



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: 04/15/14	TITLE Royal Harbor Water System Improvements Project	NUMBER: 14-039	OPENING DATE & TIME: 05/06/14 2:00 PM
PRE-BID DATE, TIME AND LOCATION: Non-mandatory Pre-Bid Meeting held April 24; 10:00 AM local time; 380 Riverside Circle, Naples FL, 34102			

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

<p>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.</p> <p style="text-align: center;">FEI/EIN Number _____</p>		
AUTHORIZED SIGNATURE	DATE	PRINTED NAME/TITLE
<p style="color: red; font-size: small;">Please initial by all that apply I acknowledge receipt / review of the following addendum</p> <p style="color: red; font-size: small;"> _____Addendum #1 _____Addendum #2 _____Addendum #3 _____Addendum #4</p>		

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, Statutes, Ordinances, and rules and regulations of any kind.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

54. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY, AND VOLUNTARY EXCLUSION: The contractor agrees to comply with Executive Order 12549 "Debarment and Suspension" and 2 CFR 180 "OMB Guidelines to Agencies on Government wide Debarment and Suspension."

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

THE CITY OF NAPLES IS AN EQUAL OPPORTUNITY EMPLOYER

GENERAL INSURANCE REQUIREMENTS

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

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

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

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

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

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

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

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

No other format will be acceptable.

The Certificate must state the proposal number and title.

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

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

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: _____

Submitting Vendor Name: _____

CONSTRUCTION
SPECIAL CONDITIONS

A. **TERMS OF CONTRACT**

The resulting contract will commence on award and be in effect until completion of the project (180 days substantial and 210 days final from notice to proceed).

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
<ul style="list-style-type: none"> 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. 	
<ul style="list-style-type: none"> 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. 	
<ul style="list-style-type: none"> Include any delivery information. 	
<ul style="list-style-type: none"> Mandatory FORMS from this document to be included are: <u>Cover Sheet</u>, <u>References Sheet</u>, <u>Submission Checklist Sheet</u>, and <u>Bid Form / Compensation Schedule</u>, completed federal <u>W-9</u> form, and all information requested in the Bid Specifications. 	
<ul style="list-style-type: none"> Have an authorized individual sign the appropriate pages including the <u>Cover Sheet</u> 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. 	
<ul style="list-style-type: none"> Bid proposal / document needs to be received by the OPENING DATE & TIME indicated on the Cover Sheet. The mailing envelope must be addressed to: <div style="margin-left: 40px; text-align: center;"> City of Naples Purchasing Division 735 8th Street South Naples, Florida 34102 </div> 	
<p style="text-align: center;">The mailing envelope should be sealed and marked with:</p> <div style="margin-left: 40px; text-align: center;"> BID Number: BID Title: BID Opening Date: </div>	

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

Submitting Vendor Name: _____

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.



TETRA TECH

PROJECT MANUAL

CITY OF NAPLES ROYAL HARBOR WATER SYSTEM IMPROVEMENTS PHASE 1

Bid Set

Prepared For:

CITY OF NAPLES

**735 Eight Street S.
Naples, Florida 34102**

Prepared By:

**Tetra Tech
10600 Chevrolet Way, Suite 300
Estero, Florida 33928**

Tt #200-08516-14002

April 2014

**CITY OF NAPLES
ROYAL HARBOR WATER SYSTEM IMPROVEMENTS
PHASE 1**

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**CITY OF NAPLES
ROYAL HARBOR WATER SYSTEM IMPROVEMENTS
PHASE 1**

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DIVISION 0

BIDDING AND **CONTRACT** **REQUIREMENTS**

SECTION 00300

BID FORM

SUBMITTED: _____
Date

PROJECT IDENTIFICATION: **CITY OF NAPLES
ROYAL HARBOR WATER SYSTEM
IMPROVEMENTS – PHASE I**

NAME OF BIDDER: _____

BUSINESS ADDRESS: _____

Phone No.: _____ Fax No.: _____

E-Mail Address: _____

CONTRACTOR'S FLORIDA LICENSE NO.: _____

THIS BID IS SUBMITTED TO: City of Naples, Florida (hereinafter called Owner) acting through its City Commission.

1. The undersigned Bidder offers and agrees to enter into an Agreement with Owner in the form included in the Bidding Documents, to complete all work for the Contract Price and within the Contract Time, all in accordance with the Contract Documents.
2. Bidder accepts all of the terms and conditions of the Bidding Documents, including without limitation those dealing with the Owner's time for accepting for Bid and the disposition of Bid Bond.
3. In submitting this Bid, Bidder makes all representations required by the Instructions to Bidders and further warrants and represents that:

(a) Bidder has examined copies of all the Bidding Documents and of the following addenda:

No. _____	Dated _____;	No. _____	Dated _____
No. _____	Dated _____;	No. _____	Dated _____
No. _____	Dated _____;	No. _____	Dated _____
No. _____	Dated _____;	No. _____	Dated _____

(Receipt of all which is hereby acknowledged) and also copies of the Advertisement for Bids and the Instructions to Bidders.

(b) Bidder has examined the site and locality where the Work is to be performed and the legal requirements (Federal, State and local laws, ordinances, rules and regulations) and conditions affecting cost, degree of difficulty, progress or performance of the Work and has made such independent investigations as Bidder deems necessary.

- (c) This Bid is genuine and not made in the interest or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; Bidder has not solicited or induced any person, firm or a corporation to refrain from bidding; and Bidder has not sought by collusion to obtain for himself any advantage over any other Bidder or over Owner.
- (d) Bidder hereby agrees if this Bid is accepted, to commence work under this contract on or before a date to be specified in the Notice to Proceed and to fully complete all work of the Project within the Contract Time stipulated in the Agreement (Section 00500). Bidder further agrees to pay as liquidated damages the amount stated in the Agreement for each consecutive calendar day completion of the work is delayed.
4. Bidder submits the following unit prices to perform all the Work as required by the Drawings and Specifications for the City of Winter Garden. Bid shall be awarded based on Total Base Bid. Estimated quantities may exceed items listed. Payment based on installed quantities.
5. 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.

BID SUMMARY

Item No.	Description	Estimated Quantity	Unit	Unit Price	Total Price
PHASE I IMPROVEMENTS					
1	Mobilization/Demobilization	1	LS	\$	\$
2	General Requirements, Bonds and Insurance	1	LS	\$	\$
3	Indemnification	1	LS	\$ 100.00	\$ 100.00
4	Maintenance of Traffic	1	LS	\$	\$
5	Locate Utilities in Advance of Construction	1	LS	\$	\$
6	Survey Layout and As-Builts	1	LS	\$	\$
7	Furnish and Install 8-inch PVC water main and fittings	12,500	LF	\$	\$
8	Furnish and Install 4-inch PVC water main and fittings	1,050	LF	\$	\$
9	Furnish and Install 4-inch PVC force main and fittings	950	LF	\$	\$
10	Directional Drill 10-inch HPDE water main	710	LF	\$	\$
11	Furnish and Install 12-inch PVC storm drain, fittings and storm drain structures	1	LS	\$	\$
12	8-inch Gate Valve and Appurtenances	15	EA	\$	\$
13	4-inch Gate Valve and Appurtenances	6	EA		
14	Air Release Valve and Appurtenances	4	EA	\$	\$
15	Blow-off Assembly	7	EA	\$	\$
16	Fire Hydrant Assembly	28	EA	\$	\$
17	Service Connection (Long)	135	EA	\$	\$
18	Service Connection (Short)	145	EA	\$	\$
19	Grout and Abandon/Remove Existing Pipe	1	LS	\$	\$

Item No.	Description	Estimated Quantity	Unit	Unit Price	Total Price
20	Lift Station Pump Out Assembly	1	LS	\$	\$
21	Core Manhole and Install Rubber Boot Connection	1	EA	\$	\$
TOTAL BASE BID					
_____				\$	_____
(In Words)					(In Figures)

ADDITIVE ALTERNATIVE

Item No.	Description	Estimated Quantity	Unit	Unit Price	Total Price
A	Installation of 4" Piping and Fittings*	1	LS	\$	\$
TOTAL ALTERNATIVE BID					
_____				\$	_____
(In Words)					(In Figures)

*Additive Alternative A consists of the additional price for installation of 4" PVC water main, fittings, valves, appurtenances, etc. as shown on the Drawings. The Unit price for the lump sum item shall include the additional cost for all labor, materials, and equipment necessary to install the additional force main, including, fittings, valves, sitework, asphalt replacement, driveway replacement, and all other items necessary to complete the installation.

If the contract is to be awarded, it will be awarded on the basis of the most responsive, responsible, lowest "Total Bid." Additive alternatives may be considered in conjunction with the Total Base Bid in determining the lowest responsive bidder and Total Bid. The Owner reserves the right to accept any or all additive alternates in its sole discretion to determine the lowest Total Bid prior to award of the contract.

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.

Unit Prices have been computed in accordance with the General Conditions. Bidder acknowledges that quantities are not guaranteed and final payment will be based on actual quantities determined as provided in the Contract Documents.

5. The following documents are attached to and made a condition of this Bid:
- (a) **Bid Bond/Bid Security.**
 - (b) **Public Entities Crime Statement.**
 - (c) **Questionnaire and Subcontractor Listing (Sections 00301 and 00301-A).**
 - (d) **Evidence of Bidder's Certification and License to perform the work.**
 - (e) **References.**
6. The terms used in this Bid, which are defined in Article 1 of the General Conditions shall have the meanings assigned to them in the General Conditions as amended by the Supplementary Conditions.
7. **COMPLIANCE WITH FLORIDA TRENCH SAFETY ACT (90-96, LAWS OF FLORIDA)**

Bidder hereby acknowledges that all costs for complying with the Florida Trench Safety Act (90-96, Laws of Florida) are included in the various items of the proposal and in the Total Bid Price. For informational purposes only, the Bidder is required to further identify these costs, to be summarized below:

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

THIS IS NOT A PAY ITEM. The purpose of this form is to disclose information on the costs associated with trench safety measures and to insure that the Bidder has considered these costs and included them in the Bid Price. Contractor will not receive additional payment if actual quantities differ from those estimated above or if the Contractor uses a safety measure different than those listed.

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

The Utility Work shall be performed by a General Contractor or Underground Contractor Licensed in the State of Florida. Contract shall not be awarded unless proof of valid license(s) is provided.

NAME OF BIDDER: _____

If Bidder is: (ALL SIGNATORIES MUST HAVE THEIR NAME PRINTED OR TYPED
BELOW THEIR SIGNATURE)

SOLE PROPRIETORSHIP

_____(SEAL)
(Individual's Signature)

_____(SEAL)
(Individual's Name)

Doing Business as: _____

Business Address: _____

Phone No.: _____

Fax No.: _____

E-Mail Address: _____

Florida Licence No.: _____

A PARTNERSHIP

_____(SEAL)
(Partnership Name)

_____(SEAL)
(General Partner's Signature)

_____(SEAL)
(General Partner's Name)

Business Address: _____

Phone No.: _____

Fax No.: _____

E-Mail Address: _____

Florida License No.: _____

NAME OF BIDDER: _____

A CORPORATION

(Corporation Name)

(State of Incorporation)

By _____
(Name of Person Authorized to Sign)

(Title)

(Authorized Signature)

(Corporate Seal)

Attest _____
(Secretary)

Business Address: _____

Phone No.: _____

Fax No.: _____

E-Mail Address: _____

Corporation President:: _____

Florida License No.: _____

NAME OF BIDDER: _____

A JOINT VENTURE

By _____ (SEAL)

(Name)

(Address)

By _____ (SEAL)

(Name)

(Address)

Business Address: _____

Phone No.: _____

Fax No.: _____

E-Mail Address: _____

Florida License No.: _____

(Each joint venturer must sign. The manner of signing for each individual, partnership, and corporation that is a party to the joint venture should be in the manner indicated above).

8. List the following in connection with the Surety which is providing the Bid Bond.

Surety's Name: _____

Surety's Address: _____

Name and address of Surety's resident agent for service of process in Florida:

SCHEDULE OF MANUFACTURERS/SUPPLIERS

The Contract Documents are based upon the equipment or products available from the manufacturers/suppliers denoted as "A", "B", etc. However, the Bidder must indicate in his Bid which Base Bid manufacturer/supplier he intends to use for each item of equipment listed by circling one (1) of the listed manufacturers/suppliers. Should the Bidder fail to circle a named supplier, he hereby agrees to provide the item listed as "A". After receipt of bids, the Bidder may not substitute for any manufacturer or supplier circled.

If the Bidder desires to propose one (1) or more substitution or "or equal" manufacturers/suppliers, he may write in the name of such substitution or "or equal" in the spaces provided on the pages following the lists, but he must, nevertheless, also circle one of the listed manufacturers/suppliers. All substitutions or "or equal" items must be identified at the time of Bid (see Paragraph 6.05 of the General Conditions as amended by the Supplementary Conditions). Substitutions or "or equal" items will **not** be considered when determining the Apparent Low Bidder. Substitutions or "or equal" items will **not** be evaluated or considered until after the "Effective Date" of the Agreement. The Bidder shall base his Bid on providing one of the listed manufacturers and shall assume for bidding purposes that all substitutions or "or equal" items will not be accepted.

If the proposed substitution or "or equal" manufacturer/supplier is determined "not equivalent" by the Engineer, the Bidder must use the circled manufacturer/supplier. If the Bidder fails to indicate which listed manufacturer/supplier he intends to use or if a substitution or "or equal" is rejected, he must use the supplier listed as "A". Also, if the Bidder circles more than one listed manufacturer/supplier, he must use the first manufacturer/supplier circled (unless a substitution or "or equal" is approved).

Each proposed substitution or "or equal" will be evaluated in accordance with Paragraph 6.05 of the General Conditions following the Effective Date of the Agreement.

In addition to the reimbursement required under Paragraph 6.05 of the General Conditions, the Contractor shall also reimburse the Owner for any engineering costs directly attributable to the change in manufacturers/suppliers, caused by the acceptance of proposed substitutions or "or equal" items, such as; additional field trips for the Engineer, additional redesign costs, and additional review costs, etc. Other costs directly attributable to the change in manufacturers/suppliers caused by the acceptance of proposed substitutions or "or equal" items such as increased electrical requirements, larger buildings, modifications to structures, additional pumps, piping or tankage, etc., shall be borne by the Contractor and not by the Owner. Bidder further agrees that the use of substitute equipment offered will not affect the completion date.

The Owner may request, and the Bidder shall supply any additional information on proposed substitutes or "or equal" items prior to Notice of Award.

SCHEDULE OF BASE BID MANUFACTURERS/SUPPLIERS

Item No.	Equipment Item or Material	Specification Section No.	Base Bid Manufacturer/Supplier
1.	PVC Pipe	15050	A. JM Eagle B. National Pipe and Plastics
2.	Gate Valve	15050	A. Mueller B. Kennedy C. American Flow
3.	Valve Boxes	15050	A. Tyler/Union B. Star
4.	Restrained Fittings	15050	A. EBBA B. JCM C. Romac D. Star
5.	Air Release Valves	15050	A. Int. Valve Vento Matic B. A.R.I.
6.	HDPE Pipe	02531	A. Performance Pipe B. LP Driscoplex 4000 C. CSR Polypipe
7.	Storm Pipe	15050	A. Contech Construction Products Inc., A-2000

SUBSTITUTIONS AND "OR EQUAL"

The undersigned as Bidder agrees that substitutions, or "or equal" items will not be considered until after the "Effective Date of the Agreement" and will be evaluated in accordance with Paragraph 6.05, of the General Conditions as amended by the Supplementary Conditions. If Bidder intends to propose substitutions or "or equal" items after the "Effective Date of the Agreement", it is agreed that these items will be listed on the Substitution List that must be included with the Bid (form provided herein). Only the proposed substitutions or "or equal" items listed on the Substitution List and submitted at the time of Bid will be evaluated by the Engineer in accordance with the General Conditions.

SUBSTITUTION LIST OF
MANUFACTURERS/SUPPLIERS

Bidder proposes the following substitutions and "or equal" items of alternate manufacturers/suppliers for the equipment of material categories so identified:

	<u>Equipment Item Material</u>	<u>Drawing No.</u>	<u>Spec. Section</u>	<u>Substitute/"or equal" Manufacturer/Supplier (List One Only)</u>	<u>Proposed Price Deduct</u>
1.	_____	_____	_____	_____	_____
2.	_____	_____	_____	_____	_____
3.	_____	_____	_____	_____	_____
4.	_____	_____	_____	_____	_____
5.	_____	_____	_____	_____	_____
6.	_____	_____	_____	_____	_____
7.	_____	_____	_____	_____	_____
9.	_____	_____	_____	_____	_____
10.	_____	_____	_____	_____	_____

END OF SECTION

DIVISION 1

GENERAL **REQUIREMENTS**

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 or structures owned or controlled by the Owner or other governmental body are encountered during the course of the Work, and are not indicated on the 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 PDF Drawing 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 for 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 Royal Harbor Water System Improvements – Phase I 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 materials for the construction of the facilities consisting of, but not limited to, the following:

The City has identified the need to replace approximately 14,700 LF of asbestos cement (AC) water mains within the Royal Harbor area with 4-inch and 8-inch PVC water mains in order to meet current and projected fire flow requirements during Phase I. In addition to the replacement of the water main, two (2) 10-inch HDPE directional drills will be added underneath the intercoastal canal to “loop” the system. All piping will be installed within the City Right-of-way and easements.

Additionally included in Phase I is the installation of approximately 950 LF of 4-inch PVC force main to replace deteriorating discharge force main from the City’s Lift Station and approximately 290 LF of 12-inch corrugated PVC storm drain piping. The work will require cutting and capping of the existing force main, coring a new manhole penetration with rubber boot system and installation of storm drain structures per the City’s Standards.

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.

- B. No excavations shall be left unexposed or unattended while Contractor is not on premises.

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 services to residents are disrupted for a minimum period of time as directed by the City. 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 and eighty (180) days and finally complete two hundred and 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)**

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, pre-construction video and 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. 2)

- a. Measurement for various items covered under General Requirements, Bonds, and Insurance will not be made for payment, and all items shall be included in the lump sum price.
- b. Payment for General Requirements, Bonds, and Insurance shall include all 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. This item will be paid upon each payment request made by the Contractor. The Contractor shall attach with the payment request invoices to substantiate that appropriate insurance and bonds have been obtained by the Contractor.

3. Indemnification (Bid Item No. 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. Maintenance of Traffic (Bid Item No. 4)

- a. Measurement of various items for Maintenance of Traffic will not be made for payment, and all items shall be included in the lump sum price
- b. Payment for Maintenance of Traffic will be made at the Contract lump sum price for the item, which price and payment shall be full compensation for permitting, construction, and maintenance of any necessary detour facilities; the providing of necessary facilities for access to residences, businesses, etc., along the project; the furnishing, installing and maintaining of traffic control, barricades, railings, message boards (VMS), warning lights, and other safety devices during construction, the control of dust, providing the

services of uniformed off-duty police officers, and other special requirements for the safe and expeditious movements of traffic as called for in the Specifications and shown on the Drawings.

5. Locate Utilities in Advance of Construction (Bid Item No. 5)

- a. Measurement of various items to Locate Utilities in Advance of Construction will not be made for payment and all items shall be included in the lump sum price.
- b. Payment for Locating Utilities in Advance of Construction Contractor will be made at the contract lump sum price for the item, which price and payment shall be full compensation for all labor, materials, and equipment necessary to physically locate all utilities in the immediate area using non-destructive digging equipment, 3D Ground Penetrating Radar (GPR) supplies and personnel experienced in the use of subsurface utility engineering (SUE) to determine precise horizontal and vertical positions of utilities. The Contractor shall perform utility locates at least 21 calendar days in advance of construction in order to request clarification if required from the Engineer. The Engineer will have 7 calendar days to respond. This construction scheduling will allow all necessary decisions to be made prior to the contractor's crews reaching the work area and having a delay claim and/or a crew mobilization/demobilization claim.

The work includes equipment to paint/mark the approximate position of the underground utility, vacuum excavation equipment that includes air tools (water jet, air lance) to break up the surface and soil. The vacuum excavation equipment involves removing the disturbed soil and temporarily storing it. The exposed underground utility is examined and pertinent data such as size, type, material, and depth is gathered. A marker such as an iron rod and cap or nail and disk are placed next to the test hole and the depth measurement is taken to this point. The stored soil is then returned to the excavated test hole and the surface is returned to its original state; asphalt patch is tamped into the hole when applicable. Markings such as paint and/or lathe and ribbon are left near the hole for future identification. Assume all lines to be located are active lines and service must be maintained at all times possible.

6. Survey Layout and As-Builts (Bid Item No. 6)

- a. The lump sum payment shall cover all costs to layout all aspects of the proposed improvements. Costs for partial and final clearance submittal requirements. It also includes an overall as-built survey of the completed improvements including electronic files in AutoCAD.

7. Polyvinyl Chloride (PVC) Potable Water and Force Main and Fittings (Restrained Joint and Push-on Pipe) (Bid Item Nos. 7 through 9):

- a. Measurement for pipe, except as otherwise specified, will be based on the laying length of the pipe in linear feet actually placed as measured along the centerline of the completed pipe, including length of fittings and specials measured along the centerlines, but excluding directional drill, between the limits shown on the Drawings and restraint of pipe as required by contract documents.
- b. Payment for pipe will be made at the Contract unit price per linear foot for the size and type installed, which price and payment shall be full compensation for piping, fittings, installation in locations indicated on the Construction Drawings, all pipe fittings, clearing, grubbing, excavation, tree trimming, site restoration, sidewalk removal and replacement, asphalt removal and replacement, curb and gutter removal and replacement, dewatering, sod removal and replacement, pipe bedding, backfill and compaction, pressure testing, flushing/filling of main, joint restraints, bacteriological testing and sampling assemblies, silt fencing, pipe identification tape, insulated conducting wire, pipe supports, connections to existing water main including restraint of existing pipe on both sides of the tie in, support of existing main, keeping existing main in service, line stop, and other appurtenances, hiring of power company to hold and support power poles if needed, hiring of power company to relocate power pole as required, vegetation removal and replacement, removal and replacement of fences, removal and replacement of driveways and roadways disturbed during construction to meet pre-construction condition or better, site restoration, including landscape and/or sodding as necessary, and all equipment and all other work necessary to complete the installation as specified. All cost to clean, repair new or existing piping and appurtenances will be included under the payment for linear feet of pipe.

8. Directional Drill 10-inch HDPE Piping and Fittings (Bid Item No. 10):

- a. Measurement for Directional Drill pipe and fittings, except as otherwise specified, will be based on the laying length of the pipe in linear feet actually placed as measured along the centerline of the completed pipe, including the length of fittings and valves between the limits shown on the Drawings.
- b. Payment for Directional Drill pipe and fittings will be at the Contract unit price per linear foot for the size and type installed, which price and payment shall be full compensation for pipe fittings, installation by directional drill in locations indicated on the Contract Documents, all fusion welding, mechanical joint adapters, braided insulated conducting wire, silt fencing, buoyancy control, drilling mud recycling and disposal, site restoration, including landscaping, tree trimmings, vegetation removal and replacement, sidewalk removal and replacement, sod removal and replacement, silt fencing, removal and replacement of fences, removal and replacement of driveways and roadways disturbed during construction and all other equipment and labor necessary to complete the installation within the limits shown for each drill.

9. Polyvinyl Chloride (PVC) Storm Drain Pipe, Fittings and Storm Drain Structures (Bid Item No. 11):

- a. Measurement for pipe, except as otherwise specified, will be based on the lump sum cost to install the storm drain pipe and fittings as shown on the Contract Drawings.
- a. Payment for pipe will be made at the Contract lump sum price for the installation of the storm drain piping, which price and payment shall be full compensation for piping, fittings, installation in locations indicated on the Construction Drawings, all pipe fittings, clearing, grubbing, excavation, tree trimming, site restoration, sidewalk removal and replacement, asphalt removal and replacement, curb and gutter removal and replacement, dewatering, sod removal and replacement, pipe bedding, backfill and compaction, pressure testing, flushing/filling of main, joint restraints, bacteriological testing and sampling assemblies, silt fencing, pipe identification tape, insulated conducting wire, pipe supports, hiring of power company to hold and support power poles, hiring of power company to relocate power pole as required, vegetation removal and replacement, removal and replacement of fences, removal and replacement of driveways and roadways disturbed during construction and all equipment and all other work

necessary to complete the installation as specified. All cost to clean, repair new or existing piping and appurtenances will be included under the payment for linear feet of pipe.

10. Gate Valves and Appurtenances (Bid Item Nos. 12 and 13):

- a. Measurement for Gate Valves, except as otherwise specified, will be based on the number of actual gate valves installed and accepted.
- b. Payment for gate valves will be made at the Contract unit price per the item, which price and payment shall be full compensation for furnishing, installing and testing the valve, complete with mechanical restraints, nut with extension, tie rods, valve box, pad, disk and cover.

11. Air Release Valve and Appurtenances (Bid Item No. 14):

- a. Measurement for Air Release Valve, except as otherwise specified, will be based on the number of air release valves to be paid for will be determined by the actual units installed and accepted.
- b. Payment for Air Release Valve will be made at the Contract unit price per the item, which price and payment shall be full compensation for furnishing, installing and testing the valve, complete with tapping saddle, gate valves, supports, vent, vault, bedding rock, footing, frame, cover, access lid, piping, fittings and bends, enclosures, and appurtenances.

12. Blow-off Assembly (Bid Item No. 15)

- a. The number of Blow-off Assemblies to be paid for will be determined by the actual units installed and accepted.
- b. Payment for Blow-off Assembly will be made at the Contract unit price per the item, which price and payment shall be full compensation for furnishing, installing to finished grade and testing the valve, complete with the cap, nipple, valve, double meter box, bedding rock, cover, access lid, piping, fittings and bends, other required appurtenances, site restoration, including landscape and/or sodding as necessary, tree trimmings, vegetation removal, site restoration, including landscaping and/or sodding as necessary, tree trimmings, vegetation removal, and for all equipment and all other work necessary to complete the installation as specified.

13. Fire Hydrant Assembly: (Bid Item No. 16)

- a. Measurement and payment for the Fire Hydrants to be paid for will be determined by the actual count of units installed and accepted.
- b. Payment for Fire Hydrants will be made at the Contract unit price per hydrant for the respective size and type, which price and payment shall be full compensation for furnishing, installing (to finished grade) and testing the hydrant, complete with restraining mechanisms, hydrant painting, site restoration, including landscaping and/or sodding as necessary, tree trimmings, vegetation removal, and for all equipment and all other work necessary to complete the installation as specified. The hydrant tee, pipe stub from the main to the hydrant, the gate valve and box and removal of existing hydrants within project limits will also be paid for under this item.

14. Service Connections (Bid Item Nos. 17 and 18):

- a. Measurement for the number of Service Connections to be paid for will be determined by the actual count of units installed and accepted.
- b. Payment for Service Connections will be made at the Contract unit price per service up to the meter box including clean out and connection, which price shall be full compensation for all labor, installation, material, fittings, and services required for the installation of the piping below the existing services, sitework, installation, trenching, demolition, and backfilling and restoration of site including driveways, sidewalks, landscaping and sodding.

15. Grout and Abandon/Remove Existing Pipe (Bid Item No. 19)

- a. Measurement of this item will not be made for payment and all items shall be included in the lump sum price.
- b. Payment to abandon the existing sanitary sewer will be made at the Contract lump sum price for the grout and abandonment or removal of the existing force main as shown on the Contract Drawings. Price and payment shall be full compensation for all cutting, capping, restraint, and grouting of the existing pipe, site restoration, including landscaping and/or sodding as necessary, tree trimmings, vegetation removal, pipe removal and disposal, and for all equipment and all other work necessary to complete the

installation as specified. Costs associated with exposure to and handling of Asbestos Cement (AC) pipe are included in this item.

16. Lift Station Pump Out Assembly (Bid Item No. 20)

- a. Measurement for Lift Station Pump Out Assembly will not be made for payment and all items shall be included in the lump sum price.
- b. Payment for Lift Station Pump Out Assembly will be made at the Contract lump sum price for the piping and assembly, which price shall be full compensation for all labor, installation, material, and services required for the installation of the assembly, sitework, installation out of the wet well, site restoration, and all other work necessary to install the vault in accordance with the Drawings and Specifications.

17. Core Manhole and Install Rubber Boot Connection (Bid Item No. 21)

- a. The number of boot connections of the various sizes and types to be paid for will be determined by the actual count of connections installed and accepted.
- b. Payment for resilient boot connections will be made at the Contract unit price per resilient boot connection for the respective size and type, which price and payment shall be full compensation for furnishing boot connection through manhole, installing, cleaning, testing of proposed and depressurized existing main, complete with plugs, caps, mechanical restraints, and other required appurtenances, thrust collars or other restraint of existing and new pipes, pipe identification tape, insulated conducting wire, site restoration, including landscaping and/or sodding, tree trimmings, vegetation removal, and for all equipment and all other work necessary to complete the installation as specified. This item shall include all work required to notify and/or provide temporary service to existing customers during shut downs. All cost to clean, repair and restrain new or existing piping and appurtenances at the connection point as required by the restrained joint table are included under the payment of this item.

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 (1st) and the tenth (10th) 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

BTM/specs/01027 - APPLICATIONS FOR PAYMENT

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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.

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 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.
- C. 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:

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

<u>Permit</u>	<u>Permit No.</u>	<u>Issue Date</u>
1. FDEP ERP General Permit	TBD	TBD
2. Notice of Intent to Use the General Permit for Construction of Water Main	TBD	TBD

C. Permits by Contractor:

Permits by required by Contractor include, but are not limited to:

- Permit
1. General Permit for Stormwater Discharge from Large and Small Construction Activities [62-621.300(4)(a)]
 2. Dewatering
 3. All other permits required by the City of Naples

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
DIPRADuctile	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 01100

SPECIAL PROJECT PROCEDURES

PART 1 - GENERAL

1.01 PUBLIC NOTIFICATION

- A. At least two (2) weeks prior to construction in a given area, Contractor shall use VMS boards at a minimum of two (2) locations per area to notify public of upcoming construction. VMS boards shall be used throughout construction to notify public of traffic restrictions.

1.02 PUBLIC NUISANCE

- A. The Contractor shall not create a public nuisance including, but not limited to, encroachment on adjacent lands, flooding of adjacent lands, or excessive noise.
- B. Sound levels measured by the Engineer shall not exceed 50 dBA from 7 P.M. to 7 A.M. or 60 dBA 7 A.M. to 7 P.M. This sound level shall be measured at the exterior of the nearest exterior wall of the nearest residence. Levels at the equipment shall not exceed 85 dBA at any time. Sound levels in excess of these values are sufficient cause to have the Work halted until equipment can be quieted to these levels. Work stoppage by the Engineer or Owner for excessive noise shall not relieve the Contractor of the other portions of this Specification including, but not limited to, completion dates and bid amounts.
- C. No extra charge may be made for time lost due to work stoppage resulting from the creation of a public nuisance.

1.03 ASBESTOS PIPE REMOVAL AND DISPOSAL PROCEDURES

- A. General. The Contractor will be responsible for permitting, removal and disposal of asbestos-cement (A-C) pipe segments required to perform the Work as shown on the Drawings. The following paragraphs briefly summarize permitting, field procedures and disposal activities related to the A-C pipe. In these discussions, certain local, state and federal laws have been referenced. The Contractor must comply with all applicable local, state and federal laws/regulations whether or not such laws/regulations are referenced in these specifications.

The Contractor shall provide evidence of experience of proper procedures in removal, handling and disposal of asbestos-cement pipe materials within the past five (5) years. References from at least three completed projects shall be provided at the Preconstruction Conference. If the Contractor proposes to utilize the

services of a duly qualified Subcontractor for this portion of the work, these same requirements shall be met.

- B. Permitting. The Contractor shall apply for and obtain all permits related to removal of the A-C pipe segments. In accordance with Florida Department of Environmental Protection (FDEP) Rule 62-257.30 1 of the Florida Administrative Code (FAC), the Contractor must submit a “Notice of Asbestos Removal Project” form with a copy to the Engineer. The Contractor will submit the form to FDEP in a timely manner in accordance with the schedule contained in Rule 62-257. The agencies that may require permits for this project are not necessarily limited to the FDEP.
- C. Field Procedures. The Contractor is responsible for all procedures, including safety and health procedures, which will be used when handling A-C pipe segments. The Contractor’s handling of A-C pipe segments shall be in conformance with 29 CFR 1926.58 (OSHA Safety and Health Standards).

Cutting of A-C pipe shall be done in conformance with the recommended practices contained in the American Water Works Association’s (AWWA) Manual No. M-16. Cutting methods should be used which minimize the production of airborne dust.

- D. Preparation of Transport of Materials. The Contractor will remove the pipe sections from the ground in whole pieces without fracturing, breaking or otherwise damaging pipe. The A-C pipe segments shall be carefully loaded onto the transport vehicle without damaging the pipe. The transport vehicle shall totally enclose the A-C pipe segments so that wind and rain cannot disperse dust from the pipe material. Transport of the A-C pipe segments shall also meet the requirements of the waste disposal agency.
- E. Waste Disposal. As stated in Rule 62-701.520(3), the FDEP indicates that asbestos containing waste materials can be accepted at a permitted Class I, II or III landfill. The regulations also indicate that the waste generator (the Contractor) shall make arrangements with the landfill operator before disposal of the asbestos containing waste materials and inform the operator of the quantity of the waste and the scheduled date the shipment will arrive at the landfill. The Contractor shall provide the Engineer and the Owner a manifest immediately following disposal.

1.04 Water Main and Force Main Clearance Packages

- A. The Contractor shall submit complete clearance packages in accordance with the requirements of the general notes on the contract drawings. Rejected submittals will result in a credit back to the Owner of \$500.00 per occurrence from the project retainage at the sole discretion of the Engineer and Owner.

1.05 EXISTING UTILITIES

- A. Pipe Locations. All pipes 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.
- B. Utility Conflicts. Contractor shall familiarize themselves with layout of existing utilities and must identify all locations where there is the possibility of conflicts with existing utilities. Contractor will promptly notify the Owner and Engineer in writing in accordance with these documents. Contractor acknowledges that resolving utility conflicts, can sometimes require permitting. The Owner will grant additional days to the Contractor to cover the length of unanticipated delay in writing. However, under no circumstances will the Contractor be eligible for remobilization costs.

1.06 TRAFFIC

- A. Contractor will be responsible for submittal of Maintenance of Traffic (MOT) plans per FDOT and City of Naples Engineering Division requirements. MOT is required for all private roadways. Contractor shall be the responsible party relating to all aspects of traffic permitting. Approval must be received from City of Naples Engineering Division and Engineer prior to commencement of any work.
- B. The Contractor shall maintain 2-way traffic conditions for the full duration of the project. Refer to the project drawings for further details pertaining to MOT submittals.
- C. All safety precautions shall be taken and all traffic controls be furnished satisfactorily to the City, FDOT, and/or other government agencies having jurisdiction, where partial or complete obstruction of highways, roadways, streets, drives or sidewalks is required in the performance of the Work.

1.07 LANDSCAPING RESTORATION

- A. Contractor shall be responsible for replacing all landscaping disturbed during construction with landscaping of equal or better quality, quantity, material and size. The extent of existing landscaping is not shown on drawing and shall be the responsibility of Contractor and field inspected prior to bidding.

1.08 OPEN EXCAVATIONS

- A. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons, and damage to property. The Contractor shall, at his own expense, provide suitable and safe bridges and other crossings for accommodating travel by workmen.

1.09 TEST PITS

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

1.10 JURISDICTIONAL DISPUTES

- A. It shall be the responsibility of the Contractor to pay all costs that may be required to perform any of the Work shown on the Drawings or specified herein in order to avoid any work stoppages due to jurisdictional disputes. The basis for subletting Work in question, if any, shall conform with precedent agreements and decisions on record with the Building and Construction Trades Department, AFL-CIO, dated June, 1973, including any amendments thereto.

1.11 INCLEMENT WEATHER

- A. In the event of inclement weather, or whenever the Engineer directs; the Contractor shall, and shall cause subcontractors to protect carefully the Work and materials against damage or injury from the weather. If, in the opinion of the Engineer, any portion of work or materials have been damaged or injured by reason of failure on the part of the Contractor or any subcontractors to so protect the Work, such Work and materials shall be removed and replaced at the expense of the Contractor.

1.12 COORDINATION OF WORK

- A. The Contractor shall cooperate fully so as to eliminate or minimize the creation of conflicts. Adjustments from time to time may be required in the Contractor's work location and/or schedule provided a reasonable notice is given by the Owner or Engineer.

1.13 USE OF PUBLIC/PRIVATE STREETS

- A. The use of public/private streets and roads shall be such as to provide a minimum of an inconvenience to the public and to other traffic. Any earth or other excavated materials spilled from trucks shall be removed by the Contractor and the streets and roads cleaned to the satisfaction of the Owner.
- B. Access to properties along the Project must be maintained at all times throughout the duration of the Project as shown in the Drawings.

1.14 CHEMICALS

- A. All chemicals used during project construction, or furnished for project operations, whether herbicide, pesticide, disinfectant, polymer, reactant or of other classification, must show approval of the State Department of Health, Florida Department of Environmental Protection and if required, also the EPA or USDA. Use of all such chemicals and disposal of residues shall be in strict conformance with the manufacturer's instructions or recommended use procedures.

1.15 SAFETY AND HEALTH REGULATIONS

- A. The Contractor shall comply with the Department of Labor Safety & Health Regulations for construction promulgated under the Occupational Safety & Health Act of 1970, (PL 91-596) and under Section 107 of the Contract Work Hours & Safety Standards Act (PL 91-54).
- B. All equipment furnished and installed under this Contract shall comply to Part 1910, Occupational Safety & Health Standards & Amendments thereto.
- C. The Contractor shall comply with the Florida Trench Safety Act (90-96, Florida Law).

1.16 STATE AND FEDERAL PERMITS

- A. Construction in Florida Department of Transportation rights-of-way, wetlands and navigable water bodies will be governed by applicable State and Federal permits. All conditions set forth on the permits shall be a part of the Contract and they shall be attached by addendum.

1.17 INSPECTION

- A. The authorized representatives and agents of the Environmental Protection Agency and Controlling State and Local Pollution Control Agencies shall be permitted to inspect all work, material, payrolls, personnel records, invoices of materials and any other relevant data and records. The Owner and Engineer shall

be permitted access to any work area for the inspection of work and materials. The Owner may, at the Contractor's expense, order the uncovering or removal of any finished work if circumstances indicate faulty work or materials were used in the original installation. The Owner and Engineer shall also be permitted to inspect material invoices, payrolls or any other relevant data or records as may be necessary or required to satisfy the requirements of the Contract.

1.18 ENVIRONMENTAL PROTECTION

A. General:

1. Contractor shall comply with all Federal, State and Local laws and regulations controlling pollution of the environment. He shall take necessary precautions to prevent pollution of streams, lakes, ponds, and reservoirs with fuels, oils, bitumens, chemicals, or other harmful materials and to prevent pollution of the atmosphere from particulate and gaseous matter. In the event of conflict between such laws and regulations and the requirements of the Specifications, the more restrictive requirements shall apply. Environmental protection requirements specified in other Sections shall be considered as supplementing the requirements of this Section.
2. Failure of the Contractor to fulfill any of the requirements of this Section may result in the Owner ordering the stopping of construction operations.
3. Failure on the part of the Contractor to perform the necessary measures to control erosion, siltation, and pollution will result in the Owner notifying the Contractor to take such measures. In the event that the Contractor fails to perform such measures within 24 hours after receipt of such notice, the Owner may stop the Work as provided above, or may proceed to have such measures performed by others. The cost of such work performed by others plus related fees by the Engineer will be deducted from monies due the Contractor on his Contract.
4. All erosion and pollution control features installed by the Contractor shall be acceptably maintained by the Contractor during the time that construction work is being done.
5. Repair or replace damaged or inoperative erosion and pollution control devices as directed by the Engineer or the Owner's Representative.
6. Where there is a high potential for erosion and possible water pollution, the Contractor shall not expose, by his construction methods or procedures, an area of erosive land at any one time larger than the minimum amount required for the proper and efficient construction operation. If the exposure of any incomplete work corresponding to the

exposure period required for erosion is anticipated, temporary protective measures shall be taken to prevent the erosion or collapse of land in that immediate construction area.

B. Erosion and Pollution Control Schedule: At or prior to the preconstruction conference, the Contractor shall submit to the Owner for his information, three (3) copies of his erosion and pollution control work schedule. This schedule shall show the time relationship between phases of the Work which must be coordinated to reduce erosion and pollution, and shall describe construction practices and temporary control measures which will be used to minimize erosion and pollution. The schedule shall also show the Contractor's proposed method of erosion control on haul roads and borrow and material pits, and his plan for disposal of waste materials or other sources of pollution. Maps or other documents may also be required to show the proposed final surface gradient of proposed borrow pits, soil type base course pits, and waste areas. No work shall be started until the erosion and pollution control schedules and methods of operations have been submitted to the Owner for his information.

C. Air Pollution Controls:

1. Contractor shall control dust caused by his operations in the construction of the Project, including but not specifically limited to the following:
 - a. Clearing, grubbing, and stripping.
 - b. Excavation and placement of embankment.
 - c. Cement and aggregate handling.
 - d. Limerock stabilization.
 - e. Use of haul roads.
 - f. Sandblasting or grinding.
2. Contractor shall control air pollution from the following causes in constructing the project:
 - a. Volatiles escaping from asphalt and cutback materials.
 - b. Use of herbicides or fertilizers.
3. Control of dust and other air pollutants by the Contractor shall include:
 - a. Exposing the minimum area of land.

- b. Applying temporary mulch with or without seeding.
 - c. Use of water sprinkler trucks.
 - d. Use of covered haul trucks.
 - e. Use of stabilizing agents in solution.
 - f. Use dust palliatives and penetration asphalt on temporary roads.
 - g. Use of wood chips in traffic and work areas.
 - h. Use of vacuum-equipped sandblasting systems.
 - i. Use of plastic sheet coverings.
 - j. Restricting the application rate of herbicides to recommended dosage. Materials shall be covered and protected from the elements. Application equipment and empty containers shall not be rinsed and discharged so as to pollute a stream, river, lake, pond, water impoundment, or the ground water.
 - k. Relay of operations until climate or wind conditions dissipate or inhibit the potential pollutants.
- D. Open Burning of Combustible Wastes: No open burning of combustible waste materials or vegetation shall be permitted. All waste materials shall be removed from the site or within public rights-of-way and disposed in a legal manner.
- E. Permanent and Temporary Water Pollution Control (Soil Erosion):
- 1. Sufficient precautions shall be taken during construction to minimize the run-off of polluting substances such as silt, clay, fuels, oils, bitumens, calcium chloride, or other polluting materials harmful to humans, fish, or other life, into the supplies and surface waters of the State. Control measures must be adequate to assure that turbidity in the receiving water will not be increased more than allowed by the State or controlling agency. Such measures may consist of construction of berms, dikes, dams, drains and sediment basins, or use of fiber mats, woven plastic filter cloths, gravel, mulches, quick growing grasses, sod, bituminous spray and other erosion control devices or methods approved by the State or controlling agency.

2. The Contractor shall promptly clear all waterways and drainage patterns of false work, piling, debris, or other obstructions placed during construction work and not a part of the finished work.
 3. The Contractor shall remove and dispose of silt accumulations as directed by the Engineer or the Owner's Representative.
 4. If new and additional erosion control structures are to be installed, under this project, to prevent possible future erosion as a result of work under this contract, they shall be constructed concurrently with the other work, as early as possible, and as conditions permit.
- F. Noise Control: The Contractor shall provide adequate protection against objectionable noise levels caused by the operation of construction equipment in order to comply with all current City ordinances and these Specifications. Sound levels shall be measured at the exterior of the nearest exterior wall of the nearest residence or building. Levels at construction equipment shall not exceed 85 dBA at any time. Sound levels in excess of allowable values are sufficient cause to have the work halted until equipment can be quieted to these levels. Work stoppage by the Engineer or Owner for excessive noise shall not relieve the Contractor of the other portions of this Specification including, but not limited to completion dates and bid amounts.

1.19 TREE AND SHRUB PROTECTION AND TRIMMING

- A. Contractor shall exercise care to protect all trees and shrubs designated to remain. Trees and shrubs outside construction limits shall remain and shall be protected and where damaged, restored to original condition. Contractor shall obtain approval from the Owner prior to removing any trees. Trees damaged within construction limits due to negligence shall be restored to original condition.
- B. Tree limbs which interfere with construction operations and are approved for pruning shall be neatly cut with sharp pruning instruments; do not break or chop. All cut faces shall be coated with an approved tree pruning compound which is waterproof, antiseptic, elastic and free of kerosene, coal tar, creosote and other substances harmful to plants. Pruning operations shall be extended to restore the natural shape of the entire tree or shrub. Do not allow fires under or adjacent to trees or other plants which are to remain.
- C. Contractor shall protect tree and shrub root systems. Do not store construction materials, debris or excavated materials beyond construction limits. Do not permit vehicles or construction equipment beyond the limits of utility line construction. Restrict foot traffic to prevent excessive compaction of soil over root system. Excavated material shall be stockpiled away from tree drip lines as approved by the Engineer. Protect tree and shrub root systems from damage due

to noxious materials in solution caused by run-off or spillage during construction operations, or drainage from stored materials. Protect root systems from flooding, erosion or excessive wetting resulting from dewatering operations. Excavate within the drip line of trees only when approved by the Engineer. Where trees are designated to remain within the limits of construction and trenching for utilities is required within tree drip lines, cut roots with sharp pruning instruments; do not break or chop. Paint roots over 2" caliper with approved tree pruning compound.

- D. Trees damaged by construction operations shall be repaired promptly after damage occurs to prevent progressive deterioration of damaged trees. Removed trees, branches, roots and other excess materials shall be removed from the construction site to an approved landfill at the expense of the Contractor.

1.20 SITE CLEANUP AND RESTORATION

- A. The Contractor shall keep the working area free at all times of tools, materials and equipment not essential to the progress of the Work. Debris, waste materials, and rubbish shall be properly disposed of and not allowed to accumulate. If the Contractor should fail to do this, the Owner will make the necessary arrangements to effect the cleanup by others and will back charge the cost to the Contractor. If such action becomes necessary on the part of and in the opinion of the Owner, the Owner will not be responsible for the inadvertent removal of material which the Contractor would not have disposed of had he effected the required cleanup.
- B. Where material or debris has washed or flowed into or been placed in watercourses, ditches, gutters, drains, catch basins, or elsewhere as result of the Contractor's operations, such material or debris shall be entirely removed and satisfactorily disposed of during progress of the Work, and the ditches, channels, drains etc., kept in a clean and neat condition.
- C. On or before the completion of the Work, the Contractor shall, unless otherwise especially directed or permitted in writing, tear down and remove all temporary buildings and structures built by him; shall remove all temporary works, tools, and machinery or other construction equipment furnished by him; shall remove, acceptably disinfect, and cover all organic matter and material containing organic matter in, under, and around privies, houses, and other buildings used by him; shall remove all rubbish from any grounds he has occupied; and shall leave the roads and all parts of the premises and adjacent property affected by his operations, in a neat and satisfactory condition.
- D. The Contractor shall restore the entire project site to its original or better condition, with the exception of any area(s) designated for alteration by the Contract Documents. The Contractor shall restore or replace; when and as directed, any public or private property damaged by his work, equipment, or employees to a condition at least equal to that existing immediately prior to the

beginning of operations. To this end the Contractor shall do as required all necessary highway or driveway, walk, and landscaping work. Suitable materials, equipment, and methods shall be used for such restoration.

- E. The Contractor shall thoroughly clean all materials and equipment installed by him and his subcontractors and on completion of the Work shall deliver it undamaged and in fresh and new appearing condition.

1.21 LAWS AND REGULATIONS

- A. It shall be the responsibility of the Contractor to give all notices and comply with all the laws, rules, regulations, ordinances, etc., that may be applicable at the time the Work is started on the project. Should the Contractor discover the Drawings or Specifications are contradictory to, or in variance with the above, he shall notify the Engineer immediately, in writing, in order that any required changes or modifications can be made. It is not the Contractor's responsibility to make certain that the Drawings or Specifications are in non-compliance with any of the above; however, should he be aware of any existing discrepancy, or have reason to believe such may exist and performs work without proper notice to the Engineer, the Contractor shall be responsible for any cost involved in making the necessary alterations or corrections.

1.22 CONTRACTOR'S USE OF PREMISES

- A. All project construction work will be accomplished on the Owner's property, public/private rights-of-way/easements or within temporary construction easements and the Contractor shall confine his activity to those designated areas. The Contractor shall not enter upon private property for any reason without securing prior permission from the property owner. Such permission, including any stipulations, shall be in writing and a copy shall be delivered to the Engineer prior to the Contractor's entry or occupation of the subject property. This requirement will be rigidly enforced, particularly with regard to the utilization of vacant areas adjacent to the work site for the storage of materials or parking equipment.
- B. The Contractor shall perform his work in such a manner that he will not damage adjacent public or private property. Any damage to existing physical structures or utility services shall be repaired or restored promptly at no expense to the Owner.
- C. The Contractor shall avoid damage to and preserve all existing vegetation (grass, shrubs, trees, etc.) on or near the work area which do not, within reason, interfere with construction. The Contractor will be responsible for and required to replace or restore all such vegetation damaged or destroyed at no cost to the Owner. The Contractor will also be responsible for any unauthorized cutting or damage to

trees, shrubs, etc., and also damage caused by careless operation of equipment, storage of materials and rutting or tracking of grass by equipment.

- D. The Contractor shall conduct access, hauling, filling, and storage operations as specified herein and as shown on the Contract Drawings.
 - 1. On-site borrow areas are designated as follows: Suitable material, as approved by Engineer, from excavations for project structures. Any additional borrow material required shall be provided by the Contractor from off-site.
 - 2. On-site spoil areas will become property of the Contractor and are to be disposed off-site.
- E. Construct all fill areas so runoff will not flood improved areas.
- F. All connections to existing piping systems shall be made as shown or indicated on the Drawings after consultation, cooperation, and coordination with the Owner. Some such connections may have to be made during off-peak hours (late night or early morning hours). The Contractor shall give a minimum of 72 hours notice to the Owner when tie-ins with the existing plant utilities are required.
- G. For major utility pipeline tie-ins and relocations, the Contractor shall submit a detailed Plan of Action for review and approval by the Owner and the Engineer. No major utility relocation or tie-ins shall proceed until the Plan of Action for that Work is approved.

1.23 HAZARDOUS LOCATIONS

- A. The Contractor shall be responsible for identification of hazardous locations, appropriate construction methods, and all other safety issues.

1.24 ADDITIONAL PROVISIONS

- A. The Contractor shall provide at his own cost all necessary temporary facilities for access to, and for protection of, all existing structures. The Contractor is responsible for all damage to existing structures, equipment, and facilities caused by his construction operations, and must repair all such damage when and as ordered by the Engineer.

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 the General Conditions. 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 indicated 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
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- 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 General Conditions.
- 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 01390

COLOR AUDIO-VIDEO PRECONSTRUCTION RECORD

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: Prior to commencing work, the Contractor shall have a continuous color audio-video DVD recording taken along the entire length of the Project and at all proposed construction sites within the Project area to serve as a record of pre-construction conditions.

1.02 QUALITY ASSURANCE

- A. The Contractor shall engage the services of a professional electrographer. The color audio-video DVDs shall be prepared by a responsible commercial firm known to be skilled and regularly engaged in the business or preconstruction color audio-video DVD documentation.
- B. The electrographer shall furnish to the Engineer a list of all equipment to be used for the audio-video taping, i.e., manufacturer's name, model number, specifications and other pertinent information.
- C. Additional information to be furnished by the electrographer is the names and addresses of two references that the electrographer has performed color audio-video taping for, on projects of a similar nature, within the last 12 months.
- D. Owner's Representative must be present during filming. Provide Owner five (5) days notice prior to start of filming.
- E. No construction shall begin prior to review and approval of the DVDs covering the construction area by the Owner and Engineer. The Engineer shall have the authority to reject all or any portion of a video DVD not conforming to specifications and order that it be redone at no additional charge.
- F. The Contractor shall reschedule unacceptable coverage within five (5) days after being notified. The Engineer shall designate those areas, if any, to be omitted from or added to the audio-video coverage.
- G. DVD recordings shall not be made more than ninety (90) days prior to construction in any area. All DVDs and written records shall become property of Owner.

PART 2 - PRODUCTS

2.01 AUDIO-VIDEO DVDS

- A. Audio-video DVDs shall be new. Reprocessed DVDs will not be acceptable.

PART 3 - EXECUTION

3.01 EQUIPMENT

- A. All equipment, accessories, materials and labor to perform this service shall be furnished by the Contractor.
- B. The total audio-video system shall reproduce bright, sharp, clear pictures with accurate colors and shall be free from distortion, tearing, rolls or any other form of imperfection. The audio portion of the recording shall reproduce the commentary of the camera operator with proper volume, clarity and be free from distortion and interruptions.
- C. When conventional wheeled vehicles are used, the distance from the camera lens to the ground shall not be more than ten (10) feet. In some instances, audio-video DVD coverage may be required in areas not accessible by conventional wheeled vehicles. Such coverage shall be obtained by walking or special conveyance provided by the Contractor.
- D. The color video camera used in the recording system shall have a horizontal resolution of 350 lines at center, a luminance signal to noise ratio of 45 dB and a minimum illumination requirement of one (1) foot candle.

3.02 RECORDED INFORMATION - AUDIO

- A. Each DVD shall begin with the current date, project name and municipality and be followed by the general location, i.e., viewing side and direction of progress. The audio track shall consist of an original live recording. The recording shall contain the narrative commentary of the electrographer, recorded simultaneously with his fixed elevation video record of the zone of influence of construction.
- B. The Owner and Engineer reserves the right to supplement the audio portion of the taping as deemed necessary. A representative of the Owner or Engineer shall be selected to provide such narrative.

3.03 RECORDED INFORMATION - VIDEO

- A. All video recordings shall, by electronic means, display on the screen the time of day, the month, day and year of the recording. This time and date information must be continuously and simultaneously generated with the actual recording.
- B. Each video DVD shall have a log of that video DVD's contents. The log shall describe the various segments of coverage contained on that video DVD in terms of the names of streets or easements, coverage beginning and end, directions of coverage, video unit counter numbers, engineering stationing numbers and the date.

3.04 LIGHTING

- A. All audio-video shall be done during time of good visibility. No recording shall be done during precipitation, mist or fog. The recording shall only be done when sufficient sunlight is present to properly illuminate the subjects of recording and to produce bright, sharp video recordings of those subjects.

3.05 SPEED OF TRAVEL

- A. The rate of speed in the general direction of travel of the vehicle used during recording shall not exceed 44 feet per minute. Panning, zoom-in and zoom-out rates shall be sufficiently controlled to maintain a clear view of the object.

3.06 AREA OF COVERAGE

- A. Coverage shall include all surface features located within the zone of influence of construction supported by appropriate audio coverage. Such coverage shall include, but not be limited to, existing driveways, sidewalks, curbs, pavements, ditches, mailboxes, landscaping, culverts, fences, signs, and headwalls within the area covered.

END OF SECTION

SECTION 01410

TESTING AND TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. The Contractor shall employ and pay for services of an Independent Testing Laboratory to perform testing specifically indicated on the Contract Documents or in the specifications and may at any other time elect to have materials and equipment tested for conformity with the Contract Documents.
2. Contractor shall cooperate with the laboratory to facilitate the execution of its required services.
3. The Contractor shall provide Engineer with all test results herein within five (5) days of receipt.

B. Related Requirements Described Elsewhere:

1. Conditions of the Contract.
2. Respective section of the Specifications: Certification of products.
3. Each Specification section listed: Laboratory tests required, and standards for testing.
4. Testing laboratory inspection, sampling and testing is required for, but not limited to the following:
 - a. Excavating, Backfilling, and Compaction.
 - b. Stabilized Sub-Base.
 - c. Limerock Base.
 - d. Asphaltic Concrete Pavement.
 - e. Cast-in-Place Concrete.

5. Compaction and Backfill: Schedule for Structures, Table 02220-A.

C. The following schedule defines the responsibilities of various tests.

Test	Notes	Paid for By
Soil Compaction	Pipe Work: Every 300 ft at each lift of compaction minimum. Beneath Structures: Each 500 SF each lift of compaction minimum. Subgrade: Every 300 ft at each lift of compaction minimum.	Contractor
Settlement Monitoring	As required by testing laboratory	Contractor
LBR	Pipe Work: One test per road crossing. Base: Every 300 ft at each lift of compaction minimum.	Contractor
Asphaltic Concrete Pavement	Surface Course: Every 300 ft at least three tests per lift minimum. Subgrade: At least 1 per 100 SF Base: At least 1 per 100 SF	Contractor
Bacteriological	As per Specification Section 15050	Contractor
Pressure	As per Specification Section 15044	Contractor

D. Additional Tests: In the event that first test samples do not meet the applicable material specifications, the Contractor shall take measures to conform the material and equipment to the Specifications. All subsequent tests after the first test required to show compliance with the Specifications shall be paid for by the Contractor.

1.02 CONTRACTOR'S RESPONSIBILITIES

A. Cooperate with Owner's personnel and laboratory personnel. Provide access to Work and manufacturer's operations.

- B. Provide to the laboratory the preliminary design mix proposed to be used for concrete, and other materials mixes which require control by the testing laboratory.
- C. Materials and equipment used in the performance of work under this Contract are subject to inspection and testing at the point of manufacturer or fabrication. Standard specifications for quality and workmanship are indicated in the Contract Documents. The Engineer may require the Contractor to provide statements or certificates from the manufacturers and fabricators that the materials and equipment provided by them are manufactured or fabricated in full accordance with the standard specifications for quality and workmanship indicated in the Contract Documents. All costs of providing statements and certificates shall be a subsidiary obligation of the Contractor, and no extra charge to the Owner shall be allowed on account of such testing and certification.
- D. Furnish incidental labor and facilities:
 - 1. To provide access to Work to be tested.
 - 2. To facilitate inspections and tests.
- E. Notify Owner a minimum of one (1) working day in advance of operations to allow for laboratory assignment of personnel and scheduling of tests.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.01 CONSTRUCTION UTILITIES

- A. The Contractor shall arrange with the power and telephone companies, if necessary, to obtain temporary electrical service for construction purposes.
- B. The Contractor shall pay all power and telephone company installation and use charges for the telephone service and electrical energy utilized for temporary power and light.
- C. The Contractor shall make his own arrangements at his own expense for obtaining the water supply and sanitary facilities necessary for construction purposes, and he shall acquire and pay for all water consumed during construction.

1.02 TEMPORARY BUILDINGS

- A. The Contractor shall provide on-site temporary buildings or other structures for storing (tools or machinery and supplies). The Contractor is responsible for securing storage facilities.

1.03 CLEAN-UP

- A. Upon completion of daily work, all excess material and rubbish shall be removed from the job site, and any off-site locations used, and disposed of in a lawful manner and in accordance with the Contract Documents. The surrounding construction area, easements, and any other affected grounds shall be left in a condition as good or better than existed prior to construction. Any remedial actions, measures or reconstruction of damaged properties shall be accomplished at the Contractor's expense.

1.04 USE OF PREMISES

- A. The Contractor shall confine his apparatus and the storage of materials to area permitted by laws, ordinances, permits, or directions of the Engineer and shall not unduly encumber the project route area with his materials.

1.05 SOIL EROSION

- A. The Contractor shall take all required and necessary actions as outlined in Section 01568, to minimize siltation and soil erosion during construction.

1.06 ACCESS ROADS

- A. Streets, roads, and drives used by the Contractor for access to and from the site of the work shall be protected from damage. Any such damage done shall be repaired and left in good condition at the end of the construction period. Upon completion of construction, access areas and temporary easements shall be restored to the pre-construction condition at no additional cost to the Owner.

1.07 MAINTENANCE DURING CONSTRUCTION

- A. The Contractor shall maintain, at his expense, the work during construction and until final acceptance of all work under the contract.
- B. In the event the Contractor fails to remedy any unsatisfactory situation within twenty-four (24) hours after receipt of written notice from the Engineer describing the unsatisfactory conditions, the Owner may immediately proceed with adequate forces and equipment to maintain the project, and the entire cost of this maintenance will be deducted from the monies otherwise due the Contractor under the Contract.
- C. As an alternative to the above specified maintenance, the cost of all of the items that are not properly maintained may be deducted at the Contract Prices from the current partial payment request even if such items have been paid for in previous estimates.

1.08 SANITARY FACILITIES

- A. The Contractor shall provide and maintain temporary sanitary accommodations for the use of his employees, the Engineer, and those of his subcontractors as may be necessary to comply with health requirements and regulations and as directed by the Engineer. No nuisance will be permitted from these accommodations.

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. 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 01568

TEMPORARY EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. The Work specified in this Section consists of designing, providing, maintaining and removing temporary erosion and sedimentation controls as required by applicable rules and regulations and permit conditions.
2. Temporary erosion controls include, but are not limited to, grassing, mulching, netting, and providing interceptor ditches at ends of berms and at those locations which will ensure that erosion during construction will be either eliminated or maintained within acceptable limits.
3. Temporary sedimentation controls include, but are not limited to, silt dams, traps, barriers, and appurtenances at the foot of sloped surfaces which will ensure that sedimentation pollution will be either eliminated or maintained within acceptable limits.
4. Contractor is responsible for providing effective temporary erosion and sediment control measures during construction or until final controls become effective.

B. Related Work Described Elsewhere:

1. Excavation, Backfilling, and Compaction: Section 02220.
2. Loaming and Sodding: Section 02822

PART 2 - PRODUCTS

2.01 EROSION CONTROL

- ###### A. Netting shall be fabricated of material acceptable to the Owner.

2.02 SEDIMENTATION CONTROL

- ###### A. Bales shall be clean, seed-free cereal hay type.
- ###### B. Netting shall be fabricated of material acceptable to the Owner.

- C. Filter stone shall be crushed stone which conforms to Florida Department of Transportation (FDOT) Specifications (not to be mixed with underdrain aggregate).
- D. Concrete block shall be hollow, non-load bearing type.
- E. Concrete shall be exterior grade not less than 1-inch thick.

PART 3 - EXECUTION

3.01 EROSION CONTROL

- A. Minimum procedures for grassing are:
 - 1. Scarify slopes to a depth of not less than 6 inches and remove large clods, rock, stumps, roots larger than 1/2 inch in diameter and debris.
 - 2. Sow seed within 24 hours after the ground is scarified with either mechanical seed drills or rotary hand seeders.
 - 3. Apply mulch loosely and to a thickness of between 3/4 inch and 1-1/2 inches.
 - 4. Apply netting over mulched areas on sloped surfaces.
 - 5. Roll and water seeded areas in a manner which will encourage sprouting of seeds and growing of grass. Reseed areas which exhibit unsatisfactory growth. Backfill and seed eroded areas.

3.02 SEDIMENTATION CONTROL

- A. Install and maintain silt dams, traps, barriers, and appurtenances as shown on the approved descriptions and working drawings. Hay bales which deteriorate and filter stone which is dislodged shall be replaced.

3.03 PERFORMANCE

- A. Should any of the temporary erosion and sediment control measures employed by the Contractor fail to produce results which comply with the requirements of the State of Florida, the Owner or Engineer, the Contractor shall immediately take whatever steps are necessary to correct the deficiency at his own expense.

END OF SECTION

SECTION 01570

TRAFFIC REGULATION

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This section covers procedures for developing and implementing traffic control and regulation measures and maintenance of traffic in and around the construction area to provide for safe and efficient protection and movement of vehicular and pedestrian traffic/through and adjacent to the construction site areas.
- B. Contractor will be responsible for submittal of Maintenance of Traffic (MOT) plans per FDOT and City of Naples Engineering Division requirements. MOT will be required for all private roadways. Contractor shall be the responsible party relating to all aspects of traffic permitting. Approval must be received from City of Naples Engineering Division and Engineer prior to commencement of any work.
- C. Project roadways shall not be closed at any time during construction, even during emergencies. ALL MOT, traffic pattern modifications or diversions shall be approved by the City Engineer prior to implementation. Contractor shall provide temporary pavement as required.
- D. Anytime the roadway is reduced to single lane traffic conditions, the Contractor shall work 24 hours per day/7 days per week until standard 2-way traffic conditions resume. Refer to the project drawings for further details pertaining to MOT submittals.

1.02 REFERENCES

- A. Codes, Specifications, and Standards

Codes, specifications, and standards referred to by number or title shall form a part of this Specification to the extent required by the reference thereto. Latest revisions shall apply, unless other wise shown or specified.

- B. Florida Department of Transportation (FDOT) Standards

FDOT Manual State of Florida Manual of Traffic Control and Safe Practices for Street and Highway Construction, Maintenance and Utility Operations.

FDOT Specifications Florida Department of Transportation Standard Specifications for Road and Bridge Construction, Latest Edition.

FDOT Standards Florida Department of Transportation Roadway and Traffic Design Standards, Latest Edition.

1.03 SUBMITTALS

- A. Before restricting traffic flow through any thoroughfare, the Contractor shall give written notice to and, if necessary, obtain a permit or permits from the duly constituted public authority having jurisdiction over the thoroughfare. Contractor shall also notify the applicable law enforcement, fire, and emergency services having jurisdiction in the area. Notice shall be given no less than seven (7) days in advance of the time when it may be necessary in the process of construction to close or restrict traffic to such thoroughfare, or as may be otherwise required by the governing authority.
- B. The Contractor shall prepare and submit a Maintenance of Traffic (MOT) Plan or Traffic Control (TCP) Plan. The MOT shall comply with Winter Garden Code and Federal and State criteria, specifically MUTCD and FDOT 600 Series Indexes. Each MOT provider will be certified with FDOT MOT Course #BT-05-0079 (Advanced) and American Traffic Safety Services Association (ATSSA) certification as the minimum level of qualification required for project MOT plans. Each MOT shall include, but not be limited to, the following:
1. Each MOT shall show the posted speed limits.
 2. MOT for work outside the travel lanes can consist of the legible dimensioned sketch of field conditions, position and type of traffic control devices and a brief description of intended work, type of right of way encroachment, time and work duration.
 3. MOT requiring a full or partial closure will provide full information as above, and dimensioned legible sketch of conditions and MOT. Based on the complexity of the project, the Engineer may require a P.E. sign and seal plans. This requirement may be satisfied if MOT is prepared by a company having trained and design certified personnel.
 4. MOT for larger projects (i.e., subdivision entrance with deceleration lanes and overlay) will require that the plans be signed and sealed by a P.E. MOT shall detail individual phases.
 5. TCP shall include the listing of all agencies (police, fire, emergency, utilities) and phone numbers to be contacted (72 hours) before and during MOT.

6. During the whole construction, an MOT trained and certified person shall be present. The level of certification depends on type and complexity of the job (flagman, ATSSA Certified Worksite Traffic Supervisor, etc.). On site road personnel during MOT operations shall be minimum FDOT course BT-05-077 (Basic) certified and the onsite MOT foreman shall be minimum FDOT course BT-05-0079 (Advanced) certified.
7. Any changes in MOT shall be supervised by trained and responsible personnel (i.e., ATSSA Inspector). It includes active to non-active, day to night and phasing.
8. Contractor may choose the professional services, i.e., (Bob's Barricades, Traffic Control Devices, Inc., Control Specialists, Inc., etc.). TCP and on-site MOT shall clearly display the names and emergency phone number of the MOT responsible person.

1.04 SITE CONDITIONS

- A. The Contractor shall plan construction operations such that existing local traffic access can be maintained and shall maintain during the construction such barricades, lights, flagmen, and other protective devices as appropriate, whether specified for the project or required by the local governing authority. Traffic control devices used for maintenance of traffic shall comply with the FDOT Manual.
- B. The Contractor shall conduct his work in such manner as not to unduly or unnecessarily restrict or impede normal traffic through the streets of the community. Insofar as it is practicable, excavated material and spoil banks shall not be located in such manner as to obstruct traffic. The traveled way of all streets, roads, and alleys shall be kept clear and unobstructed insofar as is possible and shall not be used for the storage of construction materials, equipment, supplies, or excavated earth, except when and where necessary.

If required by duly constituted public authority, the Contractor shall, at his own expense, construct bridges or other temporary crossing structures over trenches so as not to unduly restrict traffic. Such structures shall be of adequate proper construction and shall be maintained by the Contractor in such manner as not to constitute an undue traffic hazard. Private driveways shall not be closed except when and where necessary, and then only upon due advance notice to the Engineer and the Owner and for the shortest practicable period of time consistent with efficient and expeditious construction. The Contractor shall be liable for any damages to persons or property resulting from his work.

- C. The Contractor shall make provisions at cross streets for the free passage of vehicles and foot passengers, either by bridging or otherwise, and shall not obstruct the sidewalks, gutters, or streets, nor prevent in any manner the flow of water in the latter, but shall use all proper and necessary means to permit the free passage of surface water along the gutters. The Contractor shall immediately cart away all offensive matter, exercising such precaution as may be directed by the County. All material excavated shall be so disposed of as to inconvenience the public and adjacent tenants as little as possible and to prevent injury to trees, sidewalks, fences, and adjacent property of all kinds. The Contractor may be required to erect suitable barriers to prevent such inconvenience or injury.

- D. Unless otherwise required by the governing authority, maintenance of traffic in and around the construction zone shall conform to Section 102 of the FDOT Specifications, and 600 Series Roadway Design Standards drawings of the FDOT Standards, as applicable.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

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 of 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. Contractor's startup plan shall include a schedule which allows at least a 2-week notification period to the City for coordination.

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, etc. 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.

3.03 FINAL CLEANING

- A. Employ skilled workmen for final cleaning.
- B. Prior to final completion, or Owner occupancy, Contractor shall conduct an inspection of sight-exposed 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 (1) 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 maintenance and operation 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. General Requirements: Division 1
2. Sitework: Division 2
3. Mechanical: Division 15.

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 this 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 INSTRUCTIONS". List:
 - a. Title of Project.
 - b. Identity of separate structure as applicable.
 - c. Identity of general subject matter covered in the manual.

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. Neatly typewritten table of contents for each volume, arranged in systematic order.
 - 1. Contractor, name of responsible principal, address and telephone number.
 - 2. A list of each product required to be included, indexed to content of the volume.
 - 3. List, with each product, 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.
 - d. Local source of supply for parts and replacement equipment including name, address and telephone number.
 - 4. Identify each product by product name and other identifying symbols as set forth in Contract Documents.
- B. Product Data:
 - 1. Include only those sheets which are pertinent to the specific product.
 - 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.

- C. Drawings:
 - 1. Supplement product data with drawings as necessary to clearly illustrate:
 - a. Relations of component parts of equipment and systems.
 - b. Control and flow diagrams.
 - 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.
- D. 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.
- E. Copy of each warranty, bond and service contract issued.
 - 1. Provide information sheet for Owner's personnel, give:
 - a. Proper procedures in event of failure.
 - b. 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 and four (4) electronic copies.
- 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 and four (4) electronic copies.
- B. Content, for each unit of equipment and system, as appropriate:
 1. Description of unit and component parts.
 - a. Function, normal operating characteristics, and limiting conditions.
 - b. Performance curves, engineering data and tests.
 - c. Complete nomenclature and commercial number of replaceable parts.
 - 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.
3. Maintenance procedures:
 - a. Routine operations.
 - b. Guide to "trouble-shooting".
 - c. Disassembly, repair and reassembly.
 - d. Alignment, adjusting and checking.
4. Servicing and lubrication required.
5. Manufacturer's printed operating and maintenance instructions.
6. Description of sequence of operation by control manufacturer.
7. Original manufacturer's parts list, illustrations, assembly drawings and diagrams required for maintenance.
 - a. Predicted life of parts subject to wear.
 - b. Items recommended to be stocked as spare parts.
8. As-installed control diagrams by controls manufacturer.
9. Each Contractor's coordination drawings.
 - a. As-installed color coded piping diagrams.
10. Charts of valve tag numbers, with location and function of each valve.
11. List of original manufacturer's spare parts, manufacturer's current prices and recommended quantities to be maintained in storage.

12. Other data as required under pertinent sections of specifications.
 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.
- C. 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.
- D. Prepare and include additional data when the need for such data becomes apparent during instruction of Owner's personnel.
- E. Additional requirements for operating and maintenance data: Respective sections of Specifications.

1.07 SUBMITTAL SCHEDULE

- A. Submit two (2) copies of preliminary draft of proposed formats and outlines of contents of Operation and Maintenance Manuals within 90 days after Notice to Proceed.
- B. Submit two (2) copies of completed data in preliminary form no later than 20 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 (1) 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 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 recorded with portable DVD recording cameras and DVDs supplied by the Contractor. DVD recording shall be made by the Contractor under the direction of the Owner using DVD compatible recording 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 Division 15: Mechanical. 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

DIVISION 2

SITEWORK

SECTION 02110

CLEARING, GRUBBING, AND STRIPPING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: This section describes the work included in clearing, grubbing, stripping, and otherwise preparing the project site for construction operations.
- B. Related Work Specified Elsewhere:
 - 1. Excavating, Backfilling, and Compaction: Section 02220.
- C. Clearing: Remove and dispose of shrubs, brush, limbs, and other vegetative growth. Remove all evidence of their presence from the surface including sticks and branches. Remove and dispose of trash piles and rubbish that currently is scattered over the construction site or collects there during construction. Protect trees, shrubs, vegetative growth, and fencing which are not designed for removal. Clearing operations shall be conducted so as to prevent damage to existing structures and installations, and to those under construction, so as to provide for safety of employees and others.
- D. Grubbing: Grubbing shall consist of the complete removal of all stumps, roots larger than 1-1/2 inches in diameter, matted roots, brush, timber, logs, and any other organic or metallic debris remaining after clearing not suitable for foundation purposes, resting on, under or protruding through the surface of the ground to a depth of 18 inches below the subgrade. All depressions excavated below the original ground surface for or by the removal of such objects, shall be refilled with suitable materials and compacted to a density conforming to the surrounding ground surface.
- E. Stripping: Remove and dispose of all organics and sod, topsoil, grass, and grass roots, and other objectionable material remaining after clearing and grubbing from the areas designated to be stripped. Grass and grass roots in areas to be excavated or filled upon shall be stripped of to a depth of 4 inches. In areas so designated, topsoil shall be stockpiled. Topsoils so stockpiled shall be protected until it is placed as specified. Any topsoil remaining after all work is in place shall be disposed of by the CONTRACTOR unless directed otherwise by the ENGINEER.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Trees and Shrubbery: Existing trees, shrubbery, and other vegetative material may not be shown on the Drawings. Inspect the site as to the nature, location, size, and extent of vegetative material to be removed or preserved, as specified herein. Preserve, in place, trees that are specifically shown on the Drawings and designated to be preserved.

- B. Preservation of Trees, Shrubs, and Other Plant Material:
 - 1. All plant materials (trees, shrubbery, and plants) beyond the limits of clearing and grubbing shall be saved and protected from damage resulting from the work. No filling, excavating, trenching, or stockpiling of materials will be permitted within the drip line of these plant materials. The drip line is defined as a circle drawn by extending a line vertically to the ground from the outermost branches of a plant or group of plants. To prevent soil compaction within the drip line area, no equipment will be permitted within this area.

 - 2. When trees are close together, restrict entry to area with drip line by fencing. In areas where no fence is erected, the trunks of all trees 2 inches or greater in diameter shall be protected by encircling the trunk entirely with boards held securely by 12-gauge wire and staples. This protection shall extend from ground level to a height of 6 feet. Cut and remove tree branches where such cutting is necessary to affect construction operation. Remove branches other than those required to affect the work to provide a balanced appearance of any tree. Scars resulting from the removal of branches shall be treated with a tree sealant.

PART 3 - EXECUTION

3.01 GENERAL

- A. Clearing and Grubbing Limits: All excavation areas associated with routing of proposed transmission mains shall be cleared and grubbed to a depth of one (1) foot below the completed surface.

- B. Disposal of Clearing and Grubbing Debris: Do not burn combustible materials. Remove all cleared and grubbed material from the work site and dispose of in accordance with all local laws, codes, and ordinances, the cost of which shall be included in the contract price.

- C. Areas to be Stripped: All excavation and embankment areas associated with new structures, slabs, walks, and roadways shall be stripped. Stockpile areas shall be stripped.
- D. Disposal of Strippings: Remove all stripped material and dispose off-site, unless otherwise directed to stockpile material, the cost of which shall be included in the contract price.

END OF SECTION

SECTION 02140

DEWATERING

PART 1 – GENERAL

1.01 DESCRIPTION

A. Scope of Work

The Work to be performed under this section shall include furnishing all equipment and labor necessary to remove storm or subsurface waters from excavation areas in accordance with the requirements set forth, as shown on the Drawing, including obtaining jurisdictional agency approval for such activities.

1.02 QUALITY ASSURANCE

A. The dewatering of any excavation areas and the disposal of the water shall be in strict accordance with the latest revision of all local and state government rules and regulations.

B. The CONTRACTOR shall obtain all required permits from the appropriate Water Management District(s), and shall comply with all conditions of such permits issued by the District(s).

1.03 SUBMITTALS

A. Submit proposed dewatering construction methods to the Water Management District (and other jurisdictional permitting agencies) with copy to ENGINEER.

B. Notify Water Management District at least (minimum) seven (7) days prior to beginning dewatering operations. Notify other jurisdictional permitting agencies in accordance with the requirements of the respective agency.

C. Submit records showing daily withdrawals to the permitting agency(ies) within seven (7) days after completing all dewatering operations.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – EXECUTION

3.01 GENERAL

- A. Construct temporary infiltration basins, turbidity barriers and other devices as specified, shown on the plans or as required by the permitting agency(ies).
- B. Install flow measurement equipment in compliance with jurisdictional permitting agencies.
- C. Notify jurisdictional permitting agency(ies) prior to beginning dewatering operations (Section 1.03B above).
- D. Protect abutting properties from construction and dewatering operations (see Division 1 - General Requirements).

3.02 DEWATERING

- A. Provide adequate equipment for the removal of storm or subsurface waters which may accumulate in the excavation.
- B. If subsurface water is encountered, utilize suitable equipment to adequately dewater the excavation so that it will be dry for work and pipe laying. A wellpoint system or other dewatering method approved by the respective jurisdictional agency(ies) shall be utilized if necessary to maintain the excavation in a dry condition for preparation of the trench bottom and for pipe laying.
- C. Dewatering by trench pumping will not be permitted if migration of fine-grained natural material from bottom, sidewalls, or bedding material will occur.
- D. In the event that satisfactory dewatering cannot be accomplished due to subsurface conditions or where dewatering could damage existing structures, obtain the ENGINEER's approval of wet trench construction or procedure before commencing construction.

3.03 DISPOSAL

- A. Discharge water as required by permits.
- B. Discharge to temporary infiltration pits or to partially backfilled trenches.
- C. Discharge to storm sewers, canals, stream, or wetlands only if specifically allowed by the jurisdictional agency.
- D. In no case, shall discharge result in turbidity reaching wetlands or any waterways.

- E. If turbidity exceeds limits allowed by jurisdictional permitting agency(ies), stop all activities, install additional erosion and sedimentation control.
- F. Construct temporary culverts, barricades and other protective measures to prevent damage to property or injury to any person or persons.
- G. Flooding of streets, roadways, driveways, or private property will not be permitted.
- H. Engines driving dewatering pumps shall be equipped with residential type mufflers.

END OF SECTION

SECTION 02220

EXCAVATION, BACKFILLING, AND COMPACTION

PART I - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: The work included under this Section consists of excavating, trenching, sheeting/shoring, grading, backfilling, and compacting those soil materials required for the construction of the structures, piping, ditches, utility structures and appurtenances as shown on the Drawings and specified herein.
- B. Definitions:
1. Maximum Density: Maximum weight in pounds per cubic foot of a specific material.
 2. Optimum Moisture Content: The optimum moisture content shall be determined by ASTM D 1557 specified to determine the maximum dry density for relative compaction. Field moisture content shall be determined on the basis of the fraction passing the 3/4-inch sieve.
 3. Rock Excavation: Excavation of any hard natural substance which requires the use of special impact tools such as jack hammers, sledges, chisels or similar devices specifically designed for use in cutting or breaking rock, but exclusive of trench excavating machinery.
 4. Suitable: Suitable materials for fills shall be classified as A-1, A-3 or A-2-4 in accordance with AASHTO Designation M-145 and shall be free from vegetation, organic material, marl, silt or muck. Not more than 10 percent (10%) by weight of fill material shall pass the No. 200 Sieve. The CONTRACTOR shall furnish all additional fill material required.
 5. Unsuitable: Unsuitable materials are classified as A-2-5, A-2-6, A-2-7, A-4, A-5, A-6, A-7, and A-B in accordance with AASHTO Designation M-145.
- C. Plan for Earthwork:
1. The CONTRACTOR shall be responsible for having determined to his satisfaction, prior to the submission of his bid, the conformation of the ground, the character and quality of the substrata, the types and quantities of materials to be encountered, the nature of the groundwater conditions,

the prosecution of the work, the general and local conditions and all other matters which can in any way affect the work under this Contract according to the General Conditions.

2. Prior to commencing the excavation, the CONTRACTOR shall submit a plan of his proposed operations to the ENGINEER for review. The CONTRACTOR shall reflect the equipment and methods to be employed in the excavation. Prices established in the Proposal for the work to be done will reflect all costs pertaining to the work. No claims for extras based on substrata or groundwater table conditions will be allowed.

- D. Trench Safety Act: The CONTRACTOR shall comply with all of the requirements of the Florida Trench Safety Act (Chapter 90-96, CS/CB 2626, laws of Florida). The CONTRACTOR shall acknowledge that included in various items of his bid proposal and in the total bid price are costs for complying with the provisions of the Act. Additionally, the CONTRACTOR is required to break out the costs for complying with the Florida Trench Safety Act. FAILURE TO COMPLY WITH THE REQUEST IN THIS SECTION SHALL RESULT IN THE BID BEING DECLARED NONRESPONSIVE. Failure to comply with the provisions of the Act shall result in a per item penalty of \$1,000 per day that the work is out of compliance.

1.02 APPLICABLE PUBLICATIONS

- A. All publications and standard specifications referred to herein are the latest or current issue of that publication or specification as of the specification date.

1.03 QUALITY ASSURANCE

- A. A soil compaction test shall be performed at every 300-feet of pipework at each 12-inch lift of compaction. A soil compaction test shall also be performed beneath structures for a minimum of every 100 S.F. The testing shall be in accordance with Paragraph 1.04 of this section.

1.04 TESTING

- A. Determination of laboratory moisture-density relationship and maximum density shall be by the Modified Proctor Method of ASTM D-1557. At least one (1) test per soil type shall be made.
- B. In place soil density shall be determined either by use of a Nuclear Density Meter per ASTM D-2922 or by use of the Drive Sleeve Method per ASTM D-2937. In place densities shall be taken at one (1) every 5,000 square feet at not greater than 1 foot vertical intervals for all areas of potential building or pavement

construction. One (1) density test is required for each pad or isolated footing and for every 20 lined feet of strip/wall footing length.

- C. Compaction shall be deemed to comply with the Specifications when no tests fall below the specified relative compaction. The CONTRACTOR shall pay the costs of any retesting of work not conforming to the Specifications.
- D. Relative compaction is defined as the ratio, expressed as a percentage, of the in-place density to the laboratory maximum density.
- E. Density tests will be made for determination of specified compaction by an independent testing laboratory provided by the CONTRACTOR as approved by the ENGINEER. Tests will be made in locations reviewed and approved by the ENGINEER. If any tests are unsatisfactory, re-excavate and recompact the fill or backfill until the specified compaction is obtained. Additional compaction tests will be taken to each side of an unsatisfactory test at locations approved by the ENGINEER to determine the extent of re-excavation and recompaction necessary.

1.05 FEDERAL AND STATE REGULATORY REQUIREMENTS

- A. All trench excavations which exceed 4 feet in depth shall comply with the applicable trench safety standards as stated in the OSHA excavation safety standards 29 CFR S. 1926.650 Subpart P as regulated and administered by the Florida Department of Labor and Employment Security as the "Florida Trench Safety Act."

1.06 JOB CONDITIONS

- A. If, in the opinion of the ENGINEER, conditions encountered during construction warrant a change in the footing elevation, or in the depth of removal of unsuitable material from that indicated in the soils report, an adjustment will be made in the contract price, as provided in the General and Special Conditions.

1.07 SUBMITTALS

- A. Submit to the ENGINEER for review the proposed methods of construction, including dewatering, excavation, bedding, filling, compaction and backfilling for the various portions of the work. Review shall be for method only. The CONTRACTOR shall remain responsible for the adequacy and safety of the methods.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General:

1. All fill material from on and off-site sources shall be subject to the approval of the ENGINEER.
2. All fill material shall be unfrozen and free of organic material, trash, or other objectionable material. Excess or unsuitable material as designated by the ENGINEER shall be removed from the job site by the CONTRACTOR.

B. Common Fill Material:

1. Common fill shall be sand not containing stones, rock, concrete or other rubble larger than 2 inches in diameter. It shall have physical properties which allow it to be easily spread and compacted.
2. The CONTRACTOR shall utilize as much excavated material as possible for reuse in accordance with the contract drawings and specifications or as directed by the ENGINEER.
3. The ENGINEER shall direct the CONTRACTOR on the type of material allowed in certain sections of the earthwork operations.

C. Structural Fill: Structural fill shall be well graded sand to gravelly sand having the following gradation:

<u>U.S. Sieve Size</u>	<u>Percent Passing By Weight</u>
1 - inch	100
No. 4	75-100
No. 40	15-80
No. 100	0-30
No. 200	0-10

D. Class I Soils¹: Manufactured angular, granular material, 1/4 to 1-1/2 inches (6 to 40 mm) in size, including materials having significance such as crushed stone or rock, broken coral, crushed slag, cinders, or crushed shells. Sieve analysis for crushed stone is given below separately.

¹ Soils defined as Class I soils are not defined in ASTM D2487.

1. Crushed Stone: Crushed stone shall consist of clean mineral aggregate free from clay, loam or organic matter, conforming with ASTM C33 stone size No. 89 and with particle size limits as follows:

<u>U.S. Sieve Size</u>	<u>Percent Passing By Weight</u>
1/2	100
3/8	90-100
No. 4	20-55
No. 8	5-30
No. 16	0-10
No. 50	0-5

E. Class II Soils²:

1. GW: Well-graded gravels and gravel-sand mixtures, little or no fines. Fifty (50) percent or more retained on No. 4 sieve. More than 95 percent retained on No. 200 sieve. Clean.
2. GP: Poorly graded gravels and gravel-sand mixtures, little or no fines. Fifty (50) percent or more retained on No. 4 sieve. More than 95 percent retained on No. 200 sieve. Clean.
3. SW: Well-graded sands and gravelly sands, little or no fines. More than fifty (50) percent passes No. 4 sieve. More than 95 percent retained on No. 200 sieve. Clean.
4. SP: Poorly graded sands and gravelly sands, little or no fines. More than fifty (50) percent passes No. 4 sieve. More than 95 percent retained on No. 200 sieve. Clean.

F. Coarse Sand: Sand shall consist of clean mineral aggregate with particle size limits as follows:

<u>U.S. Sieve Size</u>	<u>Percent Passing By Weight</u>
No. 10	100
No. 20	0-30
No. 40	0-5

² In accordance with ASTM D2487, less than 5 percent pass No. 200 sieve.

- G. Other Material: All other material, not specifically described, but required for proper completion of the work shall be selected by the CONTRACTOR and approved by the ENGINEER.

PART 3 - EXECUTION

3.01 PREPARATION

A. Clearing and Grubbing:

1. Strip and dispose of topsoil off-site, unless otherwise directed to stockpile the material by the ENGINEER.
2. Clear the site of all shrubs, brush, vegetation growth, and relocate all shrubbery marked for relocation on the drawings.

3.02 PROTECTION

A. Sheeting and Bracing:

1. Furnish, put in place, and maintain sheeting and bracing as required to support the sides of excavations, to prevent movement which could in any way diminish the width of the excavation below that necessary for proper construction, and to protect adjacent structures, and to protect workers from hazardous conditions or other damage. Such support shall consist of braced steel sheet piling, braced wood lagging and soldier beams or other approved methods. If the OWNER is of the opinion that sufficient or proper supports have not been provided, he may order additional supports be installed at the expense of the CONTRACTOR, and compliance with such order shall not relieve or release the CONTRACTOR from his responsibility for the sufficiency of such supports. Care shall be taken to prevent voids beside the sheeting, but if voids are formed, they shall be immediately filled and compacted. Where soil cannot be properly compacted to fill a void, lean concrete shall be used as backfill at no additional expense to the OWNER.
2. The CONTRACTOR shall construct sheeting outside the neat lines of the foundation unless deemed otherwise for his method of operation. Sheeting shall be plumb and securely braced and tied in position. Sheeting and bracing shall withstand all pressure to which the structure or trench will be subjected. Any deformation shall be corrected by the CONTRACTOR at his own expense so as to provide the necessary clearances and dimensions.
3. Where sheeting and bracing is required to support the sides of excavations for structures, the CONTRACTOR shall engage a Professional

Geotechnical ENGINEER, registered in the State of Florida, to design the sheeting and bracing. The sheeting and bracing installed shall conform with the design, and certification of this shall be provided by the Professional Structural ENGINEER.

4. The installation of sheeting, particularly by driving or vibrating, may cause distress to existing structures. The CONTRACTOR shall evaluate the potential for such distress and, if necessary, take all precautions to prevent distress of existing structures because of sheeting installation.
5. The CONTRACTOR shall leave in place to be embedded in the backfill, all sheeting and bracing not shown on the Drawings but which the OWNER directs him in writing to leave in place at any time during the progress of the work for the purpose of preventing injury to structures, utilities, or property, whether public or private. The OWNER may direct that timber used for sheeting and bracing be cut off at any specified elevation.
6. All sheeting and bracing not left in place shall be carefully removed in such manner as not to endanger the construction, or other structures, utilities, or property. All voids left or caused by withdrawal of sheeting shall be immediately refilled with sand by ramming with tools especially adapted for that purpose, or otherwise directed by the OWNER.
7. The right of the OWNER to order sheeting and bracing left in place shall not be construed as creating any obligation on his part to issue such orders, and his failure to exercise his right to do so shall not relieve the CONTRACTOR from liability for damages to persons or property occurring from or upon the work occasioned by negligence or otherwise, growing out of a failure on the part of the CONTRACTOR to leave in place sufficient sheeting and bracing to prevent any caving or moving of the ground.
8. No wood sheeting is to be withdrawn if driven below mid-diameter of any pipe, and under no circumstances shall any wood sheeting be cut off at a level lower than 1 foot above the top of any pipe.

B. Pumping and Drainage:

1. Dewatering activities to meet the requirements of Section 02140: Dewatering.

3.03 EXCAVATION

A. Excavating for Structures and Utilities:

1. Excavation work shall be performed in a safe and proper manner with appropriate precautions being taken against all hazards. Excavations shall provide adequate working space and clearances for the work to be performed therein and for installation and removal of concrete forms. In no case shall excavation faces be undercut for extended footings.
2. Excavation shall be made to such dimensions as will give suitable room for bracing and supporting, for pumping and draining, for installing the pipelines, and for all other work required.
 - a) Excavation for precast or prefabricated structures shall be carried to an elevation two (2) feet lower than the proposed outside bottom of the structure to provide space for the backfill material.
 - b) Excavation for structures constructed or cast-in-place in dewatered or dry excavations shall be carried down to the 2-feet below the bottom of the structure where dewatering methods are such that a dry evacuation bottom is exposed and the naturally occurring material at this elevation leveled and left ready to receive construction. Material disturbed below the founding elevation in dewatered excavations shall be replaced with Class B concrete.
3. Immediately document the location, elevation, size, material type and function of all new subsurface installations, and utilities encountered during the course of construction.
4. Excavation equipment operators and other concerned parties shall be familiar with subsurface obstructions as shown on the Drawings and should anticipate the encounter of unknown obstructions during the course of the work.
5. Encounters with subsurface obstructions shall be hand excavated.
6. Excavation and dewatering shall be accomplished by methods which preserve the undisturbed state of subgrade soils. Subgrade soils which become soft, loose, "quick" or otherwise unsatisfactory for support of structures as a result of inadequate dewatering or other construction methods, shall be removed and replaced by crushed stone as required by the ENGINEER at the CONTRACTOR's expense.

7. The bottom of excavations shall be rendered firm and dry before placing any structure or pipe. Excavated material not suitable for backfill shall be removed from the site and disposed of by the CONTRACTOR in a legal manner. The bedding schedule for pipes shall be as shown in Table 02220-B.
8. Excavated material shall be stockpiled in such a manner as to prevent nuisance conditions. Surface drainage shall not be hindered.
9. All structure and pipe locations and elevations as required herein must be permanently documented by the CONTRACTOR, on the Record Drawings prior to the ENGINEER's approval of the Application for Payment for that work.

3.04 DRAINAGE

- A. The CONTRACTOR shall at all times during construction provide and maintain proper equipment and facilities to remove promptly and dispose of properly all water entering excavations, and keep such excavations dry so as to obtain a satisfactory undisturbed subgrade foundation condition.
- B. Trenches across roadways, driveways, walks, or other trafficways adjacent to drainage ditches or water courses shall not be backfilled prior to completion of backfilling the trench on the upstream side of the trafficway to prevent impounding water after the pipe has been laid. Bridges and other temporary structures required to maintain traffic across such unfilled trenches shall be constructed and maintained by the CONTRACTOR. Backfilling shall be done so that water will not accumulate in unfilled or partially filled trenches. All material deposited in roadway ditches or other water courses crossed by the line of trench shall be removed immediately after backfilling is completed and the original sections, grades, and contours of ditches or water courses shall be restored. Surface drainage shall not be obstructed longer than necessary.

3.05 UNDERCUT

- A. If the bottom of any excavation is below that shown on the Drawings or specified because of CONTRACTOR error, convenience, or unsuitable subgrade due the CONTRACTOR's excavation methods, he shall refill to normal grade with fill at his own cost. Fill material and compaction method shall be as directed by the ENGINEER.

3.06 STABILIZATION

- A. Subgrades for concrete structures and trench bottoms shall be firm dense, and thoroughly compacted and consolidated; shall be free from mud and muck; and shall be sufficiently stable to remain firm and intact.
- B. Subgrades for concrete structures or trench bottoms which are otherwise solid, but which becomes mucky on top due to construction operations, shall be reinforced with one or more layers of crushed rock or gravel. Not more than 1/2 inch depth of mud or muck shall be allowed to remain on stabilized trench bottoms when the pipe bedding material is placed thereon. The finished elevation of stabilized subgrades for concrete structures shall not be above subgrade elevations shown on the Drawings.
- C. All stabilization work shall be performed by and at the expense of the CONTRACTOR.

3.07 FILL AND COMPACTION

- A. Materials:
 - 1. To the maximum extent available, excess earth obtained from structure and trench excavation shall be used for the construction of fills and embankments.
 - 2. Materials used as backfill shall be free from rocks or stones larger than 2 inches in their greatest dimension; brush, stumps, logs, roots, debris, and organic or other deleterious materials; and must be acceptable to the ENGINEER.
 - 3. Backfilling and construction of fills and embankments during freezing weather shall not be done except by permission of the ENGINEER. No backfill, fill, or embankment materials shall be installed on frozen surfaces, nor shall frozen materials be in any backfill, fill or embankment.
- B. Placement and Compaction:
 - 1. Backfill materials shall be placed in approximately horizontal layers as shown on Table 02220-A. Material deposited in piles or windrows by excavating and hauling equipment shall be spread and leveled before compaction.
 - 2. Each layer of material being compacted shall have the best practicable uniform moisture content to ensure satisfactory compaction. The CONTRACTOR will be required to add water and harrow, disc, blade, or

otherwise work the material in each layer to ensure uniform moisture content and adequate compaction. Each layer shall be thoroughly compacted by rolling or other method acceptable to the ENGINEER to 98 percent of relative density at optimum moisture content as determined by Modified Proctor Method, ASTM D1557, (latest).

3. Whenever a trench passes through a backfill or embankment, material shall be placed and compacted to an elevation 12 inches above the top of the pipe before the trench is excavated.
- C. Compact and backfill excavations and construct embankments for structures according to the schedule listed in Table 02220-A. Backfill schedule for pipes is listed in Table 02220-B. (Modified Proctor shall be ASTM D-1557, latest):
 - D. Pipe shall be laid in open trenches unless otherwise indicated on the Drawings or elsewhere in the Contract Documents. Pipeline trenches shall be compacted from the bottom of the trench to the grade in 8-inch layers to a density of not less than 98-percent of modified Proctor Dry Density as determined by ASTM D1557 (latest).
 - E. Excavations shall be backfilled to the original grade or as indicated on the Drawings. Deviation from this grade because of settling shall be corrected. Backfill operation shall be performed to comply with all rules and regulations and in such a manner that it does not create a nuisance or safety hazard.
 - F. Embankments shall be constructed true to lines, grades and cross sections shown on the plans or ordered by the OWNER. Embankments shall be placed in successive layers of not more than 8 inches in thickness, loose measure, for the full width of the embankment. As far as practicable, traffic over the work during the construction phase shall be distributed so as to cover the maximum surface area of each layer.
 - G. If the CONTRACTOR requests approval to backfill material utilizing lifts and/or methods other than those specified herein, such request shall be in writing to the ENGINEER. Approval will be considered only after the CONTRACTOR has performed tests, at the CONTRACTOR's expense, to identify the material used and density achieved throughout the backfill area utilizing the method of backfill requested. The ENGINEER's approval will be in writing.
 - H. Foundation Preparation
 1. The existing ground beneath proposed equipment base slabs shall be removed and the area proof-rolled. Proof-rolling should consist of at least 10 passes of a self-propelled vibrator compactor capable of delivering a minimum impact force of 30,000 to 35,000 pounds per drum to the soils.

Each pass should overlap the preceding pass by 30 percent to insure complete coverage. Backfilled areas under and around structures and paving to the extent of excavations shall be compacted in 8-inch layers to a density of not less than 98 percent of Modified Proctor Dry Density as determined by ASTM D1557 (latest) for a depth of not less than 2-feet below the bottom of the foundations or concrete slabs. Any unsuitable foundation material shall be removed and replaced with suitable material.

2. Slabs On Grade: Subgrades for concrete slabs shall be removed, backfilled, and compacted to the required grade. The top 2-feet of concrete slab subgrade in cut sections and all fill material shall be compacted in 8-inch layers to a density of not less than 98 percent of Modified Proctor Dry Density as determined by ASTM D1557, (latest).

3.08 TRENCH EXCAVATION

- A. The CONTRACTOR shall not open more trench in advance of pipe laying than is necessary to expedite the work. All trench excavation shall be open cut from the surface.

1. Alignment, Grade, and Minimum Cover: The alignment and grade or elevation of each pipeline shall be fixed and determined from offset stakes. Vertical and horizontal alignment of pipes, and the maximum joint deflection used in connection therewith shall be in conformity with requirements of the section covering installation of pipe.
2. Where pipe grades or elevations are not definitely fixed by the contract drawings, trenches shall be excavated to a depth sufficient to provide a minimum depth of backfill cover over the top of the pipe of 42 inches where in paved or graded streets where surface grades are definitely established and 36 inches in other locations. Greater pipe cover depths may be necessary on vertical curves or to provide necessary clearance beneath existing pipes conduits, drains, drainage structures, or other obstructions encountered at normal pipe grades. Measurement of pipe cover depth shall be made vertically from the outside top of pipe to finished ground or pavement surface elevation.

- B. Limiting Trench Widths:

1. Trenches shall be excavated to a width which will provide adequate working space and sidewall clearances for proper pipe installation, jointing, and embedment. However, minimum permissible sidewall clearances between the installed pipe and each trench wall, expressed in inches, shall be as follows:

<u>Pipe Size</u>	<u>Minimum Sidewall Clearance</u>
60	24
54	21
48	19
36 or smaller	12

2. Stipulated minimum sidewall clearances are not minimum average clearances but are minimum clear distances which will be required.
3. Cutting trench banks on slopes to reduce earth load to prevent sliding and caving will be permitted only in areas where the increased trench width will not interface with surface features or encroach on right-of-way limits. Slopes shall not extend lower than one foot above the top of the pipe.

C. Mechanical Excavation:

1. The use of mechanical equipment will not be permitted in locations where its operation would cause damage to trees, buildings, culverts, and other existing property, utilities, or structures above or below ground. In all such locations, hand excavating methods shall be used.
2. Mechanical equipment used for trench excavation shall be of the type, design, and construction, and shall be so operated, that the rough trench excavation bottom elevation can be controlled, that uniform trench widths and vertical sidewalls are obtained at least from an elevation one foot above the top of the installed pipe to the bottom of the trench, and that trench alignment is such that pipe when accurately laid to specified alignment will be centered in the trench with adequate clearance between the pipe and sidewalls of the trench. Undercutting the trench sidewall to obtain clearance will not be permitted.

D. Pavement Cutting:

1. Cuts in concrete pavement, asphalt pavement, and asphalt base pavements shall be no larger than necessary to provide adequate working space for proper installation of pipe and appurtenances. Cutting shall be started with an asphalt or concrete saw in a manner which will provide a clean groove for the full depth of pavement along each side of the trench and along the perimeter of cuts for structures.
2. Asphalt pavement and asphalt base pavement over trenches excavated for pipelines shall be removed so that a shoulder not less than 6 inches in width at any point is left between the cut edge of the pavement and the top edge of the trench. Trench width at the bottom shall not be greater than at

the top and no undercutting will be permitted. Pavement cuts shall be made to and between straight or accurately marked curved lines which, unless otherwise required, shall be parallel to the centerline of the trench.

3. Pavement removed for connections to existing lines or structures shall not be greater than necessary for the installation as determined by the ENGINEER.
- E. Artificial Foundations in Trenches: Whenever so ordered by the ENGINEER, the CONTRACTOR shall excavate to such depth below grade as the ENGINEER may direct and the trench bottom shall be brought to grade with such material as the ENGINEER may order installed. All piling, concrete, or other foundations made necessary by unstable soil shall be installed as directed by the ENGINEER. Compensation for extra excavation and piling, concrete, or other foundations, except where provided by contract unit prices, shall be made in accordance with the contract provisions for extra work.
 - F. Bell Holes: Bell holes shall provide adequate clearance for tools and methods used in installing pipe. No part of any bell or coupling shall be in contact with the trench bottom, trench walls, or granular embedment when the pipe is jointed.

3.09 EXCESS EXCAVATED MATERIALS

- A. Insofar as needed, suitable excavated materials shall be used in fills and embankments shown on the Drawings. All suitable excess excavated material shall be placed at an on-site stockpile area as directed by the OWNER.
- B. The CONTRACTOR shall segregate different types of excavated materials (i.e. sands, clayey sands) as possible in the stockpile area. All unsuitable materials shall be disposed of by the CONTRACTOR offsite in a legal manner.
- C. The CONTRACTOR shall slope and compact the stockpile with a light roller type vehicle to maintain stability.
- D. The CONTRACTOR shall maintain proper soil and erosion control measures.

3.10 SETTLEMENT

- A. The CONTRACTOR shall be responsible for all settlement of backfill, fills, and embankments which may occur within the correction period stipulated in the General Conditions.

- B. The CONTRACTOR shall make, or cause to be made, all repairs or replacements made necessary by settlement within 30 days after notice from the ENGINEER or OWNER.

END OF SECTION

TABLE 02220-A
COMPACTION AND BACKFILL SCHEDULE
FOR STRUCTURES

Area	Material	Compaction
Beneath structures, foundations, slabs, and pavements. (minimum 5-foot depth below concrete foundation)	Structural Fill (Para. 2.01 C)	8-inch lifts, compacted to 98% Modified Proctor maximum dry density. Fill should not be placed over any in-place soils until those layers have been compacted to 95% Modified Proctor maximum dry density.
Around structures, foundations and slabs (minimum 5-foot spacing)	Structural Fill (para. 2.01 C)	12-inch lifts, compacted to 98% Modified Proctor maximum dry density. Use light rubber-tired or vibratory plate compactors.
From cleared existing surface to subgrade for paved, stabilized dirt, and gravel roadway surfaces	Common Fill (Para. 2.01 B)	12-inch lifts, compacted to 98% Modified Proctor maximum dry density.
Pipeline trenches from the bottom of the trench to the grade	See Table 02220-B	8-inch lifts, compacted to 98% Modified Proctor maximum dry density

TABLE 02220-B

**BACKFILL SCHEDULE FOR GRAVITY
AND PRESSURE PIPING**

Pipe Material	Pipe Size	Trench Condition	Bedding Material	PIPE ENVELOPE				Others
				PRIMARY ZONE		SECONDARY ZONE		
				Material	Depth ^c	Material	Depth	
Ductile Iron, Stainless Steel, Culvert Pipe and Prestressed Concrete Cylinder Pipe	<16"	Normal ^a	Compacted Common Fill	Coarse Sand	0.5 O.D.	Coarse Sand	0.5 O.D.+12"	Class II Material should not have stones size >2". Organic content <1.1% by wt.
		Special ^b	Class I	Coarse Sand	0.5 O.D.	Coarse Sand	0.5 O.D.+12"	
	≥16"	Normal ^a	Class II	Common Fill	0.25 O.D.	Common Fill	--	
		Special ^b	Class I	Common Fill	0.25 O.D.	Common Fill	--	
Fiberglass, PVC and Other Plastic Pipe	<16"	Normal ^a	Coarse Sand	Coarse Sand	0.7 O.D.	Coarse Sand	0.3. O.D.+12"	
		Special ^b	Class I	Coarse Sand	0.7 O.D.	Coarse Sand	0.3. O.D.+12"	
	≥16"	Normal ^a	Class II	Class II	0.7. O.D.	Class II	0.3. O.D.+12"	
		Special ^b	Class I	Class II	0.7. O.D.	Class II	0.3. O.D.+12"	
R.C.P. and C.C.P.	<48"	Normal ^a	Class II	Class II	0.5 O.D.	Common Fill	--	
		Special ^b	Class I	Class II	0.5 O.D.	Common Fill	--	
	≥48"	Normal ^a	Class II	Class II	0.25 O.D.	Common Fill with max. stone size ≤2	0.75 O.D.+12"	
		Special ^b	Class I	Class II	0.25 O.D.	Common Fill with max. stone size ≤2	0.75 O.D.+12"	

TABLE 02220-B (Continued)

BACKFILL SCHEDULE FOR GRAVITY
AND PRESSURE PIPING

Pipe Material	Pipe Size	Trench Condition	Bedding Material	PIPE ENVELOPE				Others
				PRIMARY ZONE		SECONDARY ZONE		
				Material	Depth ^c	Material	Depth	
Pipe laid in rock (min. trench requirements) except for fiberglass and PVC pipe		Rock	Class I	Class II	0.5 O.D.	Common Fill with max. stone size ≤2"	0.5 O.D.+12"	
Gravity pipe (not specified above)		Normal	Coarse Sand	Coarse Sand	0.5 O.D.	Common Fill	0.50 O.D.+12"	
Pressure pipe (not specified above)		Normal	Suitable Undisturbed Earth or Compacted Common Fill	Common Fill with max. stone size ≤2"	0.5 O.D.	Common Fill with max. stone size ≤2"	0.50 O.D.+12"	

- a Dry soils.
- b Saturated soils.
- c Outside Diameter of pipe = O.D.

Notes:

1. No Special bedding shall be required in case of suitable undisturbed earth type trench bottom.
2. Bedding thickness shall be 12 inches unless specified otherwise.
3. The backfill shall be compacted to 95% Modified Proctor maximum dry density and shall be placed in 6-inch lifts for pipe envelope and in 12-inch lifts from secondary zone to grade. Common fill shall be used as final backfill material.
4. It is intended that additional excavation be conducted to remove unsuitable material below the pipe bedding level which prevents bedding compaction as required herein and replace such materials with suitable materials. Over excavation, geotextile fabric, gravel blanket, granular fill and other acceptable stabilization method shall be placed within 4 feet of the bedding level or within 10 feet of the existing ground (whichever is greater depth) at no additional cost to the Owner. Construction required beyond these limits shall be executed in accordance with the General Conditions. When indicated on the Drawings, the Contractor shall remove unsuitable material below bedding level to the limits indicated and replace with coarse sand or other acceptable stabilization method up to the bedding level without any additional cost to the Owner.

SECTION 02531

DIRECTIONAL DRILLING OF HIGH DENSITY POLYETHYLENE (HDPE) PIPE

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: The work included under this Section consists of the installation of HDPE pipe utilizing the directional drilling method. The work in this section includes all labor, machinery, construction equipment and appliances required to perform in a good workmanlike manner all directional drilling operations.
- B. Related Work Described Elsewhere:
 - 1. Utility Piping, fittings, Valves and Accessories: Section 15050.
 - 2. Pressure Testing of Pipe: Section 15044

1.02 QUALITY ASSURANCE REQUIREMENTS

- A. Directional drilling and pipe installation shall be performed by an experienced contractor specializing in directional drilling.
 - 1. The key personnel must have at least four (4) years of experience with directional drilling projects of equal size and scope.
 - 2. The operator shall have performed at least three (3) directional bores of 10" pipe diameter, 500-foot bore length, and in similar soil conditions.
 - 3. Operator shall have performed a directional drill under a navigable water body.
- B. The directional drilling equipment shall be operated by individuals trained by the manufacturer as experienced operators. Documentation to be submitted to the Owner.
- C. Work shall be in conformance with the Directional Crossing Contractor's Association (DCCA) guidelines, latest edition.
- D. Installation, storage and handling of pipe and appurtenances shall be in accordance with pipe manufacturer's guidelines and recommendations.

- E. Technical support, tool suppliers and required support systems shall be provided by the contractor.
- F. All directional drilling shall be in accordance with all applicable local, state, and federal regulations.

1.03 SUBMITTALS

- A. Contractor shall submit qualifications of personnel who will be performing the directional drill including years of experience and past projects.
- B. Contractor shall submit certificates of inspection from the drill pipe manufacturer that the drill pipe has been inspected and certified and meets the requirements of these specifications.
- C. Contractor shall hire a three dimensional (3D) Ground Penetrating Radar (GPR) provider who will gather all existing utility information as outlined in Section 01100 Special Project Procedures, of the proposed pipeline, stake the utility locations with depth information and who provides assurance to the Contractor that if the 3D GPR information provided is discovered to be inaccurate during construction, the 3D GPR provider shall bear the cost of additional construction, if required. One 3D GPR provider, MPS3D, a subsurface utility locating firm, contact person – Ed Mizo, 321-436-9391, or approved equal service provider.
- D. Contractor shall locate (horizontal and vertical using SUE [soft dig]) all utilities within 5 feet outside of the proposed drill pit. Contractor shall assume two SUE per drill pit.
- E. Contractor shall submit a detailed (scalable) drilling work plan drawing outlining the procedures, drill path, depth, reaming diameter, and materials to be used in the drilling operation, as well as proposed laydown areas, pipe staging area during pullback, 3D GPR location data and SUE soft dig location data, and drill pit size and locations. Hand sketches shall not be adequate for work plan. Contractor shall use AutoCAD.
- F. Contractor must submit a Maintenance of Traffic (MOT) Plan by FDOT certified personnel.
- G. Contractor shall prepare an environmental protection plan and schedule of work activities for submittal to the Engineer and Owner.
- H. Contractor shall submit technical criteria for the Bentonite drilling mud used and the conformance of the product with the existing soil and ground water conditions.

- I. All submittals shall be in accordance with the General Conditions and Section 01340: Shop Drawings, Working Drawings and Samples.
- J. As-built survey documentation showing location of installed piping system, vertical and horizontal, and location of any abandoned-in-place bores, per Section 01720.
- K. The Contractor shall log all necessary data from the locator/tracking system:
 - 1. Position
 - 2. Roll Angle
 - 3. Tilt Angle
 - 4. Depth
 - 5. Temperature of Data Transmitter
 - 6. Remaining Battery Life
 - 7. Pull Back Force (Maximum pull back force shall be recorded)

Location and depth measurements shall be recorded by the Contractor every ten (10) feet over the course of the bore and that data shall be provided with the data above to the Owner and Engineer.

- L. As built survey documentation showing location of installed piping system, vertical and horizontal, 3D GPR located existing utilities, and location of any abandoned-in-place bores, per Section 01720.

1.04 PRODUCT, DELIVERY, STORAGE AND HANDLING

- A. Particular care shall be taken not to injure the pipe strength, coating or lining during delivery, storage or installation. Contractor shall check roundness of pipe prior to accepting delivery.
- B. The pulling force used shall not exceed the pipe material safety pull strength as per the manufacturers recommendation.
- C. The Owner reserves the right to reject the work performed on any portion of the project in which there is evidence that the materials have not been handled in accordance with the manufacturers recommendations.

1.05 WARRANTY AND GUARANTEES

- A. The Contractor is responsible for replacing any portion of the work found to be installed in a way that stresses the material beyond the manufacturers' recommendations.

- B. The Contractor shall provide all warranties and guarantees relative to workmanship and materials as required by the Contract Documents, General Conditions and Supplementary Conditions.

PART 2 - PRODUCTS

2.01 GENERAL

- A. The equipment used in the directional drilling shall be of adequate commercial size and satisfactory working condition for safe operation, and will be subject to approval by the Design Engineer. Such approval, however, will not relieve the Contractor of the responsibility for making a satisfactory installation satisfying all criteria of the project.
- B. The directional drilling equipment shall be controlled by means of an electronic tool directional system with wireline guidance, and shall provide a Bentonite clay slurry to completely seal around the installed carrier pipe.
- C. The Contractor shall provide all materials for completing the installation and for adequate protection of the work. Contractor must provide back-up generator and portable lights in case drill extends into the evening. Contractor must provide vacuum truck(s) of sufficient capacity to hold drilling fluid volume in the event of a frac-out or spill.
- D. Mechanical joints to HDPE pipe shall be fully constrained by compressing the pipe OD against a rigid tube or stiffener made of Type 304 stainless steel in the pipe bore.
- E. Transition fittings between HDPE pipe and ductile iron pipe shall consist of a flanged end being butt fused onto a plain HDPE pipe as shown on the drawings.

2.02 MATERIALS AND EQUIPMENT

- A. Directional Drilling Equipment:
 - 1. The directional drilling equipment shall employ a fluid cutting technique.
 - 2. The following directional drill rig manufacturers are approved for use in this project.
 - a. Vermeer, Inc.
 - b. American Augers, Inc.

c. or Equal

3. The directional drilling equipment shall be appropriate to facilitate the installation.

Directional Drilling Equipment				
System Description	Pipe Diameter	Bore Length Feet	Torque Ft-Lbs	Trust/Pullback Lbs
Maxi-HDD	18 and greater	>1,000	>10,000	>70,000
Midi-HDD	Up to 16	Up to 1,000	>10,000	>70,000
Midi-HDD	Up to 6	Up to 600	Up to 1,899	Up to 20,000

Equipment should be matched to the chart. Obtain Engineer's approval for installations differing from the above chart. Ensure the drill rod can meet the bend radars for the proposed installations.

The rig shall have means to monitor and record maximum pullback force. The pulling strength of the boring equipment shall not exceed the HDPE pipe safety pull strength as per the manufacturer's recommendation. Contractor shall be aware that the "safe" pull-load is time dependent.

B. Drill Pipe:

1. The drill pipe shall be API steel drill pipe, range 2, premium class or higher, Grade S-135 in a diameter sufficient for the torque and longitudinal loads and fluid capacities required for the work.

C. HDPE Pipe:

1. Pipe: HDPE pipe for nominal diameters 4-inch through 42-inch in size shall conform to ASTM F714 and AWWA C906, Latest Edition, NSF 61 Standard. Pipe shall be DIPS, DR 11 with a minimum pressure rating of 160 psi.
2. Pipe Material: Materials used for the manufacturing of polyethylene pipe shall be PE 3408 High Density Polyethylene (HDPE) with a minimum ASTM D3350 cell classification of 345464E or higher (for color stripes). The material shall have a minimum Hydrostatic Design Basis (HDB) of 1600 psi at 73°F when tested in accordance with Plastics Pipe Institute (PPI) TR-3 and shall be listed in the name of the pipe and fitting manufacturer in PPI TR-4.
3. Joints: HDPE pipe shall have fusion-bonded joints.

4. Pipe Installation: Installation shall be in accordance with ASTM D2774 and manufacturer's recommendation. Installation and thermal fusing shall be performed by personnel trained and experienced in the use of fusion equipment recommended by the pipe supplier. Installer shall have the necessary information relative to fusion such as, but not limited to, fusion temperature, interface pressure, and cooling time before fusing begins. Fusing shall be performed in accordance with ASTM D2657.
5. Pipe Markings: Permanent identification of piping service shall be provided by co-extruding longitudinal stripes (color coded per service type) into the outer surface of the pipe. The stripping material shall be the same material as the pipe material except for color. Stripes printed or painted on the outside surface shall not be acceptable. Markings on the pipe shall include the following:
 - a) Nominal size and OD base.
 - b) Standard material code designation.
 - c) Dimension Ratio.
 - d) Pressure Class.
 - e) AWWA designation (AWWA C906)
 - f) Material test category of the pipe.
 - g) Continuous stripes, 90 degrees apart, color coded per service. (water – blue, wastewater – green, reuse – purple)
6. Fittings:
 - a) Ductile iron mechanical fittings used with polyethylene pipe shall be specifically designed for, or tested and found to be acceptable for use with polyethylene pipe. Mechanical fittings designed for other materials shall not be used unless authorized by the mechanical fitting manufacturer. Special precautions may exist with certain mechanical fittings or additional components may be required. Consult the manufacturer of the fitting prior to its use.
 - b) Mechanical joint (MJ) adapters shall be used for connections between HDPE pipe and ductile iron pipe. HDPE mechanical joint adapter shall be jointed to the HDPE pipe by butt fusion. HDPE mechanical joint adapter shall be molded or fabricated conforming to AWWA C906. Molded fittings shall conform to ASTM D2683 for socket-type fittings, ASTM D3261 for butt-type fittings or ASTM F1055 for electro fusion-type fittings. MJ adapter shall match pressure rating and dimension ratio of HDPE pipe.

<u>DR</u>	<u>Class</u>	<u>Pipe O.D.</u>
11	160 psi	16.00"
11	160 psi	20.00"

D. Bentonite Drilling Mud

1. The drilling mud used shall be adequate for the soil and ground water conditions in this project as determined by the contractor.
2. The drilling mud used shall be totally inert and pose no environmental risk. Disposal to be off-site and in accordance with all Local, State, and Federal regulations.

E. Product Locating and Tracking: The method of locating and tracking the drill head during the pilot bore shall be walkover, wire line, and wire line with surface grid verification, or any other system as approved by the Engineer. Use a locating and tracking system capable of ensuring that the proposed installation is installed as intended. The locating and tracking system must provide information on:

- a) Clock and pitch information
- b) Depth
- c) Transmitter temperature
- d) Battery status
- e) Position (x, y)
- f) Azimuth, where direct overhead readings (walkover) are not possible (i.e.) subaqueous or limited access transportation facility)
- g) Ensure proper calibration of all equipment before commencing directional drilling operation.
- h) Take and record alignment readings or pilot points such that elevations on top of and offset dimensions from the center of the product to a permanent fixed feature are provided. Such permanent fixed feature must have prior approval of the Engineer. Provide elevations and dimensions at all bore alignment corrections (vertical and horizontal) with a minimum distance between points of 10 feet.

F. Product Bore Hole Diameter: Minimize potential damage from soil displacement/settlement by limiting the ratio of the bore hole to the product size. The size of the back reamer bit or pilot bit, if no back reaming is required, will be limited relative to the product diameter to be installed as follows:

Maximum Pilot or Back-Reamer Bit Diameter When Rotated 360 Degrees	
Nominal Inside Pipe Diameter Inches	Bit Diameter Inches
2	4
3	6
4	8
6	10
8	12
10	14
12 and greater	Maximum Product OD plus 6

2.03 ACCESSORIES & MISCELLANEOUS ITEMS

- A. Contractor shall attach a minimum of three (3) locating wires at different locations on the pipe circumference prior to directional drill installation. The wires shall be continuous coated 10-gauge UF solid (color coded per service) insulated copper wire pipe.
- B. Contractor shall furnish all items that are necessary for a complete installation whether or not specified herein or shown on the Drawings. Other items necessary for a complete installation, if any, shall conform to all applicable standards as identified in the Contract Documents including, but not limited to, Section 01070: Abbreviations and Section 01091: Reference Specifications.

2.04 SPARE PARTS - NOT USED

2.05 QUALITY CONTROL

- A. The directional drilling rig shall be calibrated to verify correct depth of drill prior to proceeding with installation.

2.06 COORDINATION

- A. Contractor shall notify Owner and Engineer a minimum of three (3) days in advance of starting work. Drilling operations shall not begin until Owner's representative is on-site and their inspection of work plan and set-up is satisfactory. Contractor is ultimately responsible for successful performance and completion of the drill.

PART 3 - EXECUTION

3.01 PREPARATION

A. Site Conditions:

1. The directional drilling operation shall be a closed system to minimize the discharge of water, drilling mud and cuttings to the water body or land areas involved in or contiguous to the construction process.
2. Contractor shall provide equipment and procedures to maximize the cleaning and recirculation of drilling mud to minimize waste.
3. The general work areas on the entry and exit sides shall be enclosed by a 12 inch berm to contain unplanned spills or discharges. Mud pits must be lined with water proof liners.
4. Equipment (pumps, tanks, vacuum trucks, etc.) and materials (such as ground sheets, silt fence, hay bales, booms, absorbent pads and sediment curtains) for clean-up of seeps, mud fractures and other contingencies shall be provided and maintained at all sites. These items are incidental and shall be included in the Contractor's price.
5. Construction related activities involving fuels and lubricants such as vehicle refueling and equipment maintenance, including the draining and pumping of lubricants, shall be conducted a minimum of 100 feet from the surface water bodies to eliminate contamination in case of a spill.
6. Any fuels or lubricants spilled shall be cleaned up immediately to the satisfaction of the Design Engineer's representative and as required by Federal, State, or local regulations.
7. All directional drilling activities shall be conducted in a manner to minimize disturbances to traffic and business activity.
8. The contractor shall be responsible for maintaining the appropriate traffic control measures required by the Florida Department of Transportation or the Owner.
9. Drilling mud shall be disposed of off-site in accordance with applicable local, State, and Federal requirements and/or permit conditions.
10. Contractor shall obtain a location for all materials and equipment to be stored and to facilitate all construction operations. If easement locations

are not adequate, Contractor shall provide provisions for such activity in lump sum for mobilization.

B. Existing Utilities

1. The Drawings show existing utilities that are believed to be near the directional drill alignment.
2. There is no guarantee that these utilities are located as shown or that other utilities may not be present.
3. The Contractor is to field locate existing utilities within 25 feet of work in advance of the work so as not to delay work and avoid conflict and disruption of utility services.
4. Contractor to notify Sunshine State One-Call Services two (2) business days prior to excavation.

3.02 INSTALLATION

A. Pilot Hole

1. A pilot hole will be drilled by an appropriately sized drill pipe.
2. A smoothly curved pilot hole shall follow the designated center line of the pipe profile described on the Drawings. The entry angle shall not exceed 15°. Exit angle should be 6° to 12° to facilitate the pullback operation.
3. The position of the drill string shall be monitored by the contractor.
4. Contractor shall compute the position in the x, y and z axis relative to ground surface from down-hole survey data a minimum of one per pipe length (approximately 30 foot intervals).
5. Deviations between the recorded position of the drill string and the required position shall be documented and immediately brought to the attention of the Engineer. If pilot hole deviates more than two (2) percent of depth over a length of 100 feet, the Contractor may be directed to pull back and re-drill.
6. The radius of curvature shall not exceed 90% of the manufacturer's recommended radius of curvature for the HDPE pipe.
7. At no time in the drilled profile shall the radius of curvature be less than 150 times the outside diameter of the HDPE pipe.

8. Contractor shall provide to the Design Engineer, on demand, the data generated by the down-hole survey tools in a form suitable for independent calculation of the pilot hole profile.
9. The actual exit point shall fall within the planned exit pit which shall be a rectangle which is approximately 20 feet wide by 100 feet long.

B. Reaming

1. Upon approval of the pilot hole location by the Design Engineer's representative, the hole opening or enlarging phase of the installation shall begin.
2. The borehole diameter shall be increased to a minimum of 25% greater than the outside diameter of the HDPE pipe being installed to accommodate the pullback operation of the HDPE pipe.
3. The type of hole opener or back reamer to be utilized in this phase shall be determined by the types of subsurface soil conditions that have been encountered during the pilot hole drilling operation.
4. The reamer type shall be at the Contractor's discretion.

C. Pipe Pullback Operation

1. The pipes shall be assembled in a manner that does not obstruct adjacent roads or City, County, or Public activities as well as vehicle and pedestrian traffic adjacent to the layout areas.
2. In front of the pipe shall be a swivel and barrel reamer to compact the borehole walls.
3. Contractor shall use buoyancy control by filling pipe with water prior to pipe pull back for all drills larger than 24 inches in diameter or as necessary for soil conditions.
4. Pullback shall never be stopped, except for drilling rod removal, until the pipe is completely pulled into its permanent position.
5. During the pullback operation, the Contractor shall monitor roller operation and use side-booms or cranes if required, to assist movement of the pipe.

6. Situations which cause coating or pipe damage shall be corrected immediately.
7. Coating or pipe damage shall be repaired by Contractor before pulling operations resume.
8. The Contractor shall provide adequate support/rollers along the stringing area to support the required length of the HDPE pipe for each bore.
9. Support/rollers shall be comprised of a non-abrasive material arranged in a manner to provide support to the bottom quarter points of the pipeline allowing for free movement of the pipeline during pullback.
10. Spacing for the supports/rollers shall be at 20 feet on center. Contractor may increase spacing of supports/rollers as long as pipe material is not adversely affected or drag along the ground.
11. Pulling Loads: The maximum pull (axial tension force) exerted on the HDPE pipelines shall be measured continuously and limited to the maximum allowed by the pipe manufacturer so that the pipe or joints are not overstressed. A breakaway head rated at the maximum safe pull force shall be utilized in advance of the pipe.
12. Vertical and horizontal curves shall be limited so that wall stresses do not exceed 50 percent (50%) of the yield stress for flexural bending of the HDPE pipe.
13. If the pipe is buckled or otherwise damaged, the damaged section shall be removed and replaced by the Contractor at his expense.
14. The contractor shall take appropriate steps during pullback to ensure that the HDPE pipe will be installed without damage. Pipe deformation of 10% or more may be grounds to abandon bore.
15. The lead end of the pipe shall be closed during the pull back operation.
16. The pull-nose should be pulled out 3-4 percent longer than the total length of the pull.
17. If unexpected subsurface conditions are encountered during the bore, the procedure shall be stopped and not continued until Owner and Engineer have been consulted.

18. Any mud fractures or frac-outs resulting from drilling activities and any damage caused by the frac-out must be contained and repaired immediately. Public safety must be maintained at all times.
19. After the carrier pipe is completely pulled through the tunnel, a sufficient relaxation period, as recommended by the specified pipe manufacturer, shall be provided prior to the final pipe tie-in.
20. The Contractor shall install, maintain, and leave in place any sheeting, underpinning, cribbing, and other related items (other than that required for the boring and receiving pits) to support any structure or facility affected by the boring operation. The Engineer, depending upon existing conditions, may require that additional sheeting for excavation be left in place.

D. Pipe Handling

1. The Contractor shall off load, stack, handle and string the pipe.
2. Pipe may be assembled and aligned for fusing using the line string or stovepipe method.
3. Torsion and Stresses: A swivel with a minimum load rating that is appropriate for the selected drill shall be used to connect the HDPE pipe to the back-reamer.
4. Pipeline Support: The pipelines shall be adequately supported during installation so as to prevent over-stressing or buckling. Contractor shall provide the necessary skids and padding to protect pipe coatings and prevent contact with the ground.
5. The contractor shall at all times handle the HDPE pipe in a manner that does not over-stress the pipe.

E. Handling Drilling Fluids and Cuttings

1. During the drilling, reaming or pullback operations, the Contractor shall make adequate provisions for handling the drilling fluids, or cuttings at the entry and exit pits.
2. These fluids must not be discharged into any waterways or stormwater system.
3. When the Contractor's provisions for storage of the fluids or cuttings on site are exceeded, these materials shall be hauled away to a suitable legal

disposal site. Contractor shall be responsible for safely disposing of drilling fluids or cuttings and obtaining any necessary permits for disposal.

4. After completion of the directional drilling work, the entry and exit pit locations shall be restored to original conditions. The Contractor shall comply with all permit provisions.

F. Water

1. The Contractor must make provisions for obtaining water at the site.

G. Responsibility

1. The Contractor shall be fully responsible for the steerable, clay lined directional drilling operation.
2. Any noticeable surface defects resulting from improper operation of this boring equipment shall be repaired by the Contractor at his expense.
3. Contractor shall notify the Owner, Engineer, and Engineer's Resident Project Representative, as well as any requested regulatory authority three (3) working days prior to starting the directional drill.
4. As-built variance from the designed bore path shall not exceed plus or minus one (1) foot in the vertical plane and plus or minus two (2) feet in the horizontal plane. Bore paths shall be included on the contractor provided survey and as-built drawings.
5. Contractor is responsible for containing and cleaning up any mud fractures or frac-outs such as to minimize damage and protect the public.

3.03 INSPECTION AND TESTING

- A. All HDPE and fittings are subject to inspection by the Owner or Engineer at the point of delivery. Material found to be defective due to manufacture or damage in shipping shall be marked as rejected and immediately removed from the job site.
- B. All piping systems shall be field hydrostatically tested per Specification Section 15044.

3.04 START-UP AND INSTRUCTION - NOT USED

END OF SECTION

SECTION 02574

PAVEMENT REMOVAL AND REPLACEMENT

PART I - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: Work included under this Section consists of cutting, removing, protecting and replacing existing pavements, driveways, sidewalks, curb and combination curb and gutter of the various types encountered.
- B. Protection of Existing Improvements: The CONTRACTOR shall be responsible for the protection of all pavements, sidewalks and other improvements within the work area. All damage to such improvements, as a result of the CONTRACTOR's operations, beyond the limits of the work of pavement replacement as described herein, shall be repaired by the CONTRACTOR at his expense.
- C. Related Work Described Elsewhere:
 - 1. Excavating, Backfilling and Compaction: Section 02220.

1.02 DEFINITIONS

- A. Surface Cap: A ½-inch thick crust of sprayed asphalt over the backfilled open cut area with sand spread over the sprayed surface.
- B. Surface Patch: A temporary asphalt surface with a minimum 1-inch of thickness as specified in Paragraph 3.01.A.1.d.
- C. Complete Replacement / Overlay: A complete resurfacing of the entire width of the street with asphaltic concrete 2-inches thick.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Materials, including stabilized subgrade, base, bituminous prime and tack coat, and asphaltic concrete for the above work shall meet the requirements established herein.

1. Stabilized subgrade shall conform to Section 160 of the Florida Department of Transportation (FDOT) Standard Specification of Road and Bridge Construction (latest edition).
2. Base material shall be limerock conforming to Section 230 of the FDOT Standard Specification of Road and Bridge Construction (latest edition).
3. Bituminous prime and tack coat materials shall conform to Section 300 of the FDOT Standard Specification of Road and Bridge Construction (latest edition).
4. Asphalt concrete shall be Type SP 9.5 or 12.5 depending on thickness required or to match existing and conform to Section 334 of the FDOT Standard Specification of Road and Bridge Construction (latest edition).
5. Portland cement concrete shall conform to Section 350 of the FDOT Standard Specification of Road and Bridge Construction (latest edition).

PART 3 - EXECUTION

3.01 PERFORMANCE

A. Removals:

1. Pavement Removal:
 - a. Where existing pavement is to be removed, the surfacing shall be mechanical saw cut prior to trench excavation, leaving a uniform and straight edge, with minimum disturbance to the remaining adjacent surfacing. The width of cut for this phase of existing pavement removal shall be minimized.
 - b. Immediately following the specified backfilling and compaction, a temporary sand seal coat surface or temporary asphalt surface shall be applied to the cut areas. This temporary surfacing shall provide a smooth traffic surface with the existing roadway and shall be maintained until final restoration. Said surfacing shall remain for 10 days in order to assure the stability of the backfill under normal traffic conditions. Following this period and prior to 15 days after application, the temporary surfacing shall be removed and final roadway surface restoration accomplished.

- c. In advance of final restoration, the temporary surfacing shall be removed and the existing pavement mechanically sawed straight and clean to the dimensions specified in the drawings. Following the above operation, the CONTRACTOR shall proceed immediately with final pavement restoration in accordance with these requirements.

2. Sidewalk, Drive & Curb Removal:

- a. Concrete sidewalks, curbs, combination curb and gutter, walks, drive ribbons, or driveways shall be removed by initially sawing the structure, with a suitable power saw, as specified above for pavement. The removal line shall be extended to the next joint, each way. After sawing, the material shall be removed. Temporary paths of travel shall be provided to maintain pedestrian traffic. Particular attention should be given to providing accessible routes to the disabled.
- b. All open-cut driveways are to be restored within 24-hours with an all-weather asphaltic paver to permit temporary property access until final restoration is completed.

B. Restorations:

1. General: Street or roadway pavement cut and removed in connection with trench excavation shall be replaced or restored in equal or better condition than the original and as shown on the Drawings. Street or roadway pavement restoration shall begin immediately upon completion of backfill and compaction or curing of flowable backfill. The Drawings indicate minimum requirements.
2. Asphalt Pavement Restoration: Restoration of existing pavement shall be in accordance with the provisions of Section 334 of the FDOT Standard Specifications for Road and Bridge Construction (latest edition). Asphaltic concrete shall be Super Pave Type 12.5 or match existing, a minimum of 2 inches thick.
3. Asphalt Driveway Restoration: Driveway pavement with base cut and removed in connection with trench excavation shall be replaced or restored as specified above for street or roadway pavement, except the new base course shall equal the existing base course in thickness, except that in no case shall new driveway base course be less than 8 inches in thickness and the asphaltic concrete shall be Super Pave Type 12.5, 3 inches thick.

Muck or unsuitable material found under existing driveway construction will not be removed and replaced.

4. Concrete, Sidewalk, Walkway, Driveway Ribbon and Curb Restoration:
 - a. Concrete sidewalks, walkways, driveways, driveway ribbons and curbs required to be removed for the installation of facilities under this Contract shall be restored. Class B concrete shall be used in all cases.
 - b. Replaced portions of these items shall conform to the lines, grades, and cross sections of the removed portions. Concrete sidewalks and walkways subject to vehicular traffic shall be of 6-inch thickness; concrete sidewalks and walkways not subject to vehicular traffic shall be of 4-inch thickness; concrete driveways and driveway ribbons shall be 6-inch thickness. Replaced concrete curb and/or gutter shall extend the next control joint, each way.
5. Concrete Pavement Restoration: Rigid pavement shall be replaced in kind with Class B concrete, using high early strength cement. The base course for rigid pavement shall be replaced in kind and compacted to a thickness to match the existing base.
6. Asphaltic Concrete Surface course Overlay:
 - a. The work under this section includes asphaltic concrete surface course overlay paving as and where directed by the ENGINEER. Where this paving is directed it shall take the place of asphaltic concrete pavement restoration as specified herein above. This surface course overlay shall extend over the reconstructed base course and the existing pavement to the limits directed by the ENGINEER, which generally shall be the full width of the roadway.
 - b. After the base course construction in the trench area has been completed and primed, the asphalt pavement surface shall be tack coated and a 1-1/2 inch compacted thickness of Super Pave Type 12.5 asphaltic concrete shall be constructed in accordance with the requirements specified above for pavement restoration.

END OF SECTION

SECTION 02822

LOAMING AND SODDING

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required to prepare lawn bed and install sodding as specified.
- B. Areas to receive sodded grass lawns shall be as follows:
 - 1. All areas within right-of-way and all other areas disturbed by the CONTRACTOR's operation.

1.02 SUBMITTALS

- A. Provide technical data as provided in Section 01340 for shop drawings on all materials or installation procedures required under this Section.
- B. Submit representative topsoil samples for analysis by a private laboratory to determine nutrient deficiencies and outline a proper fertilization program.
- C. Submit as provided in Section 01720 certifications required for all sodding supplied.

PART 2 - PRODUCTS

2.01 LOAM

- A. Loam (topsoil) shall be fertile, natural soil, typical of the locality, free from large stones, roots, sticks, peat, weeds and sod and obtained from naturally well drained areas. It shall not be excessively acidic or alkaline nor contain toxic material harmful to plant growth. Topsoil stockpiled under other Sections of this Division may be used, but the CONTRACTOR shall furnish additional loam at his own expense, if required.

2.02 SOIL CONDITIONERS

- A. Fertilizer:
 - 1. Fertilizer shall be a complete fertilizer, the elements of which are derived from organic sources. Fertilizer shall be a standard product complying with State and Federal fertilizer laws.

2. Percentages of nitrogen, phosphorus and potash shall be based on laboratory tests on soils outlined in Paragraph 1.02.A and approved by the ENGINEER. For the purpose of bidding, assume 6% nitrogen, 6% phosphorus and 6% potash by weight. At least 50% of the total nitrogen shall contain no less than 3% water-insoluble nitrogen.
 3. Fertilizer shall be delivered to the site, mixed as specified, in the original unopened standard size bags showing weight, analysis and name of manufacturer. Containers shall bear the manufacturer's guaranteed statement of analysis, or a manufacturer's certificate of compliance covering analysis shall be furnished to the ENGINEER. Store fertilizer in a weatherproof place and in such a manner that it will be kept dry and its effectiveness will not be impaired.
- B. Superphosphate shall be composed of finely ground phosphate rock as commonly used for agricultural purposes containing not less than 20 available phosphoric acid.
 - C. Lime shall be ground limestone.

2.03 SOD

- A. Sod shall be Argentine Bahia, Floratam or of like kind where existing sod is removed or disturbed and replaced by CONTRACTOR's operation. Sod shall have firm texture, a compacted growth and good root development, as approved.
- B. Sod shall be certified to meet Florida State Plant Board specifications, absolutely true to varietal type, and free from weeds or other objectionable vegetation, fungus, insects and disease of any kind.
- C. Before being cut and lifted the sod shall have been mowed 3 times with the final mowing not more than a week before cutting into uniform dimensions.

PART 3 - EXECUTION

3.01 LAWN BED PREPARATION

- A. Areas to be sodded shall be cleared of all rough grass, weeds, and debris, and ground brought to an even grade as approved.
- B. The soil shall then be thoroughly tilled to a minimum 8 inch depth.
- C. Loam shall be placed to a minimum depth of 4 inches and shall be lightly compacted. No loam shall be spread in water.
- D. Lime shall be applied at a rate necessary to achieve a pH of 6 to 7.

- E. Superphosphate at a rate for bidding purposes of 5 pounds per 1,000 square foot and complete fertilizer at a rate for bidding purposes of 16 pounds per 1,000 square foot shall be evenly distributed over entire area and cross-disked into a depth of 4-6 inches.
- F. The areas shall then be brought to proper grade, free of sticks, stones, or other foreign matter over 1-inch in diameter or dimension. The surface shall conform to finish grade, less the thickness of sod, free of water-retaining depressions, the soil friable and of uniformly firm texture.

3.02 SOD HANDLING AND INSTALLATION

- A. During delivery, prior to planting, and during the planting of the lawn areas, the sod panels shall at all times be protected from excessive drying and unnecessary exposure of the roots to the sun. All sod shall be stacked during construction and planting so as not to be damaged by sweating or excessive heat and moisture.
- B. After completion of soil conditioning as specified above, sod panels shall be laid tightly together so as to make a solid sodded lawn area. On mounds and other slopes, the long dimension of the sod shall be laid perpendicular to the slope and with the joints offset relative to upper and lower panels. Immediately following sod laying the lawn areas shall be rolled with a lawn roller customarily used for such purposes, and then thoroughly watered.
- C. Bring the sod edge in a neat, clean manner to the edge of all paving and shrub areas. Top dressing with approved, clean weed free sand may be required at no additional cost to the OWNER if deemed necessary by the ENGINEER.
- D. All areas disturbed by CONTRACTOR's operations within the utility easements, temporary construction easements, and Orange County Rights-of-Way shall be sodded in accordance with Orange County Standards.

3.03 MAINTENANCE

- A. The CONTRACTOR shall produce a dense, well established lawn. The CONTRACTOR shall be responsible for the repair and resodding of all eroded or bare spots until project acceptance. Repair sodding shall be accomplished as in the original work except that fertilizing may be omitted. Sufficient watering shall be done by the CONTRACTOR to maintain adequate moisture for optimum development of the lawn areas. Sodded areas shall receive no less than 1.5 inches of water per week.

3.04 REPAIRS TO LAWN AREAS DISTURBED BY CONTRACTOR'S OPERATIONS

- A. Lawn areas planted under this Contract and lawn areas outside the designated areas damaged by CONTRACTOR's operations shall be repaired at once by proper sod bed preparation, fertilizing and resodding, in accordance with these Specifications.

3.05 TIMING

- A. Restoration activities shall begin as soon as possible following trench backfill and compaction but no later than three (3) days after completion of backfill and compaction.

END OF SECTION

DIVISION 3

CONCRETE

SECTION 03300
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
 - 1. Footings.
 - 2. Foundation walls.
 - 3. Slabs-on-grade (driveways).
- B. Related Sections include the following:
 - 1. Division 2 Section 02200 "Earthwork" for drainage fill under slabs-on-grade.
 - 2. Division 1 Section 01410 "Testing and Testing Laboratory Services".

1.3 DEFINITIONS

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

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.

- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- D. Welding certificates.
- E. Qualification Data: For Installer, manufacturer, testing agency.
- F. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
- G. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials.
 - 2. Admixtures.
 - 3. Form materials and form-release agents.
 - 4. Steel reinforcement and accessories.
 - 5. Waterstops.
 - 6. Curing compounds.
 - 7. Floor and slab treatments.
 - 8. Bonding agents.
 - 9. Adhesives.
 - 10. Vapor retarders.
 - 11. Semirigid joint filler.
 - 12. Joint-filler strips.
 - 13. Repair materials.
- H. Field quality-control test reports.
- I. Minutes of preinstallation conference.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

- C. Testing Agency Qualifications: An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.
1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
 2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.
- D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.
- E. Welding: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code--Reinforcing Steel."
- F. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
1. ACI 301, "Specification for Structural Concrete," Sections 1 through 5.
 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- G. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.
- H. Preinstallation Conference: Conduct conference at Project site.
1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Concrete subcontractor.
 2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semirigid joint fillers, shoring and reshoring procedures, and concrete protection.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.
- B. Waterstops: Store waterstops in accordance with manufacturer's instructions. Waterstops should be protected from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
 - 2. Products: Subject to compliance with requirements, provide one of the products specified.
 - 3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
 - 4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 40 Min. Retain paragraph below for reinforcement that is welded or if added ductility is sought.
- B. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.

2.3 REINFORCEMENT ACCESSORIES

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

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.4 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 1. Portland Cement: ACI 301, 3500 psi.
- B. Silica Fume: ASTM C 1240, amorphous silica.
- C. Normal-Weight Aggregates: ASTM C 33, Class 4M coarse aggregate or better, graded. Provide aggregates from a single source.
 1. Maximum Coarse-Aggregate Size: 1 inch (25 mm) nominal.
 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- D. Water: ASTM C 94/C 94M.

2.5 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

2.6 WATERSTOPS

- A. Chemically Resistant Flexible Waterstops: Thermoplastic elastomer rubber waterstops with factory-installed metal eyelets, for embedding in concrete to prevent passage of fluids through joints; resistant to oils, solvents, and chemicals. Factory fabricate corners, intersections, and directional changes.
 1. Available Products:
 - a. JP Specialties, Inc.; Earth Shield TPV-Rubber.
 - b. WESTEC Barrier Technologies, Inc.; 600 Series TPV.
Profile: Ribbed with center bulb.

3. Dimensions: 4 inches by 3/16 inch thick (100 mm by 4.75 mm thick) and 6 inches by 3/16 inch thick (150 mm by 4.75 mm thick); nontapered.
- B. Flexible PVC Waterstops: CE CRD-C 572, with factory-installed metal eyelets, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.
1. Available Manufacturers:
 - a. Bometals, Inc.
 - b. Greenstreak.
 - c. Meadows, W. R., Inc.
 - d. Murphy, Paul Plastics Co.
 - e. Progress Unlimited, Inc.
 - f. Tamms Industries, Inc.
 - g. Vinylex Corp.
 2. Profile: Ribbed with center bulb.
 3. Dimensions: 4 inches by 3/16 inch thick (100 mm by 4.75 mm thick); and 6 inches by 3/16 inch thick (150 mm by 4.75 mm thick); nontapered.

2.7 VAPOR RETARDERS

- A. Plastic Vapor Retarder: ASTM E 1745, Class C, or polyethylene sheet, ASTM D 4397, not less than 6 mils (0.25 mm) thick. Include manufacturer's recommended adhesive or pressure-sensitive joint tape.
1. Available Products:
 - a. Fortifiber Corporation; Moistop Plus.
 - b. Raven Industries Inc.; Dura Skrim.
 - c. Reef Industries, Inc.; Griffolyn.
 - d. Stego Industries, LLC; Stego Wrap, 10 mils.
- B. Granular Fill: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448, Size 57, with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.
- C. Fine-Graded Granular Material: Clean mixture of crushed stone, crushed gravel, and manufactured or natural sand; ASTM D 448, Size 10, with 100 percent passing a 3/8-inch (9.5-mm) sieve, 10 to 30 percent passing a No. 100 (0.15-mm) sieve, and at least 5 percent passing No. 200 (0.075-mm) sieve; complying with deleterious substance limits of ASTM C 33 for fine aggregates.

2.8 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
 - 1. Available Products:
 - a. ChemMasters; Spray-Film.
 - b. MBT Protection and Repair, Div. of ChemRex; Confilm.
 - c. Sika Corporation, Inc.; SikaFilm.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.

2.9 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 per ASTM D 2240.
- C. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

2.10 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by underlayment manufacturer.
 - 4. Compressive Strength: Not less than 5000 psi (29 MPa)] at 28 days when tested according to ASTM C 109/C 109M.

- B. Repair Overlay: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
 - 4. Compressive Strength: Not less than 5000 psi (34.5 MPa) at 28 days when tested according to ASTM C 109/C 109M.

2.11 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Limit water-soluble, chloride-ion content in hardened concrete to 0.10 percent by weight of cement.
- C. Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
 - 2. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

2.12 CONCRETE MIXTURES FOR BUILDING AND BUILDING ELEMENTS

All building elements shall conform to the following mixtures except as noted below:

- A. Footings: Proportion normal-weight concrete mixture as follows:
 - 1. Minimum Compressive Strength: 3000 psi (20.7 MPa) at 28 days.
 - 2. Maximum Water-Cementitious Materials Ratio: 0.50.
 - 3. Slump Limit: 6 inches (152 mm), plus or minus 1 inch (25 mm).
- B. Foundation Walls: Proportion normal-weight concrete mixture as follows:
 - 1. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.

2. Maximum Water-Cementitious Materials Ratio: 0.45.
 3. Slump Limit: 8 inches (200 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).
 4. Air Content: 5 percent, plus or minus 1 percent at point of delivery for 1-inch (25-mm) nominal maximum aggregate size.
- C. Slabs-on-Grade (Driveways, 6 inch thick; minimum): Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: 4000 psi (34.5 MPa) at 28 days.
 2. Maximum Water-Cementitious Materials Ratio: 0.40.
 3. Slump Limit: 8 inches (200 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).
 4. Air Content: Max. 3 percent at point of delivery for 1-inch (25-mm) nominal maximum aggregate size.
- D. Miscellaneous Slabs-on-Grade (Curbing, Gutters, and Other Miscellaneous Concrete): Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: 3000 psi (27.6 MPa) at 28 days.
 2. Minimum Cementitious Materials Content: 520 lb/cu. yd. (309 kg/cu. m).
 3. Maximum Water-Cementitious Materials Ratio: 0.45.
 4. Select slump limit from two options in subparagraph below or revise to suit Project.
 5. Slump Limit: 8 inches (200 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).
 6. Air Content: Max. 3 percent at point of delivery for 1-inch (25-mm) nominal maximum aggregate size.
- E. Building Frame Members: Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
 2. Maximum Water-Cementitious Materials Ratio: 0.45.
 3. Slump Limit: 8 inches (200 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).
- F. Mat Foundation: Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: 5000 psi (34.5 MPa) at 28 days.
 2. Maximum Water-Cementitious Materials Ratio: 0.40.
 3. Slump Limit: 8 inches (200 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).

4. Air Content: 5 percent, plus or minus 1 percent at point of delivery for 1-inch (25-mm) nominal maximum aggregate size.
5. Silica Fume: Maximum 10 percent by weight of cementitious materials other than portland cement in concrete.
6. Maximum Shrinkage Rate: 0.00023 in./in.

G. Suspended Slabs: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.45.
3. Slump Limit: 8 inches (200 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).
4. Air Content: 5 percent, plus or minus 1 percent at point of delivery for 1-inch (25-mm) nominal maximum aggregate size.
5. Silica Fume: Maximum 10 percent by weight of cementitious materials other than portland cement in concrete.

H. Building Walls: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 5000 psi (34.5 MPa) at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.40.
3. Slump Limit: 8 inches (200 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).
4. Air Content: 5 percent, plus or minus 1 percent at point of delivery for 1-inch (25-mm) nominal maximum aggregate size.
5. Silica Fume: Maximum 10 percent by weight of cementitious materials other than portland cement in concrete.
6. Maximum Shrinkage Rate: 0.00023 in./in.

2.13 FABRICATING REINFORCEMENT

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

2.14 CONCRETE MIXING

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

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
 - 1. Class A, 1/8 inch (3.2 mm) for smooth-formed finished surfaces.
 - 2. Class B, 1/4 inch (6 mm) for rough-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 - 1. Install keyways, reglets, recesses, and the like, for easy removal.
 - 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

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

3.3 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.
 - 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
 - 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Engineer.

3.4 SHORES AND RESHORES

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

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

3.5 VAPOR RETARDERS

- A. Plastic Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions.
 1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.
- B. Bituminous Vapor Retarders: Place, protect, and repair vapor retarders according to manufacturer's written instructions.

3.6 STEEL REINFORCEMENT

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

3.7 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Engineer.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 - 2. Form keyed joints as indicated. Embed keys at least 3 inches (65 mm) into concrete.
 - 3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 - 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 - 5. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
 - 1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 - 1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
 - 2. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.8 WATERSTOPS

- A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect

exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions.

3.9 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Engineer.
- C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 - 1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
 - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
 - 1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - 2. Maintain reinforcement in position on chairs during concrete placement.
 - 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 - 4. Slope surfaces uniformly to drains where required.
 - 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- E. Hot-Weather Placement: Comply with ACI 301 and as follows:
 - 1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.10 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 1. Apply to concrete surfaces exposed to public view, to be covered with a coating or covering material applied directly to concrete.
- C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.11 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch (6 mm) in 1 direction.
 1. Apply scratch finish to surfaces to receive concrete floor toppings or to receive mortar setting beds for bonded cementitious floor finishes.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraighening until surface is left with a uniform, smooth, granular texture.
 1. Apply float finish to surfaces to receive trowel finish.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind

smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, paint, or another thin-film-finish coating system.
 2. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-foot- (3.05-m-) long straightedge resting on 2 high spots and placed anywhere on the surface does not exceed 3/16 inch (4.8 mm).
- E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.
1. Comply with flatness and levelness tolerances for trowel finished floor surfaces.
- F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Engineer before application.

3.12 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.
- D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel-finish concrete surfaces.

3.13 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Continuous water-fog spray.
 - b. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.

3.14 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 - 1. Defer joint filling until concrete has aged at least six month(s). Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.15 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Engineer. Remove and replace concrete that cannot be repaired and patched to Engineer's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension in solid concrete, but not less than 1 inch (25 mm) in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 - 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 - 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Engineer.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
 - 1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 - 2. After concrete has cured at least 14 days, correct high areas by grinding.
 - 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 - 4. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

5. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 6. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Engineer's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Engineer's approval.

3.16 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Contractor will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Inspections:
1. Steel reinforcement placement.
 2. Steel reinforcement welding.
 3. Headed bolts and studs.
 4. Verification of use of required design mixture.
 5. Concrete placement, including conveying and depositing.
 6. Curing procedures and maintenance of curing temperature.
- C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
 2. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

3. Compression Test Specimens: ASTM C 31/C 31M.
 - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
 - b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.
4. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
 - a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
 - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
5. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
6. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
7. Test results shall be reported in writing to Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
8. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Engineer but will not be used as sole basis for approval or rejection of concrete.
9. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that air entrainment, compressive strengths, or other requirements have not been met, as directed by Engineer. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Engineer.
10. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
11. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

END OF SECTION

SECTION 03410

PRECAST CONCRETE STRUCTURES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: The work under this section includes the design, coating, delivery and erection of precast concrete structures as indicated on the Drawings.

1.02 QUALITY ASSURANCE

- A. Standards: Unless otherwise indicated, all materials, workmanship and practices shall be in accordance with the current editions of the following standards:
1. Standard Building Code.
 2. ACI 318, Building Code Requirements for Reinforced Concrete.
 3. PCI MNL 116, Manual for Quality Control for Plants and Production of Precast Concrete Products.

1.03 SUBMITTALS

- A. The following information shall be submitted to the Engineer for approval in accordance with Section 01340. Fabrication shall not begin until submission has been approved.
1. Quality Control: Satisfactory evidence shall be submitted that plant and production methods meet the requirements of PCI MNL 116.
 2. Design: Complete calculations including shear, moment, buoyancy, and camber calculations shall be submitted. All computation sheets shall bear the seal of a Professional Engineer registered in the State of Florida.
 3. Shop Drawings: Complete fabrication and erection drawings shall be submitted. All drawings shall bear the seal of a Professional Engineer registered in the State of Florida.
- B. Manufacturer's data sheets shall be submitted on the following:

1. Joint mastic and gaskets.
2. Pipe connections.
3. Grout material.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Transportation and erection shall be done by qualified personnel using proper equipment. Lifting and supporting shall be done only at points indicated on the shop drawings.

PART 2 - PRODUCTS

2.01 MATERIALS AND FABRICATION

A. Precast Concrete Structures:

1. Design loads shall consist of dead load, live load, impact, soil loads and loads due to water table, as well as other loads which may be imposed upon the structure. Concrete vault structure shall be tested and proven capable of handling H-20 loadings.
2. Forms used for precast concrete shall be of metal and sufficiently designed and braced to maintain their alignment under pressures of the concrete during placing.
3. Aggregates. All aggregates, fine and coarse, other than lightweight aggregate shall conform to ASTM C 33. Lightweight aggregates, fine and coarse, shall conform to ASTM C 330. Aggregates shall be free of deleterious substances causing reactivity with oxidized hydrogen sulfide.

Both types of aggregate shall be graded in a manner so as to produce a homogenous concrete mix. All materials are to be accurately weighed at a central batching facility for mixing.

4. Cement shall be Portland cement Type II.
5. Minimum compressive strength of concrete used for precast concrete structures shall be 4,000 psi at 28 days.
6. Placing. All concrete shall be handled from the mixer or transport vehicle to the place of final deposit in a continuous manner, as rapidly as practicable, and without segregation or loss of ingredients, until the approved unit is completed. Maximum elapsed time from batching to

placement shall be 2 hours. Concrete shall be placed in layers not over 2 feet deep. Each layer shall be compacted by mechanical internal or external vibrating equipment. Duration of the vibration cycle shall be limited to the time necessary to produce satisfactory consolidation without causing objectionable segregation.

7. Curing:

- a) For purposes of early reuse of forms, precast concrete may be steam cured after an initial set has taken place. The steam temperature shall not exceed 160°F, and the temperature shall be raised from normal ambient temperatures at a rate not to exceed 40°F per hour.
- b) The steam cured unit shall not be removed from the forms until sufficient strength is obtained for the unit to withstand any structural strain to which it may be subjected during the form stripping operation. After the stripping of forms, further curing by means of water spraying or a membrane curing compound may be used, and shall be of a clear or white type, conforming to ASTM C 309.

8. Reinforcing steel shall be sufficiently tied to withstand any displacement during the pouring operation. All bars shall be Grade 60.

9. Joints shall be sealed with round or other flexible type natural rubber joint ring gaskets in conformance with ASTM C 433 or by a flexible preformed bitumastic sealing material equal to Ram-Nek as manufactured by R.K. Snyder and Co., Houston, Texas. If rubber joint ring gaskets are used, interior and exterior voids in the pipe joints shall be sealed with flexible sealing material specified above, installed in strict accordance with the manufacturer's printed instructions.

10. Sealing Compound and Grout: Plastic sealing compound shall comply with Federal Specification SS-S-00210. Mortar shall comply with ASTM C 387, Type S, or use grout complying with Section 3600.

11. Lifting holes through the structures are not permitted. Equally spaced lifting lugs, rings or non-penetrating lift inserts shall be provided.

B. Pipe Connections:

1. Pipe connections for wall penetrations for top slabs shall be provided with wall sleeves and rubber boot system, as specified in the Drawings.

- C. Frames and Covers shall be provided for top slabs as specified in the Drawings.
- D. Coatings as Specified in Section 09900.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Earthwork: The Contractor shall prepare an excavation large enough to accommodate the structure and permit sealing of openings, waterproofing, and backfilling operations. Earthwork shall conform to the applicable sections of Division 2.
- B. Installation of Precast Concrete Structures: Precast concrete structures shall be constructed in a workmanlike manner at the locations and dimensions indicated on the Drawings. The precast structures shall be constructed such that the structure will not transmit dead or live loads to the piping. Care shall be taken to prevent earth and other material from entering precast structures.
- C. Sealing and Grouting: Fill all interior and exterior joints between precast sections with a joint sealant, as recommended by the structure manufacturer.
- D. Setting Frames and Covers:
 - 1. Unless otherwise indicated on the Drawings, in unpaved areas the tops of slabs shall be set 0.5-feet above finished grade, unless otherwise indicated on the Drawings.

E. Interior Coating:

1. The interior coating system shall be applied following installation of the precast structures and any piping or equipment which will penetrate or attach to the walls. Surface preparation and application of the coating system shall be in strict accordance with the manufacturer's recommendations. Refer to Section 09900 for additional specifications.

F. Backfill:

1. After the structure and all appurtenances are in place and approved, backfill shall be placed to the original ground line or to the limits designated on the Drawings. Backfill material shall consist of sand or loose earth, free from stones, clods, or other deleterious material. It shall be placed in horizontal layers not exceeding 12 inches in depth, and shall be moistened and thoroughly compacted to a minimum relative density conforming to the requirements of Division 2.

END OF SECTION

DIVISIONS 4 – 8

NOT USED

DIVISION 9

COATINGS

SECTION 09900

PAINTING

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. The work of this section consists of furnishing all materials, labor, equipment and incidentals required and performing all the painting necessary to complete this Contract in its entirety.
- B. It is the intent of these Specifications to paint all proposed concrete, equipment and all other work obviously required to be painted unless otherwise specified. It is also intended to paint all existing interior and exterior surfaces affected or damaged by this project which may be exposed to view in the finished work including, but not limited to, concrete, metals, pipe, fittings, valves, equipment and all other existing items similar to proposed items specified for painting. Table 09900-A outlines the painting system to be applied to specific areas. Items omitted in the Table shall be included in the work of this Section where they come within the general intent of the specifications as stated herein.
- C. In general the following surfaces are to be painted. Table 09900-B provides a more specific schedule of surfaces to be painted described generally below.
 - 1. All exposed piping.
 - 2. Equipment furnished without factory furnished surfaces or damaged factory surfaces.
 - 3. All exterior below-ground concrete.
 - 4. The casting covers on the valve boxes.
- D. The following surfaces or items are NOT required to be painted, unless noted otherwise:
 - 1. Portions of metal, other than aluminum, embedded in concrete.
 - 2. Aluminum gratings, checkered plates, hatches, and guiderails.
 - 3. Stainless steel, brass, bronze, and aluminum other than exposed tubing.
 - 4. Aluminum, galvanized, or vinyl fencing.
 - 5. Piping buried in the ground or embedded in concrete.
 - 6. Access Hatch frames and covers.
 - 7. Packing glands and other adjustable parts and nameplates of mechanical equipment.

1.02 QUALITY ASSURANCE

A. Manufacturer's Qualifications

1. It is the intent of this specification that all paints specified in this section be supplied by one paint supplier and be the product of one manufacturer, unless a specialty paint not available from that manufacturer is specified.
2. The paint manufacturer shall have supplied paint for water and wastewater facilities for a minimum of ten (10) years, and products supplied shall be contained within the manufacturer's standard water and wastewater brochure.
3. Acceptable manufacturers are listed in Part 2 of this section.

B. The applicator shall be a licensed contractor having practical experience and successful history in the application of the specified products to surfaces and facilities of water and wastewater treatment plants. Upon request, this requirement shall be substantiated by furnishing a written list of references.

C. Thickness and Holiday Checking: Thickness of coatings shall be checked with a nondestructive, magnetic type thickness gauge. Coating integrity of interior coated surfaces shall be tested with an approved holiday detection unit per the paint manufacturer's recommendation. All pinholes shall be marked, repaired in accordance with the paint manufacturer's printed recommendations and re-tested. No pinholes or other irregularities will be permitted in the final coating. In cases of dispute concerning film thickness or "holidays," the RPR's/Engineer's properly calibrated instruments and measurements shall predominate and the Contractor shall abide by their decision unless independent tests are performed by a certified lab at the Contractor's expense. Wide film thickness discrepancies shall be measured and verified with a micrometer or other standard approved measuring instrument.

D. Inspection Devices:

1. The Contractor shall furnish, until final acceptance of such coatings, inspection devices in good working condition for the detection of holidays and measurement of dry-film thickness of protective coatings. The Contractor shall also furnish U.S. Department of Commerce, National Bureau of Standards certified thickness calibration plates to test accuracy of dry film thickness gauge and certified instrumentation to test accuracy of holiday detectors.
2. Dry film thickness gauges shall be made available for the RPR's use at all times while painting is being done, until final acceptance of such coatings.

Holiday detection devices shall be operated only in the presence of the RPR.

3. Acceptable devices include, but are not limited to, Tniker Razor Model holiday detectors for coatings in excess of twenty mils (0.50 mm) dry-film thickness, Model M-1 67 1/2 volt non-destructive holiday detector for coatings to twenty mils (0.50 mm) dry-film thickness and Mikrotest units for dry-film thickness gauging. Inspection devices shall be operated in strict accordance with the manufacturer's printed instructions.

E. Meteorological Equipment: The Contractor shall have on site the following equipment:

1. Thermometer
2. Sling psychrometer or other approved device to measure atmospheric humidity.
3. Appropriate charts.

This equipment shall be made available to the RPR.

F. Warranty Inspection: Warranty inspection shall be conducted during the eleventh month of the one (1) year warranty period following completion of all painting work. All defective work shall be repaired in strict accordance with this specification and to the satisfaction of the paint manufacturer and the Owner or his duly appointed representative.

1.03 SAFETY AND HEALTH REQUIREMENTS

- A. General: In accordance with the requirements of the OSHA Regulations for Construction, the Contractor shall provide and require the use of personal protective and lifesaving equipment for all persons working in or about the project.
- B. Head and Face Protection and Respiratory Devices: Applicable health and safety precautions required by appropriate regulatory agencies such as OSHA, ANSI, etc., should be followed.
- C. Ventilation: Ventilation shall be adequate to reduce the contamination of air contaminant to the degree that a hazard to the worker does not exist.
- D. Sound Levels: Whenever the occupational noise exposure exceeds the maximum allowable sound levels, the Contractor shall provide and require the use of approved ear protective devices.

- E. Illumination: Adequate illumination shall be provided while work is in progress. Whenever required by the RPR, the Contractor shall provide additional illumination and necessary support sufficient to cover all areas to be checked. The level of illumination required for observation purposes shall be determined by the RPR.
- F. Temporary Ladders and Scaffolding: All temporary ladders and scaffolding shall conform to the applicable requirements of the OSHA Regulations for Construction. They shall be erected where requested by the RPR to facilitate proper construction observation and be moved by the Contractor to locations requested by the RPR.

1.04 SUBMITTALS

- A. Submit to the Engineer as provided in the General Conditions and Division 1, shop drawings, manufacturer's specifications and data on the proposed paint systems and detailed surface preparation, application procedures and dry film thickness.
- B. Schedule of Painting Operations: The Contractor shall submit for approval a complete Schedule of Painting Operations within 30 days after the Notice to Proceed. This schedule is imperative so that the various fabricators may be notified of the proper shop prime coat to apply. It shall be the Contractor's responsibility to properly notify and coordinate the fabricators' surface preparation and painting operations with these Specifications. This Schedule shall include for each surface to be painted, the brand name, the volume solids, the coverage and the number of coats the Contractor proposes to use 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 Engineer to verify the proper application while work is in progress.
- C. Certification: Submit certification by the paint manufacturer that the primer used on equipment/materials is compatible with the finish coat paint.
- D. One copy of references specified in 1.02 B. 1.
- E. Test panels/samples: At the request of the Engineer, samples of the finished work prepared in strict accordance with these Specifications shall be furnished and all painting shall be equal in quality to the approved samples. Finished areas shall be adequate for the purpose of determining the quality of workmanship. Experimentation with color tints shall be furnished to the satisfaction of the Engineer where, standard chart colors are not satisfactory.

1.05 PRODUCT DELIVERY STORAGE AND HANDLING

- A. All painting materials shall be delivered to the project site in unbroken containers, bearing the manufacturer's brand and name. They shall be used without adulteration and mixed, thinned, and applied in strict accordance with the manufacturer's directions for the applicable materials and surfaces and with the Engineer's approval before using.
- B. Work areas will be designated by the Engineer for storage and mixing of all painting materials. Materials shall be in full compliance with the requirements of pertinent codes and fire regulations. Proper containers outside of the buildings shall be provided and used for painting wastes, and no plumbing fixture shall be used for this purpose.

PART 2 – PRODUCTS

2.01 GENERAL

- A. All painting materials shall be fully equal to those manufactured by Tnemec or Carboline. The painting schedule has been prepared on the basis of Carboline or Tnemec products (unless otherwise noted) and their recommendations for applications. No other brand will be considered for approval unless sufficient data substantiated by certified tests to demonstrate its equality to the paint(s) specified is submitted in writing to the Engineer for approval within 30 days after the Notice to Proceed. The type and number of tests performed shall be subject to the Engineer's approval.
- B. Shop priming shall be done with primers that are certified by the paint manufacturer to be compatible with the finish paints to be used.
- C. No paint containing lead shall be allowed.
- D. Oil shall be pure boiled linseed oil.

2.02 PAINTING SYSTEMS

- A. The following summarizes the painting systems for various types of applications. Table 09900-A outlines, in general, specific job application locations.
- B. All colors will be selected by the Owner from color charts supplied by the Contractor.
- C. Minimum thickness shall be per manufacturer's recommendations unless a greater thickness is specified.

- D. The following surfaces shall have the types of paint scheduled below applied at the minimum dry film thickness (MDFT) in mils per coat noted or at the dry film thickness (DFT) in mils per coat noted. The schedule is applicable to existing and proposed surfaces, with the exception that priming for existing surfaces is only required as specified in Paragraph 3.04.

TABLE 09990-A

Coat	Carboline	TNEMEC
1.	Unpainted wood finished shelving, window frames, door frames, door casework, and trim finish with 3 coats of exterior premium Clear Urethane. Sanding or steel wool shall be used between coats.	
2.	Wood-painted finish (interior or exterior) non-submerged:	
Prime	1 coat Sanitile 120. 1.0 to 2.0 MDFT	1 coat Series 10-99W Undercoater, 2.0 to 3-5 MDFT.
Finish	2 coats Carbocoat 45. 2.0 to 3.0 MDFT each coat.	2 coats Series 23 Enduratone, 1.5 to 2.5 MDFT per coat.
3.	Interior nonsubmerged concrete walls poured or precast, not subject to spray, splash and dampness:	
Prime	1 coat Sanitile 100 80 sf/gal	Series 54 80 sf/gal
Finish	2 coats Sanitile 155 2.0-3.0 MDFT per coat	2 coats Series 6 Tneme-Cryl 2.0 to 3.0 MDFT per coat
4.	Exterior nonsubmerged concrete, masonry, or stucco above grade:	
Prime	1 coat Sanitile 100 . 72 sf/gal	1 coat Series 54-562 80 to 100 sf/gal
Finish	2 coats Sanitile 155 2.0 to 3.0 MDFT per coat	2 coats Series 6 Tneme-Cryl 2.0 to 3.0 MDFTsper coat
5.	Exterior nonsubmerged concrete or masonry surfaces below grade to be backfilled:	
Prime	1 coat Bitumastic 300M, thinned 33%, 4-6 MDFT	1 coat Series 46H-413, thinned 33%, 4-6 MDFT
Finish	1 coat Bitumastic 300M 16.0 MDFT	1 coat Series 46H-413, High Build Tneme-Tar, 14.0 to 20.00 MDFT
6.	Interior nonsubmerged concrete masonry units:	
Prime	1 coat Sanitile 100 , 72 sf/gal	1 coat Series 54 Masonry Filler, 80 sf/gal
Finish	2 coats Sanitile 155 2.0 to 3.0 MDFT, per coat.	2 coats Series 6 Tneme-Cryl 2.0 to 3.0 MDFT per coat
7.	Concrete submerged or subject to spray – black (non-potable):	
Prime	1 coat Bitumastic 300M (thinned), 4-6 MDFT	1 coat Series 46H-413 High Build Tneme Tar, 14.0 MDFT
Finish	2 coats Bitumastic 300M 8-10 MDFT per coat	2 coats Series 46H-413 High Build Tneme Tar, 14.0 MDFT per coat
8.	Concrete submerged or subject to spray concrete – Color:	
Prime	1 coat Carboguard 890 or Carboguard 61 (Potable water), 4.0 to 6.0 MDFT	Series 20 Pota-Pox (potable water) 3.0 to 5.0 MDFT
Finish	2 coats Carboguard 890 or Carboguard 61 (Potable Water), 4.0 to 6.0 MDFT per coat	2 coats Series 20 Pota-Pox (potable water), 4.0 to 6.0 MDFT per coat
	Total: 14.0 to 16.0 MDFT	Total: 14.0 to 16.0 MDFT
	For potable water application, must NSF certified and approved color.	
9.	Concrete floors subject to moisture and traffic.	
Prime	1 coat Carboguard 890 (thinned) 3.0 to 5.0 MDFT	Series 66 Hi-Build Expoxoline, 3.0 to 5.0 DFT

Coat	Carboline	TNEMEC
Finish	2 coats Carboguard 890, 4.0 to 6.0 MDFT, each coat, with non-skid aggregate	2 coats Series 66 Hi-Build Epoxoline, 4.0 to 6.0 MDFT. Broadcast 30-50 mesh silica sand into the intermediate coat of Series 66 at a rate of 1 lb per 150 SF.
	Total: 16 MDFT	Total: 15 MDFT
10. Interior Cement Plaster or Gypsum dry walls:		
Prime	1 coat Sanitile 120, 1.0 to 2.0 MDFT	Series 51PVA Sealer 1.0 to 2.0 MDFT
Finish	2 coats Carboguard 60 4.0 to 6.0 MDFT per coat	2 coats Series 66 Hi-Build Epoxoline 3.0 to 5.0 MDFT per coat
	Total: 10 MDFT	Total: 10 MDFT
	Note: Laboratory areas shall receive special titanium base epoxy paint containing no other metals that may affect testing procedure	
11. All submerged ferrous metals and ferrous metals subject to submergence or splashing (for contact with non-potable water) – Black:		
Prime	1 coat Bitumastic No. 300-M Coal Tar Epoxy (thinned) 8.0 MDFT	1 coat Series 46H-413 Tneme-Tar 14 MDFT
Finish	1 coat Bitumastic No. 300-M Coal Tar Epoxy 16.0 to 20.0 MDFT	1 coat Series 46H-413 Tneme-Tar 14.0 to 20.0 MDFT
12. All submerged ferrous metals and ferrous metals subject to submergence or splashing (for contact with potable water) – Color – must be NSF certified and approved color:		
Prime	1 coat 340 Gold Primer 4.0 to 6.0 MDFT	Series 20 Pota-Pox 3.0 to 5.0 MDFT
Finish	2 coats Super Hi-Gard Epoxy 4.0 MDFT each	2 coats Series 20 Pota-Pox 4.0 to 6.0 MDFT per coat
	Total: 16.0 to 20.0 MDFT	Total: 20.0 MDFT
13. Interior non-submerged ferrous metal:		
Prime	1 coat 340 Gold 4.0 to 6.0 MDFT	Series 66 Hi-Build Epoxoline 3.0 to 5.0 MDFT
Finish	2 coats Hi-Gard Epoxy 4.0 MDFT each	2 coats Series 66 Hi-build Epoxoline, 4.0 to 6.0 MDFT each
	Total: 14.0 to 20.0 MDFT	Total: 14.0 to 16.0 MDFT
14. Exterior non-submerged ferrous metals:		
Prime	1 coat 340 Gold 4.0 to 6.0 MDFT	Series 66 Hi-Build Epoxoline 3.0 to 5.0 MDFT
Finish	1 coat Hi-Gard Epoxy 4.0 to 6.0 MDFT	Series 66 Hi-Build Epoxoline 4.0 to 6.0 MDFT
	1 coat 134 HS 2.0 MDFT	Series 73 Endurashield 2.0 to 5.0 MDFT
	Total: 11 MDFT	Total: 11 MDFT
15. Ferrous metals – high temperature (over 150° F up to 1200° F):		
Prime	1 coat Carbo Zinc 11 3 MDFT	Series 90E-92 Tneme-Zinc 2.0 to 3.5 MDFT
Finish	2 coat Thermaline 4631 WB 2 MDFT per coat	2 coats Series 39-1061 silicone aluminum, 0.7 to 1.5 MDFT each
16. Plastic Piping – Below Grade coating not required, except as noted. Exposed piping shall be painted as required in the color coding schedule.		
Prime	1 coat Sanitile 120 1.0 to 2.0 mils DFT	No Primer required

Coat	Carboline	TNEMEC
Finish	1 coat Carbothane 133LH 3.0 to 5.0 mils DFT	(2) Coats of Tnemec Series 73 @ 2.5-3.5 mils DFT

- E. Any surfaces not specifically named in the Schedule and not specifically excepted shall be prepared, primed and painted in the manner and with materials consistent with these Specifications. The Engineer shall select which of the manufacturer's products, whether the type is indicated herein or not, shall be used for such unnamed surfaces. No extra payment shall be made for this painting.

2.03 EXTRA PAINT

- A. Furnish one unopened gallon can of each type and each color of paint used, properly marked for future use by Owner.

PART 3 – EXECUTION

3.01 GENERAL

- A. All coating and painting shall conform to the applicable requirements of the Steel Structures Painting Council Manual (most recent edition). Any material applied upon improperly prepared surfaces shall be removed and redone to the satisfaction of the Engineer at the sole expense of the Contractor.
- B. All work shall be done by skilled craftsmen who are qualified to perform the required work and shall be done in a manner comparable with the best standards of practice found in that trade.
- C. The Contractor shall provide a supervisor to be at the work site during blast cleaning and coating operations. The supervisor shall have the authority to coordinate the work and make other decisions pertaining to the fulfillment of their contract.
- D. All dust, dirt, oil, or any contaminants which would affect the adhesion or durability of the finish coating must be removed before painting by cleaning per SPC-SP-1. Slag and weld metal accumulation and spatters shall be removed by chipping and grinding. All sharp edges shall be peened, ground or otherwise blunted as required and directed by the RPR.
- E. The Contractor's coating and painting equipment shall be designed and suitable for the application of the specific materials herein specified. Equipment shall be maintained in condition required to obtain the specified coating application. Compressors shall have suitable traps and filters installed to remove water and oils from the air. The Contractor's equipment shall be subject to the approval of the RPR based on the manufacturer's data.

- F. Sandblasting and priming shall be completed on any particular area, and the application of the primer shall follow immediately after surface preparation and cleaning prior to formation of any form of corrosion. If the surface is not primed within 24 hours, preparation shall be repeated.
- G. Prior to assembly, all surfaces that will be made inaccessible after assembly, shall be prepared as specified herein and shall receive the paint or coating system as specified herein.
- H. Coating shall not be applied to wet or damp surfaces and shall not be applied in inclement weather. Do not apply when the surface temperature is less than 5° F above the dew point. Dew or moisture condensation should be anticipated and if such conditions are prevalent, coating should be delayed until the surfaces are dry. Further, the day's coating should be completed well in advance of when condensation will occur, in order to permit the film a sufficient drying time prior to the formation of moisture.

3.02 SURFACE PREPARATION

- A. General: The following referenced surface preparation specifications of the Steel Structures Painting Council shall form a part of this specification:
 - 1. Solvent Cleaning (SSPC-SP1): Solvent such as water, mineral spirits, xylol, toluol, etc., are used to remove solvent-soluble foreign matter from the surface of ferrous metal. Rags and solvents must be replenished frequently to avoid spreading the contaminant rather than removing it. Low-pressure (1,500-4,000 psi) high volume (3-5 gal/min) water washing with appropriate cleaning chemicals is a recognized “solvent cleaning” method. All surfaces should be cleaned per this specification prior to using hand tools or blast equipment.
 - 2. Hand Tool Cleaning (SSPC-SP2) (SSI-St2): A mechanical method of surface preparation involving wire brushing, scraping, chipping and sanding. Not the most desirable method of surface preparation, but can be used for mild exposure conditions. Optimum performances of protective coatings system should not be expected when hand tool cleaning is employed.
 - 3. Power Tool Cleaning (SSPC-SP3) (SSI-St3): A mechanical method of surface preparation widely used in industry and involving the use of power sanders or wire brushes, power chipping hammers, abrasive grinding wheels, needle guns, etc. Although usually more effective than hand tool cleaning, it's not considered adequate for use under severe exposure conditions or for immersion applications.

4. White Metal Blasting (SSPC-SP5), (SSI-Sa3), or (NACE #1): The removal of all visible rust, mill scale, paint, and contaminants, leaving the metal uniformly white or gray in appearance. This is the ultimate in blast cleaning. Use where maximum performance of protective coatings is necessary due to exceptionally severe conditions such as constant immersion in water or liquid chemicals.

5. Commercial Blast (SSPC-SP6, (SSI-Sa2), or (NACE #3): All oil, grease, dirt, rust scale and foreign matter are completely removed from the surface and all rust, mill scale and old paint are completely removed by abrasive blasting 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 of rust or paint may be found in the bottom of pits, at least two-thirds of each square inch of surface area shall be free of all visible residues and the remainder shall be limited to the light residues mentioned above.

6. Brush-Off Blast (SSPC-SP7, SSI-Sa1), or (NACE #4): A method in which all oil, grease, dirt, rust scale, loose mill scale, loose rust, and loose paint or coatings are removed completely. Tight mill scale and tightly-adhered rust, paint and coatings are permitted to remain. However, all mill scale and rust must have been exposed to the abrasive blast pattern sufficiently to expose numerous flecks of the underlying metal fairly uniformly distributed over the entire surface.

7. Near White Blast (SSPC-SP10), SSI-Sa2½) or (NACE #2): In this method, all oil, grease, dirt, mill scale, rust, corrosion products, oxides, paint or other foreign matter have been completely removed from the surface by abrasive blasting, 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 coating. At least 95% of each square inch of surface areas shall be free of all visible residues, and the remainder shall be limited to the light discoloration mentioned above. From a practical standpoint, this is probably the best quality surface preparation that can be expected today for existing plant facility maintenance work.

8. High and Ultra-High Pressure Water Jet Cleaning (SSPC-SP12) or (NACE #5): As part of the surface preparation, deposits of oil, grease, and foreign matter must be removed by ultra-high pressure water jetting, by steam cleaning with detergent, or by methods in accordance with SSPC-SP1. The difference in degrees of surface cleanliness is defined by the amount of pressure as follows:

Low Pressure		
Water Cleaning (LP WC)	34 MPa	(5,000 psi)

High Pressure
Water Cleaning (HP WC) 34 to 70 MPa (5,000-10,000 psi)

High Pressure
Water Jetting (HP WJ) 70 to 170 MPa (10,000-25,000 psi)

Ultra-High Pressure
Water Jetting (UHP WJ) Above 170 MPa (25,000 psi)

- B. The abrasive used in blast cleaning shall produce a height profile in accordance with the recommendations of the manufacturer of the protective coating which is to be applied to the surface being cleaned.
- C. Field blasting cleaning for all surfaces shall be accomplished by dry sandblasting method unless otherwise directed.
- D. At all times during the blast cleaning operations, adequate means shall be employed to absolutely insure that existing protective coatings shall not be exposed to abrasion from blast cleaning operations.
- E. The Contractor shall at all times keep the area of his work in reasonably clean condition shall not permit blasting materials to accumulate in an uncontrolled manner such as to constitute a nuisance or hazard to the satisfactory prosecution or the work (or operation of the existing facilities).
- F. All blast cleaned surfaces shall be carefully dried and cleaned prior to application or specified coatings. No coatings or paint shall be applied over damp or moist surfaces.
- G. All welds shall be neutralized with a suitable solvent or other acceptable cleaner compatible with the specified Coating System materials.
- H. Specified Surface Preparation: Surface preparation for the specific Service Condition shall be as follows:
 - 1. Masonry and Concrete: All concrete shall be cured 45 days, minimum. All surfaces shall be thoroughly cleaned by sandblasting, removing all traces of previous materials. Remove all loose concrete by chipping, etc. to leave only sound firmly bonded concrete. Cracks and voids shall be repaired or filled with grout, mixed and placed in strict accordance with manufacturer's instructions. In general, final surface shall be reasonably smooth and free to voids, cavities, dirt, dust, oils, grease, laitance or other contaminants. Concrete subject to submergence shall be brush-blasted (SSPC-SP7). All other concrete and CMU to be painted shall be commercial blast (SSPC-SP6).

2. Plastic pipe shall be lightly sanded and washed clean.
3. Wood Surfaces:
 - a. These surfaces, other than stained or natural finish, shall be primed and finish-coated as specified. Wood surfaces to be painted shall be cleaned of dirt, oil, and other foreign substances with mineral spirits, scrapers, and/or sandpaper. Finish surfaces exposed to view shall be made smooth by sanding. All wood items to be painted and in contact with or built into concrete, masonry, or plaster shall be back primed. Small, dry seasoned knots shall be surface scraped and thoroughly cleaned, and shall be given a thin coat of knot sealer before application of the priming coat. Pitch on large, open, unseasoned knots and all other beads or streaks of pitch shall be scraped off, or if still soft, shall be removed with mineral spirits or turpentine and the resinous area thinly coated with knot sealer. After priming, all holes and imperfections in finish surfaces shall be filled with putty or plastic wood-filler colored to match the finish coat, allowed to dry, and sanded smooth. Unless otherwise authorized, painting shall proceed only when the moisture content of the wood does not exceed 12 percent as measured by a moisture meter.
 - b. Stained or Natural Finish: Interior wood surfaces to receive stained or natural finish shall be properly prepared to the approved shade and lightly sanded. Oak, and other open-grained wood, shall be given the same treatment and, in addition, shall be given a coat of paste wood filler not less than eight hours after the application of the stain. Excess filler shall be removed and the surface then sanded smooth. Each coat shall be lightly sanded prior to application of subsequent coat.
4. Exposed Pipe: Bituminous coated pipe shall not be used in exposed locations. Pipe which shall be exposed after project completion shall be factory primed. After installation all exterior, exposed flanged joints shall have the gap between adjoining flanges sealed with a single component Thiokol caulking to prevent rust stains.
5. Shop-Finished Surfaces: All shop-coated surfaces shall be protected from damage and corrosion before and after installation by treating damaged area immediately upon detection. Abraded or corroded spots on shop-coated surfaces shall be "Hand-Cleaned" and then touched up with the same materials as the shop coat. All shop coated surfaces which are faded, discolored, or which require more than minor touch up in the opinion of the Engineer shall be repainted. Cut edges of galvanized sheets and exposed threads and cut ends of galvanized piping, electrical conduit,

and metal pipe sleeves, not to be finish painted, shall be “Solvent Cleaned” and primed.

6. Plaster Surfaces: These surfaces shall be clean, free from grit, loose plaster, and surface irregularities, and shall have an instrument-measured moisture content not exceeding eight (8) percent.
7. Aluminum embedded or in contact with concrete must be painted with one shop coat of primer followed by one heavy coat of aluminum pigmented asphalt paint.

3.03 PREPARATION OF SURFACES - EXISTING FACILITIES

- A. All existing facilities to be painted shall be thoroughly washed with a high strength chlorine solution or a trisodium phosphate solution to provide a surface suitable for finish painting. Any corrosion of ferrous surfaces shall be removed by sandblasting, and the area primed with the appropriate primer specified in the paint schedule.

3.04 WORKMANSHIP

- A. General:
 1. Primer (spot) and paint used for a particular surface shall, in general, be as scheduled for that type of new surface. Confirm with the paint manufacturer that the paint proposed for a particular re-paint condition will be compatible with the existing painted surface. Sample re-painted areas on the actual site will be required to insure this compatibility. Finished repainted areas shall be covered by the same guarantee specified for remainder of work.
 2. Protection of furniture and other movable objects, equipment, fittings, and accessories shall be provided throughout the painting operations. Canopies of lighting fixtures shall be loosened and removed from contact with surface, covered and protected and reset upon completion. Remove all electric plates, surface hardware, etc., before painting, protect and replace when completed. Mask all machinery nameplates and all machined parts not receiving a paint finish. Dropped or spattered paint shall be promptly removed. Lay drop clothes in all areas where painting is being done to adequately protect flooring and other work from all damage during the operation and until the finished job is accepted.
 3. All safety equipment shall be painted in accordance with OSHA Standards.

4. Paints shall be mixed in proper containers of adequate capacity. All paints shall be thoroughly stirred before use and shall be kept stirred while using. No unauthorized thinners or other materials shall be added to any paint.
5. Only skilled painters shall be used on the work and specialists shall be employed where required.

B. Field Priming:

1. Equipment which is customarily shipped with a baked enamel finish or with a standard factory finish shall not be field painted unless the finish has been damaged in transit or during installation. Surfaces that have been shop painted and have been damaged, or where the shop coats or coats of paint have deteriorated, shall be properly cleaned and retouched before any successive painting is done on them in the field. All such field painting shall match as nearly as possible the original finish.

C. Field Painting:

1. All painting at the site shall be designated as Field Painting.
2. All paint shall be at room temperature before applying, and no painting shall be done when the temperature is below 50 degrees F, in dust-laden air, when rain or snow is falling, when relative humidity exceeds manufacturer's recommendation when temperature is less than 5° F above the dewpoint, or until all traces of moisture have completely disappeared from the surface to be painted.
3. Each application of paint shall be applied at the recommended thickness, free to sags, runs, with no evidence of poor workmanship. Care shall be exercised to avoid lapping on glass or hardware. Paint shall be sharply cut to lines. Finished surfaces shall be free from defects of blemishes.
4. Protective coverings or drop cloths shall be used to protect floors, fixtures and equipment. Care shall be exercised to prevent paint or coating from being splattered onto surfaces which are not to be painted. Surfaces from which such materials cannot be removed satisfactorily shall be painted or repainted, as required to produce, a finish satisfactory to the Engineer.
5. Successive coats of paint shall be tinted so as to make each coat easily distinguishable from each other with the final undercoat tinted to the approximate shade of the finished coat.
6. All welds and irregular surfaces shall receive a brush coat of the specified product prior to application of the first complete coat.

7. Finish surfaces shall not show brush marks or other irregularities. Under coats shall be thoroughly and uniformly sanded with No. 00 sandpaper or equal to remove defects and provide a smooth even surface. Top and bottom edges of doors shall be painted and all exterior trim shall be back-primed before installation.
8. Painting shall be continuous and shall be accomplished in an orderly manner so as to facilitate inspection. All exterior concrete and masonry painting shall be performed in one continuous manner structure by structure. Materials subject to weathering shall be prime coated as quickly as possible. Surfaces of exposed members that will be inaccessible after erection shall be cleaned and painted before erection.
9. All materials shall be brush painted unless spray painting is specifically approved by the Engineer. If spray painting is approved, Contractor shall accept all responsibility for any damage caused by overspray and/or drifting paint mist.
10. All surfaces to be painted as well as the atmosphere in which painting is to be done shall be kept warm and dry by heating and ventilation, if necessary, until each coat of paint has hardened. Any defective paint shall be removed and repainted in accordance with the Engineer's directions.
11. Before final acceptance of the work, all damaged surfaces of paint shall be cleaned and repainted as directed by the Engineer.
12. The aluminum work noted on the Drawings or in the Painting Schedule except all structural walkways, supports, railings, toeboards, grating, and checkered plate shall be field painted.

3.05 CLEANUP

- A. The premises shall at all times be kept free from accumulation of waste material and rubbish caused by employees or work. At the completion of the painting remove all tools, scaffolding, surplus materials, and all rubbish from and about the buildings and leave work "broom clean" unless more exactly specified.
- B. Upon completion, remove all paint where it has been spilled, splashed, or splattered on all surfaces, including floors, fixtures, equipment, furniture, etc., leaving the work ready for inspection.

3.06 COLOR CODING FOR PIPES AND EQUIPMENT

- A. Color coding is required and shall consist of color code painting and identification of all exposed conduits and pipelines for the transport of gases, liquids and semi-liquids including all accessories such as valves, insulated pipe coverings, fittings,

junction boxes, bus bars, connectors and all operating accessories which are integral to be whole functional mechanical pipe and electrical conduit system. The color coding schedule shall be in accordance with Specification Section 15050.

- B. All hangers and pipe support floor stands shall be painted. The system shall be painted up to and including the flanges attached to the mechanical equipment. Colors shall be as selected by the Owner.
- C. 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 fixed flanges or connections on the equipment.
- D. The color code establishes, defines and assigns a definite color for each category of pipe. Pipelines which are not listed on the Paint Color Code Schedule shall be assigned a color by the Engineer and shall be treated as an integral part of the Contract.
- E. All pipes, equipment, and accessories shall be painted according to Paint Color Code Schedule attached. All pipes shall have 6" long color coded flow arrows with letters defining its function (i.e., potable water, air, sludge, etc.).

3.07 FABRICATED EQUIPMENT

- A. Unless otherwise indicated, all fabricated equipment shall be shop primed and shop or field finished.
- B. All items to be shop primed shall be thoroughly cleaned of all loose material prior to priming. If, in the opinion of the Engineer, any prime coating shall have been improperly applied or if material contrary to these Specifications shall have been used, that coating shall be removed by sandblasting to white metal and reprimed in accordance with these Specifications.
- C. All shop prime coats shall be of specified materials and applied in accordance with these Specifications. The Contractor shall remove any prime coats not in accordance with these Specifications by sandblasting and apply the specified prime coat at no additional cost to the Owner.
- D. Shop primed surfaces shall be cleaned thoroughly and retouched with the specified primer before the application of successive paint coats in the field.
- E. Shop finish coats may be the standard finish as ordinarily applied by the manufacturer when approved by the Engineer. All pumps and motors shall be repainted after installation.

- F. 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.
- G. If, in the opinion of the Engineer, a shop finish coat does not give the protection quality of other work of similar nature, the Contractor shall apply the coat or coats of paint as directed by the Engineer to accomplish the desired protection quality.
- H. 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 by the Contractor.

**TABLE 09900-B
PAINT SCHEDULE**

Structure	Location	System No.
Casting Covers on Valve Boxes	Exterior	▪ Ferrous metals above grade: No. 14

END OF SECTION

DIVISIONS 10 - 14

NOT USED

DIVISION 15

MECHANICAL

SECTION 15044

PRESSURE TESTING OF PIPING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: This Section specifies the hydrostatic testing requirements for force main piping. Hydrostatic pressure and leakage testing shall be completed in accordance with AWWA C600 and C605, latest revision, however, no leakage is allowed.
- B. Testing Records:
1. Provide a record of each piping installation during the testing. These records shall include:
 - a) Date of test.
 - b) Identification of pipeline tested or retested.
 - c) Identification of pipeline material.
 - d) Identification of pipe specification.
 - e) Test fluid.
 - f) Test pressure.
 - g) Remarks: Leaks identified (type and location), types of repairs, or corrections made.
 - h) Certification by Contractor that the leakage rate measured conforms to the Specifications.
 - i) Signature of Owner's representative witnessing pipe test.
 2. 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 water for all hydrostatic tests.
- B. Provide pressure gauges, pipes, bulkheads, pumps, and meters to perform the hydrostatic testing.

PART 3 - EXECUTION

3.01 TESTING PREPARATION

- A. Pipes shall be in place and anchored before commencing pressure testing.
- B. Conduct hydrostatic tests on exposed and above ground 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.
- 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, plugs, special flanges, or blind flanges. After the new line has been successfully tested, remove caps, plugs, 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. Pressure Test:
 - 1. All tests shall be made in the presence of and to the satisfaction of the Owner, Engineer, and 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 shall be retested 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 performance of the tests.

3.02 HYDROSTATIC TESTING

- A. Hydrostatic Testing of Aboveground or Exposed Piping: Open vents at high points of the piping system to purge air while the pipe is being filled. Subject the piping system to the test pressure indicated. Maintain the test pressure for a minimum of four (4) hours. Examine joints, fittings, valves, and connections for leaks. The piping system shall show no leakage or weeping. Correct leaks and retest until no leakage is obtained.
- B. Hydrostatic Testing of Buried Piping:
1. Where any section of the piping contains concrete thrust blocks or encasement, do not start 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.
 2. 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. No leakage is allowed.
 3. Repair and retest any pipes showing leakage.
- C. Test pressures for various pipe applications are set forth below.

Service	Mark	Test Pressure (psig)
Water Main	PW	150
Force Main	FM	150

NOTES:

1. Piping not listed and sections of piping in gross discrepancy with listed pressure, with the approval of the Engineer, shall be tested at a minimum of 1.5 times working pressure.

END OF SECTION

SECTION 15050

UTILITY PIPING, FITTINGS, VALVES, AND ACCESSORIES

PART 1-GENERAL

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. All products in contact with potable water shall be in accordance with ANSI/NSF Standard 61 for potable water contact.
- C. Related Work Described Elsewhere:
 - 1. Section 01340: Shop Drawings, Working Drawings, and Samples
 - 2. Section 01740: Warranties and Bonds
 - 3. Section 02220: Excavation, Backfilling and Compaction
 - 3. Section 02531: Directional Drilling of HDPE
 - 4. Section 15044: Pressure Testing of Piping

1.02 QUALITY ASSURANCE

- A. Construction Requirements:
 - 1. All the lines shall be installed with at least 30 inches of cover, unless otherwise shown or indicated on the Drawings.
 - 2. For underground utilities, changes in horizontal alignment of less than 11-1/4 degrees may be achieved through the use of allowable pipe deflection in lieu of fittings shown on the Drawings at the Contractor's option, but subject to approval of the Engineer as to layout. Said deflection shall not exceed 75 percent of the maximum allowable deflection as stated in the pipe manufacturer's installation instructions.
- 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.

- C. All pipe and pipe fittings under this project will contain no more than 8.0 percent lead and any solder or flux used in this project will contain no more than 0.2 percent lead.

1.03 SUBMITTALS

A. Shop Drawings:

- 1. In general, the following Shop Drawings shall be submitted to the Engineer for approval prior to construction:
 - a. Mill test certificates or certified test reports on pipe and fittings.
 - b. Details of restrained and flexible joints.
 - c. Valve boxes.
 - d. All valves.
 - e. Couplings.
 - f. Tapping sleeves and valves.
 - g. Flexible expansion joints, tie rods, and flanged coupling adapters.
 - h. Joint lubricant.
 - i. Detailed piping layout drawings and pipe laying schedule (see below).
 - j. Temporary plug and anchorage system for hydrostatic pressure test.
- 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. 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 each valve type. 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.

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.

1.05 JOB CONDITIONS

- A. Water in Excavation: Water shall not be allowed in the trenches while underground pipes are being laid and/or tested. The Contractor shall not open more trench than the available pumping facilities are able to dewater to the satisfaction of the Engineer. The Contractor shall assume responsibility for disposing of all water so as not to injure or interfere with the normal drainage of the territory in which he is working. In no case shall the pipelines being installed

be used as drains for such water, and the ends of the pipe shall be kept properly and adequately plugged during construction by the use of approved stoppers and not by improvised equipment. All necessary precautions shall be taken to prevent the entrance of mud, sand, or other obstructing matter into the pipelines. If on completion of the work any such materials has entered the pipelines, it must be cleaned as directed by the Engineer so that the entire system will be left clean and unobstructed.

PART 2 - PRODUCTS

2.01 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

A. Storm Drain Pipe

1. All corrugated polyvinyl chloride pipe shall conform to FDOT Standard Specifications 2013 Section 948.1.7. Corrugated PVC pipe for storm drain shall conform to ASTM F949 and ASTM 794 manufacturing and testing requirements. Pipe shall also conform to the minimum cell classification 12454 as specified in ASTM D 1784.
2. Pipe and fittings shall be joined by the use of integral bell joints with a gasket compressed between the spigot and belled ends of the pipe. Elastomeric gaskets shall comply with the requirements of ASTM F 477. All joints and fittings shall be water tight.
3. Manufacturer's, or City approved equal
 - a. Contech Construction Products Inc., A-2000

B. PVC Pressure Piping: Unless otherwise noted, PVC pressure pipe for nominal diameters 4 inches and larger in size shall conform to the requirements of AWWA C900 DR18 for water mains and DR 14 for up to 12 inches force mains and AWWA C905 DR18 larger than 12 inches with gasketed integral bell ends. Pipe shall be designed for maximum working pressure of not less than 150 psi and with not less than a 4 to 1 sustained hydrostatic pressure safety factor. Fittings shall be ductile iron fittings with restrained mechanical joint ends as specified hereinbefore. PVC pipe for potable water shall be "blue" and NSF approved for use with potable water. PVC pipe for Wastewater Collection/Transmission shall be "green" PVC pipe shall be manufactured by JM Eagle or National Pipe and Plastics.

1. Bell and Spigot:

Pipe joints shall be made with integral bell and spigot pipe ends. The bell shall consist of an integral thickened wall section designed to be at least as

strong as the pipe wall. The bell shall be supplied with factory glued rubber ring gasket which conforms to the manufacturer's standard dimensions and tolerances. The gasket shall meet the requirements of ASTM F477 "Elastomeric Seals (Gaskets) for Joining Plastic Pipe". PVC joints shall be "Ring-Tite" as manufactured by J-M Manufacturing Company, Inc. or an equal approved by the Engineer.

2. Restrained Joints:

Where indicated on the Drawings, to prevent pipe joints and fittings from separating under pressure, pipe joints and fittings shall be restrained as follows:

- a. PVC pipe bell and spigot joints shall be restrained with the EBBA Iron MEGALUG[®] Series 1500 Restrainer, JCM: 610 Surgripe, Romac: Gripering 611, 612, 613, EBAA: 2000 Series, Star Products: Stargrip 400, or an equal approved by the Engineer. The restraining device and Tee head bolts shall be manufactured of high strength ductile iron meeting ASTM A536, Grade 6542-10. Clamping bolts and nuts shall be manufactured of corrosion resistant high strength, low alloy CORTEN steel meeting the requirements of ASTM A242.
- b. Mechanical joint fittings used with PVC pipe shall be restrained with the EBBA Iron MEGALUG[®] Series 2000 PV, JCM: 610 Surgripe, Romac: Gripering 611, 612, 613, EBAA: 2000 Series, Star Products: Stargrip 400, or an equal approved by the Engineer. The restraining device and Tee head bolts shall be manufactured of high strength ductile iron meeting ASTM A536, Grade 65-42-10. Clamping bolts and nuts shall be manufactured of corrosion resistant high strength, low alloy CORTEN steel meeting the requirements of ASTM A242.

2.02 GATE VALVES:

1. Ductile iron gate valves shall open by turning to the left (counter-clockwise), when viewed from the stem. When fully open, gate valves shall have a clear waterway equal to the nominal diameter of the pipe. The waterway shall be smooth unobstructed and free of all pockets, cavities, and depressions in the seat area. Operating nut or hand wheel shall have an arrow cast in the metal indicating the direction of opening. Each valve shall have the manufacturer's distinctive marking, pressure rating and year of manufacture cast on the body. Prior to shipment from the factory, each valve shall be tested by applying to it a hydrostatic pressure equal to twice the specified working pressure. Hydrostatic and leakage tests shall be

conducted in strict accordance with ANSI/AWWA C500 or ANSI/AWWA C509, latest revisions, whichever is applicable.

2. Gate valves with nominal sizes from 4 to 24 inches shall conform to ANSI/AWWA C509, latest revision, and shall be designed for a minimum working pressure of 250 psi. Valves shall be ductile iron body resilient wedge type with O-ring stem seals. The valve stem, stem nut, glands, and bushings shall be bronze. Valve disk shall be constructed to assure uniform seating pressure between disk seat ring and body seating surface. Resilient seat of valve shall be formed by a special corrosion and chloramine resistant, synthetic elastomer which is permanently bonded to and completely encapsulates a ductile iron valve disk. Valve ends for underground installation shall be mechanical joint as specified for ductile iron pipe and flanged for above-ground valves. Exterior and interior surfaces shall be coated as specified herein. Resilient-seated type gate valves 4 to 10 inches shall be manufactured by Mueller (part number A-2360-20), Kennedy (part number 1571-A), American Flow (part number 2500), or approved equal.
3. Valve Joints: All gate valves shall have either mechanical joint, restrained joint, or flanged ends to fit the pipe run in which they are to be used. Gate valves installed on push-on joint pipe shall have mechanical joint ends unless otherwise specified.
4. Valve Operators: Unless otherwise shown on the Drawings or specified herein, gate valves shall have non-rising stems. Buried gate valves shall be furnished with a 2-inch square AWWA standard nut operator with a valve box and cover. If gate valves greater than 12-inches are used, a minimum of 2-feet of cover shall be provided above the nut operator. When such cover is not obtained, the valve should be positioned horizontally. Gate valves located aboveground or inside structures shall be furnished with a handwheel operator which shall have an arrow cast in the metal indicating the direction of opening. Gate valves used as isolation valves for reduced pressure back flow preventers shall be of the open screw and yoke (OS&Y) design with a handwheel operator.
5. Interior Valve Coating: Interior of the valve body shall be coated with a fusion bonded or thermo-setting 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.
6. Exterior Valve Coatings: All exterior surfaces of iron body gate 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 coal tar epoxy with a minimum total finish dry film thickness of 20 mils. Prior to back filling, all uncoated nuts, bolts, glands, rods, and other parts of joints shall be coated in the field with coal tar epoxy equal to Koppers Bitumastic No. 300-M. For valves installed above-ground, 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.

2.03 AIR RELEASE VALVES

- A. Design: Single body, single orifice to allow entrained air to escape line. Compound lever mechanism actuated by a float to prevent water from escaping.
- B. Materials:
 - 1. Body: Reinforced Nylon
 - 2. Sleeve: NSF 61 Certified Reinforced Nylon
 - 3. Float and Stem: NSF 61 Certified Foamed Polypropylene
 - 4. Rolling Seal: NSF 61 Certified EPDM
 - 5. Other Internals: Reinforced Nylon
 - 6. Bolts and Nuts: 316 Stainless Steel
- C. Isolation Valve: 316 stainless full port ball valve (threaded).
- D. Accessories: Vacuum guarding, out only attachment (one way valve).
- E. Working Pressure: Valve shall be for 100 psi (minimum) working pressure.
- F. Valve shall have a standard 2-inch NPT inlet and outlet ports, unless otherwise shown on the drawings.
- G. Manufacturer: ARI (D-040-PV) or Int. Valve, Ventomatic (RBX series)”

2.04 VALVE BOXES

- A. Furnish, assemble, and place a valve box over the operating nut for each buried valve. The valve box shall be designed so as to prevent the transmission of surface loads directly to the valve or piping.
- B. Valve boxes shall be domestic manufacture, 3-piece style, manufactured of clean, even grain, gray cast iron conforming to ASTM A48, Class 30B for Gray Iron Castings; and shall be smooth, true to pattern, free from blow holes, sand holes, projections, and other harmful defects. The seating surfaces of both the cover and the top section shall be machined so that the cover will not rock after it has been seated.

- C. Valve boxes shall have installed a non-pop lid with “Water” molded in the top for identification. The lid main body shall be constructed of high-impact, fiberglass-reinforced nylon, with H-20 truck loading and with UV resistance. The lids shall be designed of premium quality materials, for use on the valve boxes in all locations and capable of operating at temperatures in excess of 250°F and highly resistant to UV sunlight, ozone, hydrocarbon fluids, and other chemicals associated with the roadway environment.
- D. The rubber retention seal shall be a ozone and chemical resistant thermoplastic elastomer composite (Dead-Bang Rubber). This rubber seal shall absorb the direct shock and vibration from traffic impact insuring the lid to stay in place. The non-pop lid shall fit snug in the box, but easy to install. The non-pop lid shall be the MIZI Non-Pop Lid, Model NP600 with ID disk, from SW Services or an approved equal. A “debris skirt”, for prevention of debris from getting into the valve box and to insure a snug fit, shall be factory attached around the top. The non-pop lid shall be supplied in black, blue, green or red, and shall be supplied by SW Services in Phoenix, Arizona, or approved equal.
- E. Additional features shall include an identification disk and/or a 3-M locator coil fixed in the upper side of the cap for pertinent information and location. The non-pop lid shall be supplied in black, blue, green or red, and shall be supplied by SW Services in Phoenix, Arizona, or approved equal.
- F. The valve boxes shall be coated inside and outside with an asphaltic coating prior to machining, so that the machined seating surfaces will be free of any coating. Cast iron valve box assemblies shall be Tyler: 461-S, 561-S, Star: 461, or an approved equal. A C-900 PVC riser pipe or DR-18, or ductile iron riser pipe for traffic shall be provided for all buried valves when operating nut is deeper than 3-feet below final grade.

2.05 PIPE AND VALVE IDENTIFICATION SYSTEMS

- A. Materials selected for identification systems for each type surface shall be the product of a single manufacturer.
- B. 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 alkalis, 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 1 mil thick magnetic metallic foil core. The tape shall be highly resistant to alkalis, 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. Warning tape shall be placed 12” to 18” above all pipe.

4. Tape background colors and imprints shall be as follows:

<u>Imprint</u>	<u>Background Color</u>
“Caution Water Line Buried Below”	Blue
“Caution Sanitary Sewer Line Buried Below”	Green

5. Identification tape shall be "Terra Tape" as manufactured by Reef Industries, Inc., Houston, TX; Allen Systems, Inc., Wheaton, IL; or approved equal.

C. Buried piping shall be identified by a continuous longitudinal painted "pantone purple" stripe of oil-based enamel paint. Said stripe shall be a minimum 2-inches in width for pipe sizes less than 24-inches in diameter and located along the top of the pipe and at 90-degree intervals around the pipe for a total of 4-stripes and three (3) stripes 2-inches in width for pipe sizes 24-inches and larger and located along the top and each side of the pipe.

D. Buried piping shall be installed with a continuous, insulated 10-gauge solid copper wire installed along the bottom of the pipe for location purposes. Directional bore pipe shall use three (3) continuous 10-gauge braided copper wire attached to the pipe.

2.06 LEAD REQUIREMENTS

A. All products shall comply with the Safe Drinking Water Act (SDWA), including the amendment from Bill S. 3874 The Reduction of Lead in Drinking Water Act. This amendment reduces the maximum allowable percentage of lead from 8.00% to 0.25% (weighted average) as it pertains to “pipe, pipe fittings, plumbing fittings, and fixtures.

2.07 LINE STOP

- A. Line stops shall be designed and manufactured in accordance with AWWA C515, latest edition. Line stops shall consist of a resilient seated insertion valve with a minimum working pressure of 200 psi. Valves shall be iron body resilient seat type with O-ring stem seals. The valve stem, stem nut, glands, and bushings shall be bronze. A 2-inch square wrench nut and a non-rising stem shall be provided. Interior ferrous surfaces of valve, except for finished or bearing surfaces, shall be coated with a fusion bonded or thermo-setting epoxy coating in accordance with AWWA C550, latest edition. Coating shall be holiday-free, NSF approved with a minimum thickness of 10 mils. Surfaces shall be clean, dry, and free from rust and grease before coating. Exterior surfaces shall be coated as specified hereinafter.
- B. Line stops shall be manufactured by Occlude, JCM, or approved equal.

2.08 TEMPORARY SAMPLING STATION

- A. Temporary sampling stations shall be a combination of corporation stop, polyethylene tubing, and curb stops. Each test service shall terminate above grade with a curb stop and smooth nosed sampling tap. Temporary sampling stations shall be properly abandoned after successful testing.

2.09 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. Excavation, backfill, and compaction shall conform to the provisions of Section 02220. Upon satisfactory installation of the pipe bedding material as specified in

Section 02220, a continuous trough for the pipe barrel and recesses for the pipe bells or couplings shall be excavated by hand digging. When the pipe is laid in the prepared trench, true to line and grade, the pipe barrel shall receive continuous, uniform support and no pressure will be exerted on the pipe joints from the trench bottom.

- B. Cover for underground piping shall not be less than that indicated on the Drawings. The minimum cover for pipe shall be 30 inches. In areas where other piping conflicts preclude the maximum cover desired, the piping shall be laid to provide the maximum cover obtainable.
- C. Pipe, fittings, valves, and accessories shall be installed as shown or indicated on the Drawings.
- D. 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).
- E. 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.
- F. 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.
- G. 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.
- H. 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.

- I. 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.
- J. 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.
- K. Upon satisfactory completion of the hydrostatic test, backfilling of the trench shall be completed.
- L. 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 make up 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 PVC PIPE

A. Storage and Handling:

1. PVC pipe shall be delivered to the site in unbroken bundles packaged in such manner as to provide protection against damage. When possible, pipe should be stored at the job site in the unit packages until ready for use. Packaged units shall be handled using a forklift or a spreader bar with fabric straps. Packaged units shall not be stacked at the job site higher than two units high.
2. When it is necessary to store PVC pipe for long periods of time, exposure to direct sunlight shall be prevented by covering the pipe with an opaque material. Adequate air circulation above and around the pipe shall be provided as required to prevent excessive heat accumulation. PVC pipe shall not be stored close to heat sources of hot objects such as heaters, fires, boilers, or engine exhaust. Pipe gaskets shall be protected from excessive exposure to heat, direct sunlight, ozone, oil, and grease. The interior and all sealing surfaces of pipe, fittings, and other appurtenances shall be kept clean and free of dirt and foreign matter.
3. Care shall be taken in handling and laying pipe and fittings to avoid severe impact blows, crushing, abrasion damage, gouging, or cutting. Pipe shall be lowered, not dropped, from trucks or into trenches. All cracked, damaged, or defective pipe and fittings, or any length of PVC pipe having a gouge, scratch, or other permanent indentation of more than 10 percent of the wall thickness in depth, shall be rejected and removed at once from the Work and replaced with new acceptable pipe at no additional cost to the Owner.

B. Field Cutting PVC Pipe: Field cutting of pipe shall be done in a neat workmanlike manner without creating damage to the pipe. The pipe shall be cut square with a fine-toothed hand or power saw or other cutter or knife designed for use with plastic pipe. Prior to cutting, the pipe shall be marked around its entire circumference or a square-in vise shall be used to ensure the pipe end is cut square. Remove burrs by smoothing edges with a knife, file, or sandpaper.

C. Field Cutting Bell and Spigot PVC Pipe: Bevel the cut end of the pipe using a pipe beveling tool, wood rasp, or portable sander to prevent damage to the gasket during joint assembly. A factory-finished beveled end should be used as a guide to ensure proper beveling angle and correct depth of bevel. Round off any sharp edges on the leading edge of the bevel with a knife or file.

D. Laying PVC Pipe:

1. Pipe Bedding: Bedding for PVC pipe shall be as specified in Section 02220 using granular pipe bedding material.
2. All PVC pipe shall be laid in accordance with the pipe manufacturer's published installation guide, the AWWA Manual of Practice No. M23 "PVC Pipe - Design and Installation" and the Uni-Bell Plastic Pipe Association installation recommendations.

E. PVC Pipe Joint Assembly for Rubber Gasketed Bell and Spigot Pipe:

1. The PVC bell and spigot joint shall be assembled in accordance with the pipe manufacturer's installation instructions, ASTM D2774, and AWWA Manual M23. Clean the interior of the bell, the gasket, and the spigot of the pipe to be jointed with a rag to remove any dirt or foreign material before assembling. Inspect the gasket, pipe spigot bevel, gasket groove, and sealing surfaces for damage or deformation.
2. Lubricate the spigot end of the pipe with a lubricant supplied or specified by the pipe manufacturer for use with gasketed PVC pipe in potable water systems. The lubricant should be supplied as specified by the pipe manufacturer. After the spigot end is lubricated, it must be kept clean and free of dirt and sand. If dirt and sand adhere to the lubricated end, the spigot must be wiped clean and relubricated.
3. Insert the spigot into the bell so that it contacts the gasket uniformly. Align the pipe sections and push the spigot end into the bell until the manufacturer's reference mark on the spigot is flush with the end of the bell. The pipe should be pushed into the bell using a bar and wood block. The joint shall not be assembled by "stabbing" or swinging the pipe into the bell, nor shall construction machinery be used to push the pipe into the bell.
4. If undue resistance to insertion of the spigot end is encountered or if the reference mark does not reach the flush position, disassemble the joint and check the position of the gasket. If the gasket is twisted or pushed out of its seat, inspect the components, repair or replace damaged items, clean the components, and repeat the assembly steps. Be sure the pipe is in proper alignment during assembly. If the gasket was not out of position, check the distance between the spigot end and the reference mark and relocate the mark if it is out of position.

3.05 INSTALLATION OF PIPE AND COUPLINGS

- A. Pipe couplings shall be installed in strict accordance with the manufacturer's published instructions and recommendations.

3.06 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 on the Drawings.
- 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, reseal 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 these specifications. 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.

3.07 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.

3.08 INSTALLATION OF IDENTIFICATION TAPE

- A. Identification tape shall be installed for all buried water mains in accordance with the manufacturer's installation instructions and as specified herein and shown on the drawings.

- B. Tape or paint will be applied in a continuous line that runs parallel to the axis of the pipe and shall be located along the top of the pipe.
- C. One set of tape shall be attached to the top of the pipe and a second set shall be buried a minimum of 18 inches below finished grade.

3.09 SEPARATION OF NON-POTABLE WATER MAINS AND POTABLE WATER MAINS

- A. Separations of non-potable and potable water mains shall be in accordance with FDEP Regulations 62-555. Details of the required separation are shown on the Drawings.

3.10 OBTAINING POTABLE WATER FOR TESTING AND FLUSHING

- A. The potable water supply shall be protected with an air gap or a reduced pressure principle backflow preventer approved by the Owner, if potable water is used for testing and flushing.
- B. To obtain potable water service during construction, the Contractor shall be required to install a temporary water meter. The piping, fittings, backflow preventer, and appurtenances required for the temporary construction water service shall be supplied by the Contractor.
- C. The Contractor shall coordinate with the Owner for temporary construction water service connection, usage, and flushing.

3.11 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.
- B. 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.
- C. The Owner shall be notified at least 72 hours prior to flushing mains.

- D. 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.

3.12 FINAL DISINFECTION FOR POTABLE WATER

- A. Before any portion of the potable water piping systems is to be placed in service, it shall be disinfected; and its disinfection shall be demonstrated by bacteriological tests conducted in accordance with "Standard Methods for Examination of Water and Sewage" for the coli-aerogenes group, by an approved laboratory, acceptable to the Engineer and the Health Department/FDEP.
- B. All pipe, fittings, valves, and all other appurtenances installed for potable water lines shall be disinfected prior to being placed in service. Disinfection procedures shall be approved by the Engineer and shall be in conformance with ANSI/AWWA C651, latest revision.
- C. Pipe subjected to contaminating materials shall be treated in a manner approved by the Engineer. Should such treatment fail to remove contaminants from the pipe, contaminated sections of pipe shall be replaced with new uncontaminated pipe at no additional cost to the Owner.
- D. Disinfection of a completed line shall be accomplished using the following procedure:
 - 1. All potable water piping, fittings, valves, and appurtenances shall be disinfected with a chlorine solution with a sufficient concentration such that the initial chlorine concentration in the water line shall be a minimum of 50 mg/l available chlorine, at any point in the line.
 - 2. Chlorine used for the purpose of disinfection shall be high test granular calcium hypochlorite which contains approximately 65 to 70 percent available chlorine by weight. The calcium hypochlorite shall be stored in a cool, dry, and dark environment, prior to its use, to minimize deterioration. The dry calcium hypochlorite will be used to makeup a high concentration chlorine solution which will be used for disinfection. Under no circumstances will undiluted, dry calcium hypochlorite be placed in the pipeline to be disinfected.
 - 3. Water from the existing, in-service water line shall be made to flow at a constant, slow rate into the water line to be disinfected. Chlorine solution shall be injected or pumped at a regulated rate into the new main, at a point not more than 10 feet downstream from the beginning of the new water main. The method of tapping the water main for the chlorine injection point and the location of the tap shall be approved by the Engineer.

4. Chlorine solution shall be circulated in the water main by opening the water control valve and systematically manipulating valves and blowoffs.
 5. Water service lines shall be disinfected in a similar manner as that for water mains, including corrective measures, by methods acceptable to the Engineer.
 6. Chlorine solution shall remain in the water lines for no less than 24 hours, but longer than 24 hours if directed by the Engineer.
 7. Extreme care shall be exercised at all times to prevent concentrated chlorine solution from entering existing water mains.
- E. After 24 hours, the free residual chlorine concentration in the water line at the pipe extremities shall be at least 10 mg/l; if not, the water lines shall be re-disinfected as described above.
- F. Final flushing of lines may proceed after 24 hours, provided the free residual chlorine analysis is satisfactory. Flushing shall be continued until a chlorine residual test shows that lines contain only the normal chlorine residual. Prior to flushing water with high chlorine concentrations, obtain approvals from the Engineer and the Owner as to the methods and locations of discharge.
- G. Following disinfection and thorough flushing of the water lines, as specified herein, the Contractor shall furnish all labor and materials required to obtain samples of water from established points of the water line in suitable sterilized containers obtained from a FDEP approved analytical laboratory. Two (2) series of successive samples shall be obtained at each established sampling points. Each test series will require two samples at each sampling point. The period between each series of samples shall be a minimum of 24 hours. Samples shall be delivered by the Contractor to the FDEP approved analytical laboratory for bacteriological examination. Samples shall be collected in conformance with FDEP standards and lab testing schedule. Prior to collecting samples, the Contractor shall notify the Engineer and the Owner who will have representatives present during sample collection.
- H. Bacteriological test results will be available approximately 48 to 72 hours after samples are submitted. If tests results are unsatisfactory, the Contractor shall immediately rechlorinate and retest the water lines and proceed with such corrective measures as are necessary to secure disinfected lines. All services shall be rechlorinated if the lines are rechlorinated. The water lines shall be re-disinfected and retested, at the Contractor's expense, until approved by the Engineer, and the FDEP.
- I. At satisfactory completion of the bacteriological test requirements, potable water lines shall be placed in service in a manner approved by the Engineer and the

Owner. Contractor shall notify the Engineer and the Owner 72 hours prior to placing lines in service.

END OF SECTION