate areas for storage and mixing of all painting materials. Store only acceptable product materials on project site. Restrict storage to paint materials and related equipment. Storage of paint materials and related equipment shall comply with the requirements or pertinent codes and fire regulations. In addition, all safety precautions noted on the manufacturer's Material Safety Data Sheets and other literature shall be strictly followed. Proper containers outside of

buildings shall be provided by the Contractor and used for painting wastes. No plumbing fixtures shall be used for this purpose.

D. Used rags shall be removed from the buildings every night and every precaution taken against spontaneous combustion.

1.06 WARRANTY AND GUARANTEES

A. Refer to Section 01740: Warranties and Bonds.

B. All paint and coatings work performed under these specifications shall be guaranteed by the coatings applicator for 100 percent of the total coated area for both materials and labor against failures during the warranty period.

C. Failure under this warranty shall include flaking, peeling, or delaminating of the coating due to aging, chemical attack, or poor workmanship; but it shall not include areas, which have been damaged by unusual chemical, thermal, or mechanical abuse.

PART 2 - PRODUCTS

2.01 MATERIALS

A. All paint shall be manufactured by one of the suppliers listed in Paragraph 1.03E., herein, and shall be their highest grade of paint.

B. The following coating systems list a product by name to establish a standard of quality; other products of the same generic types may be submitted to the Engineer for approval as described in Paragraph 1.04., herein. When other than the specified coating system is proposed, the Contractor shall submit on a typewritten list giving the proposed coatings, brand, trade name, generic type and catalog number of the proposed system for the Engineer's approval.

C. Paint used in successive field coats shall be produced by the same manufacturer. Paint used in the first field coat over shop painted or previously painted surfaces shall cause no wrinkling, lifting, or other damage to underlying paint. Shop paint shall be of the same type and manufacture as used for field painting by the Contractor.

D. Emulsion and alkyd paints shall contain a mildewcide and both the paint and mildewcide shall conform to OSHA and Federal requirements, including Federal Specification TT-P- 19.

E. Finish coats containing lead shall not be allowed. Oil shall be pure boiled linseed oil.

F. Rags shall be clean painter's rags, completely sterilized.

2.02 COATING SYSTEMS

A. Class 1 Exposures - Exposed Concrete and Masonry, Interior, Non-immersion excluding Floors.

1. Examples of this classification include the following surfaces for the existing generator/electrical building as required:

a. interior masonry and plaster,

b. concrete block walls

c. concrete walls, columns, t-supports

2. Surface Preparation: As specified in Paragraph 3.02, herein, including filling cracks, voids, and other surface imperfections, removing mortar droppings, cleaning, and air-blasting.

3. Class 1 Coating System:

a. Prime Coat: Epoxy Polyamide Filler for Concrete Block

(1) Masonry Filler Series 54-660 Epoxy Block Filler: One (1) coat at 75 to 100 sq. ft./gal. Actual coverage may be less than the minimum stated depending on the porosity of the substrate to be coated.

b. Finish Coats: Epoxy Polyamide or Amine-Cure (Glossy):

(1) Ceramlon ENV Series 84: Two (2) coats at 6 to 8 mils DFT each coat for a minimum total finish thickness of 14 mils DFT.

NOTE: MAXIMUM ELAPSED TIME BETWEEN COATS, AS STATED BY THE COATING MANUFACTURER, SHALL NOT BE EXCEEDED.

B. Class 2 Exposures - Exposed Concrete, Immersion, Potable:

1. Examples of this classification are not included.

C. Class 3 Exposures - Interior Concrete, Non-Immersion, Potable:

1. Examples of this classification are not included.

D. Class 4 Exposures - Buried Exterior Concrete Surfaces:

1. Class 4 exposures consist of all exterior below grade surfaces for precast and/or cast-in-place concrete structures, all exterior concrete footings below grade and shall include the following:

   a. Exterior below grade surfaces of precast and/or cast-in-place concrete.

2. Surface Preparation: Same as required for Class 2 exposure surface preparation specified in Paragraph 2.02.B.2 above.

3. Class 4 Coating System:

   a. Prime Coat: Polyamide cured coal tar epoxy thinned 33 percent by volume.
   Hi-Build Tneme-Tar 46H-413: One (1) coat, 4 mils DFT.

   b. Finish Coats: Polyamide cured coal tar epoxy.
   Hi-Build Tneme-Tar 46H413: Two (2) coats, 10 mils DFT per coat.

   c. Total minimum system finish coating thickness shall be 24 mils DFT.

   NOTE: MAXIMUM ELAPSED TIME BETWEEN COATS, AS STATED BY THE COATING MANUFACTURER, SHALL NOT BE EXCEEDED.

E. Class 5 Exposures - Concrete and Masonry, Exterior, Non-Immersion

1. Class 5 exposures consist of exposed exterior concrete and masonry surfaces of buildings subjected to normal exterior elements and not subjected to wastewater immersion or contact. Class 5 exposures shall include the following:

   a. Exterior concrete and masonry surfaces for the existing generator/electrical building (if required)

2. Surface Preparation: As specified in Paragraph 3.02 herein and in addition the following:

   a. Masonry surfaces shall be prepared by filling cracks, voids and other surface imperfections, removing mortar droppings, cleaning and high pressure water blasting.

   b. Concrete surfaces shall be prepared as required for Class 2 exposure surface preparation specified in Paragraph 2.02.B.2 above.

3. Class 5 Coating System:

a. Prime Coat for Masonry Structures: waterborne cementitious acrylic masonry block filler, Tnemec Series 130-6602 (off white) Envirofill Masonry Block Filler: One (1) coat at 80 to 100 square feet per gallon. Actual coverage may be less than the minimum stated depending on the porosity of the substrate to be coated.

c. Finish Coats: A Modified Waterborne Acrylic Elastomeric Coating. Tnemec Series 156 Enviro-Crete: Two (2) coats, 5 mils DFT per coat for a total thickness of 10 mils DFT.

F. Class 6 Exposures - Gypsum Wallboard (Interior):

1. Examples of this classification are not included.

G. Class 7 Exposures - Metals, Immersion, Non-Potable:

1. Examples of this classification are not included.

H. Class 8 Exposures - Metals, Non-Immersion, Interior/Exterior:

1. Class 8 exposures consist of interior and exterior metal surfaces that do not come in direct contact with wastewater or corrosive atmospheres and shall include the following:

a. Pumps, motors, equipment, and appurtenances.

b. Aboveground piping, fittings, valves, and metal electrical conduit.

c. Miscellaneous steel plates, shapes, hardware, etc.

d. Galvanized steel surfaces.

e. Other surfaces obviously requiring field coating or as specified to be field coated in Division 11 or in Section 09905: Piping and Equipment Identification Systems.

2. Surface Preparation: As specified in Paragraph 3.02 herein and, in addition, the following:

a. All bare metals or areas that were shop primed that have been damaged shall be abrasive blast cleaned to SSPC-SP6, commercial blast cleaning standards.

b. Shop primed items, stored on site for a prolonged period prior to coating, shall be prepared for coating following the coating manufacturer's recommendations prior to applying touch-up and subsequent coats. Surface preparation may include brush-off abrasive blasting or spot blasting to SSPC-SP6, commercial blast cleaning standards, for areas where the primer has been damaged and bare metal is showing.

c. Non-ferrous metals shall be degreased and cleaned in compliance with SSPC-SP1 for solvent cleaning.

3. Class 8 Coating System:

a. Prime Coat for Ferrous Metals: Two-part epoxy polyamide primer. Hi-Build Epoxoline Series 66: One (1) coat, 4 mils DFT per coat.

b. Prime Coat for Non-Ferrous Metals: Two-part epoxy polyamid primer. Hi-Build Epoxoline Series 66: One (1) coat, 2.0 mils DFT per coat.

c. Intermediate Coat: Two component cross-linked epoxy. Hi-Build Epoxoline Series 66: One (1) coat, 4.0 mils DFT.

d. Finish Coat: Aliphatic Acrylic Polyurethane topcoat. Endura-Shield Series 73: One (1) coat, 2 mils DFT per coat.

e. Total minimum system finish coating thickness shall be 10 mils DFT for ferrous metals and 8.0 mils DFT for non-ferrous metals.

NOTE: MAXIMUM ELAPSED TIME BETWEEN COATS, AS STATED BY THE COATING MANUFACTURER, SHALL NOT BE EXCEEDED.

I. Class 9 Exposures - Plastic Piping, Valves, Fittings, and Conduit:

1. Class 9 exposures consist of PVC or fiberglass piping or electrical systems requiring color coding, and for protection of exposed, exterior plastic components from the elements, and shall include the following:

a. PVC and fiberglass piping, fittings, valves, and electrical conduits requiring color coding in accordance with Section 09905: Piping and Equipment Identification System.

b. Exposed exterior plastic piping, valve, and fitting components subject to UV degradation and weathering by the elements.

2. Surface Preparation: As specified in Paragraph 3.02 herein, including cleaning and washing with detergent to remove all dirt and foreign material, and light surface abrasion using medium grade sandpaper. Remove dust, dirt and debris with clean rags prior to coating.

3. Class 9 Coating System:

   a. Finish Coats: Single component, water-borne acrylic topcoat.
   Tneme-Cryl Series 6: Two (2) coats, 3 mils DFT per coat.

   b. Total minimum system finish coating thickness shall be 6 mils DFT.

J. Class 10 Exposures – Aluminum:

1. Class 10 exposures consist of aluminum surfaces embedded or in contact with concrete, mortar or plaster, or aluminum in contact with dissimilar metals, which may cause corrosion due to electrolysis, and shall include the following:

   a. Aluminum surfaces in contact with concrete, mortar or plaster.

   b. Aluminum surfaces in contact with dissimilar metals, which may cause corrosion due to electrolysis.

2. Surface Preparation: As specified in Paragraph 3.02 herein, including solvent cleaning in accordance with SSPC-SP1 standards for solvent cleaning.

3. Class 10 Coating System:

   a. Prime Coat: Zinc chromate wash primer.
   Carboline/Kop Coat 40 Passivator: One (1) coat, 0.5 mils DFT per coat.

   b. Finish Coats for Aluminum Exposed to View: Two-component, high build, modified aluminum epoxy mastic.
   Carboline Carbomastic 90 Aluminum: Two (2) coats, 10 mils DFT per coat, color: Aluminum C901.

   c. Finish Coat for Aluminum Not Exposed to View: Polyamide cured coal tar epoxy.
   Kop Coat Bitumastic No. 300-M: One (1) coat, 20 mils DFT per coat, color: Black.

   d. Total minimum system finish coating thickness shall be 20.5 mils DFT.

K. Class 11 Exposures - High Temperature Steel to 1200°F:

1. Class 11 exposures consist of carbon steel, hot dip galvanized steel and stainless steel surfaces exposed to high operating temperatures up to 1200°F, and shall include the following:

a. Examples of this classification are not included in this project.

2. Surface Preparation: As specified in Paragraph 3.02 herein, including abrasive blast cleaning to SSPC-SP10 standards for near-white blast cleaning for ferrous surfaces or solvent cleaning to SSPC-SP1 standards for solvent cleaning for galvanized or non-ferrous surfaces.

3. Class 11 Coating System:

a. Prime Coat: Self curing, inorganic zinc primer consisting of a basic zinc silicate complex with a zinc filler.
Carboline Carbo Zinc 11: One (1) coat, 3.0 mils DFT per coat.

b. Finish Coats: Single packaged, modified silicone.
Carboline 4631: Two (2) coats, 1.5 mils DFT per coat.

c. Total minimum system finish coating thickness shall be 6 mils DFT.

PART 3 - EXECUTION

3.01 SHOP PAINTING

A. Surface Preparation: All ferrous metal to be primed in the shop shall have all rust, dust and scale, as well as all other foreign substances, removed by sandblasting or pickling in accordance with SSPC-SP5 or SP8, respectively. Cleaned metal shall be primed or pretreated immediately after cleaning to prevent new rusting. Under no circumstances will cleaned metal be allowed to sit overnight before priming, or pretreatment and priming. All nonferrous metals shall be solvent cleaned prior to the application of primer. In addition, galvanized surfaces which are to be topcoated shall first be degreased then primed.

B. Materials Preparation:

1. Mix and prepare painting materials in strict accordance with manufacturer's recommendations and directions, stirring materials before and during application to maintain a mixture of uniform density, free of film, dirt and other foreign materials.

2. No thinners shall be used except those specifically mentioned and only in such quantity as directed by the manufacturer in his instructions. If thinning is used, sufficient additional coats shall be applied to assure the required dry

film thickness is achieved. The manufacturer's recommended thinner or cleanup solvent shall be used for all clean-up. Application by brush, spray, airless spray or roller shall be as recommended by the manufacturer for optimum performance and appearance.

C. Applications:

1. All painting shall be done by skilled and experienced craftsmen and shall be of highest quality workmanship. Coating systems shall be as specified herein.

2. Apply paint in accordance with the manufacturer's directions. Use applicators and techniques best suited for the type of material being applied.

3. All paint and coatings materials shall be stored under cover and at a temperature within 10°F of the anticipated application temperature and at least 5°F above the dew point.

4. Apply additional coats when undercoats, stains, or other conditions show through the final coat of paint, until the paint film is of uniform finish, color, and appearance.

5. Paint shall be applied in a neat manner with finished surfaces free of runs, sags, ridges, laps, and brush marks. Each coat shall be applied in a manner that will produce an even film of uniform and proper thickness.

6. Paint back sides of access panels and removable or hinged covers to match the exposed surfaces.

7. Equipment manufacturer or supplier shall provide touch-up paint for items with shop applied finish coats.

8. Where specified in the individual sections, primer coat(s) shall be applied in the shop by the equipment manufacturer. The shop coats shall be as specified and shall be compatible with the field coat or coats.

D. Certification: The Contractor shall obtain from the equipment manufacturer or supplier, prior to shipment of equipment, a written certification that surface preparation, coating brand, material, DFT, and application method complied with this Section.

3.02 SURFACE PREPARATION

A. All dirt, rust, scale, splinters, loose particles, disintegrated paint, grease, oil, and other deleterious substances shall be removed from all surfaces which are to be coated.

B. Hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items and surfaces not to be painted which are in contact with or nearby surfaces to be painted shall be removed, masked, or otherwise protected prior to surface preparation and painting operations. Refer to Paragraph 3.09B.

C. Before commencing work, the painter must make certain that surfaces to be covered are in perfect condition and must obtain Engineer's approval to proceed. Should the painter find such surfaces impossible of acceptance, he shall report such fact to the Engineer. The application of paint shall be held as an acceptance of the surfaces and working conditions and the painter will be held responsible for the results reasonably expected from the materials and processes specified.

D. Program the cleaning and painting so contaminants from the cleaning process will not fall onto wet, newly-painted surfaces.

E. Ferrous Metal Surfaces:

1. Remove any oil or grease from surfaces to be coated with clean rags soaked in toluol or other solvent recommended by coating manufacturer in accordance with SSPC specifications. Any chemical contamination shall be eliminated by means of neutralization or flushing or both prior to additional surface preparation. Clean rags shall be changed each 100 square feet.

2. For immersion service, all sharp edges and welds shall be ground smooth to a rounder contour, all weld splatter shall be removed, and all pits and dents shall be filled, and all imperfections shall be corrected prior to sandblasting.

3. For non-immersion service, all sharp edges and welds shall be ground, all weld splatter shall be removed, all pits and dents shall be filled, and all imperfections shall be corrected prior to sandblasting.

4. For immersion service, all surfaces to be coated shall be sandblasted to white metal in accordance with Steel Structures Painting Council Specification SP-5 of National Association of Corrosion Engineers Specification NACE-2. A white metal blast is defined as removing all rust, scale, paint, etc., to a clean white metal which has a uniform gray-white appearance. No streaks or stains or rust or any other contaminants are allowed. The proper abrasive to obtain the specified surface profile (anchor pattern) designated in the coating manufacturer's most recent printed application instructions shall be used. After sandblasting, dust and spent sand shall be removed from the surfaces by brushing or vacuum cleaning. The prime coat shall be applied as soon as possible after the blasting preparation is finished and always before the surface starts to rust. No sandblasted surface shall stand overnight before coating.

5. For non-immersion service, or wherever specified in the coating manufacturer's most recent printed application instructions for other services, all surfaces to be coated shall be sandblasted to near white metal in accordance with Steel Structures Painting Council Specification SP-10 or National Association of Corrosion Engineers Specification NACE-2. A near white metal blast is defined as removing all rust, scale, paint, etc., except for very light shadows, very slight streaks or slight discolorations caused by rust stain, mill scale oxides, or slight, tight residues of paint or coatings that may remain. The proper abrasive to obtain the specified surface profile (anchor pattern) designated in the coating manufacturer's most recent printed Application Instructions shall be used. After sandblasting, dust and spent sand shall be removed from the surfaces by brushing or vacuum cleaning. The prime coat shall be applied as soon as possible after the blasting preparation is finished and always before the surface starts to rust. No sandblasted surface shall stand overnight before coating. (This is 95 percent of any given surface area blasted to white metal).

6. For non-immersion service surfaces to be coated shall be sandblasted where specified to a commercial sandblast in accordance with Steel Structures Painting Council Specification SP-6 or National Association of Corrosion Engineers Specification NACE-3. A commercial sandblast is defined as removing all rust, scale, paint, etc., except for slight shadows, streaks or discolorations caused by rust stain, mill scale oxides or slight, tight residues of paint or coating that may remain; if the surface is pitted, slight residues or paint or rust, may be found in the bottom of pits. The proper abrasive to obtain the specified surface profile (anchor pattern) designated in the coating manufacturer's most recent printed Application Instructions shall be used. After sandblasting, dust and spent sand shall be removed from the surfaces by brushing or vacuum cleaning. The prime coat shall be applied as soon a possible after the blasting preparation is finished and always before the surface starts to rust. no sandblasted surface shall stand overnight before coating (this is 2/3 of any given surface area blasted to white metal).

7. Ferrous metal surfaces previously exposed to sulfides shall be sandblasted, flame cleaned, and sandblasted again in accordance with the recommended surface preparation for the particular service in question.

8. Where blast cleaning is done in the field, only "virgin" sand, grit, or abrasive will be used.

9. Inaccessible areas, such as behind tank rafters or skip-welded lap joints, or in between back-to-back angle iron bracing, shall be coated before assembly to prevent corrosive action from taking place in these inaccessible areas. All surface voids shall be sealed-welded and back-to-back bracing and tank

rafters either coated before assembly or eliminated from the design and construction. Sharp corners and edges shall be ground to a smooth contour and welds prepared as described above.

F. Concrete Surfaces:

1. All efflorescence, laitance, chalk, dust, dirt, oils, grease, concrete curing agents, form release agents, sealers, old coatings and other chemical contaminants shall be removed either by steam cleaning with detergent, by scrubbing with a hot trisodium phosphate solution consisting of 2 pounds of trisodium phosphate to each gallon of hot water (160°F), or by high pressure water blasting (3,000 psi or higher). Multiple cleaning operations may be required to remove all contaminants. Repeat the cleaning operation until the contamination is removed and flush the area with clean water to remove residual cleaning solution. Allow to dry thoroughly before coating.

2. All concrete surfaces to be coated shall be clean and dry. "Dry" is defined for new concrete as free of moisture and fully cured which is a minimum of 30 days at 75°F and 50 percent Relative Humidity or some equivalent cure time at other conditions (7 days minimum for stucco). Moisture content of concrete shall be determined by using both of the following methods.

   a. The presence of moisture shall be checked by taping a one-foot square piece of 20 mil thick minimum plastic film on the surface. Pieces of test plastic film should be placed at various locations that are likely to be slow drying out, such as below grade, low spots in floors, inside corners and lower wall areas. The plastic film should be carefully sealed with tape to prevent the escape of any moisture or vapor that would be trapped behind the film. The film should be left in place over night or longer to allow sufficient time for moisture migration. After 16 hours minimum remove and examine the backside for moisture condensation and inspect the concrete surface for darkened areas. The source of the moisture, if present, shall be located, and the cause corrected prior to coating.

   b. The presence of moisture shall also be determined with a moisture detection device such as a Delmhorst Model DLM2E. Moisture determined by this method shall be less than 14 percent moisture content before coating operations shall be allowed to proceed.

3. Old paint and unremoved tar stains shall be solvent cleaned with naphtha, trichloroethylene, or perchloroethylene. Proper safety precautions shall be observed if this step is necessary. The surface shall be flushed with fresh water and dried.

4. Do not use form oils incompatible with coating, concrete curing agents, or concrete hardeners on concrete surfaces to be coated.

5. Concrete and/or cinder block walls to receive a coating shall be air-blasted with 100 psi clean, dry, oil-free air to remove dust, etc., and wire brushed to remove all loose and/or weak mortar. See requirements for sumps, tanks and other water-bearing structures below.

6. Concrete floors shall be thoroughly swept clean and then acid etched. Acid etching consists of first dampening the entire surface with clean water - avoid and excess of water that will for puddles. Acid etch the damp floor with a 10 to 15 percent solution of hydrochloric (muriatic) or phosphoric acid. Allow the acid to stand on the floor until the bubbling stops. For best results, while the acid is bubbling scrub the floor with a stiff bristled brushes. Do not allow the "spent" acid to dry on the floor. Rinse the surface thoroughly with fresh water. If the surface does not appear as rough as medium grit sandpaper, repeat the above steps. Neutralize the surface with a 5 percent solution of soda ash, tri-sodium phosphate, or ammonium hydroxide in clean water. Let the solution stand for 10 minutes on the surface. Rinse thoroughly with water. The surface must be slightly alkaline (pH of 9.0) prior to coating.

7. The floors or concrete sumps, tanks or other water-bearing structures should be acid etched as described above or they may be sandblasted. The walls of concrete sumps and tanks must be sandblasted. Roughen the surface to a texture equivalent to that of medium grit sandpaper. Use compressed air blast nozzle with oil-free air. The abrasive used should be dry silica sand with the maximum particle size that will pass through a 16 mesh screen and minimum particle size retained on a 30 mesh screen. After blast cleaning is completed, sand, dust and loose particles should be removed from the surface by vacuuming or blowing off with high pressure oil-free air. Examine the surface for texture and uniformity, as well as the removal of dust, efflorescence and laitance. Patch voids and cracks that will cause discontinuities in the coating or unsightly appearance using a patching compound compatible with the coating system.

G. Wood Surfaces: Wood should be clean and dry. Remove surface deposits of sap or pitch by scraping and wiping clean with rags dampened with mineral spirits or VM & P Naphtha. Seal knots and pitch pockets with shellac reduced with equal parts of shellac thinner (denatured alcohol) before sandpaper and finishing with fine grit and remove sanding dust. After the prime coat is dry, fill cracks and holes with putty or spackling compound. When filler is hard, sand flush with the surface using fine grit sandpaper. Sand lightly between coats with fine grit, open-coated sandpaper

H. Galvanized Steel and Non-Ferrous Metal:

1. Galvanized steel and aluminum will only be coated when so specified.

2. Surfaces shall be clean and dry. Remove dust and dirt by blowing off the surface with high pressure air or wiping clean with dry rags. Oil, grease and protective mill coatings should be removed by solvent cleaning in accordance with SSPC-SPl.

3. White rust should be removed from galvanized steel or aluminum by hand or power brushing. Care should be taken not to damage or remove the galvanizing. Rust should be removed from old galvanized steel by Hand or Power Tool Cleaning in accordance with SSPC-SP2 or SP3.

4. Other surface preparation as outlined in the coating manufacturer's latest written Application Instructions shall be observed for more demanding exposures.

I. Stainless Steel:

1. Stainless steel will only be coated when so specified, or when it is adjacent to areas to be coated such as piping supports, anchor bolts or flange bolts.

2. Stainless steel requires only solvent cleaning prior to coating using any one of the methods in SSPC-SP1. Only solvents and cleaning solutions containing less than 200 ppm of halogens should be used to prevent stress corrosion cracking.

3. Stainless steel may be whip-blasted to provide a surface profile to increase the mechanical bond of the coating system. The height of the profile and the texture required should be defined for the operator and as a standard for the acceptance of the work. Pictorial standards for the surface cleanliness of carbon steel are not applicable to stainless steel, since there are no corrosion products or mill scale to remove from the surface.

4. Abrasive blast cleaning procedures outlined by Steel Structures Painting Council for carbon steel may also be used for stainless steel. Only very hard silica sand or other abrasive media should be used for a fast cutting action and to obtain a sharp angular profile.

J. Gypsum Drywall:

1. Sand joint compound with fine grit, open-coated sandpaper to provide a smooth flat surface. Avoid heavy sanding of the adjacent wall board surfaces, which will raise the nap of the paper covering. Remove dust from the surface by wiping with clean rags or other means. If additional joint finishing is required to provide a smooth surface, the same joint compound of a ready-mixed spackling compound should be used. Putty, patching

pencils, caulking, or masking tape should not be applied to dry wall surfaces to be painted.

2. Lightly scuff-sand tape joints after priming to remove raised paper nap. Take care not to sand through the prime coat and remove dust by wiping with clean rags.

K. PVC or Other Plastic Piping or Ductwork:

1. Solvent clean.

2. If recommended by manufacturer, lightly abrade surface with medium grade sandpaper. Remove dust by wiping with clean rags.

3.03 MATERIALS PREPARATION

A. Mix and prepare painting materials in strict accordance with manufacturer's recommendations and directions, stirring materials before and during application to maintain a mixture of uniform density, free of film, dirt, and other foreign materials.

B. Except where otherwise specified, thinning shall be done only if necessary for the workability of the coating material and then, only in accordance with the coating manufacturer's most recent printed Application instructions. Use only thinner provided by coating manufacturer. If thinning is used, sufficient additional coats shall be applied to assure the required dry film thickness is achieved. The manufacturer's recommended thinner or cleanup solvent shall be used for all clean-up. Application by brush, spray, airless spray or roller shall be as recommended by the manufacturer for optimum performance and appearance.

3.04 APPLICATION

A. Paint all exposed surfaces in rooms scheduled for painting whether or not colors are designated in schedules, except where the natural finish of material is obviously intended and specifically noted as a surface not be painted. Where items or surfaces are not specifically mentioned, paint these the same as adjacent similar materials or areas. If color of finish is not designated, the Engineer will select these from standard colors available for the materials systems as specified.

B. Color Selection:

1. Colors for Multi-coat Systems: Each coat shall be applied in a different color or shade from the preceding coat to aid in determining the uniformity and coverage of the coating. The finish coat color shall be selected by the Owner or Engineer. When a white finish coat is specified, the last two (2) coats shall be white.

2. Color Coding Piping: All exposed piping shall be identified as specified in Section 09905: Piping and Equipment Identification System. Pipe identification system shall include color coding or banding, legends, and arrows.

3. Color Coding Conduit: All exposed electrical conduit with conductors over 120 volts shall be color banded as specified in Division 16: Electrical and Section 09905: Piping and Equipment Identification System (color code, if provided, takes precedence).

4. All interior walls of buildings shall have a Wainscot (for each floor, the lower section of wall coated a contrasting color) from the floor to a level 56 inches above the highest elevation for that floor. Color of Wainscot shall be selected by Owner.

C. All painting shall be done by skilled and experienced craftsmen and shall be of highest quality workmanship.

D. Apply paint in accordance with the manufacturer's directions. Use applicators and techniques best suited for the type of material being applied. All equipment shall be maintained in good working order and shall be comparable to that described in the coating manufacturer's most recent Application Instructions. It shall be thoroughly cleaned and inspected daily. Worn spray nozzles, tips, etc., shall be replaced regularly. Effective oil and water separators shall be used and serviced on all air lines.

E. All paints and coating materials shall be stored under cover and at a temperature within 10°F of the anticipated application temperature and at least 5°F above the dew point.

F. Apply additional coats when undercoats, stains, or other conditions show through the final coat of paint, until the paint film is of uniform finish, color, and appearance.

G. Paint shall be applied in a neat manner with finished surfaces free of runs, sags, ridges, laps, and brush marks. Each coat shall be applied in a manner that will produce an even film of uniform and proper thickness. Allow each coat to dry thoroughly before applying the next coat; follow manufacturer's recommendations taking into account temperature and relative humidity.

H. All interior surfaces of structures shall be finish coated prior to installation of equipment, conduit, and other exposed items by Mechanical, Electrical, or Instrumentation.

1. Paint back sides of access panels and removable or hinged covers to match the exposed surfaces.

I. Finish exterior doors on tops, bottoms, and side edges the same as the exterior faces, unless otherwise indicated.

J. Sand lightly between each succeeding enamel or varnish coat.

K. Omit the first coat (primer) on metal surfaces which have been shop-primed and touch-up painted, unless otherwise specified.

L. Retouching Existing Painted Surfaces: Existing painted surfaces damaged by the modification work or other operations of the Contractor shall be retouched to conform to the above coating systems and blend in with the new and existing work. Damaged surfaces shall be repainted with not less that two (2) coats, and other existing surfaces that are listed shall be repainted with the coating system specified.

M. The prime and intermediate coats as specified for the various coating systems may be applied in the shop by the manufacturer. The shop coats shall be of the type specified and shall be compatible with the field coat or coats. Such items as pumps, motors, equipment, electrical panels, etc. shall be given at least one touch-up coat with the intermediate coat material and one complete finish coat in the field.

3.05 APPLICATION RESTRICTIONS

A. Environmental Requirements:

1. Comply with manufacturer's recommendations as to environmental conditions under which coatings and coating systems can be applied.

a. The conditions below shall be adhered to even if manufacturer's recommendations are less stringent. If manufacturer's recommendations are more stringent, they shall apply.

b. No coatings shall be applied when the air, surface, and material temperature is below 55°F or above 95°F for 24 hours prior to and 24 hours after coating application. Surface temperature shall be at least 5°F above the dew point for 24 hours prior to and 24 hours after coating application. The dewpoint shall be determined by use of a sling psychrometer in conjunction with U.S. Weather Bureau psychometric tables. Do not apply coatings when the relative humidity exceeds 85 percent or to damp or wet surfaces, unless otherwise permitted by the coating manufacturer's printed instructions. No painting shall be done when the surfaces may become damaged by rain, fog or condensation or when it is anticipated that these conditions will prevail during the drying period, unless suitable enclosures to protect the surface are used. Where heat is necessary, it shall be supplied by the painting

applicator and shall be of such type that it will maintain an air and coated surface temperature of 55°F minimum prior to and after the coating application as described above, and 90°F minimum during the cure stage if hot air forced curing is recommended by the coating manufacturer for special coatings. Further, this heater shall be of such type as not to contaminate the surface area to be or being coated with combustion products. The Contractor shall supply utilities to run electric or gas heaters. Any surface coating damaged by moisture or rain shall be removed and redone as directed by the Owner or Engineer.

2. Do not apply finish in areas where dust is being or will be generated during application through full cure.

3. All exterior painting shall be done only in dry weather.

4. Spray application shall occur only when wind velocities, including gusts, are less that 10 miles per hour. All materials, equipment, etc. in the vicinity of spray application shall be protected from overspray.

B. Application of materials shall be done only on properly prepared surfaces as herein specified. Between any two coats of material, unless specifically cover in the coating manufacturer's most recent printed application instructions, if more than one (1) week passes between subsequent coats, the coating manufacturer will be contacted for his recommended preparation of the surface prior to application of the next coat. This preparation might include brush-off blasting, steam cleaning, or solvent wiping (with an indicated solvent) and shall be specified in writing by the material supplier and followed by the applicator. Any surface coating damaged by moisture or rain shall be removed and redone as directed by the Owner or Engineer.

C. In no case shall paint be applied to surfaces which show a moisture content greater that 14 percent. The presence of moisture shall be determined prior to coating by testing with a moisture detection device such as a Delmhorst Model DLM2E.

3.06 MINIMUM COATING THICKNESS

A. Coating thickness shall meet or exceed the specified minimum dry film thickness (DFT) in all areas. The average coating thickness as determined by multiple representative DFT measurements shall meet or exceed the mid-point of DFT range. If below this DFT value, the surface shall be recoated with at least the minimum DFT until the total DFT meets or exceeds the mid-point DFT.

B. Coverage rates are theoretical as calculated by the coating manufacturer and are, therefore, the maximum allowable.

C. Apply a prime coat to material which is required to be painted or finished, and which has not been prime coated by others.

D. On masonry, application rates will vary according to surface texture; however, in no case shall the manufacturer's stated coverage rate be exceeded. On porous surfaces, is shall be the painter's responsibility to achieve a protective and decorative finish either by decreasing the coverage rate or by applying additional coats of paint.

E. Recoat primed and sealed walls and ceilings where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.

3.07 FINISHES

A. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

B. Complete Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not in compliance with specific requirements.

3.08 FIELD QUALITY CONTROL

A. The Contractor shall request acceptance of each coat by the Owner's representative before applying the next coat; and the Contractor shall provide the necessary properly calibrated gauges. All nonferrous surfaces shall be checked for number of coats and thickness by use of a Tooke gauge. All ferrous surfaces shall be checked for film thickness by use of an Elcometer or Micro-Test magnetic dry film gauge properly calibrated. In addition, submerged tank linings and metals shall be tested for freedom from holidays and pinholes by use of a Tinker-Rasor or K-D Bird Dog Holiday Detector. All defects shall be corrected to the satisfaction of the Owner.

3.09 PROTECTION

A. All other surfaces shall be protected while painting.

B. Protection of furniture and other movable objects, equipment, fittings, and accessories shall be provided throughout the painting operation. Remove all electric plates, surface hardware, etc., before painting; protect and replace when completed. Mask all machinery nameplates and all machined parts not to receive paint. Lay drop cloths in all area where painting is being done to adequately protect flooring and other work from all damage.

3.10 CLEANING

A. The Contractor shall perform the work under this Section while keeping the premises free from accumulation of dust, debris, and rubbish and shall remove all scaffolding, paint cloths, paint, empty paint containers, and brushes from buildings and the project site when completed.

B. Cleaning: All paint brushed, splattered, spilled, or splashed on any surface not specified to be painted shall be removed.

C. The Contractor shall insure that all glass throughout that portion of the facility in which he worked is cleaned of dirt and paint before he leaves the job site. Further, the Contractor shall insure that all glass in this area is thoroughly washed and polished.

D. Upon completion of the project, the job site shall be left neat and clean.

3.11 EXTRA STOCK

A. Paint To Be Supplied To Owner: Upon completion of painting work, the Owner shall be furnished at no additional cost, unopened containers providing a minimum of one (1) gallon of each type and color of finish paint for touching up. Multi-component coatings shall have each component supplied in separate containers boxed together. Paint container labels shall be complete with manufacturer's name, generic type, number, color, and location where used.

END OF SECTION

SECTION 09905

PIPING, VALVE, AND EQUIPMENT IDENTIFICATION SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: The work included under this Section consists of providing an identification system for piping systems and related equipment.

B. Related Work Described Elsewhere:

1. Painting: Section 09900

1.02 QUALITY ASSURANCE

A. Standards: ANSI Standard A13.1, Scheme for the Identification of Piping Systems.

1.03 SUBMITTALS

A. Submit manufacturer's descriptive literature, illustrations, specifications, and other pertinent data.

B. Schedules:

1. Provide a typewritten list of all tagged valves giving tag color, shape, letter code and number, the valve size, type, use, and general location.

2. Provide a complete list of materials to be furnished and surfaces on which they will be used.

C. Samples:

1. Provide a sample of each type valve tag supplied.

2. Provide a sample of each type of identification tape supplied.

3. Provide manufacturer's color charts for color selection by Engineer.

1.04 PRODUCTS DELIVERY, STORAGE, AND HANDING

A. Delivery Of Materials: Except for locally mixed custom colors, deliver sealed containers with labels legible and intact.

B. Storage Of Materials:

1. Store only acceptable project materials on project site.

2. Store in suitable location.

3. Restrict storage to paint materials and related equipment.

4. Comply with health and fire regulations.

1.05 JOB CONDITIONS

A. Environmental Requirements:

1. Comply with manufacturer's recommendations as to environmental conditions under which coatings and coating systems can be applied.

2. Do not apply finish in areas where dust is being generated.

B. Protection: Cover or otherwise protect finished work of other trades and surfaces not to be painted.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Materials for painting shall conform to requirements of Section 09900: Painting.

B. Materials selected for coating systems for each type surface shall be the product of a single manufacturer.

C. Aboveground piping shall be identified by self-adhesive pipe markers equal to those manufactured by W. H. Brady Company or equal.

1. Markers shall be of wording and color as shown in Table 09905.

2. Lettering shall be:

a) 2 1/4-inches high for pipes 3 inches diameter and larger.

b) 1 1/8-inches high for pipes less than 3 inches diameter.

3. Flow arrows shall be:

a) 2 1/4-inches by 6 inches for pipes 3 inches diameter and larger.

b) 1 1/8-inches by 3 inches for pipes less than 3 inches diameter.

D. Buried piping shall be identified by identification tape installed over the centerline of the pipelines.

1. Identification Tape for Steel or Iron Pipe: Identification tape shall be manufactured of inert polyethylene film so as to be highly resistant to alkalies, acids, or other destructive agents found in soil, and shall have a minimum thickness of 4 mils. Tape width shall be 6 inches and shall have background color specified below, imprinted with black letters. Imprint shall be as specified below and shall repeat itself a minimum of once every 2 feet for entire length of tape. Tape shall be Terra Tape Standard 250, or approved equal.

2. Identification Tape for Plastic or Non-Magnetic Pipe: Identification tape shall be manufactured of reinforced polyethylene film with a minimum overall thickness of 4 mils and shall have a 0.35 mil thick magnetic metallic foil core. The tape shall be highly resistant to alkalies, acids, and other destructive agents found in soil. Tape width shall be 3 inches and shall have background color specified below, imprinted with black letters. Imprint shall be as specified below and shall repeat itself a minimum of once every 2 feet for entire length of tape. Tape shall be TerraTape Sentry Line 1350, or approved equal.

3. Tape background colors and imprints shall be as follows:

Imprint	Background Color
"Caution Electrical Line Buried Below:	Red

4. Identification tape shall be "Terra Tape" as manufactured by Reef Industries, Inc., Houston, TX; Allen Systems, Inc., Wheaton, IL; or approved equal.

E. Aboveground Valve Identifications: A coded and numbered tag attached with brass chain and/or brass "S" hooks shall be provided on all valves.

1. Tag Types: Tags for valves on pipe shall be brass or anodized aluminum. Colors for aluminum tags shall, where possible, match the color code of the pipe line on which installed. Square tags shall be used to indicate normally closed valves and round tags shall indicate normally open valves.

2. Coding: In addition to the color coding, each tag shall be stamped or engraved with wording or abbreviations to indicate the valve service and number. All color and letter coding shall be approved by the Engineer. Valve service shall either be as listed in Table 09905, or by equipment abbreviation if associated with a particular piece of equipment. Valve numbering, if required, shall be as approved by the Engineer and/or Owner.

F. Buried valves shall have valve boxes protected by a concrete pad. The concrete pad for the valve box cover shall have a 3-inch diameter, bronze disc embedded in the surface as shown on the Drawings. The bronze disc shall have the following information neatly stamped on it:

1. Size of valve, inches

2. Type of valve:

a) GV - Gate Valve
b) BFV - Butterfly Valve
c) PV - Plug Valve

3. Valve Service - See Table 09905 for abbreviations

4. Number of turns to fully open

5. Direction to open

PART 3 - EXECUTION

3.01 COLOR CODING FOR PIPES AND EQUIPMENT

A. Piping color codes, and code labels for pipe identification shall conform to Table 09905.

B. General Notes and Guidelines:

1. Pipelines, equipment, or other items which are not listed here shall be assigned a color by the Owner and shall be treated as an integral part of the Contract.

2. Color coding shall consist of color code painting and identification of all exposed conduits, through lines and pipelines for the transport of gases, liquids, or semi-liquids including all accessories such as valves, insulated pipe coverings, fittings, junction boxes, bus bars, connectors and any operating accessories which are integral to a whole functional mechanical pipe and electrical conduit systems.

3. All moving parts, drive assemblies, and covers for moving parts which are potential hazards shall be Safety Orange.

4. All safety equipment shall be painted in accordance with OSHA standards.

5. All inline equipment and appurtenances not assigned another color shall be painted the same base color as the piping. The pipe system shall be painted with the pipe color up to, but not including, the flanges attached to pumps and mechanical equipment assigned another color.

6. All pipe hangers and pipe support floor standards shall be painted, unless specified otherwise due to material of construction.

C. All hangers and pipe support floor and accessories stands shall be painted to match their piping. The system shall be painted up to, but not including, the face of flanges or the flexible conduit connected to electrical equipment. Structural members used solely for pipe hangers or supports shall be painted to match their piping. Where the contact of dissimilar metals may cause electrolysis and where aluminum will contact concrete, mortar or plaster, the contact surface of the metals shall be coated in accordance with Section 09900.

D. All systems which are an integral part of the equipment, that is originating from the equipment and returning to the same piece of equipment, shall be painted between and up to, but not including, the face of flanges or connections on the equipment.

E. All insulated surfaces, unless otherwise specified, shall be given one coat of glue sizing, one prime coat and one finish coat.

F. System code lettering and arrows shall conform to the requirements of ANSI A 13.1 marked on piping as follows:

1. Legends shall be of the following color for the respective pipe color:

Key to Classification of Predominant Colors For Piping		Color of Letters, if not otherwise specified
(F) Fire Protection:	Red	White
(D) Dangerous:	Yellow	Black
	Orange	Black
	White	Black
	Brown	White
(S) Safe:	Green	Black
	Black	White
	Light Gray	Black
	Dark Gray	White
	Aluminum	Black
(P) Protective:	Blue	White

2. Markers shall be placed no more than 20 feet apart with at least one marker on every straight run and additional markers at turns and where pipe passes through walls.

3. An arrow indicating direction of flow shall be placed adjacent to each marker.

3.02 FABRICATED EQUIPMENT

A. Unless otherwise indicated or specifically approved, all fabricated equipment shall be shop primed and finished. See Section 09900 - Painting.

B. The Contractor shall be responsible for and take whatever steps are necessary to properly protect the shop prime and finish coats against damage from weather or any other cause.

C. Where specified in other sections of these specifications for mechanical equipment, the Contractor shall apply field coat or coats of paint in accordance with Section 09900. If shop finish coat is unsatisfactory due to poor adhesion or other problems with primer or finish coats, coatings shall be removed and replaced by sandblasting, priming and finishing in accordance with Section 09900 and this Section.

D. Wherever fabricated equipment is required to be sandblasted, the Contractor shall protect all motors, drives, bearings, gears, etc., from the entry of grit. Any

equipment found to contain grit shall be promptly and thoroughly cleaned. Equipment contaminated by grit in critical areas, such as bearings, gears, seals, etc., shall be replaced at no cost to the Owner.

3.03 INSTALLATION OF IDENTIFICATION TAPE

A. Identification tape shall be installed for all buried piping in accordance with the manufacturer's installation instructions and as specified herein.

B. Identification tape for piping shall be installed at two (2) locations:

1. One (1) foot below finished grade along centerline of pipe, and;

2. Directly on top of the pipe.

3.04 BURIED VALVES

A. In paved or concrete areas, tops of valve box covers shall be set flush with pavement or concrete top. In concrete areas, valve boxes shall be embedded. Following paving operations, a 24 inch square shall be neatly cut in the pavement around the box and the paving removed. The top of the box shall then be adjusted to the proper elevation and a 24 inch square by 6 inch thick concrete pad poured around the box cover. Concrete pads in traffic areas shall be reinforced with No. 4 reinforcement bars as shown on the Drawings. Concrete for the pad shall be 3,000 psi compressive strength.

B. In unpaved areas, tops of valve box covers shall be set 0.20-foot above finished grade. After the top of the box is set to the proper elevation, a 24 inch square by 6 inch thick concrete pad shall be poured around the box cover. Concrete for the pad shall be 3,000 psi compressive strength.

C. The bronze, valve identification disc shall be embedded in the concrete pad.

TABLE 09905

COLOR CODES AND ABBREVIATIONS

Service	Mark	Conduit, Pipe, and Valve Color Code	Letter and Flow Arrow Color
Raw Water	RW	White	Black
Permeate	PERM	Aqua	Black
Potable Water	PW	Dark Blue	White
Caustic Soda	NaOH	Yellow with Green Band	Black
Chlorine (Gas / Solution)	Cl_2 / CS	Yellow	Black
Hydrofluosilicic Acid	H_2SiF_6	Light Blue with Red Band	Black
Phosphate Corrosion Inhibitor	PO_4	Light Green with Red Band	Black
Sulfuric Acid	H_2SO_4	Yellow with Red Band	Black
Concentrate	CNT	Dark Brown	White
Cleaning Solution	CLNC/CLNS	Light Gray	Black
Cleaning Product	CLNP	Light Gray	Black
Reverse Osmosis Feed Water	ROFW	N/A	Black
Pretreated Raw Water	PTRW	N/A	Black
Filtered Raw Water	FRW	N/A	Black
Finished Water	FW	Dark Blue	White

END OF SECTION

SECTION 15000

MECHANICAL-GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. All equipment furnished and installed under this contract shall conform to the general stipulations set forth in this section except as otherwise specified in other sections.

2. Contractor shall coordinate all details of equipment with other related parts of the Work, including verification that all structures, piping, wiring, and equipment components are compatible. Contractor shall be responsible for all structural and other alternations in the Work required to accommodate equipment differing in dimensions or other characteristics from that contemplated in the Contract Drawings or Specifications.

B. Related Work Described Elsewhere:

1. General Requirements: Division 1

2. Painting: Division 9

C. General Design:

1. Contract Drawings and Specifications: The Contract Drawings and Specifications shall be considered as complementary, one to the other, so that materials and work indicated, called for, or implied by the one and not by the other shall be supplied and installed as though specifically called for by both. The Contract Drawings are to be considered diagrammatic, not necessarily showing in detail or to scale all of the equipment or minor items. In the event of discrepancies between the Contract Drawings and Specifications, or between either of these and any regulations or ordinances governing work of these specifications, the bidder shall notify the Engineer in ample time to permit revisions.

1.02 QUALITY ASSURANCE

A. Materials and Equipment: Unless otherwise specified, all materials and equipment furnished for permanent installation in the work shall conform to applicable standards and specifications and shall be new, unused, and undamaged when installed or otherwise incorporated in the work. No such material or equipment shall be used by the Contractor for any purpose other than that intended or specified, unless such use is specifically authorized in writing by the Owner. No material shall be delivered to the work site workout prior acceptance of drawings and data by the Engineer.

B. Equivalent Materials and Equipment:

1. Whenever a material or article is specified or described by using the name of a proprietary product or the name of a particular manufacturer or vendor, the specific item mentioned shall be understood as establishing the type, f unction, and quality desired. Other manufacturers' products will be accepted provided sufficient information is submitted to allow the Engineer to determine that the products proposed are equivalent to those named. Such items shall be submitted for review in accordance with Section 01340: Shop Drawings, Working Drawings, and Samples.

2. Requests for review of equivalency will not be accepted from anyone except the Contractor and such requests will not be considered until after the contract has been awarded.

C. Governing Standards: Equipment and appurtenances shall be designed in conformity with ANSI, ASME, ASTM, IEEE, NEMA, OSHA, AGMA, and other generally accepted applicable standards. They shall be of rugged construction and of sufficient strength to withstand all stresses which may occur during fabrication, testing, transportation, installation, and all conditions or operations. All bearings and moving parts shall be adequately protected against wear by bushings or other acceptable means. Provisions shall be made for adequate lubrication with readily accessible means.

D. Tolerances: Machinery parts shall conform to the dimensions indicated on the drawings within allowable tolerances. Protruding members such as joints, corners, and gear covers shall be finished in appearance. All exposed welds shall be ground smooth and the corners of structural shapes shall be rounded or chamfered.

E. Clearances: Ample clearances shall be provided for inspection and adjustment. All equipment shall fit the allotted space and shall leave reasonable access room for servicing and repairs. Greater space and room required by substituted equipment shall be provided by the Contractor and at his expense.

F. Testing:

1. When the equipment is specified to be factory tested, the results of the tests shall be submitted to the Engineer and approval of the test results shall be obtained before shipment of the equipment.

2. When an item of equipment, including controls and instrumentation, has been completely erected, the Contractor shall notify the Engineer, who will designate a time to make such tests as required, and operate the item to the satisfaction of the Contractor. All testing shall be done in the presence of the Contractor. "Completely erected" shall mean that the installation is erected, all necessary adjustments have been made, all required utility connections have been made, required lubricants and hydraulic fluid have been added and the unit has been cleaned and painted.

G. Pressure Test:

1. After installation, all piping shall be pressure tested. Piping shall be tested in accordance with Section 15044.

2. All tests shall be made in the presence of and to the satisfaction of the Construction Manager and also, to the satisfaction of any local or state inspector having jurisdiction.

   a. Provide not less than three days notice to the Construction Manager and the authority having jurisdiction when it is proposed to make the tests.

   b. Any piping or equipment that has been left unprotected and subject to mechanical or other injury in the opinion of the Construction Manager shall be retested in part or in whole as directed by the Construction Manager.

   c. The piping systems may be tested in sections as the work progresses by no joint or portion of the system shall be left untested.

3. All elements within the system that may be damaged by the testing operation shall be removed or otherwise protected during the operation.

4. All defects and leaks observed during the tests shall be corrected and made tight in an approved manner and the tests repeated until the system is proven tight.

5. Repair all damage done to existing or adjacent work or materials due to or on account of the tests.

6. Provide test pumps, gauges, or other instruments and equipment required for the performance of all tests. Provide all temporary bracing, test plugs, additional restraint, and thrust blocking which may be required for test pressures above normal working pressures.

7. All tests shall be maintained for as long a time as required to detect all defects and leaks but not less than the duration specified for each type of pipe or piping system in this Division.

H. Failure of Test:

1. Defects: Any defects in the equipment, or deviations from the guarantees or requirements of the Specifications, shall be promptly corrected by the Contractor by replacements or otherwise. The decision of the Engineer as to whether or not the Contractor has fulfilled his obligations under the Contract shall be final and conclusive. If the Contractor fails to correct any defects or deviations, or if the replaced equipment when tested shall f ail again to meet the guarantees or specified requirements, the Owner, notwithstanding his having made partial payment for work and materials which have entered into the manufacturer for such equipment, may reject that equipment and order the Contractor to remove it from the premises at the Contractor's expense.

2. Rejection of Equipment: In case the Owner rejects a particular item of equipment, then the Contractor hereby agrees to repay to the Owner all sums of money paid to him to deliver to the Contractor a bill of sale of all his rights, title, and interest in and to the rejected equipment provided, however that the equipment shall not be removed from the premises until the Owner obtains from other sources other equipment to take the place of that rejected. The bill of sale shall not abrogate the Owner's right to recover damages for delays, losses or other conditions arising out of the basic Contract. The Owner hereby agrees to obtain the alternate equipment within a reasonable time and the Contractor agrees that the Owner may use the original equipment furnished by him without rental or other charge until the other equipment is obtained.

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

J. Acceptance of Materials:

1. Only new materials and equipment shall be incorporated in the work. All materials and equipment furnished by the Contractor shall be subject to the inspection and acceptance of the Owner. No material shall be delivered to the work without prior submittal approval of the Engineer.

2. The Contractor shall submit to the Project Manager and Professional Engineer data relating to materials and equipment he proposes to furnish for the work. Such data shall be in sufficient detail to enable the Engineer to identify the particular product and to form an opinion as to its conformity to the specifications.

3. Facilities and labor for handling and inspection of all materials and equipment shall be furnished by the Contractor. If the Engineer requires, either prior to beginning or during the progress of the work, the Contractor shall submit samples of materials for such special test as may be necessary to demonstrate that they conform to the specification. Such sample shall be furnished, stored, packed, and shipped as directed at the Contractor's expense. Except as otherwise noted, the Owner will make arrangements for and pay for tests.

4. The Contractor shall submit data and samples sufficiently early to permit consideration and acceptance before materials are necessary for incorporation in the work.

K. Safety Requirements:

1. In addition to the components shown and specified, all machinery and equipment shall be safeguarded in accordance with the safety features required by the current codes and regulations of ANSI, OSHA, and local industrial codes.

2. The Contractor shall provide for each V-belt drive or rotating shaft a protective guard which shall be securely bolted to the floor or apparatus. The guard shall completely enclose drives and pulleys and be constructed to comply with all safety requirements.

3. For double inlet fans, the belt guard shall be arranged so as not to restrict the air flow into the fan inlet. Guards shall not interfere with lubrication of equipment.

1.03 SUBMITTALS (SEE SECTION 01340: SHOP DRAWINGS, WORKING DRAWINGS AND SAMPLES)

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Packaging: All equipment shall be suitably packaged to facilitate handling and protect against damage during transit and storage. All equipment shall be boxed, crated, or otherwise completely enclosed and protected during shipment, handling, and storage. All equipment shall be protected from exposure to the elements and shall be kept thoroughly dry at all times.

B. Protection: All machined surfaces and shafting shall be cleaned and protected from corrosion by the proper type and amount of coating necessary to assure protection during shipment and prior to installation. Painted surfaces shall be protected against impact, abrasion, discoloration, and other damage as specified in Sections 09900. All painted surfaces which are damaged prior to acceptance of equipment shall be repainted to the satisfaction of Engineer.

C. Lubrication: Grease and lubricating oil shall be applied to all bearings and similar items as necessary to prevent damage during shipment and storage.

D. Marking: Each item of equipment shall be tagged or marked as identified in the delivery schedule or on the Shop Drawings. Complete packing lists and bills of material shall be included with each shipment.

E. Fabricated sub-assemblies, if any, shall be shipped in convenient sections as permitted by carrier regulations and shall be properly match-marked for ease of field erection.

F. Responsibility:

1. The Contractor shall be responsible for all material, equipment, and supplies sold and delivered to the site under this Contract until final inspection of the work and acceptance thereof by the Owner. In the event any such material, equipment, and supplies are lost, stolen, damaged, or destroyed prior to final inspection and acceptance, the Contractor shall replace same without additional cost to the Owner.

2. Should the Contractor fail to take proper action on storage and handling of equipment supplied under this Contract within seven days after written notice to do so has been given, the Owner retains the right to correct all deficiencies noted in previously transmitted written notice and deduct the cost associated with these corrections from the Contractor's Contract. These costs may be comprised of expenditures for labor, equipment usage, administrative, clerical, engineering, and any other costs associated with making the necessary corrections.

G. Delivery: The Contractor shall arrange deliveries of products in accordance with construction schedules and coordinate to avoid conflict with work and condition at the site.

1. The Contractor shall deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.

2. Immediately on delivery, the Contractor shall inspect shipments to assure compliance with requirements of Contract Documents and accepted submittals, and that products are properly protected and undamaged.

3. Under no circumstances shall the Contractor deliver equipment to the site more than one month prior to installation without written authorization from the Construction Manager. Operation and maintenance data shall be submitted to the Engineer for review prior to shipment of equipment as described in Section 01730: Operating and Maintenance Data.

H. Storage and Protection of Products:

1. The Contractor shall furnish a covered, weather-protected storage structure providing a clean, dry noncorrosive environment for all mechanical equipment, valves, architectural items, electrical and instrumentation equipment, and special equipment to be incorporated into this project. Storage of equipment shall be in strict accordance with the "Instructions for Storage" of each equipment supplier and manufacturer including connection of space heaters, and placing of storage lubricants in equipment. Corroded, damaged, or deteriorated equipment and parts shall be replaced before acceptance of the project. Equipment and materials not properly stored will not be included in a payment estimate.

a. The Contractor shall store products subject to damage by the elements in weathertight enclosures.

b. The Contractor shall maintain temperature and humidity within the ranges required by manufacturer's instructions.

c. The Contractor shall store fabricated products above the ground, on blocking or skids, to prevent soiling or staining. The Contractor shall cover products which are subject to deterioration with impervious sheet coverings and provide adequate ventilation to avoid condensation.

d. The Contractor shall store loose granular materials in a well drained area on solid surfaces to prevent mixing with foreign matter.

2. All materials and equipment to be incorporated in the work shall be handled and stored by the Contractor before, during, and after shipment in a manner to prevent warping, twisting, bending, breaking, chipping, rusting, and any injury, theft, or damage of any kind whatsoever to the material or equipment.

3. Cement, sand, lime shall be stored under a roof and off the ground, and shall be kept completely dry at all times. All structural and miscellaneous steel and reinforcing steel shall be stored off the ground or otherwise to prevent accumulations of dirt, or grease, and in a position to prevent accumulations of standing water, staining, chipping, or cracking. Brick, block, and similar masonry products shall be handled and stored in a manner to reduce breakage, chipping, cracking and peeling to a minimum.

4. All materials which, in the opinion of the Construction Manager, have become damaged and are unfit for the use intended or specified, shall be promptly removed from the site of the work, and the Contractor shall receive no compensation for the damaged material or its removal.

5. The Contractor shall arrange storage in a manner to provide easy access for inspection. The Contractor shall make periodic inspections of stored products to assure products are maintained under specified conditions, and free from damage or deterioration.

6. Protection After Installation: The Contractor shall provide substantial coverings as necessary to protect installed products from damage from traffic and subsequent construction operations. The Contractor shall remove covering when no longer needed.

I. Extended Storage Requirements For Equipment: Because of the long period allowed for construction, special attention shall be given to extended storage and handling of equipment onsite. As a minimum, the procedure specified herein shall be followed:

1. If equipment will be stored onsite for more than one month prior to incorporation into the Work, the Contractor shall submit a written request to the Construction Manager outlining any special provision to be made to protect and maintain the equipment while it is being stored. All such provisions shall be acceptable to the Construction Manager. No equipment shall be stored onsite for more than one month without prior written authorization from the Construction Manager.

2. All equipment having moving parts including gears, electric motors, and/or instruments shall be stored in a temperature and humidity controlled building accepted by the Construction Manager, until such time as the equipment is to be installed.

3. All equipment shall be stored fully lubricated with oil and grease unless otherwise instructed by the manufacturer.

4. Manufacturer's storage instructions shall be carefully studied by the Contractor and reviewed by him with the Construction Manager. These instructions shall be carefully followed and a written record of this review kept by the Contractor.

5. Moving parts shall be rotated a minimum of once weekly to ensure proper lubrication and to avoid metal-to-metal "welding". Upon installation of the equipment, the Contractor shall start the equipment, and operate loaded when possible, weekly for an adequate period of time to ensure that the equipment does not deteriorate from lack of use.

6. Lubricants shall be changed upon completion of installation and as frequently as required thereafter during the period between installation and acceptance. Mechanical equipment to be used in the work, if stored for longer than ninety days, shall have the bearings cleaned, flushed, and lubricated prior to testing and startup, at no extra cost to the Owner.

7. Prior to acceptance of the equipment, the Contractor shall have the manufacturer inspect the equipment and certify that its condition has not been detrimentally affected by the long storage period. Such certifications by the manufacturer shall be deemed to mean that the equipment is judged by the manufacturer to be in a condition equal to that of equipment that has been shipped, installed, tested, and accepted in a minimum time period. As such, the manufacturer will guarantee the equipment equally in both instances. If such a certification is not given, the equipment shall be judged to be defective, and it shall be removed and replaced at the Contractor's expense.

8. A maintenance log shall be maintained by the Contractor outlining the schedule of maintenance required for each piece of equipment as well as the date on which the maintenance was actually performed and the initials of the individual performing the work. Submit a copy of the maintenance log monthly with the progress pay application.

1.05 WARRANTY AND GUARANTEES

A. The manufacturer's written warranty shall be submitted for all major pieces of equipment, as specified in Section 01740: Warranties and Bonds. The manufacturer's warranty period shall be concurrent with the Contractor's correction period for one year after the time of completion and acceptance.

PART 2 - PRODUCTS

2.01 GENERAL

A. All materials that come into contact with the water being treated or the finished water shall be on either the EPA or NSF lists of products approved for use in contact with potable water. Manufacturers shall submit an affidavit with the shop drawings indicating approval by the EPA or NSF for the materials used in products that come into contact with the water, in accordance with Rule 62-555.320(3) Florida Administrative Code.

2.02 MATERIALS AND EQUIPMENT

A. Fabrication and Manufacture:

1. Workmanship and Materials:

a. Contractor shall guarantee all equipment against faulty or inadequate design, improper assembly or erection, defective workmanship or materials, and leakage, breakage or other failure. Materials shall be suitable for service conditions.

b. All equipment shall be designed, fabricated, and assembled in accordance with recognized and acceptable engineering and shop practice. Individual parts shall be manufactured to standard sizes and gages so that repair parts, furnished at any time, can be installed in the field. Like parts of duplicate units shall be interchangeable. Equipment shall not have been in service at any time prior to delivery, except as required by tests.

c. Except where otherwise specified, structural and miscellaneous fabricated steel used in equipment shall conform to AISC standards. All structural members shall be designed for shock or vibratory loads. Unless otherwise specified, all steel which will be submerged, all or in part, during normal operation of the equipment shall be at least 1/4 inch thick.

2. Lubrication:

a. Equipment shall be adequately lubricated by systems which require attention no more frequently than weekly during continuous operation. Lubrications systems shall not require attention during startup or shutdown and shall not waste lubricants.

b. Lubricants of the type recommended by the equipment manufacturer shall be furnished by the Contractor in sufficient quantity to fill all lubricant reservoirs and to replace all consumption during testing, startup, and operation prior to acceptance of equipment by Owner. Unless otherwise specified or permitted, the use of synthetic lubricants will not be acceptable.

c. Lubrication facilities shall be convenient and accessible. Oil drains and fill openings shall be easily accessible from the normal operating area or platform. Drains shall allow for convenient collection of waste oil in containers from the normal operating area or platform without removing the unit from its normal installed position.

3. Equipment Foundation Supports:

a. All foundations, platforms and hangers required for the proper installation of equipment shall be furnished and installed by the Contractor.

b. Unless otherwise indicated or specified, all equipment shall be installed on reinforced concrete bases at least 6 inches high and shall conform to Section 03300. Cast iron or welded steel baseplates shall be provided for pumps, compressors, and other equipment. Each unit and its drive assembly shall be supported on a single baseplate of neat design. Baseplates shall have pads for anchoring all components and adequate grout holes. Baseplates for pumps shall have a means for collecting leakage and a threaded drain connection. Baseplates shall be anchored to the concrete base with suitable anchor bolts and the space beneath filled with grout as specified in Section 03600: Grout. All open equipment bases shall be filled with nonshrinking grout sloped to drain to the perimeter of the base.

c. The Contractor shall furnish, install and protect all necessary guides, bearing plates, anchor and attachment bolts, and all other appurtenances required for the installation of equipment. These shall be of ample size and strength for the purpose intended.

d. Equipment suppliers shall furnish suitable anchor bolts for each item of equipment. Anchor bolts, together with templates or setting drawings, shall be delivered sufficiently early to permit setting the anchor bolts when the structural concrete is placed. Anchor bolts shall have a minimum diameter of 3/4 inch. Unless otherwise indicated or specified, anchor bolts for items of equipment mounted on baseplates shall be long enough to permit 1-1/2 inches of grout beneath the baseplate and to provide adequate anchorage into structural concrete.

e. Structural steel supports and miscellaneous steel required for supporting and/or hanging equipment and piping furnished under this Division shall be provided and installed by Contractor.

f. All foundations, anchor pads, piers, thrust blocks, inertia blocks and structural steel supports shall be built to template and reinforced as required for loads imposed on them.

g. The Contractor shall assume all responsibility for sizes, locations and design of all foundations, anchor pads, pier, thrust blocks, inertia blocks, curbs and structural steel supports.

4. Shop Painting:

a. All steel and iron surfaces shall be protected by suitable paint or coatings applied in the shop. Surfaces which will be inaccessible after assembly shall be protected for the life of the equipment. Exposed surfaces shall be finished smooth, thoroughly cleaned, and filled as necessary to provide a smooth uniform base for painting. Electric motors, speed reducers, starters, and other self-contained or enclosed components shall be shop primed or finished with a high-grade oil resistant enamel suitable for coating in the field with an alkyd enamel. Coatings shall be suitable for the environment where the equipment is installed.

b. Surfaces to be painted after installation shall be prepared for painting as recommended by the paint manufacturer for the intended service, and then shop painted with one or more coats of the specified primer. Unless otherwise specified, the shop primer for steel and iron surfaces shall be Cook "391-N-167 Barrier Coat", Koppers "No. 10 Inhibitive Primer", or equal.

c. Machined, polished, and nonferrous surfaces which are not to be painted shall be coated with rust-preventive compound, Houghton "Rust Veto 344", Rust-Oleum "R-9", or equal.

5. Nameplates: Contractor shall provide equipment identification nameplates for each item of equipment. Nameplates shall be 1/8-inch Type 304 stainless steel and shall be permanently fastened. Plates shall be fastened using round head metallic drive screws, or where metallic drive screws are impractical, with stainless steel pop rivets. Metallic drive screws shall be brass or stainless steel, Type V and No. 8 by 3/8-inch long. Names and/or equipment designations shall be engraved on the plates and the engraving painted with a primer and black paint system compatible with stainless steel. Contractor shall submit a list of proposed names and designations for review prior to fabrication of nameplates. At a minimum, each nameplate shall include equipment manufacturers name, year of manufacture, serial number and principal rating data.

6. Valve Identification: On all valves, except shut-off valves located at a fixture or piece of equipment, the Contractor shall provide a coded and numbered tag attached with brass chain and/or brass "S" hooks.

   a. Tag Types:

      i. Tags for valves on pipe and tube lines conducting hot medium (steam, condensate, hot water, etc.) shall be brass or anodized aluminum.

      ii. Tags for all other valves shall be Type 304 stainless steel.

      iii. Square tags shall be used to indicate normally closed valves and round tags shall indicate normally open valves.

   b. Coding: In addition to the color coding, each tag shall be stamped or engraved with wording or abbreviations to indicate the line service. All color and letter coding shall be approved by the Engineer.

   c. Valve Schedule: The Contractor shall provide a typewritten list of all tagged valves giving tag shape, letter code and number, the valve size, type, use and general location within building.

7. Noise Attenuation and Control:

   a. Unless otherwise specified, the maximum permissible noise level for a complete installed piece of equipment located within or

outside a structure shall not exceed 85 dB at 3 feet. A complete piece of equipment includes the driver and driven equipment, plus any intermediate couplings, gears, and auxiliaries. All equipment provided herein that is specified to be factory and field tested shall be tested as specified herein for noise generation at the equipment manufacturer's expense.

b. Maximum permissible noise (sound pressure) levels shall be in decibels as read on the "A" weighting scale of a standard sound level meter (dB); all measurements shall be made in relation to a reference pressure of 0.0002 microbar. Measurements of emitted noise levels shall be made on a sound level meter meeting at least the Type 2 requirements set forth in ANSI S1.4, Specification for Sound Level Meters. The sound level meter shall be set on the "A" scale and to slow response. Unless otherwise specified for a particular piece of equipment, the point of measurement of sound level shall be made at the specified distance from any major surface along the entire perimeter and at midheight of the piece of equipment, or at the specified distance from an outer major surface encompassing the sound source including inlets or outlets.

2.03 ACCESSORIES

A. Special Tools and Accessories: Equipment requiring periodic repair and adjustment shall be furnished complete with all special tools, instruments, and accessories required for proper maintenance. Equipment requiring special devices for lifting or handling shall be furnished complete with those devices.

2.04 SPARE PARTS

A. Spare parts for certain equipment provided under Divisions 11, 13, 14, 15, and 16 have been specified in the pertinent sections of the specifications. The Contractor shall collect and store all spare parts in an area to be designated by the Engineer. In addition, the Contractor shall furnish to the Engineer an inventory listing of all spare part, the equipment they are associated with, and the name and address of the supplier.

B. Maintenance Materials:

1. All grease, oil, and fuel required for testing of equipment shall be furnished with the respective equipment. The Owner shall be furnished with a year's supply of required lubricants including grease and oil of the type recommended by the manufacturer with each item of equipment supplied.

2. The Contractor shall be responsible for changing the oil in all drives and intermediate drives of each mechanical equipment after initial break-in of the equipment, which in no event shall be any longer than three weeks of operation.

2.05 QUALITY CONTROL

A. Contractor shall follow Manufacturer's and Supplier's recommended product quality control specifics as required for project.

PART 3 - EXECUTION

3.01 PREPARATION (Not Applicable)

3.02 INSTALLATION

A. Installation: Equipment shall not be installed or operated except by, or with the guidance of, qualified personnel having the knowledge and experience necessary for proper results. When so specified, or when employees of Contractor or his subcontractors are not qualified, such personnel shall be field representatives of the manufacturer of the equipment or materials being installed.

1. The Contractor shall have on site sufficient proper construction equipment and machinery of ample capacity to facilitate the work and to handle all emergencies normally encountered in work of this character. To minimize field erection problems, mechanical units shall be factory assembled when practical.

2. Equipment shall be erected in a neat and workmanlike manner on the foundations and supports at the locations and elevations shown on the Drawings, unless otherwise directed by the Engineer during installation.

3. All equipment shall be installed in such a manner as to provide access for routine maintenance including lubrication.

4. For equipment such as pumping units, which require field alignment and connections, the Contractor shall provide the services of the equipment manufacturer's qualified mechanic, millwright, machinist, or authorized representative, to align the pump and motor prior to making piping connections or anchoring the pump base.

5. Equipment of a portable nature which require no installation shall be delivered to a location designated by the Owner.

B. Tolerances: Precision gauges and levels shall be used in setting all equipment. All piping and equipment shall be perfectly aligned, horizontally and vertically. Tolerances for piping and equipment installation shall be 1/2 inch to 30 ft horizontal and vertically. All valves and operators shall be installed in the position shown on the Contract Drawings or as directed by the Engineer, if not shown.

C. Alignment and Level: The equipment shall be brought to proper level by shims (1/4 inch maximum). After the machine has been leveled and aligned, the nuts on the anchor bolts shall be tightened to bind the machine firmly into place against the wedges or shims. Grouting shall be as specified in Section 03600: Grout.

D. Grouting: The grout shall be tamped into position with a board, steel bar, or other tool. Tamping should not be so hard as to raise or otherwise displace the plate.

E. Contact of Dissimilar Metals: Where the contact of dissimilar metal may cause electrolysis and where aluminum will contact concrete, mortar, or plaster, the contact surface of the metals shall be separated using not less than one coat of zinc chromate primer and one heavy coat of aluminum pigmented asphalt paint on each surface.

F. Cutting and Patching: All cutting and patching necessary for the work shall be performed by the Contractor.

G. Operation: All equipment installed under this Contract, including that furnished by Owner or others under separate contract, shall be placed into successful operation according to the written instructions of the manufacturer or the instructions of the manufacturer's field representative. All required adjustments, tests, operation checks, and other startup activity shall be provided.

3.03 INSPECTION AND TESTING

A. Where the specifications require observation of performance tests by the Construction Manager, such tests shall comply with the quality assurance paragraph in this section.

3.04 START-UP AND INSTRUCTION

A. Services Furnished Under This Contract:

1. An experienced, competent, and authorized representative of the manufacturer of each item of equipment shall visit the site of the Work and inspect, check, adjust if necessary, and approve the equipment installation. In each case, the manufacturer's representative shall be present when the equipment is placed in operation. The manufacturer's representative shall revisit the jobsite as often as necessary until all trouble

is corrected and the equipment installation and operation are satisfactory in the opinion of Construction Manager.

2. Each manufacturer's representative shall furnish to Owner, Construction Manager, a letter of certification stating that the equipment has been properly installed and lubricated; is in accurate alignment; is free from any undue stress imposed by connecting piping or anchor bolts; and has been operated under full load conditions and that it operated satisfactorily.

3. All costs for field services shall be included in the contract amount.

END OF SECTION

SECTION 15044

PRESSURE TESTING OF PIPING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: This section specifies the leakage testing requirements for water piping.

B. Related Work Described Elsewhere (not applicable)

C. General Design (not applicable)

1.02 QUALITY ASSURANCE

A. Test Pressures: Test pressures for the various services and types of piping shall be as shown in Table 15044-A and at a minimum shall be 1.5 times the working pressure.

1.03 SUBMITTALS

A. Materials and Shop Drawings (Not Applicable)

B. Additional Information:

1. Testing Plan: Submit prior to testing and include at least the information that follows:

a. Testing dates.

b. Piping systems and section(s) to be tested.

c. Test type.

d. Method of isolation.

e. Calculation of maximum allowable leakage for piping section(s) to be tested.

2. Certifications of Calibration: Testing equipment.

3. Certified Test Report.

4. Testing Records:

a. Provide a record of each piping installation during the testing. These records shall include:

i. Date of test.

ii. Identification of pipeline tested or retested.

iii. Identification of pipeline material.

iv. Identification of pipe specification.

v. Test fluid.

vi. Test pressure.

vii. Remarks: Leaks identified (type and location), types of repairs, or corrections made.

viii. Certification by Contractor that the leakage rate measured conformed to the specifications.

ix. Signature of Owner's representative witnessing pipe test.

b. Submit five (5) copies of the test records to the Engineer's representative upon completion of the testing.

PART 2 - PRODUCTS

2.01 GENERAL

A. Testing fluid shall be clean water for all piping except air service and shall be of such quality to prevent corrosion of materials in piping system for all hydrostatic tests. Air piping shall be tested using compressed air.

2.02 MATERIALS AND EQUIPMENT

A. Provide pressure gauges, necessary bracing and restraint, test plugs, pipes, bulkheads, pumps, and meters to perform the hydrostatic and pneumatic testing.

PART 3 - EXECUTION

3.01 PREPARATION

A. Pipes shall be in place and anchored before commencing pressure testing.

B. Conduct hydrostatic and pneumatic 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. Before conducting hydrostatic tests, flush pipes with water to remove dirt and debris. For pneumatic tests, blow air through the pipes.

D. Test new pipelines which are to be connected to existing pipelines by isolating the new line from the existing line by means of pipe caps, special flanges, or blind flanges. After the new line has been successfully tested, remove caps or flanges and connect to the existing piping.

E. Conduct hydrostatic tests on buried pipe after the trench has been completely backfilled. The pipe may be partially backfilled and the joints left exposed for inspection for an initial leakage test. Perform the final test, however, after completely backfilling and compacting the trench.

F. New Piping Connected to Existing Piping: Isolate new piping with grooved-end pipe caps, spectacle blinds, blind flanges, or as acceptable to ENGINEER.

G. Pressure Test:

1. All tests shall be made in the presence of and to the satisfaction of the Owner or Engineer and also, to the satisfaction of any local or state inspector having jurisdiction.

a. Provide not less than three (3) days notice to the Owner, Engineer, and the authority having jurisdiction when it is proposed to make the tests.

b. Any piping or equipment that has been left unprotected and subject to mechanical or other injury in the opinion of the Engineer shall be retested in part or in whole as directed by the Engineer.

c. The piping systems may be tested in sections as the work progresses, but no joint or portion of the system shall be left untested.

2. All elements within the system that may be damaged by the testing operation shall be removed or otherwise protected during the operation.

3. Repair all damage done to existing or adjacent work or materials due to or on account of the tests.

3.02 INSTALLATION (Not Applicable)

3.03 INSPECTION AND TESTING

A. Hydrostatic Testing of Buried Piping:

1. Test after backfilling has been completed. Expel air from piping system during filling.

2. Where any section of the piping contains concrete thrust blocks or encasement, do not make the pressure test until at least 10 days after the concrete has been poured. When testing mortar-lined 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.

3. Apply and maintain the test pressure by means of a hydraulic force pump. Maintain the test pressure for a minimum duration of four (4) hours. After the test pressure is reached, use a meter to measure the additional water added to maintain the pressure during the four hours. This amount of water is the loss due to leakage in the piping system. The allowable leakage rate is defined by the formula.

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

in which:

L	=	allowable leakage (gallons/hour) during the test period.
S	=	length of pipe, in feet
D	=	diameter of the pipe (inches)
P	=	specified test pressure (psig)

4. Allowable leakage for PVC is 90% of calculated number above.

5. Butt fused pipe shall have zero leakage.

6. Repair and retest any pipes showing leakage rates greater than that allowed.

B. Test Pressure:

1. All pipe shall be tested at pressures shown in Table 15044-A and at a minimum shall be 1.5 times the normal working pressure of the pipe.

3.04 START-UP AND INSTRUCTION (Not Applicable)

[INSERT TABLE 15044]

TABLE 15044-A

PIPING PRESSURE TEST SCHEDULE

Service	Legend	Maximum Operation Pressure (psig)	Test Pressure (psig)
Reclaimed Water	RW	150	165

END OF SECTION

SECTION 15050

PROCESS AND UTILITY PIPING, FITTINGS, VALVES, AND ACCESSORIES

PART 1-GENERAL

Butterfly valve

1.01 DESCRIPTION

A. Scope of Work: The Work included in this Section consists of furnishing all labor, equipment, and materials and in performing all operations necessary for the construction or installation of all process and utility piping, valves, and appurtenances complete and ready for operation as shown on the Drawings and specified herein.

B. Related Work Described Elsewhere:

1. Section 15044: Pressure Testing of Piping

1.02 QUALITY ASSURANCE

B. Pipe Inspection: The Contractor shall obtain from the pipe manufacturers a certificate of inspection to the effect that the pipe and fittings supplied for this Contract have been inspected at the plant and that they meet the requirements of these Specifications. All pipe and fittings shall be subject to visual inspection at time of delivery by rail or truck and also just before they are lowered into the trench to be laid. Joints or fittings that do not conform to these Specifications will be rejected and must be removed immediately by the Contractor.

The entire product of any plant may be rejected when, in the opinion of the Engineer, the methods of manufacture fail to secure uniform results, or where the materials used are such as to produce inferior pipe or fittings.

1.03 SUBMITTALS

A. Shop Drawings:

1. In general, Shop Drawings for all proposed items to be furnished shall be submitted electronically in PDF format to the Engineer for approval prior to construction.

2. Tabulated layout schedule for each pipe system including:

a) Pipe invert station and elevation at each change of grade and alignment.

b) The limits of each reach of pipe thickness class and of restrained joints.

c) The limits of each reach of concrete encasement.

d) Locations of valves and other mechanical equipment.

e) Methods and locations of supports.

f) Details of special elbows and fittings.

3. A separate Shop Drawing submittal will be required for each major item listed above and for each different type of an item within a major item. For example, separate submittals will be required for butterfly, plug, ball, solenoid, check, and automatic air release valves. All submittals shall be in accordance with the General and Special Conditions and Section 01340: Shop Drawings, Working Drawings, and Samples.

B. Acceptance of Material:

1. The Contractor shall furnish an Affidavit of Compliance certified by the pipe manufacturer that the pipe, fittings, and specials furnished under this Contract comply with all applicable provisions of current AWWA and ASTM standards and these Specifications. No pipe or fittings will be accepted for use in the Work on this project until the Affidavit has been submitted and approved by the Engineer.

2. The Owner reserves the right to sample and test any pipe or fitting after delivery and to reject all pipe and fittings represented by any sample which fails to comply with the specified requirements.

C. Operation and Maintenance Manuals: Submit operation and maintenance manuals for applicable components requiring periodic maintenance and/or explanation of operation, at the discretion of the Engineer. Manuals shall be prepared in accordance with Section 01730: Operating and Maintenance Data. Information shall include:

1. Detailed assembly drawings, clear and concise instructions for operating, adjusting, overhauling, troubleshooting and, other maintenance. Include Shop Drawings previously submitted and approved with all corrections made.

2. A complete lubrication schedule including lubricant types, grades, and recommended frequency of lubrication.

3. A list of parts for all products with catalog numbers and all data necessary for ordering replacement parts. Such instructions and parts lists shall be prepared for the specific product furnished and shall not refer to other types or models.

1.04 DELIVERY, STORAGE AND HANDLING

A. Pipe, fittings, valves, and accessories shall be handled in such manner as to ensure a sound undamaged condition during shipping, delivering, and installing.

B. Particular care shall be taken not to injure the pipe coating and linings.

C. Insides of valves and piping shall be kept free of dirt and debris.

PART 2 - PRODUCTS

2.01 DUCTILE IRON PIPE AND FITTINGS

A. Ductile Iron Pipe: Ductile iron pipe shall conform to the requirements of ANSI, A21.51 and AWWA C151, latest revision. Flanged pipe shall have a minimum thickness class of Class 53.

B. Pipe shall have a minimum rated water working pressure of 250 psi and shall be furnished in laying lengths of 20 feet or less, unless specifically shown otherwise on the Drawings. All piping and fittings shall be new and unused, no refurbished piping or fittings will be accepted.

C. Coating and Lining:

1. Cement-Mortar Interior Lining: Ductile iron pipe, fittings, and specials shall be cement lined in accordance with ANSI/AWWA C104, current revision, "Cement-Mortar Lining for Ductile Iron and Gray Iron Pipe and Fittings for Water". The cement lining shall have standard thickness and, after curing, the lining shall have a seal coat of bituminous material in accordance with AWWA C104, current revision.

2. Exterior Coatings for Buried Pipe: Ductile iron pipe, fittings, and specials to be installed underground shall be coated on the exterior at the factory with one coat, 1 mil DFT, of asphaltic coating per AWWA C151, C110 and C153. All clamps, bolts, nuts, studs, and other uncoated parts of joints for underground installation shall be coated with coal tar epoxy prior to backfilling. Coal tar epoxy shall be equal to Kop-Coat Bitumastic No. 300-M.

3. Exterior Coating for Exposed Pipe: Ductile iron pipe, fittings, and specials to be installed aboveground shall be furnished with a shop applied primer on the exterior. The shop primer shall be as specified in Section 09900: Painting. Exposed piping shall be painted in accordance with Sections 09900.

4. Pipe Labeling: Pipe manufacturer shall label in large legible lettering on the exterior of the pipe the type of pipe interior lining.

D. Fittings: Fittings for ductile iron pipe shall flanged joint as indicated on the Drawings and shall have a minimum working pressure of 250 psi. Fittings shall be ductile iron and shall conform to ANSI/AWWA C110 and ANSI/AWWA C153, latest revisions for flanged pipe. Fittings shall be coated and lined as indicated on the Drawings, in the manner specified above for ductile iron pipe. The rubber gaskets shall be as described below.

E. Flanged Joints: Flanges shall be Class 125 per ANSI B16.1 with any special drilling and tapping as required to insure correct alignment and bolting.

1. Gaskets: Fullface, 1/8-inch thick, cloth-inserted rubber: Johns-Manville No. 109, John Crane Co., Style 777, or equal. Gaskets shall be suitable for a water pressure of 350 psi at a temperature of 150°F.

2. Bolts and Nuts for Flanges:

a) Bolts and nuts shall be Type 316 stainless steel conforming to ASTM A193, Grade B8M for bolts and ASTM A194, Grade 8M for nuts. The nuts shall have a hardness that is lower than that of the bolts and washers by a difference of 50 Brinnell hardness to percent galling during installation.

3. Flanges shall be long-hub type screwed tightly on pipe by machine at the foundry prior to facing and drilling. Flange machine surfaces shall be coated with rust inhibitor immediately after facing and drilling. Field assembled screwed on flanges are prohibited.

2.02 FLANGED ADAPTER COUPLING

A. Adapters shall be suitable for joining plain-end pipe to flanged pipes and fittings. Adapters shall conform in size and bolt hole placement to ANSI standards for steel and/or cast iron flanges 125 or 150 pound standard unless otherwise required for connections (ANSI B16.1 125 lb./ANSI B16.5 150 lb.).

B. Adapters shall be constructed of steel and coated in accordance with Section 09900. Bolts and nuts shall be Type 316 stainless steel conforming to ASTM A193, Grade B8 for bolts, and ASTM A194, Grade 8 for nuts and washers. Bolts

and nuts greater than 1 1/8 inches in diameter shall be carbon steel ASTM A307, Grade B, with Cadmium plating, ASTM A165, Type NS. Gasket material shall be suitable for exposure to the liquids to be contained within the pipes.

C. Adapters shall be Dresser style 128 or equal.

2.03 FLEXIBLE EXPANSION JOINTS

A. Flexible expansion joints shall be of the molded wide double arch design manufactured of neoprene rubber with polyester and steel reinforcement. Neoprene body shall be supplied with a Hypalon coating. Joints shall be flanged suitable for 150 psi water working pressure and in accordance with ANSI B16.1 dimensions and bolting patterns. Flanged ends shall be furnished with galvanized, split ductile iron retaining rings.

B. Provide limit restraint bolts on all lines. Expansion joints 6 inches and larger in size shall have a minimum of four limit restraint bolts. Restraint bolts and nuts shall be Type 316 stainless steel.

C. Minimum performance for flexible expansion joints shall be as follows:

Size (In.)	Axial Compression (Inches)	Axial Elongation (Inches)	Lateral Deflection (Inches)	Angular Deflection Degrees
2	7/8	1/2	1	30
4	7/8	1/2	1	30
6	7/8	1/2	1	25
8	1-3/8	3/4	1	25
10	1-3/8	3/4	1	20
12	1-3/8	3/4	1	20
24	1-5/8	7/8	1	20

D. Flexible expansion joints shall be Redflex as manufactured by Redvalve, Style 1015, Maxi-Joint as manufactured by General Rubber Corporation, Style 100, Metrasphere as manufactured by the Metraflex Company, or an equal approved by the Engineer.

2.04 TIE RODS

A. When prior approval is obtained from the Engineer, ductile iron pipe, fittings, and valves may be restrained using tie bolt joint restraint. Joint restraint materials for this method of restraint shall be the Super-Star SST Series Joint Restraint System as manufactured by Star National Products, a Division of Star Industries, Inc. Columbus, Ohio, or an equal approved by the Engineer.

B. All bolts, nuts, washers, tie rods, and other fasteners for the joint restraint system shall be manufactured of CORTEN high strength, low alloy, corrosion-resistant steel in conformance with ASTM A242. Tie bolts shall be manufactured of heat treated CORTEN steel. Tie rods and all fasteners for the system shall be galvanized in conformance with the requirements of ASTM A123. Tie rods shall have a minimum diameter of 3/4-inch. The number of tie rods required per joint shall be as recommended by the manufacturer.

C. Prior to backfilling after installation, all parts of the joint restraint system shall be coated with coal tar epoxy equal to Kop-Coat Bitumastic No. 300-M, for a minimum dry film thickness of 20 mils.

2.05 AUTOMATIC AIR AND VACUUM VALVES

A. Clean Water Air and Vacuum Valves:

1. Valves shall have heavy duty compound lever operating mechanism with 316 stainless steel pivot pins and 316 stainless steel retaining rings. Valves shall be constructed of cast iron ASTM A126, Grade B with ASTM A240 stainless steel trim and float. Valves shall have an adjustable orifice button, constructed of 316 stainless steel with viton or Buna-N seating. Provide 1/2-inch threaded outlet and stainless steel plug for top cover and body drain. Entrance to valve shall include a surge check valve incorporated into the valve design. Valves shall have a working pressure rating of at least 300 P.S.I. Valves shall be DeZurik-APCO ACS Model 1200-6" (to include Air/Vacuum Valve, Surge Check Valve, Air Release Valve & Butterfly Valve as one assembly) or approved equal.

2. Air and vacuum valves shall include a 1-inch gate valve and Dezurik-APCO 200A air release valve. Air release valve shall be cast iron ASTM A126 with stainless steel ASTM A240 T304 float, brass seat, Buna-N needle and stainless steel lever pin. Valves shall have a working pressure rating of at least 300 P.S.I.

3. Air and vacuum valves shall incorporate a flanged butterfly valve and surge check valve with retainer plate upstream or valve.

C. Valve End Connections:

1. Valves shall have a flanged end connection of 6-inches in diameter.

2. Flanges for Class 150 valves shall comply with ANSI B16.1, Class 125. Flanges for Class 300 valves shall comply with ANSI B16.1, Class 250.

2.06 BUTTERFLY VALVES

A. Butterfly valves for liquid service, 4 inches in size and larger, shall be Class 150-B in conformance with ANSI/AWWA C504, latest revision and designed for a minimum working pressure of 150 psi. Butterfly valves shall be of the tight closing rubber seat type. Valves shall be bubble tight with 150 psi on the upstream side of the valve and 0 psi on the downstream side and shall be satisfactory for applications involving valve operation after long periods of inactivity. Valve discs shall rotate 90 degrees from the fully open position to the fully closed position. Butterfly valves shall be as manufactured by American-Darling Valve Company, M&H, Kennedy Valve Manufacturing Company, Mueller Company, DeZurik, Henry Pratt Company, or an approved equal.

B. Valve bodies shall be constructed of high-strength cast iron conforming to ASTM A126, Class B. Buried valves shall have integrally cast mechanical joint ends as specified for ductile iron pipe and above-ground valves shall have cast iron flanges. End flanges shall conform in dimensions and drilling to ANSI B16.1, Class 125. Two trunnions for shaft bearings shall be integral with each valve body. Valve body thickness shall be in strict accordance with ANSI/AWWA C504 latest revision for Class 150-B valves.

C. Valve seat ring shall be constructed of Type 304 stainless steel. Seating edges of the seat ring shall be smooth and polished. The seat ring shall be capable of compensating for changes in direction of flow to assure a bubble tight seal in either direction.

D. Valve discs shall be solid (no cores) for 24-inch and smaller valves, and shall be either solid or hollow core for valves greater than 24-inch. Discs shall be constructed of ASTM A536, Grade 65-45-12 ductile iron. Valve disc shall be of the offset design to provide 360 degree uninterrupted seating.

E. Valve shafts may consist of a one piece unit extending completely through the valve disc bearings and into the operating mechanism or may be of the "stub shaft" type, which comprises two separate shafts inserted into the valve disc hubs. If used, stub shafts shall extend a minimum of 1 1/2 shaft diameters into the valve disc hubs. Valve shafts shall be constructed of ASTM A276, Type 304 stainless steel or a stainless steel with greater overall corrosion and oxidation resistance. The minimum shaft diameter shall conform to ANSI/AWWA C504, latest revision for Class 150B valves. The valve disc shall be attached to the shaft by means of "O" ring sealed taper pins. The valve shaft seal shall consist of "O" rings in a bronze cartridge or self adjusting nitrile Vee-type ring seals.

F. Valve seats shall be of a corrosion and chloramine resistant synthetic rubber compound bonded to a high grade stainless steel retaining ring and secured to the valve disc by Type 304 stainless steel set screws or shall be molded in,

vulcanized, and bonded to the body. Seats bonded to the body shall withstand a 75-pound pull tested in accordance with ASTM D429, Method B. The valve seat shall be adjustable and replaceable in the field without dismantling operator, disc, or shaft.

G. Valve shafts shall be fitted with sleeve-type bearings. Bearings shall be corrosion resistant and self-lubricating (Nylon or Teflon). Bearings shall be designed for a pressure not exceeding the published design load for the bearing material, or 1/5 of the compressive strength of the bearing or shaft material.

H. All butterfly valves shall open left or counter-clockwise when viewed from the stem. Manual valve operators shall be of the worm gear or traveling nut type and shall be fully enclosed. All operators shall have adjustable mechanical stop limiting devices to prevent over travel of disc. Should an adjustment of the disc be required to maintain a bubble tight seal, this adjustment shall be made externally without removing the operator housing cover. The operator shall be designed such that all adjustments can be made under pressure and without the possibility of dirt getting into the operator lubricant. Any adjustments through the lower shaft will not be acceptable. Units furnished for buried service shall be fully gasketed and grease packed. Manual valves located above ground shall be equipped with handwheel operator and shall have a suitable indicator arrow to give valve position from fully open to fully closed. Each buried butterfly valve shall be furnished with a 2-inch square AWWA nut operator with valve box and cover. Operator components shall, at the extreme operator positions, withstand without damage a pull of 200 lbs. for handwheel or chainwheel operators or an input torque of 300 ft.-lbs. for operating nuts.

I. Interior of valve body and valve disc except for valve seat and stainless steel valve seat ring shall be coated with a fusion bonded or thermosetting epoxy coating in accordance with AWWA C550, latest revision. Coating shall be holiday-free, NSF approved, with a minimum thickness of 16 mils. Surfaces shall be clean, dry, and free from rust and grease before coating.

J. All exterior surfaces of butterfly valves shall be clean, dry, and free from rust and grease before coating. For buried service, the exterior ferrous parts of all valves shall be coated at the factory with epoxy in accordance with AWWA C550. For valves installed aboveground, the exterior ferrous parts of all valves shall be shop primed at the factory with one coat, minimum dry film thickness of 4 mils, of a rust inhibitive, universal epoxy primer. Primer shall be suitable for finish paint specified. Following installation, aboveground valves shall be finish painted in accordance with Section 09900: Painting.

K. Prior to shipment from the factory, hydrostatic and leakage tests shall be conducted for each butterfly valve. Hydrostatic and leakage tests shall be

conducted in strict accordance with ANSI/AWWA C504, latest revision, and results shall be submitted to the Engineer.

2.07 CHECK VALVES

A. Valve: Check valves shall be the slanting disc type. The valve housing shall consist of two cast iron ASTM A126 Grade B body sections bolted together at a central diagonal flange, which shall be inclined at an angle of 55 degrees. Valves shall be designed for a pressure of 150 psi. Ends shall be 125 pound ANSI B16.1 flanges or 125 pound ANSI B2.1 threaded fittings. Each body section must have an access covered hole for internal inspection and each body half and disc fully machined to accept attachment of a bottom or top mounted oil dash pot. Oil dash pot shall be provided. Opening and closing speed shall be field adjustable through the dash pot and needle valve. The disc shall be made of ductile iron ASTM B584 C83600. The seat ring and disc ring shall be bronze, ASTM B271 C92200, and must be of the design that permits replaceability in the field without need for special tools or machining. The pivot pins in the body and the bushings in the disc lugs shall be stainless steel, but of different hardness to prevent galling and must therefore conform to ASTM specifications A582 T303 and A269 T304, respectively. The flow area, through the valve body inlet and outlet, shall be equal to the pipe size, and gradually increased to an area 40 percent greater than the pipe size through the valve seat. Inspection ports shall be provided upstream and downstream of the valve disc. An indicator must be supplied and visually show the disc position at all times. An electrical signal switch shall be provided with each valve which can be mounted on the indicator cover to give a remote signal indicating whether the valve is opened or closed.

B. Pressure: 250 psi.

C. Service: Reuse Water.

D. Dezurik-APCO Series 800, Val-Matic Series 9000, Crispin TD Series, or approved equal.

2.08 FLANGED ADAPTER COUPLING

A. Adapters shall be suitable for joining plain-end pipe to flanged pipes and fittings. Adapters shall conform in size and bolt hole placement to ANSI standards for steel and/or cast iron flanges 125 or 150 pound standard unless otherwise required for connections (ANSI B16.1 125 lb./ANSI B16.5 150 lb.).

B. Adapters shall be constructed of steel and coated in accordance with Section 09900. Bolts and nuts shall be Type 316 stainless steel conforming to ASTM A193, Grade B8 for bolts, and ASTM A194, Grade 8 for nuts and washers. Bolts and nuts greater than 1 1/8 inches in diameter shall be carbon steel ASTM A307,

Grade B, with Cadmium plating, ASTM A165, Type NS. Gasket material shall be suitable for exposure to the liquids to be contained within the pipes.

C. Adapters shall be Dresser style 128 or equal.

2.09 UNI-FLANGE® FLANGE ADAPTERS

A Adapters shall be suitable for joining plain-end pipe to flanged pipes and fittings. Adapters shall conform in size and bolt hole placement to ANSI standards for steel and/or cast iron flanges 125 or 150 pound standard unless otherwise required for connections (ANSI B16.1 125 lb./ANSI B16.5 150 lb.).

B. Adapters shall be constructed of ductile iron in accordance with ASTM A536 grade 65-45-12 and coated in accordance with Section 09900. Bolts and nuts shall be Type 316 stainless steel conforming to ASTM A193, Grade B8 for bolts, and ASTM A194, Grade 8 for nuts and washers. Bolts and nuts greater than 1 1/8 inches in diameter shall be carbon steel, ASTM A307, Grade B, with cadmium plating, ASTM A165, Type NS. Set screws shall be AISI 4140 steel 190,000 psi, heat treated to Rockwell C42-50, and zinc plated for corrosion resistance.

C. Provide limit restraint/thrust bolt harness assemblies if required based upon piping system test pressure.

D. Adapters shall be Uni-flange® Series 400 adapter flange by the Ford Meter Box Company, Inc. for above-ground and below-ground piping with diameters of 2 inches through 48 inches.

2.10 PIPE AND VALVE IDENTIFICATION SYSTEMS

A. Identification systems for above-ground and below-ground piping and for valves shall be as specified under Section 09905 of these Specifications.

2.11 MISCELLANEOUS ITEMS

A. Other items necessary for the complete installation and not specified herein shall conform to the details and notes shown on the Drawings. All minor items implied, usually included, or required for the construction of a complete operating system shall be installed whether shown on the Drawings or not.

PART 3 - EXECUTION

3.01 INSPECTION

A. All pipe, fittings, valves, and other material shall be subject to inspection and approval by the Engineer after delivery, and no broken, cracked, imperfectly coated, or otherwise damaged or unsatisfactory material shall be used. When a

defect or crack is discovered, the injured portion shall not be installed. Cracked pipe shall have the defect cut off at least 12 inches from the break in the sound section of the barrel.

3.02 GENERAL INSTALLATION REQUIREMENTS

A. Pipe, fittings, valves, and accessories shall be installed as shown or indicated on the Drawings.

B. All connections to existing piping systems shall be made as shown or indicated on the Drawings after consultation and cooperation with authorities of the Owner. Some such connections may have to be made during off-peak hours (late night or early morning).

C. Pipe Joint Deflection: Whenever it is desirable to deflect pipe joints to avoid obstructions or to maintain required alignment, the amount of the joint deflection shall not exceed 80 percent of the maximum limits allowed by the pipe manufacturer.

D. In preparation for pipe installation, placement (stringing) of pipe should be as close to the trench as practical on the opposite side of the trench from the excavated material. The bell ends of the pipe should point in the direction of the work progress.

E. Pipe and fittings shall be laid accurately to the lines and grades indicated on Drawings or required. Where grades for the pipeline are not indicated on the Drawings, maintain a uniform depth of cover with respect to finish grade. Care shall be taken to insure a good alignment both horizontally and vertically and to give the pipe a firm bearing along its entire length. Any pipe which has its grade or joint disturbed after laying shall be taken up and relayed.

F. All pipe and fittings shall be cleared of sand, dirt, and debris before laying. All precautions shall be taken to prevent sand, dirt, or other foreign material from entering the pipe during installation. If necessary, a heavy, tightly woven canvas bag of suitable size shall be placed over each end of the pipe before lowering into the trench and left there until the connection is made to the adjacent pipe. Any sand, dirt, or other foreign material that enters the pipe shall be removed from the pipe immediately. Interior of all pipe and fittings shall be kept clean after installation until accepted in the complete Work.

G. Any time that pipe installation is not in progress, the open ends of pipe shall be closed by a watertight plug or other method approved by the Engineer. Plugs shall remain in pipe ends until all water is removed from the trench. No pipe shall be installed when trench conditions are unsuitable for such work, including standing water, excess mud, or rain.

H. After pipe has been laid, inspected, and found satisfactory, sufficient backfill shall be placed along the pipe barrel to hold the pipe securely in place while conducting the preliminary hydrostatic test. No backfill shall be placed over the joints until the preliminary test is satisfactorily completed, leaving them exposed to view for the detection of visible leaks.

I. Upon satisfactory completion of the hydrostatic test, backfilling of the trench shall be completed.

J. Above-ground and Exposed Piping: Piping shall be cut accurately to measurements established at the job site and shall be worked into place without springing or forcing, properly clearing all equipment access areas and openings. Changes in sizes shall be made with appropriate reducing fittings. Pipe connections shall be made in accordance with the details shown and manufacturer's recommendations. Open ends of pipe lines shall be properly capped or plugged during installation to keep dirt and other foreign material out of the system. Pipe supports and hangers shall be provided where indicated or as required to insure adequate support of the piping.

3.03 INSTALLATION OF DUCTILE IRON PIPE

A. INSPECTION AND TESTING

1. All pipe shall be inspected and tested at the foundry.

2. The Owner shall have the right to have any or all piping, fittings, or special castings inspected and tested by an independent testing agency at the foundry or elsewhere. Such inspection and testing will be at the Owner's expense.

3. Mark as rejected and immediately remove from the job site, all pipe lengths showing a crack, damaged lining, or receiving a severe blow that may cause an incipient fracture, even though no such fracture can be seen.

4. Removal of cracked portions: Any pipe showing a distinct crack, but no incipient fracture beyond the limits of the visible crack, may be cut off and the sound portion installed. Cut the pipe at least 12 inches from the visible limits of the crack. Cutting of pipe shall be done by skilled workmen, and in such a manner as to not damage the pipe. Every cut shall be square and smooth, with no damage to the pipe lining. Cut surfaces shall be recoated as specified for the pipe. Cutting and installing cracked pipe shall only be performed when approved by the Engineer, and shall be at the expense of the Contractor.

B. Handling and Cutting Pipe:

1. Care shall be taken in handling, cutting, and laying ductile iron pipe and fittings to avoid damaging the pipe and interior coal tar epoxy or cement mortar lining, scratching or marring machined surfaces, and abrasion of the pipe coating. All cracked pipe and fittings shall be removed at once from the Work at no additional cost to the Owner.

2. Pipe cutting shall be done in a neat workmanlike manner without creating damage to the pipe and interior coal tar epoxy or cement mortar lining. Ductile iron pipe may be cut using an abrasive pipe saw, rotary wheel cutter, guillotine pipe saw, milling wheel saw or oxyacetylene torch. Cut ends and rough edges of ductile iron pipe shall be ground smooth. For push-on joint connections, the cut end shall be beveled to prevent gasket damage during joint assembly. Interior lining shall be repaired at cut ends per the manufacturer's instructions prior to joint assembly.

C. Laying Pipe and Fittings:

1. Bedding for Ductile Iron Pipe: Minimum bedding requirements shall be Type 2 as defined in ANSI/AWWA C600, latest revision. Provide proper bedding required, in accordance with thickness class of pipe being laid and depth of cover. Proper pipe laying conditions shall be in accordance with ANSI/AWWA C150 and C151, latest revisions, and ANSI/AWWA C600, latest revision.

2. All ductile iron pipe and fittings shall be laid in accordance with American Water Works Association Standard ANSI/AWWA C600, latest revision, entitled "Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances", with the following sections specifically applying:

a) Section 3.3 - Pipe Installation

b) Section 3.4 - Joint Assembly

D. Ductile Iron Pipe Joints:

1. Type: The joints of all pipelines shall be made absolutely tight. The particular joint used shall be approved by the Engineer prior to installation. Where shown on the Drawings or where, in the opinion of the Engineer, settlement or vibration is likely to occur, all pipe joints shall be bolted mechanical type or restrained type as specified above, or as indicated on the Drawings.

2. Push-on Joints: Push-on joints shall be made in strict accordance with the manufacturer's recommendations. Lubricant, if required, shall be an inert, non-toxic, water soluble compound incapable of harboring, supporting, or

culturing bacterial life. Manufacturer's installation recommendations shall be submitted to the Engineer for review and approval before commencing work. The bell of the pipe shall be cleaned of excess tar or other obstructions and wiped out before the cleaned and prepared spigot of the next pipe is inserted. The new pipe shall be shoved firmly into place until properly seated and held securely until the joint has been completed.

3. Mechanical Joints: All types of mechanical joint pipes shall be laid and jointed in full conformance with manufacturer's recommendations, which shall be submitted to the Engineer for review and approval before work is begun. Only specially skilled workmen shall be permitted to makeup mechanical joints. Torque wrenches, set as specified in AWWA Standard C111, shall be used; or spanner type wrenches not longer than specified therein may be used with the permission of the Engineer.

4. Restrained Joints: Restrained joints shall be provided where indicated on the Drawings. Joint assembly shall be made in strict accordance with the manufacturer's instructions, which shall be submitted to the Engineer for review and approval before commencing work.

5. Flanged Joints: Flanged joints shall be made up by inserting the gasket between the flanges. The threads of the bolts and the faces of the gaskets shall be coated with suitable lubricant immediately before installation.

   a) Bolt holes of flanges shall straddle the horizontal and vertical centerlines of the pipe. Clean flanges by wire brushing before installing flanged fittings. Clean flange bolts and nuts by wire brushing and lubricate bolts with oil and graphite.

   b) Insert the nuts and bolts (or studs), finger tighten, and progressively tighten diametrically opposite bolts uniformly around the flange to the proper tension.

   c) Execute care when tightening joints to prevent undue strain upon valves, pumps, and other equipment.

   d) 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.

3.04 INSTALLATION OF VALVES

A. Valves of the size and type shown on the Drawings shall be set plumb and installed at the locations indicated on the Drawings. Valves shall be installed in

accordance with manufacturer's installation instructions and with the details shown on the Drawings.

B. Valves shall be installed such that they are supported properly in their respective positions, free from distortion and strain. Valves shall be installed such that their weight is not borne by pumps and equipment that are not designed to support the weight of the valve.

C. Valves shall be carefully inspected during installation; they shall be opened wide and then tightly closed and the various nuts and bolts shall be tested for tightness. Special care shall be taken to prevent any foreign matter from becoming lodged in the valve seat. Check and adjust all valves for smooth operation.

D. Install valves with the operating stem in either horizontal or vertical position.

E. Allow sufficient clearance around the valve operator for proper operation.

F. Clean iron flanges by wire brushing before installing flanged valves. Clean carbon steel flange bolts and nuts by wire brushing, lubricate threads with oil or graphite, and tighten nuts uniformly and progressively. Clean threaded joints by wirebrushing or swabbing. Apply Teflon joint compound or Teflon tape to pipe threads before installing threaded valves. Joints shall be watertight.

G. For buried valves, a valve box shall be centered accurately over the operating nut and the entire assembly shall be plumb. The tops of valve boxes shall be adjusted to the proper elevation as specified below and as shown on the Drawings.

1. In paved areas, tops of valve box covers shall be set 1/4-inch below pavement. Following paving operations, an 18-inch square shall be neatly cut in the pavement around the box and the paving removed. The top of the box shall then be adjusted to the proper elevation and an 18-inch square by 6-inch thick concrete pad poured around the box cover. Concrete pads in traffic areas shall be reinforced with No. 4 reinforcement bars as shown on the Drawings. Concrete for the pad shall be 3,000 psi compressive strength at 28 days.

2. In unpaved areas, tops of valve box covers shall be set 2 inches above finished grade. After the top of the box is set to the proper elevation, a 18-inch square by 6-inch thick concrete pad shall be poured around the box cover. Concrete for the pad shall be 3,000 psi compressive strength at 28 days.

3. The concrete pad for the valve box cover shall have a 3-inch diameter, bronze identification disc embedded in the concrete surface as shown on the Drawings. The bronze identification disc shall be as specified in

Section 09905 and shall have the information as shown on the Drawings neatly stamped on it.

H. Valves shall be tested hydrostatically, concurrently with the pipeline in which they are installed. Protect or isolate any parts of valves, operators, or control and instrumentation systems whose pressure rating is less than the pressure used for the pressure test(s). If valve joints leak during pressure testing, loosen or remove the nuts and bolts, reseat or replace the gasket, reinstall or retighten the bolts and nuts, and hydrostatically retest the joints.

I. Following installation, all above-ground valves shall be painted in accordance with the painting system specified in Section 09900: Painting. Following installation of buried valves or valves installed in valve vaults, repair any scratches, marks and other types of surface damage, etc., with a coating equal to the original coating supplied by the manufacturer. Prior to backfilling, all nuts, bolts, and other parts of the valve joints shall be coated with two coats, 10 mils DFT per coat, of coal tar epoxy equal to Kop-Coat Bitumastic No. 300-M.

3.05 INSTALLATION OF TIE RODS

A. Tie rods shall be installed in strict accordance with the manufacturer's written installation requirements. Unless otherwise indicated on the Drawings, the size and number of tie rods for a joint or installation shall be as recommended by the manufacturer's design chart for a working pressure of 150 psi.

B. Following installation and prior to backfilling, all parts of the buried tie rod joint restraint system, including tie rods, tie bolts, nuts, washers, and other fasteners, shall be coated with two coats, 10 mils DFT per coat, of coal tar epoxy equal to Koppers Bitumastic No. 300-M.

3.06 HYDROSTATIC PRESSURE AND LEAKAGE TESTING - See Section 15044

3.07 INSTALLATION OF AIR RELEASE VALVES

A. Piping, fittings, and the air release valves shall be installed as shown on the Drawings.

B. The air release valve assemblies shall be installed so that they are properly supported and such that they will function properly and freely and no parts shall be strained.

C. Air release valve testing shall be performed during the testing of pipeline which air release is attached.

3.08 MAIN CLEANING AND FLUSHING

A. Following the hydrostatic and leakage tests, all the mains constructed under this contract shall be cleaned and flushed to remove sand, loose dirt, and other debris. Flushing velocity shall be a minimum of 2.5 fps. Flushing shall continue until clean water flows from the main. However, the Contractor shall endeavor to use the minimum amount of flushing water required to complete the work. To increase the efficiency of the cleaning and flushing operation, the Contractor shall use a pipeline pigging device of the proper size designed to clean the intended pipeline. The pigging device shall be capable of turning through a standard 90 degree MJ bend. The type of pipeline pigging device and the method of operation shall be approved by the Engineer.

B. Upon completion of testing for the gravity drain line system, drain lines shall be flushed to remove dirt, sand, stones, and other debris which may have entered the lines during construction and settled out in the lines. Materials and debris flushed from the drain lines shall be removed from a downstream lift station and disposed of at an approved disposal area.

C. Temporary blowoffs may be required for the purpose of flushing mains. Temporary blowoffs shall be installed as close as possible to the ends of the main being flushed. Blowoffs installed on the main shall be the same diameter as the main. Temporary blowoffs shall be removed and plugged after the main is flushed. All costs for installing and removing temporary blowoffs shall be at no additional cost to the Owner.

D. The Owner shall be notified at least 72 hours prior to flushing mains.

E. Blowoffs and temporary drainage piping used for flushing shall not be discharged into any gravity sewer or pumping station wetwell. The Contractor shall obtain prior approvals from the Engineer and the Owner as to the methods and locations of flushing water discharge.

END OF SECTION

SECTION 15800
PACKAGED TERMINAL AIR CONDITIONERS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Provide all labor, material, services and appurtenances necessary for the installation of the following equipment:

1. Packaged A/C units (DX, ELEC)

2.01 SUBMITTALS

A. Submit catalog data, shop drawings and installation instructions prior to commencement of work for all materials and equipment incorporated into the drawings and specified herein.

PART 2 - PRODUCTS

A. General: All controls, contactors, and overload protection for fan motors, compressors, heaters, etc., shall be an integral part of the unit.

The unit cabinet shall have 52" to 76” width, 94" height, and 30" to 42” depth. Standard unit cabinet shall be constructed of 16-gauge hot-dipped galvanized steel that has been powder coated. Powder coat shall be a TGIC polyester powder coat with a minimum of 4 mils thickness. The unit cabinet shall be internally acoustically insulated with 1.0" closed cell Armaflex and provided with stainless steel access fasteners on removable doors.

Evaporator section of the unit shall be constructed of 16-gauge hotdipped galvanized steel with a cooling coil constructed of aluminum fins mechanically joined to seamless copper tubing. The evaporator coil shall be dual-circuited with two separated refrigerant circuits. Each circuit shall be equipped with service valves, a sight glass, moisture indicator and fully-adjustable expansion valves. A full-area stainless steel drain pan with auxiliary overflow shall be provided.

Compressor/condenser section shall be constructed of hot-dipped galvanized steel. The 15-ton unit shall have two 7.5 ton compressors and two 7.5 ton condenser circuits complete with service valves on each circuit. The 10-ton unit shall have two 5 ton compressors and two 5 ton condenser circuits complete with service valves on each circuit. The condenser coil is to be constructed of aluminum fins mechanically joined to seamless copper tubing.

Supply air blowers in the unit shall be two DWDI backwardly inclined blower assemblies driven by a common double-shafted motor and packaged in a 16-gauge hot-dipped galvanized assembly.

The unit shall be equipped with a unitized control system with the following features: Unit shall have two-stage cooling and heating control with ± 0.25°F accuracy, 65°F – 95°F set point, three-point system fan switch (fan only, heat/cool cycle operation, and continuous fan cooling) and a control Power-On indicator lamp. System control thermostat shall have a digital readout of the system status, a power on/off switch, and remote/local control status indicating lamps.

The cooling system shall have high and low refrigerant pressure overloads, condenser and evaporator fan overloads with automatic reset on all overload conditions, high temperature overload, compressor overloads, compressor short time delays, defrost cycle with control system defrost, and refrigeration system failure lights with Form C alarm contacts. The entire unit shall be designed and constructed with all major system assemblies designed in utilized assemblies that may be easily and quickly repaired by service personnel with minimum down time in the operation of the system.

Accessories shall include the following items:

1. Low ambient controls for operation down to 0 degrees F. Manufacturer shall provide low ambient controls if standard unit is not capable of 0 degrees F operation.

2. Multiplexer controls for two units.

3. Unit mounted disconnect.

4. Provide 3 spare sets of filters (turn over to owner).

5. Provide compressor anti-short cycle protection.

Provide Specific Systems AirPAK Models 120 and 180 units or preapproved equal.

PART 3 - EXECUTION

3.01 GENERAL

A. Install and startup per manufacturer’s instructions.

B. Slab mounted packaged air conditioning units shall be set on 6" high concrete base, observe manufacturer's spacing requirements.

END OF SECTION

SECTION 16050

BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: General administrative, procedural requirements, and installation methods for electrical installations specified in Division 16.

B. The Drawings are schematic and are not intended to show every detail of construction.
   1. In general, conduits/raceways, transitions and offsets shown on Drawings indicate approximate locations in plan and elevation where the systems are intended to be run.
   2. CONTRACTOR shall fully coordinate electrical Work with other trades to avoid interferences.
   3. In the event of interferences, CONTRACTOR shall request clarification from ENGINEER in writing.

B. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Sections, apply to Work of this Section.

1.02 SUBMITTALS

A. Shop Drawings: Submit Shop Drawings covering the items included under this Section of Work. Shop Drawing submittals shall include:
   1. Submit product data covering the items included under this Section of Work.

B. Conforming to Construction Drawings: Submit a complete set of Drawings showing the locations of the piping, ductwork, etc., as actually installed. Such Drawings shall be submitted to ENGINEER on tracing cloth, mylar, or sepia paper from which blueprints can be obtained.

C. Operation and Maintenance Manuals: Submit in accordance with requirements of Section 01600, operation and maintenance manuals for items included under this Section. Include following information for equipment items:
   1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
   2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
   3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
   4. Servicing instructions and lubrication charts and schedules.

1.03 RECORD DOCUMENTS

A. Prepare Record Documents in accordance with requirements in Section 01770. In addition, CONTRACTOR shall submit, prior to final payment, Drawings conforming to construction records of systems it has installed. Vendor drawings shall be sized as manufacturers' standard.

B. Provide typewritten data sheets on motor control circuits with following information on each branch feeder: Load name, horsepower or KVA (transformer), fuse size, starter size, service factor of motor, motor nameplate currents, power factor correction capacitor size (if used), and thermal overload part number.

1.04 QUALITY ASSURANCE

A. National Electrical Code: Comply with NFPA 70, National Electrical Code.

B. UL Compliance and Labeling: Use products and components labeled by UL.

1.05 PERMITS, INSPECTIONS, AND LICENSES

A. CONTRACTOR shall procure all necessary permits and licenses, observe and abide by all applicable laws, codes, regulations, ordinances, and rules of the State, territory, or political subdivision thereof, wherein Work is done, or any other duly constituted public authority, and further agrees to hold OWNER harmless from liability or penalty which might be imposed by reason of an asserted violation of such laws, codes, regulations, ordinances, or other rules.
   1. Upon completion of Work, CONTRACTOR shall secure certificates of inspection from the inspector having jurisdiction and shall submit 3 copies of the certificates to OWNER. CONTRACTOR shall pay the fees for the permits, inspections, licenses, and certifications when such fees are required.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to Project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification. Equipment shall be packaged to prevent damage during shipment, storage, and handling. Do not install damaged units; replace, and remove damaged units from Site.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 GENERAL ELECTRICAL INSTALLATION

A. Provide electrical materials and equipment enclosures appropriate for areas in which they are installed. Each area will be designated on Drawings with a type of construction such as NEMA 4, 4X, 7 or 9 if it is other than NEMA 12. An area designated by a name and elevation includes space bounded by floor, ceiling, and enclosing walls.
   1. Exception: Provide manufacturer's standard construction for indoor or outdoor application where equipment is not manufactured to NEMA specifications (e.g., switchgear, transformers, high voltage capacitors, bus duct, and light fixtures; materials and equipment used in finished areas such as offices, laboratories, etc.).

B. Provide nonmetallic electrical materials and equipment enclosures in NEMA 4X areas; watertight NEMA 4 and equipment enclosures for outdoor applications and indoor applications below grade; explosion-proof NEC Class I, Division 1, Group D equipment for NEMA 7 areas; explosion-proof NEC Class II, Division 2, Group F equipment for NEMA 9 areas.

C. Coordinate with power company high voltage and/or low voltage metering requirements. Furnish, install, and connect metering equipment not furnished, installed or connected by power company.

D. Coordinate with telephone company the communication service requirements. Furnish, install, and connect cable and terminal equipment not furnished, installed, or connected by telephone company. Furnish and install a 4-foot by 8-foot by 3/4-inch plywood backboard painted white, raceway from backboard to property line, and cross-connect base and blocks which utilize punchdown wiring methodology.

E. Provide chases, slots, and openings in other building components during progress of construction, to allow for electrical installations.

F. Supporting devices and sleeves shall be set in poured-in-place concrete and other structural components as they are constructed.

G. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide maximum headroom possible. Locate light fixtures at approximately 8 feet above floor and where fixtures may be readily serviced.

H. Coordinate connection of electrical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.

I. Install systems, materials, and equipment to conform with approved submittal data, including coordination Drawings, to greatest extent possible. Conform to arrangements indicated by Drawings recognizing that portions of Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to ENGINEER.

J. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components where installed exposed in finished spaces.

K. As much as practical, connect equipment for ease of disconnecting with minimum of interference with other installations.

L. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

3.02 RACEWAY INSTALLATION

A. Outdoors, use the following materials:
   1. Exposed Conduit: PVC externally coated rigid metal conduit and fittings.
   2. Underground Direct Buried Conduit: PVC externally coated rigid metal conduit.
   3. Underground Concrete Encased Conduit: Fiberglass-reinforced conduit or rigid nonmetallic conduit if the conductors are used for power or 120 VAC; otherwise, use rigid metal conduit.

4. Conduit Used to Connect to Vibrating Equipment including transformers and hydraulic, pneumatic or electric solenoid or motor-driven equipment: Liquidtight flexible metal conduit.

B. Indoors, use the following wiring materials:
   1. Connection to Vibrating Equipment, including transformers and hydraulic, pneumatic or electric solenoid or motor-operated equipment: Liquidtight flexible metal conduit.
      a. Exception: NEMA 7 or 9 areas require explosion-proof flexible conduit.
   2. Exposed Conduit: Rigid metal conduit or intermediate metal conduit.
      a. Exceptions:
         1) Areas indicated as NEMA 4X, use rigid Schedule 40 PVC conduit.
         2) Areas indicated as NEMA 7 or NEMA 9 (such as grit and raw sewage rooms), use PVC externally coated rigid steel conduit.
   3. Concealed Conduit: Rigid metal conduit or intermediate metal conduit unless indicated otherwise.

C. Minimum size conduit shall be 3/4 inch unless shown otherwise.

D. Instrument Signal Conduit Requirements: Shielded signal wires for 4-20 mA type instruments or thermocouple wires assigned to the same control panel may be run in the same conduit. Shielded instrument signal wires, thermocouple wires, and shielded 2-wire intercom wires may be run in the same conduit. No other wires will be permitted in an instrument signal/2-wire intercom conduit. Conduit shall be RMC or PVC-coated RMC.

E. Conduit Thread Paint: Make threaded conduit joints watertight by coating threaded portions with a spray-on or brush-on zinc-bearing paint. Provide paint containing 90 percent minimum by weight of metallic zinc powder in the dried film. Clean field-cut threads of oil using the recommended solvent prior to coating threads.

F. Install expansion fittings in all exposed rigid nonmetallic conduit runs of 20 feet or more.

G. Install expansion/deflection fittings where conduit passes a building expansion joint or where conduits are attached to two structures joined by a concrete expansion joint.

H. Exposed or Concealed Construction: Install conduit exposed inside buildings except for areas with finished walls (e.g., offices, laboratories, lavatories, locker rooms, etc.) unless otherwise indicated.

I. Exposed Raceways: Install parallel and perpendicular to nearby surfaces or structural members and follow the surface contours as much as practical. Make bends and offsets so the inside diameter is not effectively reduced. Keep the legs of a bend in the same plane and the straight legs of offsets parallel. Conduits shall slope away from loads to keep moisture from entering the load. Run parallel or banked raceways 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. This requires that there be a change in the plane of the run, such as from wall to ceiling and that the raceways be of the same size. In other cases, provide field bends for parallel raceways. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot water pipes. Install horizontal raceway runs above water and steam piping.

J. Space raceways, fittings, and boxes 0.25 inch from mounting surface in NEMA 4 and NEMA 7 areas. Spacers shall be one-piece construction of stainless steel, galvanized steel, PVC, ABS, or other noncorrosive material.

K. Sleeves: Install in concrete floor slabs except where conduit passes through a housekeeping pad. Install in exterior walls below grade.

L. Stub-up Connections: Extend conduits through concrete floor for connection to freestanding equipment with an adjustable top or coupling threaded inside for plugs and set flush with the finished floor. Extend conductors to equipment with rigid metal conduit; flexible metal conduit may be used 6 inches above the floor. Where equipment connections are not made under this Contract, install screwdriver-operated threaded flush plugs with floor.

M. Flexible Connections: Use short length (maximum 6 feet for lighting fixtures; maximum 3 feet for all other equipment) of flexible conduit for recessed and semi-recessed lighting fixtures, equipment subject to vibration, noise transmission, or movement, and all motors. Use liquidtight flexible conduit in wet locations and rated flexible connections for hazardous locations. Install separate ground conductor across flexible connections.

N. Join raceways with fittings designed and approved for the purpose and make joints tight. Where joints cannot be made tight, use bonding jumpers to provide electrical continuity of the raceway system. Where terminations are subject to vibration, use bonding bushings or wedges to assure electrical continuity. Where subject to vibration or dampness, use insulating bushings to protect conductors.

O. Use raceway fittings that are of types compatible with the associated raceway and suitable for the use and location. For intermediate metal conduit, use threaded rigid metal conduit fittings. For PVC externally coated rigid metal conduit, use only factory-coated fittings approved for use with that material. Patch all nicks and scrapes in PVC coating after installing conduit.

P. Install raceway sealing fittings in accordance with the manufacturer's written instructions. Locate fittings at suitable, approved, accessible locations and fill them with UL listed sealing compound. For concealed raceways, install each fitting in a flush metal box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points and elsewhere as indicated:
   1. Where conduits enter or leave hazardous locations.
   2. Where conduits enter or leave NEMA 4X areas.
   3. Where conduits pass from warm locations to cold locations, such as the boundaries of refrigerated spaces and air-conditioned spaces.
   4. Where required by the NEC.

Q. Install electrical boxes in those locations which ensure ready accessibility to enclosed electrical wiring. Provide knockout closures to cap unused knockout holes where blanks have been removed.

R. Fasten electrical boxes firmly and rigidly to substrates or structural surfaces to which attached, or solidly embed electrical boxes in concrete masonry.

S. Provide fire-retardant barriers in all pull and junction boxes containing circuits that are otherwise continuously separated in conduit. Securely fasten these barriers within box. Size barriers so that space between barrier and box wall does not exceed 0.125 inch anywhere around the perimeter of barrier.

T. Support exposed raceway within 1 foot of an unsupported box and access fittings. In horizontal runs, support at box and access fittings may be omitted where box or access fittings are independently supported and raceway terminals are not made with chase nipples or threadless box connectors.

U. In open overhead spaces, cast boxes threaded to raceways need not be supported separately except where used for fixture support; support sheet metal boxes directly from building structure.

V. Terminations: Where raceways are terminated with locknuts and bushings, align the raceway to enter squarely and install the locknuts with dished part against the box. Where terminating in threaded hubs, screw the raceway or fitting tight into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align the raceway so the coupling is square to the box and tighten the chase nipples so no threads are exposed.

W. Complete installation of electrical raceways before starting installation of conductors within raceways and prevent foreign matter from entering raceways by using temporary closure protection. Cap spare conduit. Protect stub-ups from damage where conduits rise from floor slabs. Arrange so curved portion of bends is not visible above the finished slab.

X. Install pull wires in empty raceways: Use No. 14 AWG zinc-coated steel or monofilament plastic line having not less than 200-pound tensile strength. Leave not less than 12 inches of slack at each end of the pull wire.

3.03 WIRE AND CABLE INSTALLATION

A. Use pulling means including fish tape, cable, rope, and basket weave wire/cable grips which will not damage cables or raceways. Pull conductors simultaneously where more than one is being installed in same raceway. Use UL listed pulling compound or lubricant where necessary.

B. Keep branch circuit conductor splices to minimum. Splice feeders only where indicated. Use a standard kit. No splices are allowed for instrument and telephone cables except at indicated splice points.

C. Install splice and tap connectors which possess equivalent or better mechanical strength and insulation rating than conductors being spliced. Use splice and tap connectors which are compatible with conductor material and are UL listed as pressure type connectors.

D. Provide adequate length of conductors within electrical enclosures and train conductors to terminal points with no excess. Bundle multiple conductors, with conductors larger than No. 10 AWG cabled in individual circuits. Make terminations so there is no bare conductor at terminal.

E. Terminate power conductors at equipment using pressure-type terminals specifically designed for type of terminations to be made. Terminate no more than 2 conductors No. 8 AWG and smaller within the same pressure-type terminal. These 2 conductors shall be no more than 4 wire gauge sizes apart. Terminate no more than 1 conductor larger than No. 8 AWG within any pressure-type terminal.
   1. Exception: Power factor correction capacitor conductors may be terminated at the motor disconnect switch load terminals.

F. Seal wire and cable ends until ready to splice or terminate.

3.04 CUTTING AND PATCHING

A. Perform cutting and patching in accordance with requirements in Section 01730. In addition, the following requirements apply.
   1. Perform cutting, fitting, and patching of electrical equipment and materials required to uncover Work to provide for installation of ill-timed Work, remove and replace Work that is either defective or does not conform to requirements of Drawings.
   2. Cut, remove, and legally dispose of selected electrical equipment, components, and materials as indicated including, but not limited to, removal of electrical items indicated to be removed and items made obsolete by new Work. Protect structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed. Provide and maintain temporary partitions or dust barriers adequate to prevent spread of dust and dirt to adjacent areas.
   3. Patch existing finished surfaces and building components using new materials matching existing materials.

3.05 EQUIPMENT CHECKOUT AND TESTING

A. In addition to testing recommended by equipment or material supplier and called for in equipment or material specification, perform the following.

B. Motor Testing: Motor insulation shall be tested by using a 500 VDC (minimum) megger and applying test until a constant megohm reading of the following magnitude is obtained:

$R_{min.} = 4 (KV + 1)$ at 25 degrees C winding temp.
$R_{min.} = IV + 1$ at 40 degrees C winding temp.

   1. If motors do not meet requirements of megger test, blow hot air through motors to dry out and repeat until test is passed. If desirable, drying can be done by applying an electrical potential to equipment. However, in no case, induced or direct, shall voltage or current exceed continuous rating of equipment being dried.
   2. After passing megger test, motors shall be hi-pot tested at 200 percent rated voltage for a minimum of 1 minute.

C. Equipment Testing: The following tests which are applicable for a particular item of equipment shall be performed:
   1. Test current transformer circuits by applying current to secondary wiring at current transformer terminals until contactor trips.
   2. Test, time, and set protective relays. Relays shall be timed at various multiples (minimum of 3 points) of the pick-up value to determine agreement with published curves and adjust as necessary to agree with coordination study required settings. Exact tests to be performed vary with type of relay. Manufacturer's instructions for relay shall be complied with.
   3. After Work has been completed, demonstrate to OWNER's Representative that entire electrical installation is in proper working order and will perform functions for which it was designed by functional testing.
   4. Make any specific tests required by the manufacturer's installation instructions.

D. Check-out Procedures. In general, check-out procedures (as listed below) which are applicable for a particular item of equipment shall be performed:
   1. Vacuum interior of cubicles and remove foreign material.
   2. Wipe clean with a lint-free cloth insulators, bushings, bus supports, etc.

3. Check and adjust time delay, under-voltage devices, phase relay, over-current relays, etc., as required by coordination study or ENGINEER.
4. Fill motor bearings requiring oil.
5. Check and change, as required, thermal overload heater elements to correspond with motor full-load current and service factors of installed motor.
6. Check direction of rotation of motors and reverse connections if necessary. Check rotation with motor mechanically uncoupled where reverse rotation could damage equipment.
7. Equipment with two or more sources of power connected by tie breakers, transfer switches, or generator receptacles shall be checked for rotation from each possible combination of power sources. Power sources must have the same phase sequence for each source throughout entire facility.
8. Check exposed bolted power connections for tightness.
9. Check operation of breakers, contactors, etc., and control and safety interlocks.
10. Check tightness of bolted structural connections.
11. Check leveling and alignment of enclosures.
12. Check operating parts and linkages for lubrication, freedom from binding, vibration, etc.
13. Check tightness and correctness of control connections at terminal blocks, relays, meters, switches, etc.
14. Clean auxiliary contacts and exposed relay contacts after vacuuming.

END OF SECTION

SECTION 16100

VARIABLE FREQUENCY DRIVES

PART 1 - GENERAL

1.01 SUMMARY

A. These Specifications apply, in general, to all Variable Frequency Drives (VFDs) provided under other Specification Sections. They shall supplement the detailed equipment specifications, but in cases of conflict the equipment specifications shall govern.

1.02 SUBMITTALS

A. Shop Drawings: Submit in accordance with Section 01330, Shop Drawings covering the items included under this Section. Shop Drawing submittals shall include:
   1. Product data for the following products:
      a. Motors.
      b. Variable Frequency Drives.

B. All equipment suppliers shall submit Operation and Maintenance manuals to ENGINEER, through CONTRACTOR, 3 bound copies and 2 electronic/digital format copy of a manual containing specifications, Drawings, and descriptions of equipment; installation instructions; operation, maintenance, and lubrication manuals; parts lists; emergency instructions; and where applicable, test data with curves, wiring diagrams, PLC programs on CD and schematics. This information shall be submitted for each item of equipment furnished under this Contract and shall be specific to the exact equipment models complete with all appurtenances provided. It shall also include detailed, comprehensive directions for all required maintenance activities and for the repair or replacement of all wearing parts. Special attention shall be paid to necessary safety precautions that OWNER's staff should take when operating, maintaining, or repairing the equipment.
   1. Bound copies of O&M Manuals shall be in addition to any instructions shipped with the equipment and shall be submitted only after ENGINEER has given final approval of Shop Drawings. All manuals shall be submitted to ENGINEER following final Shop Drawing approval and prior to the date of shipment of the equipment to the Site. Organize operation and maintenance manuals into suitable sets of manageable size, organized by section or process, as directed by ENGINEER. Bind properly indexed data in heavy-duty 2-inch, 3-ring vinyl-covered binders, with pocket folders for folded sheet information. Appropriate identification shall be noted on the front and spine of each binder.
   2. Electronic Copy of O&M Manuals: Each equipment O&M manual shall be provided with an electronic disk, matching the content of the final approved printed O&M Manual. The information shall be saved in a single ".pdf" file, with bookmarks for each chapter, section, appendices, etc., as well as each piece of equipment. Where numerous pieces of equipment may be addressed within a section, a second tier of bookmarks shall be provided to allow quick access to each piece of equipment or key piece of information.
   3. "Sample" Table of Contents:

      Bookmarks

      Table of Contents
      Section 1 - Approved Shop Drawings
      Submersible Pumps

Base-mounted Pumps
Section 2 - Installation Instructions and Parts Identification
Submersible Pumps
Base-mounted Pumps
Section 3 - Operations and Maintenance Information
Section 4 - Troubleshooting (If not included in Section 3.)
Section 5 - Parts List (If not included in Section 3.)
Section 6 - Lubrication Instructions (If not included in Section 3.)

4. These manuals shall be in addition to any instructions shipped with the equipment and shall be submitted only after ENGINEER has given final approval of Shop Drawings. All manuals shall be submitted to ENGINEER following final Shop Drawing approval and prior to the date of shipment of the equipment to the Site. Organize operation and maintenance manuals into suitable sets of manageable size, organized by section or process, as directed by ENGINEER. Bind properly indexed data in heavy-duty 2-inch, 3-ring vinyl-covered binders, with pocket folders for folded sheet information. Appropriate identification shall be noted on the front and spine of each binder.

1.03 QUALITY ASSURANCE

A. Compliance with OSHA: All equipment provided under this Contract shall meet all the requirements of the Federal and/or State Occupational Safety and Health Acts. Each equipment supplier shall submit to ENGINEER certification that the equipment furnished is in compliance with OSHA.

B. Electrical Codes, Ordinances, and Industrial Standards: The design, testing, assembly, and methods of installation of the wiring materials, electrical equipment and accessories proposed under this Contract shall conform to the National Electrical Code and to applicable State and local requirements. UL listing and labeling shall be adhered to under this Contract. Any equipment that does not have a UL, FM, CSA, or other listed testing laboratory label shall be furnished with a notarized letter signed by the supplier stating that the equipment furnished has been manufactured in accordance with the National Electrical Code and OSHA requirements. Any additional cost resulting from any deviation from codes or local requirements shall be borne by CONTRACTOR.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with specified requirements and the attached Bill of Materials, products which shall be incorporated in Work include:
1. Variable Speed Drives:
a. Square D Company, Schneider Electric.

2.02 MATERIALS

A. Anchor Bolts: Anchor bolts, nuts, and washers shall be hot-dipped galvanized in conformity with ASTM A 385 and be supplied with sleeves.

2.03 COMPONENTS

A. Motor Starters and Control Panels: Motor starters 480 volt or less shall be size one or larger and have 120 volt AC contactor coils. All control circuits and indicating lights associated with the starter shall be 120 volt. The control transformer shall be sized to have 100 VA minimum spare capacity for future use. A terminal strip shall be provided for all control wires entering the starter with spare terminals for future use. The terminal strip and wires shall be identified. One spare normally open auxiliary starter contact, wired to the terminal strip, shall be provided for future use. Indicating lights shall be 120 volt, oiltight, push-to-test type. Explosion-proof units shall meet NEC Class I, Division I, Group D requirements.

1. Provide equipment enclosures appropriate for areas in which they are installed as indicated in the Bill of Materials. Each area will be designated on Drawings with a type of construction, such as NEMA 4, or 4X if it is other than NEMA 12. An area designated by a name and elevation includes space bounded by floor, ceiling, and enclosing walls.

2.04 VARIABLE SPEED DRIVES

A. Variable speed drives shall be provided as called for in the detailed Bill of Materials Quote from Schneider Electric, and/or Equipment Specifications. The following symbols will be employed in the Specifications to indicate the type of variable speed drive to be provided.

1. VS-2 Variable Frequency.

B. VS-2 Variable Frequency: This system shall comprise a motor and a variable frequency drive.

1. Motor: The drive motors shall be sized within their rated loads under the specified conditions without utilizing the top 15 percent of the 1.0 or 1.15 service factor. The motors shall be AC squirrel cage induction motors of NEMA "B" design and shall be rated 230/460 or 460 volt AC, 3-phase, 60 hertz for an ambient up to 40 degrees C. The motors shall be Class "F" insulated. The winding temperature rise shall be NEMA Standard for Class "F" insulation at the rated service factor load. The motor shall have passive temperature switches for use in the motor control circuit that will limit the winding temperature as defined by NEMA Standard MG1-12.53, Type 1. The motors shall be rated for inverter duty in accordance with NEMA MG1-1993, Rev. 1, Part 31, Definite Purpose Inverter-Fed Motors," and shall be capable of handling unfiltered voltage peaks of up to 1600 volts, and rise times of 0.1 micro-seconds.
2. Variable Frequency Drive: The variable frequency drive unit shall convert 480 volt plus 10 percent, minus 5 percent; 3-phase; 60 hertz plus or minus 2 hertz, input power into an adjustable frequency output. Output power shall be of suitable capacity and wave form to provide stepless speed control of the specified AC motor throughout a continuous speed range of 10:1 under variable torque load not exceeding 1.15 times the motor's full load rating in an ambient of 0-40 degrees C with up to 95 percent humidity. The drive continuous run amperes rating shall be 1.15 times the full load ampere of the load. The drive shall be able to withstand external short circuits without fuse blowing or device failure.
    a. Drives of the pulse-width-modulation type shall have current limit protection for the drive and load of 110 percent of motor nameplate rating for variable torque loads and 150 percent of motor nameplate rating for constant torque loads, for a minimum of 1 minute before automatically disconnecting the drive.
    b. CONTRACTOR shall meet the requirements of recommendations of IEEE 519 1992. CONTRACTOR shall provide drives as indicated in the attached Bill of Materials. Variable frequency drive shall be sinusoidal input type which minimizes harmonic distortion on the input lines through the use of electronic circuits. Individual or simultaneous operation of the variable frequency drives shall not add more than 3 percent total harmonic voltage distortion and not more than 5 percent total harmonic current

distortion (per IEEE 519 1992) as measured at the point of common coupling, which is the input terminals of each variable frequency drive.

c. Provide instantaneous static overvoltage and overcurrent protection. Provide undervoltage trip upon input power loss or phase loss without component failure and automatic restart upon return of full power and command. The drive shall not be damaged by application of incorrect phase sequence.
d. The back of the VFD enclosure must be capable of being mounted flush against a wall, without the need for an additional air gap for ventilation of drive heat sinks.
e. Provide input circuit breaker interlocked with the door.
f. Provide three spare fuses of each type used.
g. Provide line voltage transient suppression and immunity to local ambient electrical noise.
h. Provide drive fault detection circuit with contacts for remote alarm used by others. The drive shall shut down on any type of failure. Cause of drive shutdown shall be displayed on operator interface.
i. Provide isolation of signal circuits from the power circuits. The drive shall have self-protection from regenerative power on rapid decrease of speed signals.
j. Provide a forced air ventilation system to remove heat from the drive enclosure and drive components. Power for the ventilation system shall be provided from the drive circuits. Drive ventilation components shall be designed such that the drive can be mounted flush against the wall and side by side without obstructing the air flow to heat sinks. Fans shall be easily accessed and replaceable from the front or top of the drive.
k. The drive shall accept a speed control signal from either an isolated or non-isolated 4-20 mA source while in the automatic speed control mode and from a door-mounted operator interface when the manual mode is selected. Provide a door-mounted operator interface panel that allows remote/local mode selection and manual speed control.
l. The drive shall output an isolated 4-20 mA speed signal for remote speed indication.
m. The drive shall accept a remote start/stop contact closure while in the Auto mode and from operator interface when the Local mode is selected.
n. The drive shall have an alphanumeric operator interface display capable of displaying amps, voltage, kW, rpm, frequency, and elapsed running time.
o. Provide a delay to restart the motor after the motor is running. The delay to restart shall be adjustable from 3 to 60 seconds. Minimum delays greater than 5 seconds will not be accepted.
p. The 4-20 mA input signal shall control the motor speed between 10 percent of full speed and full speed. The 20 mA signal being full speed and 4 mA being minimum speed. The 4-20 mA input signal shall control the motor speed between the adjustable minimum and maximum speed settings. The minimum speed shall be field adjustable from 10-70 percent of rated speed. The maximum speed shall be field adjustable from 70-100 percent of rated speed. The minimum and maximum speed settings shall override the 4-20 mA signal at their respective settings. The speed signal shall follow a linear time ramp, adjustable from 4 to 20 seconds. Provide separate acceleration and deceleration control. The motor speed shall follow the input signal, in the steady state, with a plus or minus 2 percent linearity.
q. The drive shall be of modular construction for ease of maintenance.
r. The drive shall be capable of communicating monitoring and diagnostic function through a serial communication link.
s. When the following sensors are provided with either the pump or motor, provide the associated monitoring or controller. The sensors may include leak detection, vibration, bearing temperature, and motor temperature.
    1) Provide, for remote use by others, two normally open contacts rated 3amps at 120 volt AC which close when the controller is running, or faults.

t. In pump applications and where shown on Drawings, the variable frequency drives shall contain the necessary circuitry to energize a 120 volt AC pump solenoid valve when the pump is running. The rating of this circuit shall be sufficient to control a solenoid valve with an inrush of 360 VA and a holding VA of 120.

3. All wires are to be identified, and the identifying mark shown on the schematics and wiring diagram. Documentation of schematics, wiring diagrams, terminal strips, and operating and maintenance manuals shall be supplied at Shop Drawing time and delivered with the equipment.
4. All voltage transformation transformers, if required, shall be provided as part of the drive package and shall conform to Division 16. The transformers may be internal or external to the controller package.
5. The supplier shall provide a field start-up and calibration service on-Site. The supplier is to perform the calibration at Site at a mutually set time with ENGINEER. ENGINEER is to witness the calibration. The supplier's personnel shall have a stable 4-20 mA source, and a plus or minus 0.5 percent accurate 3-1/2-digit, digital milliamp meter to be used in the calibration procedure. The supplier's personnel must also have an electronic vibration sensor that reads in displacement and velocity to dynamically balance the motor and its driven device over the entire operating speed range. The pump and motor coupled and running under load shall be dynamically balanced after installation. The amplitude of vibration shall be measured on the bearing housings of the motor in all directions with a portable electronic measuring device such as Balance Technology Inc., Model 801, Vitec, Inc., Model 655, Metrix Instrument Co., Model 5282, or equal. The plane and rpm of maximum vibration shall be determined at each bearing and recorded. The frequency of maximum velocity vibration amplitude shall also be determined and recorded for each bearing. The maximum allowable vibration velocity for an acceptable installation shall be 0.3 inch per second. The vibration testing shall be witnessed by ENGINEER. The recorded results shall be submitted to ENGINEER including a sketch showing the plane of maximum vibration.
6. The system will be calibration checked at 100 percent, 75 percent, 50 percent, and minimum speed points. The minimum and maximum speeds will be set. The deceleration and acceleration rates will be set. The delay to restart will be set.

2.05 FABRICATION

A. Shop Painting: All iron and steel surfaces shall be protected by suitable paint or coatings applied in the shop or at point of fabrication. Surfaces which will be inaccessible after assembly shall be protected for the life of the equipment.
   1. The cleaned surfaces shall be shop primed before any rust bloom forms. All other exposed surface shall be properly filed, scraped, sanded, etched, brushed, sandblasted, and/or cleaned to provide surfaces free from dirt, loose crystals, rust, scale, oil, and grease and shop primed.
   2. Shop primed surfaces shall be painted with one or more coats of a primer which meets the requirements of this Section and is compatible with the finish painting system specified. Minimum shop coat thickness shall be 1.5 dry mills.

B. Electric motors, speed reducers, starters, pumps, and other self-contained or enclosed components shall be shop finished with 2 coats of an enamel paint as per manufacturer's recommendations.

C. Where specified, steel and iron surfaces shall be hot-dipped galvanized in conformity with ASTM A 153 and A 385.

PART 3 - EXECUTION

3.01 EQUIPMENT INSTALLATION CHECK

A. An experienced, competent, and authorized representative of the manufacturer or supplier of each item of equipment shall visit Site of Work a minimum of 2 times, once prior to installation to review installation procedures with CONTRACTOR and once after installation to inspect, check, adjust if necessary, and approve the equipment's installation. The equipment supplier's representative shall revisit Site as often as necessary until all trouble is corrected and the equipment installation and operation is satisfactory to ENGINEER.

B. Manufacturer's representative shall provide all necessary tools and testing equipment required including noise level and vibration sensing equipment.

C. Each equipment supplier's representative shall furnish to OWNER, through ENGINEER, a written report certifying that the equipment:
   1. Has been properly installed and lubricated;
   2. Is in accurate alignment;
   3. Is free from any undue stress imposed by anchor bolts;
   4. Has been operated under full load condition and that it operated satisfactorily to ENGINEER;
   5. That OWNER's Representative has been instructed in the proper maintenance and operation of the equipment; and
   6. Furnish OWNER a copy of all test data recorded during the installation check including noise level and vibration readings.

3.02 OPERATION AND MAINTENANCE TRAINING

A. Provide services of manufacturer's service representative to instruct OWNER's personnel in operation and maintenance of equipment. Training shall include start-up and shutdown, servicing and preventative maintenance schedule and procedures, and troubleshooting procedures plus procedures for obtaining repair parts and technical assistance.
   1. Manufacturer’s representative shall provide 1 day, 8 hours, on-Site training.
   2. Review operating and maintenance data contained in the operating and maintenance manuals.
   3. Schedule training with OWNER, provide at least 7-day prior written notice to ENGINEER.

3.03 Schneider Electric Quote:

Budget Pricing

Q2C Number: 33068975	Quote Number: 1	Revision Number: 0

Project Name: CITY OF NAPLES, FL
Project Sub-Name: Effluent Transfer Pump Drives
Project Location: NAPLES, FL
Quote Name: DRIVE SYSTEM CENTER
Through Addenda Number: 0
Bid Date: 03/25/2013
Consultant / Specifier:
Contractor / Installer:
Sales Representative: THOM CHENOWETH

Terms & Conditions

This Quotation is subject to Schneider Electric USA, Inc.'s published Terms and Conditions

Payment Terms: STANDARD
Billing Type(s):
Currency: US DOLLARS

Quote Markings

Q2C Number: 33068975 **Quote Number:** 1 **Revision Number:** 0
Project Name: CITY OF NAPLES, FL **Quote Name:** DRIVE SYSTEM CENTER

Item No.	Purch. Line No.	Qty.	Catalog Number / Details	Unit List Price	Extended List Price
001-00		4	DRIVE SYSTEM CENTER DSC 600 HP N1 w Matrix Drive Systems Center (DQG bom prepared by MST) Custom Packaged AC Drive consisting of Altivar 61 Drive Controller Rated for: 600 Horsepower not to exceed 708 FLA @ 460 VAC output, Variable Torque operation Using ATV61HC40N4D with continuous current rating of 759 AMPS Enclosure Construction: Type 1 with enclosure ventilation Custom Enclosure 90"H X 58"W X 32"D I.D. engraved nameplate Disconnect means: Flange mounted industrial duty disconnect mechanism with lock-out/tag-out provisions for: Circuit breaker disconnect with current limiting fuses Meets UL508A Power Options and Modifications include: Input Power Modification Integrated MTE Matrix Series D LOW PASS Passive Harmonic Mitigation Filter. The MTE Matrix filter guarantees Total Harmonic Distortion (THD) will NOT exceed 5% at the drive terminals Matrix Filters exceed 18-pulse performance characteristics with superior harmonic abatement, improvement in system efficiency and increased immunity to phase unbalance conditions. Programmable filter capacitor sequencing is provided using a capacitor isolation contactor for drive idle conditions. Supplementary surge protection Class 6671 SDSA3650 surge suppressor 40 kA/phase Control Options and Modifications include: Operator Controls Door mounted Keypad Hand-Off-Auto selector switch Speed potentiometer Pilot lights options: 22mm PWR ON Pilot light Drive RUN Drive FAULT AUTO Mode Pilot light Auxiliary contacts: 1 NO/ 1NC + 1 NO Drive Enable contacts 1 NO / 1 NC Drive Fault contacts 1 Form C Auto Mode contact Meters Power Logic PM820 Communication and network options: Are not quoted on this BOM Thermal Management Enclosure ventilation fan timed sequencing		

Q2C Number: 33068975 **Quote Number:** 1 **Revision Number:** 0
Project Name: CITY OF NAPLES, FL **Quote Name:** DRIVE SYSTEM CENTER

Item No.	Purch. Line No.	Qty.	Catalog Number / Details	Unit List Price	Extended List Price
			Includes the following standard features: Remote fault condition reset in Auto mode with transition of auto start contact Manual Fault condition reset in OFF position of H-O-A selector switch Customer safety interlocks/run permissive wired to customer terminal strip. Wire identification markers White component mounting plate Auto Start relay w/115 volt control interface (dry contact closure required) Application specific option and interfaces include: Additional 150VA 115V control power Delivery is estimated at 12weeks AFTER approval of ISC prepared Approval Drawings Approval drawing time is currently estimated at 3 weeks ARO PRICING IS NET PRICE DETERMINATION CATEGORY 22075		

Total List
Total Warranty:
Total FOB
Quote Total US DOLLARS:

END OF SECTION

SECTION 16120

WIRES AND CABLES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes the following:
   1. Low-Voltage Wire and Cable.
   2. Instrument Cable.

1.02 SUBMITTALS

A. Shop Drawings: Submit Shop Drawings covering the items included under this Section. Include Shop Drawings of wires, cables, connectors, and termination assemblies.

B. Reports of field tests prepared as noted in Section 01600.

1.03 QUALITY ASSURANCE

A. UL Compliance: Provide components which are listed and labeled by UL. For cables intended for use in air handling space comply with applicable requirements of UL Standard 710, "Test Method for Fire and Smoke characteristics of cables used in Air Handling Spaces."

B. NEMA/ICEA Compliance: Provide components which comply with following standards:
   1. NEMA WC 70-1999/ICEA S-95-658-1999, Nonshielded Power Cables Rated 2,000 Volts or Less for the Distribution of Electrical Energy.

C. IEEE Compliance: Provide components which comply with the following standard.
   1. Standard 82, Test procedures for Impulse Voltage Tests on Insulated Conductors.

D. Labeling: Handwritten labels are not acceptable. All labels shall be machine printed on clear or opaque tape, stenciled onto adhesive labels, or typewritten onto adhesive labels. The font shall be at least 1/8 inch in height, block characters, and legible. The text shall be of a color contrasting with the label such that is may be easily read. If labeling tape is utilized, the font color shall contrast with the background. Patch panels shall exhibit workstation numbers or some type of location identifier, in sequential order, for all workstations or devices attached. Each Network cable segment shall be labeled at each end with its respective identifier.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with specified requirements, manufacturers offering products which may be incorporated in Work include:
   1. Low-Voltage Wire and Cable:
      a. American Insulated Wire Corp.
      b. General Cable.

c. The Okonite Co.
d. Southwire Co.

2. Connectors for Low-Voltage Wires and Cable Conductors:
   a. AMP.
   b. O-Z/Gedney Co.
   c. Square D Company.
   d. 3M Company.
3. Instrument Cable:
   a. Belden (Trade Nos. 1120A and 1118A).

2.02 LOW-VOLTAGE WIRES AND CABLES

A. Conductors: Provide stranded conductors conforming to ASTM Standards for concentric stranding, Class B. Construction of wire and cable shall be single conductor (1/c) unless multiconductor cable is shown by notation in form (x/c) where x indicates the number of separate insulated conductors per cable.

B. Conductor Material: Copper. Minimum size power wire shall be No. 12 AWG.

C. Insulation: Provide XHHW, or THWN/THHN insulation for power conductors used in single- and 3-phase circuits with more than 120 volts to ground. Provide XHHW, or THWN/THHN insulation for power conductors used in single- and 3-phase circuits with 120 volts or less to ground
   1. Provide THHN/THWN, or XHHW insulation for grounding conductors installed in raceways.
   2. Provide THHN/THWN insulation for control conductors.

2.03 CONNECTORS FOR LOW-VOLTAGE WIRES AND CABLES

A. Provide UL listed factory fabricated, solderless metal connectors of sizes, ampacity ratings, materials, types, and classes for applications and services indicated. Use connectors with temperature ratings equal to or greater than those of the wires upon which used.

2.04 INSTRUMENT CABLE

A. Instrument Cable: 600 volt minimum insulated shielded cable with two or more twisted No. 16 or No. 18AWG stranded copper conductors; PVC, nylon, or polyethylene outer jacket; and 100 percent foil shielding.

PART 3 - EXECUTION

3.01 FIELD QUALITY CONTROL

A. Prior to energizing, check installed 480 volt, 3-phase power circuits and higher wires and cables with a 1,000-volt megohm meter to determine insulation resistance levels to assure requirements are fulfilled. Minimum acceptable megohm meter reading is 100 megohms held at a constant value for 15 seconds. A certified copy of megohm meter tests shall be submitted to ENGINEER. Test reports shall include ambient temperature and humidity at time of testing. Notify ENGINEER 48 hours prior to test with schedule.

END OF SECTION

SECTION 16130

RACEWAYS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Raceways for electrical wiring. Types of raceways in this Section include the following:
   1. Intermediate metal conduit.
   2. Liquidtight flexible conduit.
   3. Rigid metal conduit.
   4. PVC externally coated rigid metal conduit.
   5. Conduit bodies.

1.02 SUBMITTALS

A. Shop Drawings: Submit in accordance with Section 01330, Shop Drawings covering the items included under this Section. Shop Drawing submittals shall include:
   1. Product data for the following products:
      a. Conduit.
      b. Conduit bodies.

1.03 QUALITY ASSURANCE

A. Codes and Standards:
   1. NEMA Compliance: Comply with applicable requirements of NEMA standards pertaining to raceways.
   2. UL Compliance and Labeling: Comply with applicable requirements of UL standards pertaining to electrical raceway systems. Provide raceway products and components listed and labeled by UL, ETL, or CSA.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in Work include:

   1. Conduit:
      a. Allied Tube.
      b. Carlon.
      c. Johns Manville.
      d. Occidental Coatings.
      e. Perma-Cote Industries.
      f. Republic Steel.
      g. Robroy Industries.

h. Steelduct Co.
i. Triangle Conduit.
j. Wheatland Tube.
k. Youngstown Sheet and Tube.

2. Liquidtight Conduit:
   a. Anamet, Inc.
   b. Carlon.
   c. Electric-Flex.
   d. Thomas and Betts.
3. Conduit Bodies:
   a. Adalet-PLM.
   b. American Electric.
   c. Appleton Electric Co.
   d. Carlon.
   e. Crouse-Hinds Division, Cooper Industries, Inc.
   f. Delta Industrial Products.
   g. Killark Electric Mfg. Co.
   h. Kraloy Products Co.
   i. O-Z/Gedney Co.
   j. Perma-Cote Industries.
   k. Robroy Industries.
   l. Spring City Electrical Mfg. Co.
4. Conduit Thread Paint:
   a. CRC Chemicals, USA.
   b. Sherwin Williams.
   c. ZRC Chemical Products Co.

2.02 METAL CONDUIT AND TUBING

A. Rigid Metal Conduit: ANSI C 80.1, hot-dip galvanized.

B. Intermediate Metal Conduit: UL 1242, hot-dip galvanized.

C. PVC Externally Coated Rigid Metal Conduit and Fittings: ANSI C 80.1 and NEMA RN 1., Type 40, 40 mil nominal coating and thickness. The bond of the PVC to the substrate shall be stronger than the tensile strength of the PVC.

D. Liquidtight Flexible Metal Conduit and Fittings: UL 360. Fittings shall be specifically approved for use with this raceway.

2.03 NONMETALLIC CONDUIT AND DUCTS

A. Rigid Nonmetallic Conduit (RNC): NEMA TC 2 and UL 651, Schedule 40 or 80 PVC.

B. PVC and ABS Plastic Utilities Duct Fittings: NEMA TC 9; match to duct type and material.

C. Liquidtight Flexible Nonmetallic Conduit and Fittings: UL 1660. Fittings shall be specifically approved for use with this raceway.

2.04 CONDUIT BODIES

A. Provide matching gasketed covers secured with corrosion-resistant screws. Use cast covers in NEMA 4 areas and stamped steel covers in NEMA 1 and 12 areas. Use nonmetallic covers in NEMA 4X areas and threaded, ground joint covers in NEMA 7 and NEMA 9 areas.

B. Metallic Conduit and Tubing: Use metallic conduit bodies as follows:
   1. Rigid Metal Conduit: Use cast or malleable iron conduit bodies with zinc electroplating, aluminum enamel or lacquer finish, and threaded hubs.
   2. Intermediate Metal Conduit: Use cast or malleable iron conduit bodies with zinc electroplating, aluminum enamel or lacquer finish, and threaded hubs.
   3. PVC Externally Coated Rigid Metal Conduit: Use hot-dipped galvanized or cadmium-plated cast or malleable iron conduit bodies with threaded hubs factory PVC-coated. Field application of PVC coating to conduit bodies is not acceptable. Secure covers using PVC encapsulated or stainless steel screws.
   4. Nonmetallic Conduit and Tubing: Use nonmetallic conduit bodies conforming to UL 514 B.
   5. NEMA 7 and NEMA 9 Areas: Use materials conforming to UL standards for the area.

PART 3 - EXECUTION

NOT USED

END OF SECTION

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
South District Office
Post Office Box 2549
Fort Myers, Florida 33902-2549

RICK SCOTT
GOVERNOR

HERSCHEL T. VINYARD JR.
SECRETARY

NOTICE OF PERMIT REVISION

Electronic Mail

In the Matter of an Application
for Permit Revision by:

Justin Frederiksen, Deputy Utilities Director
City of Naples
380 Riverside Circle
Naples, FL 34104

Collier County - DW
City of Naples WWTP
Permit Number: FL0026271-010-DW1/MR (revision)
Naples WWTP Reuse Pump Upgrades

Dear Mr. Frederiksen:

In response to your application for a revision to the City of Naples wastewater permit, this is notification of the Department's revision of wastewater permit No. FL0026271 to incorporate changes, issued under section 403.087 of the Florida Statutes, as follows:

> The permittee is authorized to replace two (2) existing 350 HP vertical turbine pumps with two (2) Vertical Turbine pumps (3 Stage) with 600 horsepower motors rated for 6,500 gpm @ 278 feet TDH each.

The permitted capacity and all other conditions of the permit shall remain unchanged. This letter must be attached to the referenced permit and becomes a permanent part thereof.

The Department's agency action shall become final unless a timely petition for an administrative proceeding (hearing) is filed pursuant to Sections 120.569 and 120.57 of the Florida Statutes (F.S.), before the deadline for filing a petition. The procedures for petitioning for an administrative hearing are set forth below.

A person whose substantial interests are affected by the Department's permitting decision may petition for an administrative hearing in accordance with the provisions of Sections 120.569 and 120.57, F.S. The petition must contain the information set forth below and must be filed in (received by) the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000.

Petitions filed by the permit applicant ("permittee") or by any of the parties listed below must be filed within fourteen (14) days of receipt of this written notice. Petitions filed by any person other than those entitled to written notice under Section 120.60(3), F.S., must be filed within fourteen (14) days of publication of the public notice or within fourteen (14) days of receipt of the written notice, whichever occurs first. However, pursuant to Section 120.60(3), F.S., any person who has asked the Department for notice of agency action may file a petition within fourteen (14) days of receipt of such notice, regardless of the date of publication.

The petitioner shall mail a copy of the petition to the permittee at the address indicated above at the time of filing. The failure of any person to file a petition (or a request for mediation, as discussed below) within the appropriate time period shall constitute a waiver of that person's right to request an administrative hearing under Sections 120.569 and 120.57, F.S. Any subsequent intervention (in a proceeding initiated by another party) will be only at the discretion of the presiding officer upon the filing of a motion in compliance with Rule 28-106.205 of the Florida Administrative Code (F.A.C.).

A petition that disputes the material facts upon which the Department's action is based must contain the following information:

(a) the name, address, and telephone number of each petitioner; the name, address, and telephone number of the petitioner's representative, if any; the Department's permit identification number, and the name of the county in which the subject matter or activity is located;

(b) a statement of how and when each petitioner received notice of the Department's action;

(c) a statement of how each petitioner's substantial interests are affected by the Department's action;

(d) a statement of all disputed issues of material fact. If there are none, the petition must so indicate;

(e) a statement of facts that the petitioner contends warrant reversal or modification of the Department's action;

(f) a concise statement of the ultimate facts alleged, as well as the rules and statutes which entitle the petitioner to relief; and

(g) a statement of the relief sought by the petitioner, stating precisely the action that the petitioner wants the Department to take.

A petition that does not dispute the material facts upon which the Department's action is based shall state that no such facts are in dispute and otherwise shall contain the same information as set forth above, as required by Rule 28-106.301, F.A.C.

Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that the Department's final action may be different from the position taken by it in this notice. Persons whose substantial interests will be affected by any such final decision of the Department have the right to petition to become a party to the proceeding, in accordance with the requirements set forth above.

In addition to requesting an administrative hearing, any petitioner may elect to pursue mediation. The election may be accomplished by filing with the Department a mediation agreement with all parties to the proceeding (which include the permittee, the Department, and any person who has filed a timely and sufficient petition for hearing). The agreement must contain all the information required by Rule 28-106.404, F.A.C., and must be filed in (received by) the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000, within ten (10) days after the deadline for filing a petition, as set forth above. Choosing mediation will not adversely affect the right to an administrative hearing if mediation does not result in a settlement.

As provided in Section 120.573, F.S., the timely agreement of all parties to mediate will toll the time limitations imposed by Sections 120.569 and 120.57, F.S., for holding an administrative hearing and issuing a final order. Unless otherwise agreed by the parties, the mediation must be concluded within sixty (60) days of the execution

of the agreement. If mediation results in settlement of the administrative dispute, the Department must enter a final order incorporating the agreement of the parties. Persons seeking to protect substantial interests that would be affected by such a modified final decision must file their petitions within the appropriate time period, as set forth above, or they shall be deemed to have waived their right to a proceeding under Sections 120.569 and 120.57, F.S. If mediation terminates without settlement of the dispute, the Department shall notify all parties in writing that the administrative hearing processes under Sections 120.569 and 120.57, F.S., remain available for disposition of the dispute, and the notice will specify the deadlines that then will apply for challenging the agency action and electing remedies under those two statutes.

This action is final and effective on the date filed with the clerk of the Department unless a petition (or request for mediation) is filed in accordance with the above provisions. Upon the timely filing of a petition (or request for mediation) this order will not be effective until further order of the Department. Any party to this order has the right to seek judicial review of the order under Section 120.68, F.S., by the filing of a notice of appeal under Rule 9.110 of the Florida Rules of Appellate Procedure with the clerk of the Department in the Office of General Counsel, at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida, 32399-3000; and by filing a copy of the notice of appeal accompanied by the applicable filing fees with the appropriate district court of appeal. The notice of appeal must be filed within thirty (30) days from the date when this order is filed with the clerk of the Department.

Executed in Fort Myers, Florida

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION

Jon M. Iglehart
Director of District Management

CERTIFICATE OF SERVICE

The undersigned duly designated deputy agency clerk hereby certifies that this NOTICE OF PERMIT REVISION and all copies were mailed or emailed before the close of business on January 17, 2014 to the listed persons.

FILING AND ACKNOWLEDGMENT

FILED, on this date, pursuant to Section 120.52, F.S., with the designated Department clerk, receipt of which is hereby acknowledged.

Irene S. Collins
Clerk

January 17, 2014
Date

JMI/BTS/isc

Copies furnished to:
Daniel M. Nelson, P.E.
Bennie Shoemaker, DEP
Deanna Newburg, DEP