CLEVELAND ST. STREETSCAPE PHASE III AND FESTIVAL CORE

(16-0003-EN & 19-0026-EN)

CONTRACT DOCUMENTS & SPECIFICATIONS

Prepared for

CLEARWATER

BRIGHT AND BEAUTIFUL · BAY TO BEACH

BID DOCUMENTS

JANUARY 2021

City of Clearwater, Florida
Cleveland St. Streetscape Phase III and Festival Core (16-0003-EN & 19-0026-EN)

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Prepared in the Office of the City Engineer

SECTION 1

INVITATION TO BID
NOTICE TO CONTRACTORS

Cleveland St. Streetscape Phase III and Festival Core (16-0003-EN & 19-0026-EN)

Documents and plans for Cleveland St. Streetscape Phase III and Festival Core are available at https://www.myclearwater.com/business/engineering-construction-bids.

The work includes: Full width reconstruction of two City streets totaling about one mile. Improvements include, but not limited to: Stormwater sewers, gravity sanitary sewer, water main, reclaim water main, and associated utility adjustments. Asphalt pavement with curbing and associated signage and striping. Concrete sidewalks, off-street bicycle trail, landscaping and associated lighting.

Pre-Bid Meeting: (Virtual)
Wednesday, February 17, 2021 at 3:00 PM (EST)

Virtual Pre-Bid Meeting: details will be posted at https://www.myclearwater.com/business/engineering-construction-bids

Pre-qualification Application Submittal DEADLINE:
Wednesday, February 24, 2021

Categories: Urban Streetscape and Sanitary & Storm Sewer

Pre-qualification Amount: $10,000,000.00 (Ten Million)

Bid Opening: (Virtual) Friday, March 12, 2021 at 2:00 PM (EST) – MSB RM 130 (STAFF ONLY)

Virtual Bid Opening Meeting: details will be posted at: https://www.myclearwater.com/business/engineering-construction-bids

Mail or Drop Bid Off:
City of Clearwater, Project # [16-0003-EN]
Procurement Office, 3rd Floor
Attn: Lori Vogel
100 S. Myrtle Ave, Clearwater, FL 33756-5520
Issued by: Lori Vogel CPPB, Procurement Manager
For additional information contact Engineering Dept.: 727-562-4750

SECTION II

INSTRUCTIONS TO BIDDERS

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1. COPIES OF BIDDING DOCUMENTS

1.1. Complete sets of the Bidding Documents are accessible through the City of Clearwater website at address: www.myclearwater.com/bid. Bidding Documents may include, but are not limited to, plans, specifications, bond forms, contract form, affidavits, bid/proposal form, and addendums.

1.2. Complete sets of Bidding Documents must be used in preparing bids. Neither the City nor the Engineer shall be liable for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents, by Bidders, sub-bidders, or others.

2. QUALIFICATION OF BIDDERS

2.1. Each prospective Bidder must pre-qualify to demonstrate, to the complete satisfaction of the City of Clearwater, that the Bidder has the necessary facilities, equipment, ability, financial resources and experience to perform the work in a satisfactory manner. An application package for pre-qualification may be obtained by contacting the City of Clearwater, Engineering Department, P.O. Box 4748, Clearwater, Florida 33758-4748 (mailing address); 100 South Myrtle Avenue, Clearwater, Florida 33756-5520 (street address) or by phone at (727) 562-4750. Pre-qualification requirement information is also available on the City of Clearwater Website at address:

www.myclearwater.com/government/city-departments/engineering/construction-management.

Contractors wanting to pre-qualify to bid on a project as a General Contractor must do so two weeks (ten workdays) prior to the bid opening date. Bidders currently pre-qualified by the City do not have to make reapplication. It is the Contractor's responsibility to confirm pre-qualification status before a Bid Opening.

The Contractor shall provide copies of the current Contractor License/Registration with the State of Florida and Pinellas County in the bid response.

3. EXAMINATION OF CONTRACT DOCUMENTS AND SITE

3.1. It is the responsibility of each Bidder, before submitting a Bid, to (a) examine the Contract Documents thoroughly; (b) visit the site to become familiar with local conditions that may in any manner affect cost, progress, performance or furnishing of the work; (c) consider and abide by all applicable federal, state and local laws, ordinances, rules and regulations; and (d) study and carefully correlate Bidder's observations with the Contract Documents, and notify Engineer in writing of all conflicts, errors or discrepancies in the Contract Documents.

3.2. For the purposes of bidding or construction, bidder may rely upon the accuracy of the technical data contained in reports of explorations and tests of subsurface conditions at the site which have been utilized by the Engineer in the preparation of the Contract Documents, but not upon non-technical data, interpretations or opinions contained therein or for the completeness thereof. Drawings relating to physical conditions of existing surface and subsurface conditions (except Underground Facilities) which are at or contiguous to the site and which have been utilized by the Engineer in preparation of the Contract Documents, may be relied upon by Bidder for accuracy of the technical data contained in such drawings but not upon the completeness thereof for the purposes of bidding or construction.

3.3. Information and data reflected in the Contract Documents with respect to Underground Facilities at or contiguous to the site are based upon information and data furnished to the City and Engineer by owners of such Underground Facilities or others, and the City does not assume responsibility for the accuracy or completeness thereof unless expressly provided in the Contract Documents.

3.4. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders on subsurface conditions, Underground Facilities, other physical conditions, possible conditions, and possible changes in the Contract Documents due to differing conditions appear in the General Conditions.

3.5. Before submitting a Bid, each Bidder shall, at Bidder's own expense, make or obtain any additional examinations, investigations, explorations, tests and studies and obtain any additional information and data which pertain to the physical conditions (surface, subsurface and Underground Facilities) at or contiguous to the site or otherwise which may affect cost, progress, performance or furnishing the work in accordance with the time, price and other terms and conditions of the Contract Documents.

3.6. On request in advance, City will provide each Bidder access to the site to conduct such explorations and tests at Bidder's own expense as each Bidder deems necessary for submission of a Bid. Bidder shall fill all holes and clean up and restore the site to its former condition upon completion of such explorations and tests.

3.7. The lands upon which the Work is to be performed, rights-of-way and easements for access thereto and other lands designated for use by the Contractor in performing the Work are identified in the Contract Documents. All additional lands and access thereto required for temporary construction facilities or storage of materials and equipment are to be provided by the Contractor. Easements for permanent structures or permanent changes in existing structures are to be obtained and paid for by the City unless otherwise provided in the Contract Documents.

3.8. The submission of a Bid will constitute an unequivocal representation by the Bidder that the Bidder has complied with every requirement of these Instructions to Bidders and that, without exception, the Bid is premised upon performing and furnishing the Work required by the Contract Documents by such means, methods, techniques, sequences or procedures of construction as may be indicated in or required by the Contract Documents, and that the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions of performance and furnishing of the work.

4. INTERPRETATIONS AND ADDENDA

4.1. All questions as to the meaning or intent of the Contract Documents are to be directed in writing to the Engineer. Interpretations or clarifications considered necessary by the Engineer in response to such questions will be issued by Addenda, via the Jiffy Reprographics Plan Room to all parties recorded by the Plan Room as plan holders having received the Bidding Documents. Questions received after the time frame specified on the pre-bid meeting agenda, prior to the date for opening of Bids, may not be answered. Only information provided by formal written Addenda will be binding. Oral and other interpretations of clarifications will be without legal effect.

4.2. Addenda may also be issued to modify the Bidding Documents as deemed advisable by the City or Engineer.

5. BID SECURITY OR BID BOND

5.1. Each Bid must be accompanied by Bid Security made payable to the City of Clearwater in an amount equal to ten percent (10%) of the Bidder's maximum Bid price and in the form of a certified or cashier's check or a Proposal/Bid Bond (on form provided in Section V) issued by a surety meeting the requirements of the General Conditions.

5.2. The Bid Security of the Successful Bidder will be retained until such Bidder has executed the Agreement and furnished the required Payment and Performance bonds, whereupon the Bid Security will be returned. If the Successful Bidder fails to execute, deliver the Agreement and furnish the required Bonds within ten (10) days after the award of contract by the City Council, the City may annul the bid and the Bid Security of the Bidder will be forfeited. The Bid Security of any Bidder whom the City believes to have a reasonable chance of receiving the award may be retained by the City until the successful execution of the agreement with the successful Bidder or for a period up to ninety (90) days following bid opening. Security of other Bidders will be returned approximately fourteen (14) days after the Bid Opening.

5.3. The Bid Bond shall be issued in the favor of the City of Clearwater by a surety company qualified to do business in, and having a registered agent in, the State of Florida.

6. CONTRACT TIME

6.1. The number of consecutive calendar days within which the work is to be completed is set forth in the Technical Specifications.

7. LIQUIDATED DAMAGES

7.1. Provisions for liquidated damages are set forth in the Contract Agreement, Section V.

8. SUBSTITUTE MATERIAL AND EQUIPMENT

8.1. The contract, if awarded, will be on the basis of material and equipment described in the Drawings or specified in the Specifications without consideration of possible substitute or "or equal" items. Whenever it is indicated in the Drawings or specified in the Specifications that a substitute or "or equal" item may be furnished or used, application for its acceptance will not be considered by the Engineer until after the effective date of the Contract Agreement. The procedure for submittal of any such application is described in the General Conditions and as supplemented in the Technical Specifications.

9. SUBCONTRACTORS

9.1. If requested by the City or Engineer, the Successful Bidder, and any other Bidder so requested, shall, within seven (7) days after the date of the request, submit to the Engineer an experience statement with pertinent information as to similar projects and other evidence of qualification for each Subcontractor, supplier, person and organization to be used by the Contractor in the completion of the Work. The amount of subcontract work shall not exceed fifty percent (50%) of the Work except as may be specifically approved by the Engineer. If the Engineer, after due investigation, has reasonable objection to any proposed Subcontractor, supplier, other person or organization, he may, before recommending award of the Contract to the City Council, request the Successful Bidder to submit an acceptable substitute without an increase in Contract Price or Contract Time. If the Successful Bidder declines to make any such substitution, the City may award the contract to the next lowest and most responsive Bidder

that proposes to use acceptable Subcontractors, Suppliers, and other persons and organizations. Declining to make requested substitutions will not constitute grounds for sacrificing the Bid Security to the City of any Bidder. Any Subcontractor, supplier, other person or organization listed by the Contractor and to whom the Engineer does not make written objection prior to the recommendation of award to the City Council will be deemed acceptable to the City subject to revocation of such acceptance after the Effective Date of the Contract Agreement as provided in the General Conditions.

9.2. No Contractor shall be required to employ any Subcontractor, supplier, person, or organization against whom he has reasonable objection.

10. BID/PROPOSAL FORM

10.1. The Bid/Proposal Form is included with the Contract Documents and shall be printed in ink or typewritten. All blanks on the Bid/Proposal Forms must be completed. Unit Prices shall be to no more than two decimal points in dollars and cents. The Bidder must state in the Bid/Proposal Form in words and numerals without delineation's, alterations or erasures, the price for which they will perform the work as required by the Contract Documents. Bidders are required to bid on all items in the Bid/Proposal form. The lump sum for each section or item shall be for furnishing all equipment, materials, and labor for completing the section or item as per the plans and contract specifications. Should it be found that quantities or amounts shown on the plans or in the proposal, for any part of the work, are exceeded or should they be found to be less after the actual construction of the work, the amount bid for each section or item will be increased or decreased in direct proportion to the unit prices bid for the listed individual items.

10.2. Bids by corporations shall be executed in the corporate name by the president or a vice-president (or other corporate officer accompanied by evidence of authority to sign) and the corporate seal shall be affixed. The corporate address and state of incorporation shall be shown below the Signature. If requested, the person signing a Bid for a corporation or partnership shall produce evidence satisfactory to the City of the person's authority to bind the corporation or partnership.

10.3. Bids by partnerships shall be executed in the partnership name and signed by a general partner, whose title shall appear under the signature and the official address of the partnership shall be shown below the signature.

10.4. All names shall be typed or printed below the signature.

11. SUBMISSION OF BIDS

11.1. Sealed Bids shall be submitted at or before the time and at the place indicated in the Advertisement for Bids and shall be submitted in a sealed envelope with the project name and number on the bottom left hand corner. If forwarded by mail, the Bid shall be enclosed in another envelope with the notation "Bid Enclosed" on the face thereof and addressed to the City of Clearwater, attention Purchasing Manager. Bids will be received at the office indicated in the Advertisement until the time and date specified. Bids in any other form will not be accepted.

11.2. The sealed bid envelope shall contain, but not be limited to, the Proposal/Bid Bond and corresponding Power of Attorney, Affidavit, Non Collusion Affidavit, Proposal (pages one

and two), Addendum Sheet, Bidder's Proposal, and Scrutinized Companies and Business Operations with Cuba and Syria Certification Form.

12. MODIFICATION AND WITHDRAWAL OF BIDS

12.1. Bids may be modified or withdrawn by an appropriate document duly executed (in the manner that a Bid must be executed) and delivered as described in the Advertisement of Bids. A request for withdrawal or a modification shall be in writing and signed by a person duly authorized to do so. Withdrawal of a Bid will not prejudice the rights of a Bidder to submit a new Bid prior to the Bid Date and Time. After expiration of the period for receiving Bids, no Bid may be withdrawn or modified.

12.2. After a bid is received by the City, the bidder may request to modify the bid for typographical or scrivener's errors only. The bidder must state in writing to the City that a typographical or scrivener's error has been made by the bidder, the nature of the error, the requested correction of the error, and what the adjusted bid amount will be if the correction is accepted by the City. The City reserves the right at its sole discretion to accept, reject, or modify any bid.

13. REJECTION OF BIDS

13.1. To the extent permitted by applicable State and Federal laws and regulations, the City reserves the right to reject any, and all Bids, and to waive any, and all informalities. Grounds for the rejection of a bid include but are not limited to a material omission, unauthorized alteration of form, unauthorized alternate bids, incomplete or unbalanced unit prices, or irregularities of any kind. Also, the City reserves the right to reject any Bid if the City believes that it would not be in the best interest of the public to make an award to that Bidder, whether because the Bid is not responsive or the Bidder is unqualified or of doubtful financial ability or fails to meet any other pertinent standard or criteria established by the City. The City reserves the right to decide which bid is deemed to be the lowest and best in the interest of the public.

14. DISQUALIFICATION OF BIDDER

14.1. Any or all bids will be rejected if there is any reason for believing that collusion exists among the bidders, the participants in such collusion will not be considered in future proposals for the same work. Each bidder shall execute the Non-Collusion Affidavit contained in the Contract Documents.

15. OPENING OF BIDS

15.1. Bids will be opened and read publicly at the location and time stated in the Advertisement for Bids. Bidders are invited to be present at the opening of bids.

16. LICENSES, PERMITS, ROYALTY FEES AND TAXES

16.1. The Contractor shall secure all licenses and permits (and shall pay all permit fees) except as specifically stated otherwise in the Technical Specifications. The Contractor shall comply with all Federal and State Laws, County and Municipal Ordinances and regulations, which in any manner effect the prosecution of the work. City of Clearwater building permit fees and impact fees will be waived except as specifically stated otherwise in the Technical Specifications.

16.2. The Contractor shall assume all liability for the payment of royalty fees due to the use of any construction or operation process, which is protected by patent rights except as specifically stated otherwise in the Technical Specifications. The amount of royalty fee, if any, shall be stated by the Contractor.

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

16.4. The City of Clearwater is exempt from state sales tax on materials purchased by the City and incorporated into the WORK. The City of Clearwater reserves the right to implement the Owner Direct Purchase (ODP) Option, as may be indicated in the Scope of Work Description in Section IV – Technical Specifications and as defined in Section III – General Conditions.

17. IDENTICAL TIE BIDS/VENDOR DRUG FREE WORKPLACE

17.1. In accordance with the requirements of Section 287.087 Florida Statutes regarding a Vendor Drug Free Workplace, in the event of identical tie bids, preference shall be given to bidders with drug-free workplace programs. Whenever two or more bids which are equal with respect to price, quality, and service are received by the City for the procurement of commodities or contractual services, a bid received from a business that certifies that it has implemented a drug-free workplace program shall be given preference in the award process. Established procedures for processing tie bids will be followed if none or all of the tied bidders have a drug-free workplace program. In order to have a drug-free workplace program, a contractor shall supply the City with a certificate containing the following six statements and the accompanying certification statement:

(1) Publish a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the workplace and specifying the actions that will be taken against employees for violations of such prohibition.

(2) Inform employees as to the dangers of drug abuse in the workplace, the business's policy of maintaining a drug-free workplace, any available drug counseling, rehabilitation, and employee assistance programs, and the penalties that may be imposed upon employees for drug abuse violations.

(3) Give each employee engaged in providing the commodities or contractual services that are under bid a copy of the statement specified in subsection (1).

(4) In the statement specified in subsection (1), notify the employees that, as a condition of working on the commodities or contractual services that are under bid, the employee will abide by the terms of the statement and will notify the employer of any conviction of, or plea of guilty or nolo contendere to, any violation of chapter 893, or of any controlled substance law, of the United States, or of any state, for a violation occurring in the workplace no later than five (5) days after such conviction.

(5) Impose a sanction on or require the satisfactory participation in a drug abuse assistance or rehabilitation program if such is available in the employee's community, by any employee who is so convicted.

(6) Make a good faith effort to continue to maintain a drug-free workplace through implementation of this section.

I certify that this firm does/does not (select only one) fully comply with the above requirements.

18. AWARD OF CONTRACT

18.1. Discrepancies between words and figures will be resolved in favor of words. Discrepancies in the multiplication of units of work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

18.2. In evaluating the Bids, the City will consider the qualifications of the Bidders, whether the Bids comply or not with the prescribed requirements, unit prices, and other data as may be requested in the Bid/Proposal form. The City may consider the qualifications and experience of Subcontractors, suppliers and other persons and organizations proposed by the Contractor for the Work. The City may conduct such investigations as the City deems necessary to assist in the evaluation of any Bid and to establish the responsibility, qualifications and financial ability of Bidders, proposed Subcontractors, Suppliers and other persons, and organizations to perform and furnish the Work in accordance with the Contract Documents to the City's satisfaction within the prescribed time.

18.3. If the Contract is to be awarded, it will be awarded to the lowest responsible, responsive Bidder whose evaluation by the City indicates to the City that the award will be in the best interest of the City.

18.4. Award of contract will be made for that combination of base bid and alternate bid items in the best interest of the City, however, unless otherwise specified all work awarded will be awarded to only one Contractor.

18.5. The successful bidder/contractor will be required to comply with Section 119.0701, Florida Statutes (2014), specifically to:

(a) Keep and maintain public records that ordinarily and necessarily would be required by the City of Clearwater in order to perform the service;

(b) Provide the public with access to public records on the same terms and conditions that the City of Clearwater would provide the records and at a cost that does not exceed the cost provided in this chapter or as otherwise provided by law;

(c) Ensure that public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by law; and

(d) Meet all requirements for retaining public records and transfer, at no cost, to the City of Clearwater all public records in possession of the contractor upon termination of the contract and destroy any duplicate public records that are exempt or confidential and exempt from public records disclosure requirements. All records stored electronically must be provided to the public agency in a format that is compatible with the information technology systems of the City of Clearwater.

19. BID PROTEST

19.1. RIGHT TO PROTEST:

Any actual bidder who is aggrieved in connection with the solicitation or award of a contract may seek resolution of his/her complaints initially with the Purchasing Manager, and if not satisfied, with the City Manager, in accordance with protest procedures set forth in this section.

19.2. PROTEST PROCEDURE:

A. A protest with respect to the specifications of an invitation for bid or request for proposal shall be submitted in writing a minimum of five (5) work days prior to the opening of the bid or due date of the request for proposals, unless the aggrieved person could not have been reasonably expected to have knowledge of the facts giving rise to such protest prior to the bid opening or the closing date for proposals. Opening dates for bids or due dates for requests for proposal will be printed on the bid/request document itself.

B. Protests in respect to award of contract shall be submitted in writing a maximum of five (5) workdays after notice of intent to award is posted, or is mailed to each bidder, whichever is earlier. Notice of intent to award will be forwarded to bidders upon telephonic or written request. Protests of recommended award should cite specific portions of the City of Clearwater Code of Ordinances that have allegedly been violated.

C. Exceptions to the five (5) day requirements noted in both A and B above may be granted if the aggrieved person could have not been reasonably expected to have knowledge of the facts giving rise to such protest prior to the bid opening, posting of intent to award, or due date for requests for proposals. Request for exceptions should be made in writing, stating reasons for the exception.

D. The Purchasing Manager shall respond to the formal written protest within five (5) workdays of receipt. The Purchasing Manager's response will be fully coordinated with the appropriate Department Director and the Assistant City Manager.

E. If the protestor is not satisfied with the response from the Purchasing Manager, he/she may then submit in writing within five (5) work days of receipt of that response his/her reason for dissatisfaction, along with copies of his/her original formal protest letter and the response from the Purchasing Manager, to the City Manager.

F. The City Manager as Purchasing Agent for the City has the final authority in the matter of protests. The City Manager will respond to the protestor within ten (10) workdays of receipt of the appeal.

19.3. PROTEST FEE:

When filing a formal protest, the protesting vendor must include a fee in the amount of 5% of the selected vendor’s total bid to offset the City’s additional expenses related to the protest. This fee shall not exceed $2,500 nor be less than $50. If either the Purchasing Manager or the City Manager upholds the protest, the City will refund 100% of the fee paid.

19.4. STAY OF PROCUREMENT DURING PROTEST:

In the event of a timely protest, the Purchasing Manager shall not proceed with the solicitation or award of contract until all administrative remedies have been exhausted or until the City Manager makes written determination that the award of contract without delay is necessary to protect the best interest of the City.

20. TRENCH SAFETY ACT

20.1. The Bidder shall comply with the provisions of the City of Clearwater’s Ordinance related to trench digging (Ordinance No. 7918-08) along with the Florida Trench Safety Act (Sections 553.60-553.64, Florida Statutes) and the provisions of the Occupational Safety and Health Administration's (OSHA) excavation safety standards, 29 C.F.R.s 1926.650 Subparagraph P, or current revisions of these laws.

21. CONSTRUCTION SITE EROSION AND SEDIMENT CONTROL MANAGEMENT MEASURES

21.1. The Bidder shall comply with the provisions of the Environmental Protection Agency (EPA) National Pollution Discharge Elimination System (NPDES) stormwater permit and implement stormwater pollution prevention plans (SWPPP's) or stormwater management programs (both using best management practices (BMPs) that effectively reduce or prevent the discharge of pollutants into receiving waters.

A. The control of construction-related sediment loadings is critical to maintaining water quality. The implementation of proper erosion and sediment control practices during the construction stage can significantly reduce sediment loadings to surface waters.

B. Prior to land disturbance, prepare and implement an approved erosion and sediment control plan or similar administrative document that contains erosion and sediment control provisions.

NPDES Management Measures available at City of Clearwater Engineering Environmental Division and EPA websites to help address construction-related Best Management Practices.

SECTION III

GENERAL CONDITIONS

Table of Contents:

1. DEFINITIONS

Addenda

Written or graphic instruments issued prior to the opening of Bids which clarify, correct or change the Bidding Requirements or the contract documents.

Agent

Architect, engineer or other outside agency, consultant or person acting on behalf of the City.

Agreement

The written contract between Owner and Contractor covering the Work to be performed; other Contract Documents are attached to the Agreement and made a part thereof as provided therein.

Application for Payment

The form accepted by Engineer which is to be used by Contractor in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

Approve

The word approve is defined to mean satisfactory review of the material, equipment or methods for general compliance with the design concepts and with the information given in the Contract Documents. It does not imply a responsibility on the part of the Engineer to verify in every detail conformance with the Drawings and Specifications.

Bid

The offer or proposal of the bidder submitted on the prescribed form setting forth the prices for the work to be performed.

Bidding Documents

The advertisement or invitation to Bid, instructions to bidders, the Bid form, and the proposed Contact Documents (including all Addenda issued prior to receipt of Bids).

Bonds

Performance and payment bonds and other instruments of security.

Change Order

A written order to Contractor signed by Owner and Contractor authorizing an addition, deletion or revision in the Work, or an adjustment in the Contract Price or the Contract Time issued on or after the effective date of the Agreement.

City

The City of Clearwater, Pinellas County, Florida.

Construction Inspector

A person who is the authorized representative of the Construction Manager and inspects City construction projects in order to insure the Contractor's work complies with the intent of the Contract Documents.

Construction Manager

The person who is typically in responsible charge of City construction projects. The Construction Manager assumes responsibility for the management of construction contracts at the Preconstruction Conference. The Construction Manager chairs the

Preconstruction Conference and is the authority on any disputes or decisions regarding contract administration and performance. The Construction Manager typically acts as the Owner's Representative during construction.

Contract Documents

The Agreement, Addenda (which pertain to the Contract Documents), Contractor's Bid (including documentation accompanying the bid and any post-Bid documentation submitted prior to the execution of the Agreement) when attached as an exhibit to the Agreement, the Bonds, Instructions to Bidders, these General Conditions, any Supplementary Conditions, the Specifications and the Drawings, any other exhibits identified in the Agreement, together with all Modifications issued after the execution of the Agreement.

Contract Price

The Contract price constitutes the total compensation (subject to authorized adjustments) payable by Owner to Contractor for performing the Work.

Contract Time

The number of days or the date stated in the Agreement for the completion of the Work.

Contractor

The Person with whom the Owner has entered into the Agreement. For the purposes of this contract, the person, firm or corporation with whom this contract or agreement has been made by the City of Clearwater or its duly authorized representative.

Critical Path Method Construction Schedule—CPM

A graphic format construction schedule that displays construction activities as they relate to one another for the purpose of identifying the most efficient way to perform the work in a timely manner. The critical path identifies which activity is critical to the execution of the schedule.

Day

A calendar day of twenty-four (24) hours measured from midnight to the next midnight.

Defective

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

Drawings

The drawings, which will be identified in Technical Specifications or the Agreement, which show the character and scope of the Work to be performed and which have been prepared or approved by Engineer and are referred to in the contract documents. Shop drawings are not Drawings as so defined.

Engineer

The duly appointed representative of the City Manager of the City of Clearwater. For the purposes of this contract, the City Engineer of the City of Clearwater, Pinellas County, Florida, or his authorized representative. For certain projects, the Engineer may serve as the Owner's Representative during construction.

Engineer's Consultant

A Person having a contract with Engineer to furnish services as Engineer's independent professional associate or consultant with respect to the Project and who is identified as such in the Supplementary Conditions.

F.D.O.T Specifications

The Standard Specifications for Road and Bridge Construction as issued by the Florida Department of Transportation (latest English edition).

Furnish

The words "furnish", "furnish and install", "install", and "provide" or words of similar meaning shall be interpreted, unless otherwise specifically stated, to mean "furnish and install complete in place and ready for service".

Inspection

The term "inspection" and the act of inspecting means examination of construction to ensure that it conforms to the design concept expressed in the Drawings and Specifications. These terms shall not be construed to mean supervision, superintending or overseeing.

Laws and Regulations

Any and all applicable laws, rules, regulations, ordinances, codes and orders of any kind of governmental bodies, agencies, authorities and courts having jurisdiction.

Liens

Liens, charges, security interests or encumbrances upon real property or personal property.

Milestone

A principal event specified in the contract Documents relating to an intermediate completion date or time prior to the final completion date.

Notice to Proceed (NTP)

A written notice given by the Owner to the Contractor fixing the date on which the Contract Time will commence to run and on which Contractor shall start to perform his obligations under the Contract Documents.

Owner

The City of Clearwater, Florida. For the purposes of this contract, the person who is the City’s authorized representative from the City’s Department with whom will be responsible for the maintenance and operation of the Work once the Work is completed. For certain projects, a designee of the Owner may serve as the Owner’s Representative during construction.

Owner’s Representative

Designee of the Owner with authority to act on behalf of the Owner during construction.

Person

A natural person, or a corporation, partnership, firm, organization, or other artificial entity.

Project

The total construction of which the Work to be provided under the Contract Documents may be the whole or a part as indicated elsewhere in the Contract Documents.

Partial Utilization

Use by Owner of a substantially completed part of the Work for the purpose for which is intended (or a related purpose) prior to Final Completion of all the Work.

Representative of Contractor

The Contractor shall assign a responsible person or persons, one of whom shall be at the construction site at all times that work is progressing. The names and positions of these persons shall be submitted to the City Engineer at the time of the pre-construction conference. This person or persons shall not be changed without written approval of City Engineer.

Request for Information (RFI)

An official written request for clarification of the intent of the contract documents from the Contractor to the Engineer.

Shop Drawing

All drawings, diagrams, illustrations, schedules and other data which are specifically prepared by or for Contractor to illustrate some portion of the Work and all illustrations, brochures, standard schedules, performance charts, instructions, diagrams and other information prepared by a supplier and submitted by Contractor to illustrate material or equipment for some portion of the Work.

Specifications

Those portions of the Contract Documents consisting of written technical descriptions of materials, equipment, construction systems, standards and workmanship as applied to the Work and certain administrative details applicable thereto.

Subcontractor

A person having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the site.

Substantial Completion

The Work (or a specified part thereof) which has progressed to the point where, in the opinion of Engineer, as evidenced by Engineer's definitive certificate of Substantial Completion, it is sufficiently complete, in accordance with the Contract documents, so that the Work (or specified part) can be utilized for the purposes for which it is intended; or if no such certificate is issued, when the Work is complete and ready for final payment as evidenced by the Engineer's recommendation of final payment. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

Supplementary Conditions

The part of the Contract which amends or supplements these General Conditions.

Supplier

A manufacturer, fabricator, supplier, distributor, material man or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by the Contractor.

Surety

Any person, firm or corporation which is bound with Contractor and which engages to be responsible for Contractor and his acceptable performance of the Work by a Bid, Performance or Payment Bond.

Underground Facilities

All pipelines, conduits, ducts, cables, wires manholes, vaults, tanks, tunnels or other such facilities or attachments, and any encasements containing such facilities which have been

installed underground to furnish any of the following services or materials: electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, sewage and drainage removal or treatment, traffic or other control systems or water.

Unit Price Work

Work to be paid for on the basis of unit prices.

Work

The entire completed construction or the various separately identifiable parts thereof required to be furnished under the Contract Documents. Work includes and is the result of performing or furnishing labor and incorporating materials and equipment into the construction, and performing or furnishing services and furnishing documents, all as required by the Contract Documents.

Work Change Directive

A written directive to Contractor, issued on or after the Effective Date of the Agreement and signed by the Engineer, ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen physical conditions under which the Work is to be performed or emergencies. Work Change Directive will not change the Contract Price or Contract Time but is evidence that the parties expect that the change directed or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

2. PRELIMINARY MATTERS

2.1. DELIVERY OF BONDS AND CERTIFICATES OF INSURANCE

When Contractor delivers the executed Agreements to the Owner, Contractor shall also deliver to the Owner such Bonds and Certificates of Insurance as Contractor may be required to furnish by this contract.

2.2. COPIES OF DOCUMENTS

Engineer shall furnish to Contractor one (1) copy of Contract Documents for execution. Additional copies will be furnished, upon request, at the cost of reproduction.

2.3. COMMENCEMENT OF CONTRACT TIME/NOTICE TO PROCEED; STARTING THE PROJECT

The Contract Time will commence on the day indicated in the Notice to Proceed. Contractor shall start to perform the work on the date the Contract Time commences to run. No work shall be done at the site prior to the date that the Contract Time commences to run. Pursuant to Section 255.05(1)(b), Florida Statutes, the Notice to Proceed cannot be issued until Contractor provides City with a certified copy of the recorded bond issued by the Pinellas County Clerk of Court.

2.4. BEFORE STARTING CONSTRUCTION

Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures shown thereon and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error or discrepancy which Contractor may discover; and shall obtain a written interpretation or clarification from Engineer before proceeding with any work effected thereby; however, Contractor shall not be liable to the Owner for failure to report any conflict, error or discrepancy in the Drawings or Specifications, unless Contractor had actual knowledge thereof or should reasonably have known thereof.

No verbal agreement or conversation with any officer, Agent or employee of the Owner or Engineer's Consultant, either before or after the execution of this Contract, shall affect or modify any of the terms or obligations herein contained. Contractor shall not commence any work at any time without approved insurance required by these General Conditions. Failure to obtain this insurance will be the sole responsibility of the Contractor.

2.5. PRECONSTRUCTION CONFERENCE

After Contract has been fully executed and before the start of the Work, the Owner's Representative shall schedule a preconstruction conference to be attended by Contractor, Engineer, Owner and others as appropriate to establish a working understanding among the parties as to the Work and to discuss the schedule of the Work and general Contract procedures.

The Contractor shall submit to the Owner's Representative prior to the Notice to Proceed, a color Critical Path Method (CPM) Construction Schedule. This is to be a sequence of events including submittal review and procurement. Notice to Proceed is usually established at the preconstruction conference and such date can be inserted into the schedule at that time. The Contractor shall also submit a Submittal Schedule for review by the Engineer. This is to make sure that the list is complete, and this schedule shall be the basis of a Submittal Log.

The Contractor shall submit to the Owner's Representative prior to the Notice to Proceed, a completed Emergency Call List, a completed Authorized Signature List, and Verification of Illegal Discharge Construction Site Training.

2.6. PROGRESS MEETINGS

The Contractor is required to attend Progress Meetings. These meetings will be scheduled on a weekly, bi-weekly, or monthly basis depending on the needs of the project. The Contractor shall bring to each meeting an updated submittal log, an updated request for information (RFI) log, a look-ahead schedule to cover the project activity from the current meeting to the next meeting, and all material test reports generated in the same time period.

3. CONTRACT DOCUMENTS, INTENT

3.1. INTENT

The Contract Documents comprise the entire Agreement between Owner and the Contractor concerning the Work. They may be altered only by written agreement. The Contract Documents are complementary; what is called for by one is as binding as if called for by all. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be

constructed in accordance with the Contract Documents. Any Work, materials or equipment which may reasonably be inferred from the Contract Documents or from prevailing custom or from trade usage as being required to produce the intended result will be furnished and performed whether or not specifically called for. When words or phrases, which have a well-known technical or construction industry or trade meaning, are used to describe Work, materials or equipment, such words or phrases shall be interpreted in accordance with that meaning. Clarifications and interpretations of the Contract Documents shall be issued by the Owner's Representative. Reference to standards, specifications, manuals or codes of any technical society, organization or association, or to the code, Laws or Regulation of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard specification, manual or code, or Laws or Regulations in effect at the time of opening of Bids except as may be otherwise specifically stated in the Contract Documents. However, no provision of any referenced standard specification, manual or code, whether or not specially incorporated by reference in the responsibilities of Owner or Contractor as set forth in the Contract Documents, shall change the duties and responsibilities of Owner, Contractor, Engineer or Owner's Representative, or any of their Agents or employees from those set forth in the Contract Documents. Clarifications and interpretations of the Contract shall be issued by the Owner's Representative. Each and every provision of law and clause required by law to be inserted in these Contract documents shall be deemed to be inserted herein, and they shall be read and enforced as through it were included herein, and if through mistake or otherwise, any such provision is not inserted, or if not correctly inserted, then upon the application of either party, the Contract Documents shall forthwith be physically amended to make such insertion.

3.2. REPORTING AND RESOLVING DISCREPANCIES

If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity or discrepancy within the Contract Documents or between the Contract Documents and any provision of any such Law or Regulation applicable to the performance of the Work or of any such standard, specification, manual or code or of any instruction of any Supplier, Contractor shall report it to the Owner's Representative in writing at once, and Contractor shall not proceed with the Work affected thereby (except in an emergency) until an amendment or supplement to Contract Documents has been issued by one of the methods provided in these General Specifications, provided however, that Contractor shall not be liable to Owner, or Owner's Representative for failure to report any such conflict, error, ambiguity or discrepancy unless Contractor knew or reasonably should have known thereof.

4. AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS

4.1. AVAILABILITY OF LANDS

The Owner shall furnish, as indicated in the Contract Documents, the lands upon which the Work is to be Performed, rights-of-way, easements, rights of entry for access thereto, and such other lands which are designated for the use of contractor. The Owner shall identify any encumbrances or restrictions not of general application but specifically related to use of lands so furnished with which contractor will have to comply in performing the Work. Easements for permanent structures or permanent changes in existing facilities will be obtained and paid for by the Owner, unless otherwise provided in the Contract Documents.

4.2. INVESTIGATIONS AND REPORTS

Reference is made to the Supplementary Conditions and Technical Specifications for identification of those reports of investigations and tests of subsurface and latent physical conditions at the site or otherwise affecting cost, progress or performance of the Work which have been relied upon by Engineer in preparation of the Drawings and Specifications. Such reports are not guaranteed as to accuracy or completeness and are not part of the Contract Documents. Contractor shall promptly notify the Owner's Representative in writing of any subsurface or latent physical conditions at the site, or in an existing structure, differing materially from those indicated or referred to in the Contract Documents. Engineer will promptly review those conditions and advise if further investigation or tests are necessary. Owner or Engineer shall obtain the necessary additional investigations and tests and furnish copies to the Engineer and Contractor. If Engineer finds that the results of such investigations or tests indicate that there are subsurface or latent physical conditions, which differ materially from those, indicated in the contract Documents, and which could not reasonably have been anticipated by Contractor, a work change, or Change Order will be issued incorporating the necessary revisions.

4.3. PHYSICAL CONDITIONS, UNDERGROUND FACILITIES

The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities or by others. Unless otherwise expressly provided in the Contract Documents, Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data; and the cost of all the following will be included in the Contract Price and contractor shall have full responsibility for: (i) reviewing and checking all such information and data, (ii) locating all Underground Facilities shown or indicated in the Contract Documents, (iii) coordination of the Work with the owners of such Underground Facilities during construction, and (iv) the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work. The Contractor is required to call the Sunshine State One Call of Florida prior to any excavation per State regulations and to notify any utility owners who are not a member of the Sunshine State One Call of Florida prior to any excavation. The Sunshine State One Call of Florida is an agency for the protection and location of utilities prior to any excavation and contact number is available in local telephone directory.

4.4. REFERENCE POINTS

Engineer shall provide engineering surveys to establish reference points for construction, which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, unless otherwise noted in the Contract, shall protect and preserve the established reference points and shall make no changes or relocations without the prior written approval of the Owner and Engineer. Contractor shall report to Engineer whenever any reference point is lost or destroyed or requires relocation because of necessary changes in grades or locations and shall be responsible for the accurate replacement or relocation of such reference points by a surveyor licensed in the State of Florida. The Contractor is referred to the Technical Specifications for more specific information regarding the provision of construction surveys. If a City survey crew is assigned to the project and there is excessive stake replacement caused by negligence of Contractor's forces after initial line and grade have been set, as determined by the Engineer, the Contractor will be charged at the rate of $100.00 per hour. Time shall be computed for actual time on the project. All time shall be computed in one-hour increments with a minimum charge of one hour.

5. BONDS AND INSURANCE

5.1. PERFORMANCE AND PAYMENT BOND/CONTRACT BOND

Contractor shall furnish a Performance and Payment Bond pursuant to Section 255.05, Florida Statutes in an amount equal to the Contract Price as security for the faithful performance and payment of all Contractor's obligations under the Contract Documents. This bond shall remain in effect at least one year after the date when final payment becomes due, unless a longer period of time is prescribed by laws and regulations or by the Contract Documents. Contractor shall also furnish such other Bonds as are required by the Supplementary Conditions. All Bonds shall be in the form prescribed by the Contract Documents in Section V and shall be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Audit Staff, Bureau of Government Financial Operations, U.S. Treasury Department. All bonds signed by an agent must be accompanied by a certified copy of such agents' authority to act. All bonds shall be deemed to contain all of the Conditions of Section 255.05, Florida Statutes, even if such language is not directly contained within the bond and the Surety shall be licensed and qualified to do business in the State of Florida. Owner reserves the right to reject any surety. If the Surety on any Bond furnished by the Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of these Contract Documents, the Contractor shall within five days after notice thereof substitute another Bond and surety, both of which must be acceptable to Owner.

5.2. INSURANCE REQUIREMENTS

The Contractor shall, at its own cost and expense, acquire and maintain (and cause any sub-contractors, representatives or agents to acquire and maintain) during the term with the City, sufficient insurance to adequately protect the respective interest of the parties. Coverage shall be obtained with a carrier having an AM Best Rating of A-VII or better. In addition, the City has the right to review the Contractor's deductible or self-insured retention and to require that it be reduced or eliminated.

Specifically, the Contractor must carry the following minimum types and amounts of insurance on an occurrence basis or in the case of coverage that cannot be obtained on an occurrence basis, then coverage can be obtained on a claims-made basis with a minimum four (4) year tail following the termination or expiration of this Agreement:

The following insurance limits may be achieved by a combination of primary and umbrella/excess liability policies.

5.2.1. COMMERCIAL GENERAL LIABILITY INSURANCE

Commercial General Liability Insurance coverage, including but not limited to, premises operations, products/completed operations, products liability, contractual liability, advertising injury, personal injury, death, and property damage in the minimum amount of $1,000,000 (one million dollars) per occurrence and $2,000,000 (two million dollars) general aggregate.

5.2.2. COMMERCIAL AUTOMOBILE LIABILITY INSURANCE

Commercial Automobile Liability Insurance coverage for any owned, non-owned, hired or borrowed automobile is required in the minimum amount of $1,000,000 (one million dollars) combined single limit.

5.2.3. WORKERS' COMPENSATION AND EMPLOYER'S LIABILITY INSURANCE

Statutory Workers' Compensation Insurance coverage in accordance with the laws of the State of Florida, and Employer's Liability Insurance in the minimum amount of $100,000 (one hundred thousand dollars) each employee each accident, $100,000 (one hundred thousand dollars) each employee by disease and $500,000 (five hundred thousand dollars) aggregate by disease with benefits afforded under the laws of the State of Florida. Coverage should include Voluntary Compensation, Jones Act, and U.S. Longshoremen's and Harbor Worker's Act coverage where applicable. Coverage must be applicable to employees, contractors, subcontractors, and volunteers, if any.

5.2.4. PROFESSIONAL LIABILITY/MALPRACTICE/ERRORS OR OMISSIONS INSURANCE

Professional Liability/Malpractice/Errors or Omissions Insurance coverage appropriate for the type of business engaged in by the Contractor with minimum limits of $1,000,000 (one million dollars) per occurrence. If a claims-made form of coverage is provided, the retroactive date of coverage shall be no later than the inception date of claims-made coverage, unless prior policy was extended indefinitely to cover prior acts. Coverage shall be extended beyond the policy year either by a supplemental extended reporting period (ERP) of as great a duration as available, and with no less coverage and with reinstated aggregate limits, or by requiring that any new policy provide a retroactive date no later than the inception date of claims-made coverage.

5.2.5. CONTRACTOR'S EQUIPMENT/INLAND MARINE/PROPERTY INSURANCE

If Contractor is using its own property in connection with the performance of its obligations under this Agreement, then Contractor's Equipment–Inland Marine Insurance and/or Property Insurance on an "All Risks" basis with replacement cost coverage for property and equipment in the care, custody and control of others is recommended. City is not responsible for Contractor's (or any sub-contractors, representatives, or agents) equipment or property.

5.2.6. BUILDER'S RISK INSURANCE

The City will provide at its expense, Builder's Risk Insurance for the project to cover all risks of loss in the complete and full value of the project. Contractor agrees to cooperate in a timely manner with providing any information or documentation required for the application and by the carrier as the project proceeds.

5.3. OTHER INSURANCE PROVISIONS

Upon approval of this Agreement by City Council, and then annually upon the anniversary date(s) of the insurance policy's renewal date(s) for as long as this Agreement remains in effect, the Contractor will furnish the City with a Certificate of Insurance(s) (using appropriate ACORD

certificate, SIGNED by the Issuer, and with applicable endorsements) evidencing all of the coverage set forth above and naming the City as an "Additional Insured." In addition when requested in writing from the City, Contractor will provide the City with certified copies of all applicable policies. The address where such certificates and certified policies shall be sent or delivered is as follows:

City of Clearwater
Engineering Department
Attn: Construction Office Specialist
P.O. Box 4748
Clearwater, FL 33758-4748

1. The **Description** (of Operations/Locations/Vehicles) should specify Project Name and Project Number.
2. Contractor shall provide thirty (30) days written notice of any cancellation, non-renewal, termination, material change or reduction in coverage.
3. Contractor's insurance as outlined above shall be primary and non-contributory coverage for Contractor's negligence.
4. Contractor reserves the right to appoint legal counsel to provide for the Contractor's defense, for any and all claims that may arise related to Agreement, work performed under this Agreement, or to Contractor's design, equipment, or service. Contractor agrees that the City shall not be liable to reimburse Contractor for any legal fees or costs as a result of Contractor providing its defense as contemplated herein.

The stipulated limits of coverage above shall not be construed as a limitation of any potential liability to the City, and the City's failure to request evidence of this insurance shall not be construed as a waiver of Contractor's (or sub-contractors, representatives, or agents) obligation to provide the insurance coverage specified.

5.4. WAIVER OF RIGHTS

The Owner and Contractor intend that all policies purchased in accordance with Article on Insurance will protect the Owner, Contractor, Subcontractors, Engineer, Engineer's Consultants and all other persons or entities identified in the Supplementary Conditions to be listed as insured or additional insured in such policies and will provide primary coverage for all losses and damages caused by the perils covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insured or additional insured thereunder, the Owner and Contractor waive all rights against each other and their respective officers, directors, employees and agents for all losses and damages caused by, arising out of or resulting from any of the perils covered by such policies and any other property insurance applicable to the work; and, in addition, waive all such rights against Sub-contractors, Engineer, Engineer's Consultants and all other persons or entities identified in the Supplementary Conditions to be listed as insured or additional insured under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance otherwise payable under any policy so issued. In addition, the Owner waives all rights against Contractor, Subcontractors, Engineer, Engineer's Consultant and the officers, directors, employees and agents of any of them for: (i) loss due to business interruption, loss of use or other consequential loss extending beyond direct physical loss or damage to the Owner property or the Work caused by, arising out of or resulting from fire or other peril, whether or not insured by the Owner and; (ii) loss or damage to the completed Project or part thereof caused by, arising out of or resulting from fire or other insured

peril covered by any property insurance maintained on the completed Project or part thereof by the Owner during partial utilization, after substantial completion or after final payment.

6. CONTRACTORS RESPONSIBILITIES

6.1. SUPERVISION AND SUPERINTENDENCE

Contractor shall supervise, inspect and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences and procedures of construction. Contractor shall not be responsible for the negligence of others in the design or specification of a specific means, method, technique, sequence or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.

Contractor shall be responsible to see that the completed work complies accurately with the Contract Documents. Contractor shall keep on the work at all times during its progress a competent resident superintendent, who shall not be replaced without notice to the Owner's Representative except under extraordinary circumstances. The superintendent will be Contractor's representative at the site and shall have authority to act on behalf of Contractor. All communications to the superintendent shall be as binding as if given to Contractor. The Contractor's superintendent shall keep a mobile cell phone on his person, so he can be contacted whenever necessary.

Contractor shall employ only competent persons to do the work and whenever the Owner's Representative shall notify Contractor, in writing, that any person on the work appears to be incompetent, unfaithful, disorderly, disrespectful or otherwise unsatisfactory, such person shall be removed from the project and shall not again be employed on it except with the written consent of the Owner's Representative. Contractor represents the City of Clearwater and shall conduct themselves in a professional manner to the public at all times.

Contractor shall reimburse Owner for additional engineering and inspection costs incurred as a result of overtime work in excess of the regular working hours or on the Owner normally approved holidays. At such times when Inspector overtime is required, the Contractor shall sign an overtime slip documenting such hours and the Contractor shall be provided a copy for his records. At the end of the project and prior to payment of withheld retainage funds, the Contractor shall deliver to the Owner a check made out to the Owner of Clearwater for full reimbursement of all Inspector overtime hours. Withheld retainage shall not be released until the Owner has received this check. Minimum number of chargeable hours for inspection costs on weekends or holidays shall be four hours. The cost of overtime inspection per hour shall be $80.00 per hour.

Contractor shall provide and maintain in a neat and sanitary condition, such sanitary accommodations for the use of Contractor's employees as may be necessary to comply with the requirements of Laws and Regulations and the Engineer.

6.2. LABOR, MATERIALS AND EQUIPMENT

Contractor shall provide competent, suitably qualified personnel to survey, lay out and construct the work as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the site. Except as otherwise required for the safety or protection of persons or the work or property at the site or adjacent thereto, and except as otherwise indicated in the Contract Documents, all work at the site shall be performed during regular working hours.

Contractor shall adhere to the Community Development Code, Section 3-1508 regarding noise restrictions from 6:00 p.m. to 7:00 a.m. any day and all day Sunday. Contractor will not permit overtime work or the performance of work on Saturday, Sunday, or any legal holiday without Owner consent given after prior notice to Engineer.

Unless otherwise specified in the General Requirements, Contractor shall furnish and assume full responsibility for all materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the furnishing, performance, testing, start-up and completion of the Work.

All materials and equipment installed in the Work shall be of good quality and new, except as otherwise provided in the Contract Documents. If required by Engineer, Contractors shall furnish satisfactory evidence (including reports of required tests) as to the quality of materials and equipment. The Contractor shall provide suitable and secure storage for all materials to be used in the Work so that their quality shall not be impaired or injured. Materials that are improperly stored, may be rejected by the Engineer without testing.

All materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the instructions of the applicable manufacturer, fabricator, supplier, or distributor, except as otherwise provided in the Contract Documents.

The City of Clearwater, at its sole discretion, reserves the right to purchase major equipment or materials to be incorporated into the Work under the Owner Direct Purchase (ODP) Option, per Section III, Article 21. In such event, the Contractor shall cooperate and assist the Owner of Clearwater, at no additional cost, to implement the ODP documents and procedures.

6.3. SUBSTITUTES AND "OR EQUAL" ITEMS

Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent or "or equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be accepted by Engineer. If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer for approval. If in the Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or equal" item, it may be considered as a proposed substitute item. Contractor shall submit sufficient information as required by the Engineer to allow the Engineer to determine that the item of material or equipment proposed is essentially equivalent to that named and is an acceptable substitute therefore. Request for review of proposed substitute and "or equal" will be not be accepted by Engineer from anyone other than Contractor.

Request for substitute and "or equal" items by Contractor must be submitted in writing to Owner’s Representative and will contain all information as Engineer deems necessary to make a determination. Request for substitute shall identify why a substitute is submitted and include advantages to the Owner. All data provided by Contractor in support of any proposed substitute or "or equal" item will be at Contractor's expense. Engineer will be allowed a reasonable time to evaluate each proposal or submittal made per this paragraph. Engineer will be sole judge of acceptability.

6.4. SUBCONTRACTORS, SUPPLIERS AND OTHERS

The Contractor shall deliver to the Owner's Representative before or at the preconstruction conference a list of all Subcontractors, suppliers and other persons and organizations proposed by the Contractor for Work to be performed on the Project. The Contractor shall include with this list the qualifications and references for each Subcontractor, supplier or other person and organization for review and approval. Any changes to this list must be submitted to the Owner's Representative for approval prior to the substitution of any Subcontractors, suppliers or other persons and organizations before performing any Work on the Project for the Contractor.

Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers and other persons performing or furnishing any of the work under a direct or indirect contract with Contractor just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents shall create for the benefit of any such Subcontractor, Supplier or other person any contractual relationship between Owner or Engineer and any Subcontractor, Supplier or other person, nor shall it create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier or other person. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors, Suppliers and other persons performing or furnishing any of the work under a direct or indirect contract with Contractor. Contractor shall require all Subcontractors, Suppliers and such other persons performing or furnishing any of the work to communicate with the Engineer through Contractor.

The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the work among Subcontractors or Suppliers or delineating the work to be performed by any specific trade.

All work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer.

Contractor shall not pay or employ any Subcontractor, Supplier or other person or organization whether initially or as a substitute, against whom Owner or Engineer may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier or other person or organization to furnish or perform any of the work against whom Contractor has reasonable objection.

Owner or Engineer will not undertake to settle any differences between Contractor and his Subcontractors or between Subcontractors.

6.5. USE OF PREMISES

Contractor shall confine construction equipment, the storage of materials and equipment and the operations of works to the site and land areas identified in and permitted by the Contract Documents on other land areas permitted by Laws and Regulations, right-of-way, permits and easements, and shall not unreasonably encumber the premises with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof or of any adjacent land or areas, resulting from the performance of the Work. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceed in or

at law. Contractor shall, to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner, Engineer, Engineer's Consultant and their officials, directors, employees and agents from and against all claims, costs, losses and damages arising out of or resulting from any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

During the progress of the Work, Contractor shall keep the premises free from accumulations of waste materials, rubbish and other debris resulting from the Work. At the completion of the Work or at intervals established by the Engineer, Contractor shall remove all waste materials, rubbish and debris from and about the premises as well as all tools, appliances, construction equipment and machinery and surplus materials. Contractor shall restore to original condition all property not designated for alteration by the Contract Documents.

6.5.1. STAGING AREAS

The Contactor shall obtain and deliver to the City written permission for the use of all staging and storage areas outside of the Limits of Construction. Use of right of way within the limits of construction must be approved by the City. All applicable erosion control, tree barricade and restoration, including time limits, specifications, etc., must be followed.

6.5.2. RESTORATION TIME LIMITS

The timely restoration of all impacted areas, especially right-of-ways, is very important to the Citizens of Clearwater therefore, these time limits are imposed:

- Debris piles shall be removed within five (5) consecutive calendar days.
- Concrete driveways and sidewalks shall be replaced within ten (10) consecutive calendar days of removal. Resident access shall be maintained at all times.
- All arterial and collector roadways shall be restored ASAP.
- Local streets and asphalt driveways shall be restored as soon as a sufficient quantity is generated, however, this is never to exceed fifteen (15) consecutive calendar days. Local and resident access shall be maintained at all times.
- Any irrigation systems or components damaged or impacted by construction activities shall be repaired or replaced “in-kind” within forty-eight (48) hours to minimize the loss of turfgrass or landscape plantings, particularly during periods of drought.
- Sod must be restored “in-kind” within fourteen (14) consecutive calendar days of a successful pipe pressure test, removal of concrete forms, backfill of excavations, replacement of driveways or sidewalks or another project specific milestone. It must be watered for a period of thirty (30) days after it is placed. Erosion control and dust control of denuded areas must be maintained at all times.

If the project or a portion of it does not involve right-of ways, then a different schedule of sod restoration may be considered.

6.6. LICENSE AND PATENT FEES, ROYALTIES AND TAXES

Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the work or the incorporation in the Work of any invention, design, process, product or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product or device is specified in the Contract Documents for use in the

performance of the work and if to the actual knowledge of Owner or Engineer its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner or Engineer in the Contract Documents.

To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner, Engineer, Engineer's Consultants and the officers, directors, employees, agents and other consultants of each and any of them from and against all claims, costs, losses and damages arising out of or resulting from any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product or device not specified in the Contract Documents, and shall defend all such claims in connection with any alleged infringement of such rights.

Contractor shall pay all sales, consumer, use and other taxes required to be paid by Contractor in accordance with the Laws and Regulations of the State of Florida and other governmental agencies, which are applicable during the performance of the work.

6.7. LAWS AND REGULATIONS

Contractor shall give all notices and comply with all Laws and Regulations applicable to furnishing and performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Owner’s Representative shall be responsible for monitoring Contractor's compliance with any Laws or Regulations. If Contractor performs any work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses and damages caused by or arising out of such work: however, it shall not be Contractor's primary responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations to the Owner to report and resolve discrepancies as described above.

6.7.1. E-VERIFY

When City projects include Federal or State funding, the requirements of Executive Order 11-02 shall be adhered to utilizing the Homeland Security E-Verify System to verify employment eligibility.

Contractor and its Subcontractors shall register with and use the E-Verify system to verify the work authorization status of all newly hired employees. Contractor will not enter into a contract with any Subcontractor unless each party to the contract registers with and uses the E-Verify system. Subcontractor must provide Contractor with an affidavit stating that Subcontractor does not employ, contract with, or subcontract with an unauthorized alien. Contractor shall maintain a copy of such affidavit.

The City may terminate this Contract on the good faith belief that Contractor or its Subcontractors knowingly violated Florida Statutes 448.09(1) or 448.095(2)(c). If this Contract is terminated pursuant to Florida Statute 448.095(2)(c), Contractor may not be awarded a public contract for at least 1 year after the date of which this Contract was terminated. Contractor is liable for any additional costs incurred by the City as a result of the termination of this Contract.

See Section 448.095, Florida Statutes (2020).

See “VERIFICATION OF EMPLOYMENT ELIGIBILITY FORM” in Apendix.

6.8. PERMITS

Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. The Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work, which are applicable at the time of opening of Bids. Contractor shall pay all charges of utility owners for connections to the work, and the Owner shall pay all charges of such utility owners for capital costs related thereto such as plant investment fees.

Unless otherwise stated in the Contract Documents, Clearwater Building Permit Fees will be waived.

6.9. SAFETY AND PROTECTION

Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to: (i) all persons on the work site or who may be affected by the work, (ii) all the Work and materials and equipment to be incorporated therein, whether in storage on or off the site; and (iii) other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities and Underground Facilities not designated for removal, relocation or replacement in the course of construction. In the event of temporary suspension of the work, or during inclement weather, or whenever Owner's Representative may direct; 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 Owner's Representative, any portion of Work or materials shall 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 Contractor. The Contractor shall initiate and maintain an accident prevention program which shall include but shall not be limited to the establishment and supervision of programs for the education and training of employees in the recognition, avoidance and prevention of unsafe conditions and acts. Contractor shall provide first aid services and medical care to his employees. The Contractor shall develop and maintain an effective fire protection and prevention program and good housekeeping practices at the site of contract performance throughout all phases of construction, repair, alteration or demolition. Contractor shall require appropriate personal protective equipment in all operations where there is exposure to hazardous conditions. The Engineer may order that the work stop if a condition of immediate danger to the Owner's employees, equipment or if property damage exists. This provision shall not shift responsibility or risk of loss for injuries of damage sustained from the Contractor to Owner, and the Contractor shall remain solely responsible for compliance with all safety requirements and for the safety of all persons and property at the site of Contract performance. The Contractor shall instruct his employees required to handle or use toxic materials or other harmful substances regarding their safe handling and use. The Contractor shall take the necessary precautions to protect pedestrians and motorists from harm, and to prevent disruptions of such traffic due to construction activity.

Contractor shall comply with all applicable Laws and Regulations of any public body having jurisdiction for safety of persons or property and to protect them from damage, injury or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and utility owners when execution of the work may affect them, and shall cooperate with them in the protection, removal,

relocation and replacement of their property. All damage, injury or loss to any property caused, directly or indirectly, in whole or part, by Contractor, any Subcontractor, Supplier or any other person or organization directly or indirectly employed by any of them to perform or furnish any of the work or anyone for whose acts any of them may be liable, shall be remedied by Contractor. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor that the Work is acceptable.

6.10. EMERGENCIES

In emergencies affecting the safety or protection of persons or the Work or property at the site or adjacent thereto, Contractor, with or without special instruction or authorization from Owner or the Owner's Representative, is obligated to act to prevent damage, injury or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby. If the Owner's Representative determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued to document the consequences of such action.

6.11. DRAWINGS

6.11.1. SHOP DRAWINGS, SAMPLES, RFIs, AND SUBMITTAL REVIEW

Contractor shall submit Shop Drawings to Engineer for review and approval as called for in the Technical Specifications or required by the Engineer. The data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials and similar data to show Engineer the materials and equipment Contractor proposes to provide and to enable Engineer to review the information. Contractor shall also submit Samples to Engineer for review and approval. Before submitting each Shop Drawing or Sample, Contractor shall have determined and verified: (i) all field measurements, quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers and similar information with respect thereto, (ii) all materials with respect to intended use, fabrication, shipping, handling, storage, assembly and installation pertaining to the performance of the Work, and (iii) all information relative to Contractor's sole responsibilities in respect to means, methods, techniques, sequences and procedures of construction and safety precautions and programs incident thereto. Contractor shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples with the requirements of the Work and the Contract Documents. Each submittal will have a transmittal cover sheet identifying the shop drawing name, number, and technical specification reference; will bear a stamp or specific written indication that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal. At the time of submission, Contractor shall give Engineer specific written notice of such variations, if any, that the Shop Drawing or Sample submitted may have from the requirements of the Contract Documents, such notice to be in a written communication separate from the submittal; and, in addition, shall cause a specific notation to be made on each Shop Drawing and Sample submitted to Engineer for review and approval of each such variation.

The Contractor shall maintain a submittal log as mentioned in Article 2.5. The Engineer shall receive updated copies at each progress meeting, and the Engineer shall respond to each submittal

within fourteen (14) consecutive calendar days. The Contractor shall maintain a request for information (RFI) log as mentioned in Article 2.5. The Engineer shall receive updated copies at each progress meeting, and the Engineer shall respond to each RFI within fourteen (14) consecutive calendar days. The untimely submission of Submittal or RFIs shall not be grounds for a delay claim from the Contractor.

Engineer's review and approval of Shop Drawings and Samples will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated the Contract Documents. Engineer's review and approval will not extend to means, methods, techniques, sequences or procedures of construction (except where a particular means method, technique, sequence or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit as required new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

Engineer's review and approval of Shop Drawings or Samples shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has in writing called Engineer's attention to each such variation at the time of submission and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample approval; nor will any approval by the Engineer relieve the Contractor from responsibility for complying with the requirements of paragraph above discussing field measurements by the Contractor.

Contractor shall furnish required submittals with complete information and accuracy in order to achieve required approval of an item within two (2) submittals. Owner’s Representative reserves the right to backcharge Contractor, for Engineer’s costs for resubmittals that account for a number greater than twenty percent (20%) of the total number of first time submittals, per the approved initial submittal log. Owner’s Representative reserves the right to backcharge Contractor for all third submittals. The number of first-time submittals shall be equal to the number of submittals agreed to by Engineer and Contractor. All costs to Engineer involved with subsequent submittal of Shop Drawings, Samples or other items requiring approval will be backcharged to Contractor at the rate of 3.0 times direct technical labor cost by deducting such costs from payments due Contractor for Work completed. In the event that Contractor requests a substitution for a previously approved item, all of Engineer’s costs in the reviewing and approval of the substitution will be backcharged to Contractor, unless the need for such substitution is beyond the control of Contractor.

6.11.2. AS-BUILT DRAWINGS

The Contractor shall keep and maintain one set of blueprints, As-Built Drawings, in good order and legible condition to be continuously marked-up at the job site. The Contractor shall mark and annotate neatly and clearly all project conditions, locations, configurations and any other changes or deviations which may vary from the details represented on the original Contract Plans, including revisions made necessary by Addenda, Shop Drawings, and Change Orders during the construction process. The Contractor shall record the horizontal and vertical locations, in the plan and profile, of all buried utilities that differ from the locations indicated or which were not indicated on the

Contract Plans and buried (or concealed), construction and utility features which are revealed during the construction period.

The As-Built Drawings shall be available for inspection by the Engineer, Engineer's Consultant, and the Owner's Representative at all times during the progress of the Project.

The As-Built Drawings shall be reviewed by the Owner's Representative, or his designee, for accuracy and compliance with the requirements of "As-Built Drawings" prior to submittal of the monthly pay requests. The pay requests shall be rejected if the marked-up redline prints do not conform to the "As-Built Drawings" requirements. As-Built Drawings shall be submitted to the Owner Inspector for approval upon completion of the project and prior to acceptance of final pay request. Final pay request shall not be processed until As-Built Drawings have been reviewed by the Engineer or the Engineer's Consultant for accuracy and completeness.

Prior to placing new potable water mains in service, the Contractor shall provide the Engineer intersection drawings, as specified for the water mains.

The Owner's acceptance of the "As-Built Drawings" does not relieve the Contractor of the sole responsibility for the accuracy and completeness of the As-Built Drawings.

6.11.2.1. General

The Contractor shall prepare an "AS-BUILT SURVEY" per chapter 5J-17.052, Florida Administrative Code (see definition below), signed and sealed by a Florida registered land surveyor. The contractor will deliver to the Owner two hard copies of signed and sealed As-Built Drawings and an AutoCAD file.

5J-17.050 Definition*: (10)(a) As-Built Survey: a survey performed to obtain horizontal and/or vertical dimensional data so that constructed improvements may be located and delineated: also known as Record Survey.*

This survey shall be clearly titled "As-Built Survey" and shall be signed and sealed by a Florida registered land surveyor. The survey must be delivered to the Owner of Clearwater Construction Division upon substantial completion of the project. If this condition is not met, the Owner will procure the services of a Professional Surveyor and Mapper registered in the State of Florida and will back charge the contractor a fee of $1,800 per day or any portion thereof to provide the Owner with the required As-Built Survey.

6.11.2.2. Sanitary and Storm Sewer Piping Systems

1. Manholes and inlets shall be located by survey coordinates (northing, easting and elevation) based on the approved horizontal and vertical datum or utilize the stationing supplied on the construction plans. New and replaced service connections shall be dimensioned to the nearest downstream manhole. All manholes, cleanouts and catch basin invert and rim elevations, manhole and catch basin dimensions, pipe sizes, and pipe material shall also be noted on the plan view and also on the profile if one exists. The terminal ends of all subdrains, inverts of all pipe in structures, and the flow line of inlets shall also be noted on the plan view and also on the profile if one exists.
2. Pipe materials and areas of special construction shall be noted.

6.11.2.3. Pressure Pipe construction (Water, Reclaimed Water, Forcemain)

All pipes shall be located by survey coordinates (northing, easting and elevation) based on the approved horizontal and vertical datum or utilize the stationing supplied on the construction plans. Coordinates shall be at all pipe bends, tees, valves, reducers, and deflections. Also, all new and replaced service connections for potable and reclaimed water will be located as described above. Additionally, there must be survey coordinates no further than 100 feet apart on linear type construction and shall denote top of pipe elevation at those points.

6.11.2.4. Electrical and Control Wiring

The as-built drawings shall include all changes to the original Contract Plans. The as-built drawings shall also include the size, color, and number of wires and conduit. For projects where this information is too voluminous to be contained on the blueline prints, the Contractor shall prepare supplemental drawings, on same size sheets as the blueline prints, showing the additional conduit runs, 1-line diagrams, ladder diagrams, and other information. The wiring schematic diagrams shall show termination location and wiring identification at each point on the ladder diagram.

6.11.2.5. Horizontal and Vertical Control

The As-Built survey shall be based on the original datum used for the construction design plans or if required by the Owner the datum shall be referenced to the North American Datum of 1983/90 (horizontal) and the North American Vertical Datum of 1988. The unit of measurement shall be the United States Foot. Any deviation or use of any other datum, (horizontal and or vertical), must be approved by the Owner of Clearwater Engineering Department.

6.11.2.6. Standards

The As-Built survey shall meet the Minimum Technical Standards per Chapter 5J-17 and the Clearwater CAD STANDARDS set forth below. In addition to locating all improvements that pertain to the as-built survey it is the requirement of the Owner to have minimum location points at every change in direction and no more than 100 feet apart on all pressure pipes.

6.11.2.7. Other

The As-Built drawings shall reflect any differences from the original Contract Plans, in the same level of detail and units of dimensions as the Plans.

6.11.3. CAD STANDARDS

6.11.3.1. Layer Naming

6.11.3.1.1. Prefixes and Suffixes

DI	prefix denotes digitized or scanned entities
EP	prefix denotes existing points - field collected
EX	prefix denotes existing entities - line work and symbols
PR	prefix denotes proposed entities - line work and symbols

FU	prefix denotes future entities (proposed but not part of this contract) - line work and symbols
TX	suffix denotes text – use for all text, no matter the prefix

6.11.3.1.2. Layer Naming Definitions:

GAS	gas lines and appurtenances
ELEC	power lines and appurtenances
PHONE	telephone lines and appurtenances
CABLE	cable TV lines and appurtenances
BOC	curbs
WALK	sidewalk
WATER	water lines and appurtenances, sprinklers
STORM	storm lines and appurtenances
TREES	trees, bushes, planters
SANITARY	sanitary lines and appurtenances
FENCE	all fences
BLDG	buildings, sheds, finished floor elevation
DRIVE	driveways
EOP	edge of pavement without curbs
TRAFFIC	signal poles, control boxes
TOPBANK	top of bank
TOESLOPE	toe of slope
TOPBERM	top of berm
TOEBERM	toe of berm
SEAWALL	seawall
CONCSLAB	concrete slabs
WALL	walls, except seawall
SHORE	shoreline, water elevation
CL	centerline of road
CLD	centerline of ditch
CLS	centerline of swale
CORNER	property corners, monumentation
BENCH	benchmark, temporary benchmarks

Other layers may be created as required, using above format.

6.11.3.2. Layer Properties

All layers will use standard AutoCAD linetypes, bylayer.

All layers will use standard AutoCAD colors, bylayer.

All text will use standard AutoCAD fonts.

6.11.3.3. Text Styles

Text style for EX layers will use the simplex font, oblique angle of 0°, and a text height of .008 times the plot scale.

Text style for PR and FU layers will use the simplex font, oblique angle of 22.5°, and a text height of .010 times the plot scale.

6.11.4. DELIVERABLES

The as-built survey shall be produced on bond material, 24" x 36" at a scale of 1"=20’ unless approved otherwise. The consultant shall deliver two hard copies and one digital copy of all drawings. Requested file formats are: Autodesk DWG and Adobe PDF files.

Please address any questions regarding format to Mr. Tom Mahony, at (727) 562-4762 or e-mail address Thomas.Mahony@myClearwater.com.

6.12. CONTRACTOR'S GENERAL WARRANTY AND GUARANTEE

Contractor warrants and guarantees to Owner, Engineer and Engineer's Consultants that all Work will be in accordance with the Contract Documents and will not be defective. Contractor's warranty and guarantee hereunder includes defects or damage caused by abuse, vandalism, modification or operation by persons other than Contractor, Subcontractors or Suppliers. Until the acceptance of the Work by the Owner, the Work shall be under the charge and care of the Contractor, and he shall take every necessary precaution against injury or damage to any part thereof by action of the elements, or from any other cause whatsoever, arising from the execution or non-execution of the Work. The Contractor shall rebuild, repair and make good, at his own expense, all injuries or damages to any portion of the Work occasioned by any cause before its completion and final acceptance by the Owner. In addition, “the Contractor shall remedy any defects in the work at his own expense and pay for any damage to other work resulting therefrom which appear within a period of one year from the date of final acceptance”.

Contractor's warranty and guarantee hereunder excludes improper maintenance and operation by Owner's employees and normal wear and tear under normal usage for any portion of the Work, which has been partially accepted by the Owner for operation prior to final acceptance by the Owner. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents: (i) observations by Owner’s Representative, (ii) recommendation of any progress or final payment by Owner’s Representative, (iii) the issuance of a certificate of Substantial Completion or any payment by the Owner to contractor under the Contract Documents, (iv) use or occupancy of the Work or any part thereof by Owner, (v) any acceptance by Owner or any failure to do so, (vi) any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of Acceptance by the Engineer.

6.13. CONTINUING THE WORK

Contractor shall carry on the work and adhere to the progress schedule during all disputes or disagreements with the Owner. No work shall be delayed or postponed pending resolution of any disputes or disagreements, except as the Owner or Contractor may otherwise agree in writing.

6.14. INDEMNIFICATION

To the fullest extent permitted by law, Contractor agrees to defend, indemnify, and hold the City, its officers, agents, and employees, harmless from and against any and all liabilities, demands, claims, suits, losses, damages, causes of action, fines or judgments, including costs, attorneys', witnesses', and expert witnesses' fees, and expenses incident thereto, relating to, arising out of, or resulting from: (i) the services provided by Contractor personnel under this Agreement; (ii) any negligent acts, errors, mistakes or omissions by Contractor or Contractor personnel; and (iii) Contractor or Contractor personnel's failure to comply with or fulfill the obligations established by this Agreement.

Contractor will update the City during the course of the litigation to timely notify the City of any issues that may involve the independent negligence of the City that is not covered by this indemnification.

The City assumes no liability for actions of Contractor and will not indemnify or hold Contractor or any third party harmless for claims based on this Agreement or use of Contractor-provided supplies or services.

Notwithstanding anything contained herein to the contrary, this indemnification provision shall not be construed as a waiver of any immunity to which Owner is entitled or the extent of any limitation of liability pursuant to § 768.28, Florida Statutes. Furthermore, this provision is not intended to nor shall be interpreted as limiting or in any way affecting any defense Owner may have under § 768.28, Florida Statutes or as consent to be sued by third parties.

6.15. CHANGES IN COMPANY CONTACT INFORMATION

Contractor shall notify Owner by US mail addressed to the City Engineer of any changes in company contact information. This includes contact phone, address, project manager, email addresses, etc.

6.16. PUBLIC RECORDS

The CONTRACTOR will be required to comply with Section 119.0701, Florida Statutes.

IF THE CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO THE CONTRACTOR'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS CONTRACT, CONTACT THE CUSTODIAN OF PUBLIC RECORDS, Rosemarie Call, phone: 727-562-4092 or Rosemarie.Call@myclearwater.com**, 600 Cleveland Street, Suite 600, Clearwater, FL 33755.**

The Contractor's duty to comply with public records law applies specifically to:

a) Keep and maintain public records required by the City of Clearwater (hereinafter "public agency") to perform the service being provided by the contractor hereunder.
b) Upon request from the public agency's custodian of public records, provide the public agency with a copy of the requested records or allow the records to be inspected or copied within a reasonable time at a cost that does not exceed the cost provided for in Chapter 119, Florida Statutes, as may be amended from time to time, or as otherwise provided by law.
c) Ensure that public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by law for the duration of the contract term and following completion of the contract if the contractor does not transfer the records to the public agency.
d) Upon completion of the contract, transfer, at no cost, to the public agency all public records in possession of the contractor or keep and maintain public records required by the public agency to perform the service. If the contractor transfers all public records to the public agency upon completion of the contract, the contractor shall destroy any public records that are exempt or confidential and exempt from public records disclosure requirements. If the contractor keeps and maintains public records upon completion of the contract, the contractor shall meet all applicable requirements for the retaining public records. All records stored electronically must be provided to the public agency, upon request from the public agency's custodian of public records in a format that is compatible with the information technology systems of the public agency.
e) A request to inspect or copy public records relating to a public agency's contract for services must be made directly to the public agency. If the public agency does not possess the requested records, the public agency shall immediately notify the contractor of the request and the contractor must provide the records to the public agency or allow the records to be inspected or copied within a reasonable time.
f) The Contractor hereby acknowledges and agrees that if the Contractor does not comply with the public agency's request for records, the public agency shall enforce the contract provisions in accordance with the contract.
g) A contractor who fails to provide the public records to the public agency within a reasonable time may be subject to penalties under Section 119.10, Florida Statutes.
h) If a civil action is filed against a contractor to compel production of public records relating to a public agency's contract for services, the court shall assess and award against the contractor the reasonable costs of enforcement, including reasonable attorney fees, if:
    1. The court determines that the contractor unlawfully refused to comply with the public records request within a reasonable time; and
    2. At least 8 business days before filing the action, the plaintiff provided written notice of the public request, including a statement that the contractor has not complied with the request, to the public agency and to the contractor.
i) A notice complies with subparagraph (h)2. if it is sent to the public agency's custodian of public records and to the contractor at the contractor's address listed on its contract with the public agency or to the contractor's registered agent. Global Express Guaranteed, or certified mail, with postage or shipping paid by the sender and with evidence of delivery, which may be in an electronic format.
j) A contractor who complies with a public records request within 8 business days after the notice is sent is not liable for the reasonable costs of enforcement.

7. OTHER WORK

7.1. RELATED WORK AT SITE

The City reserves the right to have its own forces enter the construction site at any time and perform work as necessary in order to perform infrastructure repair or maintenance, whether related to the project or not. The Contractor will allow complete access to all utility owners for these purposes.

The City may have its own forces perform new work related to the project, however, this work will be identified in the Contract Scope of Work and coordination will be such that this activity is denoted in the Contractor's CPM Schedule so as not to cause any delays or interference with the Contractor's work or schedule.

7.2. COORDINATION

If the Owner contracts with others for the performance of other work on the Project at the site, the following will be set forth in the Scope of Work: (i) the person who will have authority and responsibility for coordination of the activities among the various prime contractors will be identified; (ii) the specific matters to be covered by such authority and responsibility will be itemized; and (iii) the extent of such authority and responsibilities will be provided. Unless otherwise provided in the Supplementary Conditions, the Owner shall have sole authority and responsibility in respect of such coordination.

8. OWNERS RESPONSIBILITY

Except as otherwise provided in these General Conditions, the Owner shall issue all communications from the Owner to the Contractor through Owner's Representative.

The Owner shall furnish the data required of the Owner under the Contract Documents promptly and shall make payments to Contractor promptly when they are due as provided in these General Conditions.

The Owner is obligated to execute Change Orders as indicated in the Article on Changes In The Work.

The Owner's responsibility in respect of certain inspections, tests, and approvals is set forth in the Article on Tests and Inspections.

In connection with the Owner's right to stop work or suspend work, see the Article on Engineer may Stop the Work. The Article on Suspension of Work and Termination deals with the Owner's right to terminate services of Contractor under certain circumstances.

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

9. OWNER REPRESENTATIVE'S STATUS DURING CONSTRUCTION

9.1. OWNERS REPRESENTATIVE

Dependent of the project type, the Owner's Representative during the construction period will either be the Construction Manager, the Engineer, or a designee of the Project's Owner. The duties, responsibilities and the limitations of authority of Owner's Representative during construction are set forth in the Contract Documents and shall not be extended without written consent of Owner and Engineer.

9.2. CLARIFICATIONS AND INTERPRETATIONS

Engineer will issue with reasonable promptness such written clarifications or interpretations of the requirements of the Contract Documents regarding design issues only, in the form of Submittal responses, RFI responses, Drawings or otherwise, as Engineer may determine necessary, which shall be consistent with the intent of and reasonably inferable from Contract Documents. All other clarifications and interpretations of the Contract Documents shall be issued form the Owner's Representative. Such written clarifications and interpretations will be binding on the Owner and Contractor. If Contractor believes that a written clarification or interpretation justifies an adjustment in the Contract Price or the Contract Time and the parties are unable to agree to the amount or extent thereof, if any, Contractor may make a written claim therefore as provided in the Articles for Change of Work and Change of Contract Time.

9.3. REJECTING OF DEFECTIVE WORK

The Owner's Representative or the Engineer will have authority to disapprove or reject Work which Owner's Representative or the Engineer believes to be defective, or that Owner's Representative or the Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. The Owner's Representative or the Engineer will also have authority to require special inspection or testing of the Work whether or not the Work is fabricated, installed or completed.

9.4. SHOP DRAWINGS, CHANGE ORDERS, AND PAYMENTS

In connection with Engineer's authority as to Shop Drawings and Samples, see articles on Shop Drawings and Samples. In connection with Owner's Representative authority as to Change Orders, see the articles on Changes of Work, Contract Price and Contract Time. In connection with Owner's Representative authority as to Applications for Payment, see the articles on Payments to Contractor and Completion.

9.5. DECISIONS ON DISPUTES

The Owner's Representative will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the work thereunder. Claims, disputes and other matters relating to the acceptability of the work or the interpretation of the requirements of the Contract Documents pertaining to the performance and furnishing of the work and Claims under the Articles for Changes of Work, Changes of Contract Time and Changes of Contract Price will be referred initially to Owner's Representative in writing with a request for a formal decision in

accordance with this paragraph. Written notice of each such claim, dispute or other matter will be delivered by the claimant to Owner's Representative and the other party to the Agreement promptly, but in no event later than thirty (30) days, after the start of the occurrence or event giving rise thereto, and written supporting data will be submitted to Owner's Representative and the other party within sixty (60) days after the start of such occurrence or event unless Owner's Representative allows an additional period of time for the submission of additional or more accurate data in support of such claim, dispute or other matter. The opposing party shall submit any response to Owner's Representative and the claimant within thirty (30) days after receipt of the claimant's last submittal, unless Owner's Representative allows additional time. Owner's Representative will render a formal decision in writing within thirty (30) days after receipt of the opposing party's submittal, if any, in accordance with this paragraph. Owner Representative's written decision on such claim, dispute or other matter will be final and binding upon the Owner and Contractor unless (i) an appeal from Owner Representative's decision is taken within thirty (30) days of the Owner Representative's decision, or the appeal time which may be stated in a Dispute Resolution Agreement between Owner and Contractor for the settlement of disputes or (ii) if no such Dispute Resolution Agreement has been entered into, a written notice of intention to appeal from Owner Representative's written decision is delivered by the Owner or Contractor to the other and to Owner's Representative within thirty (30) days after the date of such decision and a formal proceeding is instituted by the appealing party in a forum of competent jurisdiction to exercise such rights or remedies as the appealing party may have with respect to such claim, dispute or other matter in accordance with applicable Laws and Regulations within sixty (60) days of the date of such decision, unless otherwise agreed in writing by the Owner and Contractor.

When functioning as interpreter and judge, Owner's Representative will not show partiality to the Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity. The rendering of a decision by Owner's Representative with respect to any such claim, dispute or other matter will be a condition precedent to any exercise by the Owner or Contractor of such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any such claim, dispute or other matter pursuant the Article on Dispute Resolution.

9.6. LIMITATIONS ON OWNER REPRESENTATIVE'S RESPONSIBILITIES

Neither Owner Representative's authority or responsibility under this paragraph or under any other provision of the Contract Documents nor any decision made by Owner's Representative in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise or performance of any authority or responsibility by Owner's Representative shall create, impose or give rise to any duty owed by Owner's Representative to Contractor, any Subcontractor, any Supplier, any other person or organization or to any surety for or employee or agent of any of them.

Owner's Representative will not supervise, direct, control or have authority over or be responsible for Contractor's means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the furnishing or performance of the work. Owner's Representative will not be responsible for Contractor's failure to perform or furnish the work in accordance with the Contract Documents.

Owner's Representative will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other person or organization performing or furnishing any of the work.

Owner Representative's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds and certificates of inspection, tests and approvals and other documentation required to be delivered by the Contractor will only be to determine generally that their content complies with the requirements of the Contract Documents and, in the case of certificates of inspections, tests and approvals that the results certified indicate compliance with the Contract Documents.

The limitations upon authority and responsibility set forth in this paragraph shall also apply to Owner Representative's CEI, the Engineer's Consultants, and assistants.

10. CHANGES IN THE WORK

Without invalidating the Agreement and without notice to any surety, the Owner may, at any time or from time to time, order additions, deletions or revisions in the Work. Such additions, deletions or revisions will be authorized by a Written Amendment, a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as may otherwise be specifically provided).

If the Owner and Contractor are unable to agree as to the extent, if any, of an adjustment in the Contract Price or an adjustment of the Contract Time that should be allowed as a result of a Work Change Directive, a claim may be made therefore as provided in these General Conditions.

Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Time with respect to any Work performed that is not required by the Contract Documents as amended, modified and supplemented as provided in these General Conditions except in the case of an emergency as provided or in the case of uncovering work as provided in article for Uncovering Work.

The Owner and Contractor shall execute appropriate Change Orders or Written Amendments recommended by Owner's Representative covering:

- changes in the work which are (i) ordered by the Owner (ii) required because of acceptance of defective work under the article for Acceptance of Defective Work or correcting defective Work under the article for Owner May Correct Defective Work or (iii) agreed to by the parties;
- changes in the Contract Price or Contract Time which are agreed to by the parties; and
- changes in the Contract Price or Contract Time which embody the substance of any written decision rendered by Owner's Representative pursuant to the article for Decisions on Disputes;
- provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the progress schedule as provided in the article for Continuing the Work.

If notice of any change affecting the general scope of the work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Time) is required by the

provisions of any Bond to be given to a surety, the giving of any such notice will be Contractor's responsibility, and the amount of each applicable Bond will be adjusted accordingly.

11. CHANGES IN THE CONTRACT PRICE

11.1. CHANGES IN THE CONTRACT PRICE

The Contract Price constitutes the total compensation (subject to authorized adjustments) payable to Contractor for performing the Work. All duties, responsibilities and obligations assigned to or undertaken by Contractor shall be at Contractor's expense without change in the Contract Price. The Contract Price may only be adjusted by a Change Order or by a Written Amendment. Any claim for an adjustment in the Contract Price shall be based on a written notice of claim stating the general nature of the claim, to be delivered by the party making the claim to the other party and to Owner's Representative or promptly (but in no event later than thirty days) after the start of the occurrence or event giving rise to the claim. Notice of the amount of the claim with supporting data shall be delivered within sixty (60) days after the start of such occurrence or event, unless Owner's Representative allows additional time for claimant to submit additional or more accurate data in support of the claim, and shall be accompanied by claimant's written statement that the claimed adjustment covers all known amounts to which the claimant is entitled as a result of said occurrence or event. No claim for an adjustment in the Contract Price will be valid if not submitted in accordance with this paragraph. The value of any Work covered by a Change Order or of any claim for an adjustment in the Contract Price will be determined as follows: (i) where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (ii) where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit), (iii) where the Work is not covered by unit prices contained in the Contract Documents and agreement is reached to establish unit prices for the Work.

Where the work involved is not covered by unit prices contained in the Contract Documents and where the Owner's Representative, the Owner, the Engineer, the Engineer's Consultant, and Contractor cannot mutually agree on a lump sum price, the City of Clearwater shall pay for directed changes in the Work, on "COST REIMBURSEMENT" basis. The Contractor shall apply for compensation, detailing Contractors forces, materials, equipment, subcontractors, and other items of direct costs required for the directed work.

The application for Cost Reimbursement shall be limited to the following items:

1. Labor, including foremen, for those hours associated with the direct work (actual payroll cost, including wages, fringe benefits, labor insurance and labor taxes established by law). Expressly excluded from this item are all costs associated with negotiating the subject change.
2. Materials associated with the change, including sales tax. The costs of materials shall be substantiated through vendors' invoices.
3. Rental or equivalent rental costs of equipment, including necessary transportation costs if specifically used for the Work. The rental rates shall not exceed the current rental rates prevailing in the locality or as defined in the rental Rate Blue Book for Construction Equipment (a.k.a. DataQuest Blue Book). The rental rate is defined as the full-unadjusted base rental rate for the appropriate item of construction equipment and

shall cover the costs of all fuel, supplies, repairs, insurance, and other costs associated with supplying the equipment for work ordered. Contractor-owned equipment will be paid for the duration of time required to complete the work. Utilize lowest cost combination of hourly, daily, weekly, or monthly rates. Do not exceed estimated operating costs given in Blue Book. Operating costs will not be allowed for equipment on stand-by.

4. Additional costs for Bonds, Insurance if required by the City of Clearwater.

The following fixed fees shall be added to the costs of the directed work performed by the Contractor or Subcontractor.

A. A fixed fee of fifteen percent (15%) shall be added to the costs of Item 1 above. If work is performed by a subcontractor, the Contractor's fee shall not exceed five percent (5%), and the subcontractor's fee shall not exceed ten percent (10%).

B. A fixed fee of ten percent (10%) shall be added to the costs of Item 2 above.

C. No markup shall be added to the costs of Items 3 and 4.

The fixed fees shall be considered the full compensation for all cost of general supervision, overhead, profit, and other general expense.

11.2. ALLOWANCES AND FINAL CONTRACT PRICE ADJUSTMENT

It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be furnished and performed for such sums as may be acceptable to Owner and Engineer. Contractor agrees that: (i) the allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and (ii) Contractor's costs for unloading and handling on the site, labor, installation costs, overhead, profit and other expenses contemplated for the allowances have been included in the Contract Price and not in the allowances and no demand for additional payment on account of any of the foregoing will be valid.

Prior to final payment, an appropriate Change Order will be issued as recommended by Owner's Representative to reflect actual amounts due Contractor on account of Work covered by allowances and all the Work actually performed by the Contractor, and the Contract Price shall be correspondingly adjusted.

11.3. UNIT PRICE WORK

Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the established unit price for each separately identified item of unit price work times the estimated quantity of each item as indicated in the Agreement. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Owner's Representative. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item. The Owner or Contractor may make a claim for an adjustment in the Contract Price if: (i) the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from

the estimated quantity of such item indicated in the Contract Documents; and (ii) there is no corresponding adjustment with respect to any other item of Work; and (iii) if Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or the Owner believes that the Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease. On unit price contracts, Owner endeavors to provide adequate unit quantities to satisfactorily complete the construction of the project. It is expected that in the normal course of project construction and completion that not all unit quantities will be used in their entirety and that a finalizing change order which adjusts contract unit quantities to those unit quantities actually used in the construction of the project will result in a net decrease from the original Contract Price. Such reasonable deduction of final Contract Price should be anticipated by the Contractor in his original bid.

12. CHANGES IN THE CONTRACT TIME

The Contract Time (or Milestones) may only be changed by a Change Order or a Written Amendment. Any claim for an adjustment of the Contract Time (or Milestones) shall be based on written notice delivered by the party making the claim to the other party and to Owner's Representative promptly, but in no event later than thirty (30) days, after the occurrence of the event giving rise to the claim and stating the general nature of the claim. Notice of the extent of the claim with supporting data shall be delivered within sixty (60) days after such occurrence, unless Owner's Representative allows an additional period of time to ascertain more accurate data in support of the claim, and shall be accompanied by the claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant has reason to believe it is entitled as a result of the occurrence of said event. All claims for adjustment in the Contract Time (or Milestones) shall be determined by Owner's Representative. No claim for an adjustment in the Contract Time (or Milestones) will be valid if not submitted in accordance with the requirements of this paragraph.

All time limits stated in the Contract Documents are of the essence of the Agreement.

Where Contractor is prevented from completing any part of the work within the Contract Time (or Milestones) due to delay beyond the control of Contractor, the Contract Time (or Milestones) may be extended in an amount equal to the time lost due to such delay if a claim is made therefore as provided in the article for Changes in the

Work. Delays beyond the control of Contractor shall include, but not be limited to, acts by the Owner, acts of utility owners or other contractors performing other work as contemplated by the article for Other Work, fires, floods, epidemics, abnormal weather conditions or acts of God. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

Where Contractor is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of both the Owner and Contractor, an extension of the Contract Time (or Milestones) in an amount equal to the time lost due to such delay shall be Contractor's sole and exclusive remedy for such delay. In no event shall the Owner be liable to Contractor, any Subcontractor, any Supplier, any other person, or to any surety for or employee or agent of any of them, for damages arising out of or resulting from (i) delays caused by or within the control of Contractor, or (ii) delays beyond the control of both parties including but not limited to fires, floods, epidemics, abnormal weather conditions, acts of God or acts by utility owners or other contractors performing other work as contemplated by paragraph for Other Work.

13. TESTS AND INSPECTIONS, CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.1. TESTS AND INSPECTION

Contractor shall give Owner's Representative and Engineer timely notice of readiness of the Work for all required inspections, tests or approvals, and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

Contractor shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents. The costs for these inspections, tests or approvals shall be borne by the Contractor except as otherwise provided in the Contract Documents.

If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested or approved by an employee or other representative of such public body including all Owner Building Departments and Owner Utility Departments, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests or approvals, pay all costs in connection therewith, and furnish Owner's Representative the required certificates of inspection or approval. Unless otherwise stated in the Contract Documents, Owner permit and impact fees will be waived. Contractor shall also be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work, or of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation of the Work.

If any Work (or the work of others) that is to be inspected tested or approved is covered by Contractor without written concurrence of Owner's Representative, it must, if requested by Owner's Representative, be uncovered for observation. Uncovering Work as provided in this paragraph shall be at Contractor's expense unless Contractor has given Owner's Representative and Engineer timely notice of Contractor's intention to cover the same and Owner's Representative has not acted with reasonable promptness in response to such notice.

13.2. UNCOVERING THE WORK

If any Work is covered contrary to the written request of Owner's Representative, it must, if requested by Owner's Representative, be uncovered for Owner Representative's observation and replaced at Contractor's expense.

If Owner's Representative considers it necessary or advisable that covered Work be observed by Owner's Representative or inspected or tested by others, Contractor, at Owner Representative's request, shall uncover, expose or otherwise make available for observation, inspection or testing as Engineer or Owner's Representative may require, that portion of the Work in question, furnishing all necessary labor, material and equipment. If it is found that such Work is defective, Contractor shall pay all claims, costs, losses and damages caused by, arising out of or resulting from such uncovering, exposure, observation, inspection and testing and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and the Owner shall be entitled to an appropriate decrease in the Contract Price for the costs of the investigation, and, if the parties are unable to agree as to the amount thereof, may make a claim therefore as provided in the article for Change in Contract Price. If, however, such Work is not found to be defective, Contractor shall be allowed an increase in the Contract

Price or an extension of the Contract Time (or Milestones), or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement and reconstruction; and, if the parties are unable to agree as to the amount or extent thereof, Contractor may make a claim therefore as provided the article for Change in Contract Price and Change of Contract Time.

13.3. OWNER'S REPRESENTATIVE MAY STOP THE WORK

If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to furnish or perform the Work in such a way that the completed Work will conform to the Contract Documents, Engineer or Owner's Representative may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner's Representative to stop the Work shall not give rise to any duty on the part of Owner's Representative or Owner to exercise this right for the benefit of Contractor or any surety or other party. If the Owner's Representative stops Work under this paragraph, Contractor shall be entitled to no extension of Contract Time or increase in Contract Price.

13.4. CORRECTION OR REMOVAL OF DEFECTIVE WORK

If required by Engineer or Owner's Representative, Contractor shall promptly, as directed, either correct all defective Work, whether or not fabricated, installed or completed, or, if the Work has been rejected by Engineer or Owner's Representative, remove it from the site and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses and damages caused by or resulting from such correction or removal (including but not limited to all costs of repair or replacement of work of others).

13.5. WARRANTY/CORRECTION PERIOD

If within one year after the date of Substantial Completion or such longer period of time as may be prescribed by Laws or Regulations or by the terms of any applicable special guarantee required by the Contract Documents or by any specific provision of the Contract Documents, any Work is found to be defective, Contractor shall promptly, without cost to the Owner and in accordance with the Owner's written instructions; (i) correct such defective Work, or, if it has been rejected by the Owner, remove it from the site and replace it with Work that is not defective and (ii) satisfactorily correct or remove and replace any damage to other Work or the work of others resulting therefrom. If Contractor does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, the Owner may have the defective Work corrected or the rejected. Work removed and replaced, and all claims, costs, losses and damages caused by or resulting from such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.

In special circumstances where a particular item of equipment is placed in continuous service before Final Completion of all the Work, the correction period for that item may start to run from an earlier date if specifically, and expressly so provided in the Specifications or by Written Amendment.

Where defective Work (and damage to other Work resulting therefrom) has been corrected, removed or replaced under this paragraph the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

13.6. ACCEPTANCE OF DEFECTIVE WORK

If, instead of requiring correction or removal and replacement of defective Work, the Owner prefers to accept it, the Owner may do so.

Contractor shall pay all claims, costs, losses and damages attributable to the Owner's evaluation of and determination to accept such defective Work such costs to be approved by Owner's Representative as to reasonableness. If any such acceptance occurs prior to Owner Representative's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and the Owner shall be entitled to an appropriate decrease in the Contract Price, and, if the parties are unable to agree as to the amount thereof, the Owner may make a claim therefore as provided in article for Change of Contract Price. If the acceptance occurs after the Owner Representative's recommendation for final payment an appropriate amount will be paid by Contractor to the Owner.

13.7. OWNER MAY CORRECT DEFECTIVE WORK

If Contractor fails within a reasonable time after written notice from Owner's Representative to correct defective Work or to remove and replace rejected Work as required by Owner's Representative in accordance with the article for Correction and Removal of Defective Work or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, the Owner may, after seven days' written notice to Contractor, correct and remedy any such deficiency. In exercising the rights and remedies under this paragraph the Owner shall proceed expeditiously. In connection with such corrective and remedial action, the Owner may exclude Contractor from all or part of the site, take possession of all or part of the Work, and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the site or for which the Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's Representatives, Agents and employees, the Owner's other contractors, and Owner's Representative, Engineer, and Engineer's Consultants access to the site to enable the Owner to exercise the rights and remedies under this paragraph. All claims, costs, losses and damages incurred or sustained by the Owner in exercising such rights and remedies will be charged against Contractor and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and the Owner shall be entitled to an appropriate decrease in the Contract Price, and, if the parties are unable to agree as to the amount thereof, the Owner may make a claim therefore as provided in the article for Change of Contract Price. Such claims, costs, losses and damages will include but not be limited to all costs of repair or replacement of work of others destroyed or damaged by correction, removal or replacement of Contractor's defective Work. Contractor shall not be allowed an extension of the Contract Time (or Milestones) because of any delay in the performance of the Work attributable to the exercise by the Owner of the Owner's rights and remedies hereunder.

14. PAYMENTS TO CONTRACTOR AND COMPLETION

Requests for payment shall be processed in accordance with F.S. 218.735 and as described herein. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.1. APPLICATION FOR PROGRESS PAYMENT

Contractor shall submit (not more often than once a month) to Owner's Representative for review an Application for Payment filled out and signed by Contractor covering the Work completed once each month and accompanied by such supporting documentation as is required by the Owner's Representative and the Contract Documents. Unless otherwise stated in the Contract Documents, payment will not be made for materials and equipment not incorporated in the Work. Payment will only be made for that portion of the Work, which is fully installed including all materials, labor and equipment. A retainage of not less than five (5%) of the amount of each Application for Payment for the total of all Work, including as-built survey and Inspector overtime reimbursement, completed to date will be held until final completion and acceptance of the Work covered in the Contract Documents. No progress payment shall be construed to be acceptance of any portion of the Work under contract.

The Contractor shall review with the Engineer or the Construction Inspector all quantities and work for which payment is being applied for and reach agreement prior to submittal of an Official Pay Request. The Engineer or the Construction Inspector will verify that the on-site marked up as-built drawings are up to date with the work and are in compliance with the Contract Documents.

In addition to all other payment provisions set out in this contract, the Owner's Representative may require the Contractor to produce for Owner, within fifteen (15) days of the approval of any progress payment, evidence and/or payment affidavit that all subcontractors and suppliers have been paid any sum or sums then due. A failure on the part of the contractor to provide the report as required herein shall result in further progress or partial payments being withheld until the report is provided.

14.2. CONTRACTOR'S WARRANTY OF TITLE

Contractor warrants and guarantees that title to all Work, materials and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to the Owner no later than the time of payment, free and clear of liens. No materials or supplies for the Work shall be purchased by Contractor or Subcontractor subject to any chattel mortgage or under a conditional sale contact or other agreement by which an interest is retained by the seller. Contractor warrants that he has good title to all materials and supplies used by him in the Work, free from all liens, claims or encumbrances. Contractor shall indemnify and save the Owner harmless from all claims growing out of the lawful demands of Subcontractors, laborers, workmen, mechanics, materialmen, and furnishers of machinery and parts thereof, equipment, power tools, and all supplies incurred in the furtherance of the performance of this Contract. Contractor shall at the Owner's request, furnish satisfactory evidence that all obligations of nature hereinabove designated have been paid, discharged, or waived. If Contractor fails to do so, then the Owner may, after having served written notice on said Contractor either pay unpaid bills, of which the Owner has written notice, or withhold from the Contractor's unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged, whereupon payment to Contractor shall be resumed in accordance with the terms of this Contract, but in no event shall the provisions of this sentence be construed to impose any obligations upon the Owner to the Contractor or the Surety. In paying any unpaid bills of the Contractor, the Owner shall be deemed the agent of Contractor and any payment so made by the Owner shall be considered as payment made under the Contract by the Owner to Contractor, and the Owner shall not be liable to Contractor for any such payment made in good faith.

14.3. REVIEW OF APPLICATIONS FOR PROGRESS PAYMENTS

The Owner's Representative will within twenty (20) business days after receipt authorize and process payment by the Owner a properly submitted and documented Application for payment, unless the application requires review by an Agent. If the Application for payment requires review and approval by an Agent, properly submitted and documented Applications for payment will be paid by the Owner within twenty-five (25) business days. If an Application for payment is rejected, notice shall be given within twenty (20) business days of receipt indicating the reasons for refusing payment. The reasons for rejecting an Application will be submitted in writing, specifying deficiencies and identifying actions that would make the Application proper. In the latter case, Contractor may make the necessary corrections and resubmit the Application. The Owner's Representative or Agent may refuse to recommend the whole or any part of any payment to Owner. Owner's Representative or Agent may also refuse to recommend any such payment, or, because of subsequently discovered evidence or the results of subsequent inspections or test, nullify any such payment previously recommended, to such extent as may be necessary in Owner Representative's or Agent's opinion to protect the Owner from loss because: (i) the Work is defective, or completed Work has been damaged requiring correction or replacement, (ii) the Contract Price has been reduced by amendment or Change Order, (iii) the Owner has been required to correct defective Work or complete Work, or (iv) Owner's Representative or Agent has actual knowledge of the occurrence of any of the events enumerated in the article on Suspension of Work and Termination.

The Owner may refuse to make payment of the full amount recommended by the Owner's Representative or Agent because: (i) claims have been made against the Owner on account of Contractor's performance or furnishing of the Work, (ii) Liens have been filed in connection with the Work, except where Contractor has delivered a specific Bond satisfactory to the Owner to secure the satisfaction and discharge of such Liens, (iii) there are other items entitling the Owner to a set-off against the amount recommended, or (iv) the Owner has actual knowledge of any of the events described in this paragraph. The Owner shall give Contractor notice of refusal to pay in accordance with the time constraints of this section with a copy to the Owner's Representative or Agent, stating the reasons for such actions, and Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by the Owner and Contractor, when Contractor corrects to the Owner's satisfaction the reasons for such action.

14.4. PARTIAL UTILIZATION

Use by the Owner at the Owner's option of any substantially completed part of the Work which (i) has specifically been identified in the Contract Documents, or (ii) Owner, Engineer, Owner's Representative, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by the Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, may be accomplished prior to Final Completion of all the Work subject to the following:

The Owner at any time may request Contractor in writing to permit the Owner to use any such part of the Work which the Owner believes to be ready for its intended use and substantially complete. If Contractor agrees that such part of the Work is substantially complete, Contractor will certify to Owner, Owner's Representative, and Engineer that such part of the Work is substantially complete and request Owner's Representative to issue a certificate of Substantial Completion for that part of the Work. Contractor at any time may notify Owner, Owner's Representative, and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and

substantially complete and request Owner's Representative to issue a certificate of Substantial Completion for that part of the Work. Within a reasonable time after either such request, Owner, Contractor, Owner's Representative, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner, Owner's Representative, and Contractor in writing giving the reasons therefore. If Engineer considers that part of the Work to be substantially complete, the provisions of the articles for Substantial Completion and Partial Utilization will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

14.5. FINAL INSPECTION

Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Owner's Representative will make a final inspection with Engineer, Owner and Contractor and will within thirty (30) days notify Contractor in writing of particulars in which this inspection reveals that the Work is incomplete or defective. The Owner's Representative will produce a final punch list, deliver it to the Contractor within five (5) days of completion and assign a date for this work to be completed not less than thirty (30) days from delivery of the list. Failure to include any corrective work or pending items does not alter the responsibility of the contractor to complete all the construction services purchased pursuant to the contract. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.6. FINAL APPLICATION FOR PAYMENT

After Contractor has completed all such corrections to the satisfaction of Owner's Representative and has delivered in accordance with the Contract Documents all maintenance and operating instructions, As-built/Record Drawings, schedules, guarantees, Bonds, certificates or other evidence of insurance required by the paragraph for Bonds and Insurance, certificates of inspection, Inspector overtime reimbursement as required in the Contract Documents and other documents, Contractor may make application for final payment following the procedure for progress payments. The final Application for Payment shall be accompanied (except as previously delivered) by: (i) all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by paragraph for Bonds and Insurance, and (ii) executed consent of the surety to final payment using the form contained in Section V of the Contract Documents.

Prior to application for final payment, Contractor shall clean and remove from the premises all surplus and discarded materials, rubbish, and temporary structures, and shall restore in an acceptable manner all property, both public and private, which has been damaged during the prosecution of the Work and shall leave the Work in a neat and presentable condition.

14.7. FINAL PAYMENT AND ACCEPTANCE

If through no fault of Contractor, final completion of the Work is significantly delayed and if Owner's Representative so confirms, the Owner shall, upon receipt of Contractor's final Application for payment and recommendation of Owner's Representative, and without terminating the Agreement, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by the Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if Bonds have been furnished as required in paragraph for Bonds and Insurance, the written consent of the surety to the payment

of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Owner's Representative with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that such payment shall not constitute a waiver of claims.

If on the basis of Owner Representative's observation of the Work during construction and final inspection, and Owner Representative's review of the final Application for Payment and accompanying documentation, all as required by the Contract Documents, Owner's Representative is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Owner's Representative will indicate in writing his recommendation of payment and present the Application to Owner for payment. Thereupon, Owner's Representative will give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of this article. Otherwise, Owner's Representative will return the Application to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application. If the Application and accompanying documentation are appropriate as to form and substance, the Owner shall, within twenty (20) days after receipt thereof pay contractor the amount recommended by Owner's Representative.

14.8. WAIVER OF CLAIMS

The making and acceptance of final payment will constitute: a waiver of all claims by the Owner against Contractor, except claims arising from unsettled Liens, from defective Work appearing after final inspection, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and a waiver of all claims by Contractor against the Owner other than those previously made in writing and still unsettled.

15. SUSPENSION OF WORK AND TERMINATION

15.1. OWNER MAY SUSPEND THE WORK

At any time and without cause, Owner's Representative may suspend the Work or any portion thereof for a period of not more than ninety (90) days by notice in writing to Contractor, which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be allowed an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes an approved claim therefore as provided in the articles for Change of Contract Price and Change of Contract Time.

15.2. OWNER MAY TERMINATE

Upon the occurrence of any one or more of the following events:

Contractor persistently fails to perform the work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the progress schedule as adjusted from time to time);

Contractor disregards Laws and Regulations of any public body having jurisdiction;

Contractor violates Article 6.7.1 of this Section III;

Contractor disregards the authority of Owner's Representative;

Contractor otherwise violates in any substantial way any provisions of the Contract Documents; or if the Work to be done under this Contract is abandoned, or if this Contract or any part thereof is sublet, without the previous written consent of the Owner, or if the Contract or any claim thereunder is assigned by Contractor otherwise than as herein specified, or at any time Owner's Representative certifies in writing to the Owner that the rate of progress of the Work or any part thereof is unsatisfactory or that the work or any part thereof is unnecessarily or unreasonably delayed;

Lack of funding. The City's performance and obligation to pay under this Contract is contingent upon an annual appropriation by the Clearwater City Council.

The Owner may, after giving Contractor (and the surety, if any), seven days' written notice and, to the extent permitted by Laws and Regulations, terminate the services of Contractor, exclude Contractor from the site and take possession of the Work and of all Contractor's tools, appliances, construction equipment and machinery at the site and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion), incorporate in the Work all materials and equipment stored at the site or for which the Owner has paid Contractor but which are stored elsewhere, and finish the Work as the Owner may deem expedient. In such case Contractor shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds all claims, costs, losses and damages sustained by the Owner arising out of or resulting from completing the Work such excess will be paid to Contractor.

If such claims, costs, losses and damages exceed such unpaid balance, Contractor shall pay the difference to the Owner. Such claims, costs, losses and damages incurred by the Owner will be reviewed by Owner's Representative as to their reasonableness and when so approved by Owner's Representative incorporated in a Change Order, provided that when exercising any rights or remedies under this paragraph the Owner shall not be required to obtain the lowest price for the Work performed.

Where Contractor's services have been so terminated by the Owner, the termination will not affect any rights or remedies of the Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by the Owner will not release Contractor from liability.

Upon seven (7) days' written notice to Contractor and Owner's Representative, the Owner may, without cause and without prejudice to any other right or remedy of the Owner, elect to terminate the Agreement. In such case, Contractor shall be paid (without duplication of any items):

for completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

for expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;

for all claims, costs, losses and damages incurred in settlement of terminated contracts with Subcontractors, Suppliers and others; and for reasonable expenses directly attributable to termination.

Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.3. CONTRACTOR MAY STOP WORK OR TERMINATE

If, through no act or fault of Contractor, the Work is suspended for a period of more than ninety (90) days by the Owner or under an order of court or other public authority, or the Owner's Representative fails to act on any Application for Payment within thirty (30) days after it is submitted or the Owner fails for thirty (30) days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven (7) days' written notice to the Owner and Owner's Representative, and provided the Owner or Owner's Representative does not remedy such suspension or failure within that time, terminate the Agreement and recover from the Owner payment on the same terms as provided in the article for the Owner May Terminate. However, if the Work is suspended under an order of court through no fault of Owner, the Contractor shall not be entitled to payment except as the Court may direct. In lieu of terminating the Agreement and without prejudice to any other right or remedy, if Owner's Representative has failed to act on an Application for Payment within thirty (30) days after it is submitted, or the Owner has failed for thirty (30) days to pay Contractor any sum finally determined to be due, Contractor may upon seven (7) days' written notice to the Owner and Owner's Representative stop the Work until payment of all such amounts due Contractor. The provisions of this article are not intended to preclude Contractor from making claim under paragraphs for Change of Contract Price or Change of Contract Time or otherwise for expenses or damage directly attributable to Contractor's stopping Work as permitted by this article.

16. DISPUTE RESOLUTION

If and to the extent that the Owner and Contractor have agreed on the method and procedure for resolving disputes between them that may arise under this Agreement, such dispute resolution method and procedure will proceed. If no such agreement on the method and procedure for resolving such disputes has been reached, subject to the provisions of the article for Decisions on Disputes, the Owner and Contractor may exercise such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any dispute provided, however, that nothing herein shall require a dispute to be submitted to binding arbitration.

17. MISCELLANEOUS

17.1. SUBMITTAL AND DOCUMENT FORMS

The form of all submittals, notices, change orders, pay applications, logs, schedules and other documents permitted or required to be used or transmitted under the Contract Documents shall be determined by the Owner's Representative subject to the approval of Owner.

17.2. GIVING NOTICE

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

17.3. NOTICE OF CLAIM

Should the Owner or Contractor suffer injury or damage to person or property because of any error, omission or any act of the other party or of any of the other party's officers, employees or agents or others for whose acts the other party is legally liable, claim will be made in writing to the other party within a reasonable time of the first observance of such injury or damage. The provisions of this paragraph shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitations or repose.

17.4. PROFESSIONAL FEES AND COURT COSTS INCLUDED

Whenever reference is made to "claims, costs, losses and damages," the phrase shall include in each case, but not be limited to, all fees and charges of engineers, architects, attorneys and other professionals and all court or other dispute resolution costs.

17.5. ASSIGNMENT OF CONTRACT

The Contractor shall not assign this contract or any part thereof or any rights thereunder without the approval of Owner, nor without the consent of surety unless the surety has waived its rights to notice of assignment.

17.6. RENEWAL OPTION

Annual Contracts issued through the Engineering Department may be renewed for up to three (3) years, upon mutual consent of both the Owner and the Contractor/Vendor. All terms, conditions and unit prices shall remain constant unless otherwise specified in the contract specifications or in the Invitation to bid. Renewals shall be made at the sole discretion of the Owner and must be agreed to in writing by both parties. All renewals are contingent upon the availability of funds, and the satisfactory performance of the Contractor as determined by the Construction Department.

17.7. ROLL-OFF CONTAINERS AND/OR DUMPSTERS

All City construction projects shall utilize City of Clearwater Solid Waste roll-off containers and/or dumpsters for their disposal and hauling needs. For availability or pricing contact William Buzzell, at the City of Clearwater, Solid Waste Department, by phone: (727) 562-4929 or email: William.Buzzell@myClearwater.com.

18. ORDER AND LOCATION OF THE WORK

The City reserves the right to accept and use any portion of the work whenever it is considered to the public interest to do so. The Engineer shall have the power to direct on what line or street the Contractor shall work and order thereof.

19. MATERIAL USED

All material incorporated into the final work shall be new material unless otherwise approved by the Engineer. If requested by the Engineer, the Contractor shall furnish purchase receipts of all materials.

20. CONFLICT BETWEEN PLANS AND SPECIFICATIONS

The various Contract Documents shall be given precedence, in case of conflict, error or discrepancy, as follows: Modifications, Contract Agreement, Addenda, Supplementary General Conditions, General Conditions, Supplementary Technical Specifications and Technical Specifications. In a series of Modifications or Addenda the latest will govern. In the case of an inconsistency between Drawings and Specifications or within either Document not clarified by addendum, the better quality, more stringent or greater quantity of Work shall be provided in accordance with the Engineer/Architect's interpretation.

21. OWNER DIRECT PURCHASE (ODP)

21.1. SALES TAX SAVINGS

The Owner reserves the right to purchase certain portions of the materials or equipment for the Project directly in order to save applicable sales tax in compliance with Florida Law since owner is exempt from the payment of sales tax. The contract price includes Florida sales and other applicable taxes for materials, supplies, and equipment which will be a part of the Contractor's Work. Owner-purchasing of construction materials or equipment, if selected, will be administered on a deductive Change Order basis. The contract price shall be reduced by the actual cost of the materials or equipment purchased by owner plus the normally applicable sales tax, even if the actual cost is in excess of the cost for the materials or equipment as-bid by the Contractor. For purposes of calculating engineering fees, contractor fees, architects' fees, and any other amounts that are based on the contract amount, however, the original, as-bid contract amount shall be used.

Direct purchase shall be considered for single items or materials that exceed $10,000 in value and/or items identified in Section V, Bidders Proposal. The Contractor shall provide the Owner an ODP Summary of all intended suppliers, vendors, equipment and materials for consideration as ODP materials or equipment (refer to ODP Instructions in Contract Appendix).

21.2. TITLE AND OWNER RISK

Owner will issue Purchase Orders and provide a copy of Owner's Florida Consumer Certification of Tax Exemption and Certificate of Entitlement directly to the Vendor for ODP materials or equipment. Invoices for ODP materials or equipment shall be issued to the Owner, and a copy sent to the Contractor.

Notwithstanding the transfer of ODP materials or equipment by the Owner to the Contractor's possession, the Owner shall retain legal and equitable title to any and all ODP materials or equipment; therefore, the owner assumes the risk of damage or loss at the time of purchase or delivery of items, unless material is damaged as the result of negligence by the Contractor.

21.3. CONTRACTOR'S RECEIPT OF MATERIALS

The Contractor shall be fully responsible for all matters relating to the receipt of materials or equipment furnished to the Owner including, but not limited to, verifying correct quantities, verifying documents of orders in a timely manner, coordinating purchases, providing and obtaining all warranties and guarantees required by the Contract Documents, and inspection and acceptance of the goods at the time of delivery. The Owner shall coordinate with Contractor and Vendor delivery schedules, sequence of delivery, loading orientation, and other arrangements normally

required by the Contractor for the particular materials or equipment furnished. The Contractor shall provide all services required for the unloading and handling of materials or equipment. The Contractor agrees to indemnify and hold harmless the Owner from any and all claims of whatever nature resulting from non-payment of goods to suppliers arising from the action of the Contractor.

As ODP materials or equipment are delivered to the job site, the Contractor shall visually inspect all shipments from the suppliers and approve the vendor's invoice for items delivered. The Contractor shall assure that each delivery of ODP materials or equipment is accompanied by documentation adequate to identify the Purchase Order against which the purchase is made. This documentation may consist of a delivery ticket and/or an invoice from the supplier conforming to the Purchase Order together with such additional information as the Owner may require. The Contractor will then forward an electronic copy of the invoice and supporting documentation to the Owner for payment within fourteen (14) calendar days of receipt of said goods or materials. Such payment shall be directly from public funds, from Owner to Vendor.

The Contractor shall insure that ODP materials or equipment conform to the Specifications and determine prior to acceptance of goods at time of delivery if such materials or equipment are patently defective, and whether such materials or equipment are identical to the materials or equipment ordered and match the description on the bill of lading. If the Contractor discovers defective or non-conformities in ODP materials or equipment upon such visual inspection, the Contractor shall not utilize such nonconforming or defective materials or equipment in the Contractor's Work and instead shall properly notify the Owner of the defective or nonconforming condition so that repair or replacement of those materials or equipment can occur without undue delay or interruption to the Project. If the Contractor fails to perform such inspection and otherwise incorporates into the Contractor's Work such defective or nonconforming ODP materials or equipment, the condition of which it either knew or should have known by performance of an inspection, Contractor shall be responsible for all damages to the Owner, resulting from Contractor's incorporation of such materials or equipment into the Project, including liquidated damages.

21.4. ODP RECORDS, WARRANTIES AND INDEMNIFICATION

The Contractor shall maintain records of all ODP materials or equipment it incorporates into Contractor's Work from the stock of ODP materials or equipment in its possession. The Contractor shall account monthly to the Owner for any ODP materials or equipment delivered into the Contractor's possession, indicating portions of all such materials or equipment which have been incorporated in the Contractor's Work.

The Contractor shall be responsible for obtaining and managing all warranties and guarantees for all materials, equipment and products as required by the Contract Documents. All repair, maintenance, or damage-repair calls shall be forwarded to the Contractor for resolution with the appropriate supplier, vendor, or subcontractor.

The Owner shall indemnify and hold Contractor harmless from any sales tax (and interest and penalties incurred in connection therewith) in the event there is a final determination that purchases made by Owner, which Owner treats as being exempt from sales tax, are subject to sales tax. "Final determination" shall mean an assessment by the Department of Revenue that is no longer subject to protest, or a determination of a court having jurisdiction over such matters that is final and not subject to appeal. Contractor agrees to promptly notify owner of any audit, assessment, proposed assessment or notice of deficiency issued with regard to the Project and relating to ODP materials or equipment. ODP Purchase Orders must be closed out prior to closing out the contract/Contractor

Purchase Order. If material costs needed for project exceed the ODP Purchase Order amount, the ODP Purchase Order will not be increased. Amounts in excess of the ODP Purchase Order will be paid for by the Contractor.

22. RESIDENT NOTIFICATION OF START OF CONSTRUCTION

22.1. GENERAL

The Contractor shall notify all residents along the construction route or within a 500-foot radius, unless stated otherwise in the Contract Documents, with a printed door hanger notice indicating the following information about the proposed construction work and the Contractor performing the work: City seal or logo; the scheduled date for the start of construction; the type of construction; general sequence and scheduling of construction events; possibility of water service disruption and/or colored water due to construction efforts; Contractor's name, the Superintendent's name, Contractor address and telephone number; Contractor's company logo (optional); requirement for residents to remove landscaping and/or other private appurtenances which are in conflict with the proposed construction; and other language as appropriate to the scope of Contract work. Sample door hanger including proposed language shall be approved by the City prior to the start of construction. Notification shall be printed on brightly colored and durable card stock and shall be a minimum of 4-¼ by 11 inches in size. Notification (door hanger) shall be posted to residences and businesses directly affected by the Contractor's activities no later than seven (7) days prior to the start of construction activity. Directly affected by the Contractor's activities shall mean all Contractor operations including staging areas, equipment and material storage, principal access routes across private property, etc. Contractor cannot start without proper seven (7) day notice period to residents. Contractor is required to maintain sufficient staff to answer citizen inquiries during normal business hours and to maintain appropriate message recording equipment to receive citizen inquires after business hours.

Resident notification by the Contractor is a non-specific pay item to be included in the bid items provided in the contract proposal.

22.2. EXAMPLE

NOTICE OF CONSTRUCTION
TODAY'S DATE: ____/____/____
PLEASE EXCUSE US FOR ANY INCONVENIENCE

We are the construction contractor performing the *(state project name)* for the City of Clearwater in your area. The work will be performed in the public right-of-way adjacent to your property. This notice is placed a minimum of seven (7) days in advance of construction to notify property owners of the pending start of construction.

(Brief description of the construction process to be expected by the property owners)

The construction process may necessitate the removal of certain items from the right-of-way. Typical items such as sprinklers, grass, and postal approved mailboxes will be replaced by the contractor within a reasonably short period of time. The replacement of driveways and sidewalks will be made using standard asphalt or concrete materials. The property owner is responsible for the expense and coordination to replace driveways and sidewalks which have customized colors, textures and/or materials. Small trees, shrubs, landscaping materials, unauthorized mailboxes or structures within the right-of-way which must be removed due to the construction process will not be replaced. The property owner is responsible to relocate any such items which the property owner wishes to save prior to the start of construction. Vehicles parked on the streets or within the right-of-way may be required to be placed elsewhere.

We are available to answer any questions you may have regarding the construction process or any particular item that must be relocated. Please contact our Construction Manager _____ at (727) _____. We will be more than happy to assist you.

Construction is anticipated to begin on: _____.

Company Name
Company Address
Contractor Phone Number

23. PROJECT INFORMATION SIGNS

23.1. SCOPE AND PURPOSE

The Owner desires to inform the general public on the Owner's use and expenditure of public funding for general capital improvement and maintenance projects. To help accomplish this purpose, the Contractor is required to prepare and display public project information signs during the full course of the contract period. These signs will be displayed at all location(s) of active work. Payment to Contractor for the preparation, installation and management of project sign(s) shall be

included in the cost of the work. The number of and type of signs will be stated in SECTION IV, SCOPE OF WORK.

23.2. PROJECT SIGN, FIXED OR PORTABLE

Sign type shall be "fixed" on stationary projects and "portable" on projects which have extended locations or various locations. The particular wording to be used on the signs will be determined after contract award has been approved. Contractor will be provided the wording to be used on sign at the preconstruction conference.

23.3. FIXED SIGN

Fixed sign shall be 4-foot by 6-foot (4’x6’) in size and painted on a sheet of exterior grade plywood of the same size and a minimum thickness of 1/2-inches. Sign shall be attached to a minimum of two (2) 4-inch by 4-inch (4”x4”) below grade pressure treated (P.T.) wooden posts and braced as necessary for high winds. Posts shall be long enough to provide secure anchoring in the ground. Bottom of sign must be a minimum of 24-inches above the ground. Alternate mounting system or attachment to fencing or other fixed structure can be considered for approval. Sign shall be painted white on both sides with exterior rated paint.

23.4. PORTABLE SIGNS

Portable sign shall be a minimum of 24-inches by 30-inches (24”x30”) in size and will be attached to a standard sized portable traffic barricade. Sign material shall be aluminum, 0.080-inches or thicker, background of white reflective sheeting, and shall be silkscreen or vinyl lettering. Portable sign shall be two signs located and attached to each side of the traffic barricade.

23.5. SIGN COLORING

Background shall be white. Project Descriptive Name shall be in blue lettering. All other lettering shall be black. Basic lettering on sign shall be in all capital letters, of size proportional to the sign itself. Each sign shall depict the City’s logo. The Project Manager/City Representative shall provide the appropriate electronic logo file(s) to the Contractor.

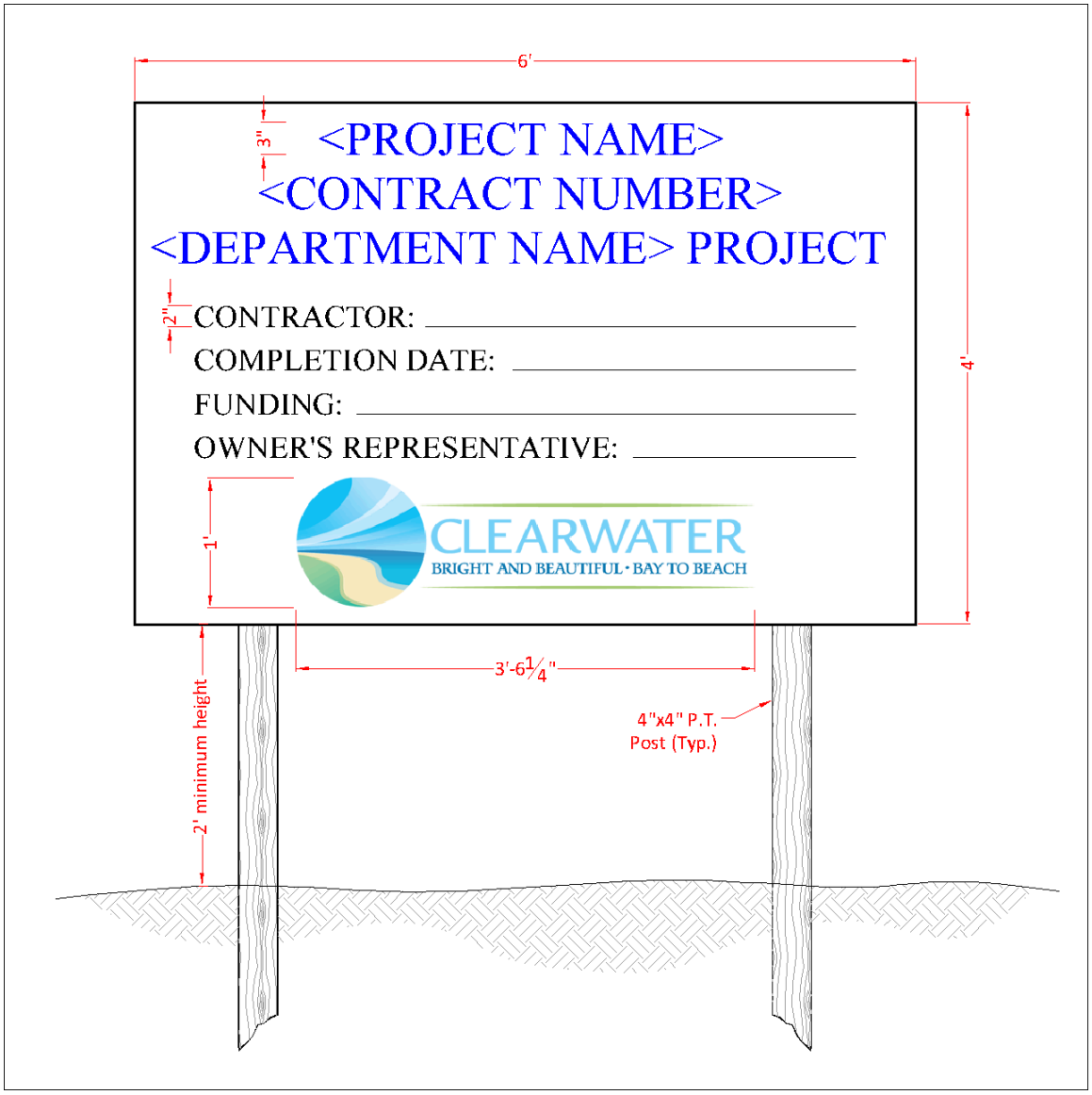
23.6. SIGN PLACEMENT

Signs shall be placed where they are readily visible by the general public which pass by the project site. Signs are not to be placed where they may become a hazard or impediment to either pedestrian or vehicular traffic. For construction projects outside of the Owner’s right-of-way, the signs will be placed on the project site. For projects constructed inside of the Owner's right-of-way, the signs will be placed in the right-of-way. Portable signs are to be moved to the locations of active work on the project. Multiple portable signs will be necessary where work is ongoing in several locations at the same time. Fixed signs are to be placed at the start of construction and will remain in place until the request for final payment.

23.7. SIGN MAINTENANCE

The Contractor is responsible for preparation, installation, movement, maintenance, replacement, removal and disposal of all project signs during the full course of the contract period. The Contractor will place and secure portable signs from dislocation by wind or other actions. Signs are to be cleaned as necessary to maintain legibility and immediately replaced if defaced.

23.8. TYPICAL PROJECT SIGN



24. AWARD OF CONTRACT, WORK SCHEDULE AND GUARANTEE

It will be required that the work will commence not later than five (5) calendar days after the Engineer gives written Notice to Proceed (NTP), which notice shall be given as outlined in Article 2 of these General Conditions.

It is further required that all work within this contract be completed within the indicated number of consecutive calendar days as determined in Section IV, Scope of Work. Contract Time to commence at start date noted on the Notice to Proceed. If the Contractor fails to complete the work within the stipulated time, the City will retain the amount stated in the Contract, per calendar day, for each day that the contract remains incomplete. The work shall be discontinued on Saturdays, Sundays, and approved Holidays. If it becomes necessary for the Contractor to perform work on Saturdays, Sundays, and approved City of Clearwater Employee Holidays, that in the opinion of the Engineer, will require the presence of Inspectors, the Contractor shall pay the City of

Clearwater, Florida, the amount of Four Hundred Eighty Dollars ($480.00) per each eight-hour (8) day for each Inspector given such assignment.

The Contractor shall remedy any defects in the work at his own expense and pay for any damage to other work resulting therefrom which appear within a period of one (1) year from the date of final acceptance.

25. SCRUTINIZED COMPANIES AND BUSINESS OPERATIONS WITH CUBA AND SYRIA CERTIFICATION FORM AND ISRAEL CERTIFICATION FORM

Pursuant to Section 287.135, Florida Statutes, any vendor, company, individual, principal, subsidiary, affiliate, or owner on the Scrutinized Companies with Activities in Sudan List, the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, or is engaged in business operations in Cuba or Syria, is ineligible for, and may not bid on, submit a proposal for, or enter into or renew a contract with the City of Clearwater for goods or services for an amount equal to or greater than one million ($1,000,000.00) dollars. Any vendor, company, individual, principal, subsidiary, affiliate, or owner on the Scrutinized Companies that Boycott Israel List, or is engaged in a boycott of Israel, is ineligible for, and may not bid on, submit a proposal for, or enter into or renew a contract with the City of Clearwater for goods or services for ANY amount.

Each entity submitting a bid, proposal, or response to a solicitation must certify to the City of Clearwater that it is not on the aforementioned lists, or engaged in business operations in Cuba or Syria, or engaged in a boycott of Israel at the time of submitting a bid, proposal or response, in accordance with Section 287.135, Florida Statutes. Business Operations means, for purposes specifically related to Cuba or Syria, engaging in commerce in any form in Cuba or Syria, including, but not limited to, acquiring, developing, maintaining, owning, selling, possessing, leasing or operating equipment, facilities, personnel, products, services, personal property, real property, military equipment, or any other apparatus of business or commerce. Boycott Israel or boycott of Israel means refusing to deal, terminating business activities, or taking other actions to limit commercial relations with Israel, or persons or entities doing business in Israel or in Israeli-controlled territories, in a discriminatory manner. A statement by a company that it is participating in a boycott of Israel, or that it has initiated a boycott in response to a request for a boycott of Israel or in compliance with, or in furtherance of, calls for a boycott of Israel, may be considered as evidence that a company is participating in a boycott of Israel.

The certification forms (the Certification) are attached hereto, and must be submitted, along with all other relevant contract documents, at the time of submitting a bid, proposal, or response. Failure to provide the Certification may deem the entity's submittal non-responsive. If the City of Clearwater determines that an entity has submitted a false certification form, been placed on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List or the Scrutinized Companies that Boycott Israel List, or engaged in business operations in Cuba or Syria, or engaged in a boycott of Israel, then the contract may be terminated at the option of the City of Clearwater. Other than the submission of a false certification, the City of Clearwater, on a case-by-case basis and in its sole discretion, may allow a company to bid on, submit a proposal for, or enter into or renew a contract for goods or services, if the conditions set forth in Section 287.135, Florida Statutes, apply.

The City retains the right to pursue civil penalties and any other applicable rights and remedies as provided by law for the false submission of the attached certification forms.

See Section V of the Contract for Certification Forms to be executed and submitted with the Bid/Proposal Form.

SECTION IV

TECHNICAL SPECIFICATIONS

Table of Content:

100 SERIES: GENERAL

101. SCOPE OF WORK

Project Name: Cleveland St. Streetscape Phase III and Festival Core

Project Number: 16-0003-EN & 19-0026-EN

Scope of Work: Full width reconstruction of two City streets totaling about one mile. Improvements include, but not limited to: Stormwater sewers, gravity sanitary sewer, water main, reclaim water main, and associated utility adjustments. Asphalt pavement with curbing and associated signage and striping. Concrete sidewalks, off-street bicycle trail, landscaping and associated lighting.

The following Articles of the Technical Specifications will apply to this contract if marked "X" as shown below:

1	X	Scope Of Work
2.1	X	Line and Grade Shall Be Performed By The Contractor
2.2	☐	Line and Grade Shall Be Performed By The City
3	X	Definition Of Terms
4	X	Order And Location Of The Work
5	X	Excavation For Underground Work
6	X	Concrete
7	X	Excavation And Forms For Concrete Work
8	X	Reinforcement
9	X	Obstructions
10	X	Restoration Or Replacement Of Driveways, Curbs, Sidewalks And Street Pavement
11	X	Work In Easements Or Parkways
12	X	Dewatering
13	X	Sanitary Manholes
14	X	Backfill
15	X	Street Crossings, Etc.
16	X	Raising Or Lowering Of Sanitary Sewer, Storm Drainage Structures
17	X	Unsuitable Material Removal
18	X	Underdrains
19	X	Storm Sewers
20	X	Sanitary Sewers And Force Mains
21	X	Drainage
22	X	Roadway Base And Subgrade
23	X	Asphaltic Concrete Materials
24	X	Adjustment To The Unit Bid Price For Asphalt
25	X	General Planting Specifications
26	☐	Hdpe Deformed - Reformed Pipe Lining
27	☐	Plant Mix Driveways
28	☐	Reporting Of Tonnage Of Recycled Materials

29	X	Concrete Curbs
30	X	Concrete Sidewalks And Driveways
31	X	Sodding
32	☐	Seeding
33	X	Storm Manholes, Inlets, Catch Basins Or Other Storm Structures
34	X	Material Used
35	X	Conflict Between Plans And Specifications
36	X	Street Signs
37	X	Audio/Video Recording Of Work Areas
38	X	Erosion And Siltation Control
39	X	Utility Tie In Location Marking
40	X	Award Of Contract, Work Schedule And Guarantee
41	X	Potable Watermains, Reclaimed Watermains and Appurtenances
42	X	Gas System Specifications
43	☐	Tennis Courts
44	X	Work Zone Traffic Control
45	☐	Cured-In-Place Pipe Lining
46	☐	Specifications for Polyethylene Sliplining
47	☐	Specifications for Polyvinyl Chloride Ribbed Pipe
48	☐	Gunite Specifications
49	☐	Sanitary and Storm Manhole Liner Restoration
50	X	Project Information Signs
51	☐	In-Line Skating Surfacing System
52	X	Resident Notification of Start of Construction
53	☐	Gabions and Mattresses
54	☐	Lawn Maintenance Specifications
55	X	Milling Operations
56	X	Clearing and Grubbing
57	☐	Riprap
58	☐	Treatment Plant Safety
59	☐	Traffic Signal Equipment and Materials
60	X	Signing And Marking
61	X	Roadway Lighting
62	X	Tree Protection
63	☐	Project Web Pages

The Contractor shall provide copies of a current Contractor License/Registration with the state of Florida and Pinellas County in the bid response.

The Contractor shall provide 1 Portable project signs as described in SECTION III, ARTICLE 23 of the Contract Documents. The final number of project signs will be determined at the beginning of the project based on the Contractor's schedule of work submitted for approval. Additional project signs may be required at no additional cost to the Owner due to the Contractor's schedule of work.

[List ODP Items to be included in the Contract Document.]

Contract Period: 548 Consecutive Calendar Days

102. FIELD ENGINEERING

102-1. LINE AND GRADE PERFORMED BY THE CONTRACTOR

Unless otherwise specified, the Contractor shall provide and pay for field engineering service required for the project. Such work shall include survey work to establish lines and levels and to locate and lay out site improvements, structures, and controlling lines and levels required for the construction of the work. Also included are such Engineering services as are specified or required to execute the Contractor's construction methods. Engineers and Surveyors shall be licensed professionals under the laws of the State of Florida. The Contractor shall provide three (3) complete sets of As-built Surveys to the Engineer prior to final payment being made as outlined in Section III (General Conditions), Article 6.11.2 of these Contract Documents.

102-1.1. GRADES, LINES AND LEVELS

Existing basic horizontal and vertical control points for the project are those designated on the Drawings or provided by the City. Control points (for alignment only) shall be established by the Engineer. The Contractor shall locate and protect control points prior to starting site work and shall preserve all permanent reference points during construction. In working near any permanent property corners or reference markers, the Contractor shall use care not to remove or disturb any such markers. In the event that markers must be removed or are disturbed due to the proximity of construction work, the Contractor shall have them referenced and reset by a Professional Land Surveyor licensed in the State of Florida.

102-1.2. LAYOUT DATA

The Contractor shall layout the work at the location and to the lines and grades shown on the Drawings. Survey notes indicating the information and measurements used in establishing locations and grades shall be kept in notebooks and furnished to the Engineer with the record drawings for the project.

102-2. LINE AND GRADE PERFORMED BY THE CITY

If line and grade is supplied by the City, at the completion of all work the Contractor shall be responsible to have furnished to the project inspector a replacement of the wooden lath and stakes used in the construction of this project. Excessive stake replacement caused by negligence of Contractor's forces, after initial line and grade have been set, as determined by the City Engineer, will be charged to the Contractor at the rate of $100.00 per hour. Time shall be computed for actual time on the project. All time shall be computed in one-hour increments. Minimum charge is $100.00. The Contractor shall provide three (3) complete sets of As-built Surveys to the Engineer prior to final payment being made as outlined in Section III (General Conditions), Article 6.11.2 of these Contract Documents.

103. DEFINITION OF TERMS

For the Purpose of these Technical Specifications, the Definition of Terms from Section III, Article 1 - Definitions of these Contract Documents shall apply.

For the purpose of the Estimated Quantities, the Contractor's attention is called to the fact that the estimate of quantities as shown on the Proposal is approximate and is given only as a basis of calculation upon which the award of the contract is to be made. The City does not assume any responsibility that the final quantities will remain in strict accordance with estimated quantities nor shall the Contractor plead misunderstandings or deception because of such estimate of quantities or of the character or location of the work or of other conditions or situations pertaining thereto.

103-1. REFERENCE STANDARDS

Reference to the standards of any technical society, organization, or associate, or to codes of local or state authorities, shall mean the latest standard, code, specification, or tentative standard adopted and published at the date of receipt of bids, unless specifically stated otherwise.

The most stringent specification prevails in the case where more than one specification is referenced for the same task.

Contractor shall utilize applicable FDOT Standards and Specifications for tasks that are not covered by City’s Standards and Specifications.

104. STREET CROSSINGS, ETC.

At such crossings, and other points as may be directed by the Engineer, trenches shall be bridged in an open and secure manner, so as to prevent any serious interruption of travel upon the roadway or sidewalk, and also to afford necessary access to public or private premises. The material used, and the mode of constructing said bridges, and the approaches, thereto, must be satisfactory to the Engineer.

The cost of all such work must be included in the cost of the trench excavation.

105. AUDIO/VIDEO RECORDING OF WORK AREAS

105-1. CONTRACTOR TO PREPARE AUDIO/VIDEO RECORDING

Prior to commencing work, the Contractor shall have a continuous color audio/video recording taken along the entire length of the Project including all affected project areas. Streets, easements, rights-of-way, lots or construction sites within the Project must be recorded to serve as a record of pre-construction conditions.

105-2. SCHEDULING OF AUDIO/VIDEO RECORDING

The video recordings shall not be made more than twenty-one (21) days prior to construction in any area.

105-3. PROFESSIONAL VIDEOGRAPHERS

The Contractor shall engage the services of a professional videographer. The color audio/video recording shall be prepared by a responsible commercial firm known to be skilled and regularly engaged in the business of pre-construction color audio/video recording documentation.

105-4. EQUIPMENT

All equipment, accessories, materials and labor to perform this service shall be furnished by the Contractor. 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. In some instances, audio/video coverage may be required in areas not accessible by conventional wheeled vehicles. Such coverage shall be obtained by walking.

105-5. RECORDED AUDIO INFORMATION

Each recording shall begin with the current date, project name and be followed by the general location, i.e., viewing side and direction of progress. Accompanying the video recording of each video shall be a corresponding and simultaneously recorded audio recording. This audio recording, exclusively containing the commentary of the camera operator or aide, shall assist in viewer orientation and in any needed identification, differentiation, clarification, or objective description of the features being shown in the video portion of the recording. The audio recording shall also be free from any conversations.

105-6. RECORDED VIDEO INFORMATION

All video recordings must continuously display transparent digital information to include the date and time of recording. The date information shall contain the month, day and year. The time information shall contain the hour, minutes and seconds. Additional information shall be displayed periodically. Such information shall include, but not be limited to, project name, contract number, direction of travel and the viewing side. This transparent information shall appear on the extreme upper left hand third of the screen. Camera pan, tilt, zoom-in and zoom out rates shall be sufficiently controlled such that recorded objects will be clearly viewed during video playback. In addition, all other camera and recording system controls, such as lens focus and aperture, video level, pedestal, chrome, white balance, and electrical focus shall be properly controlled or adjusted to maximize picture quality.

105-7. VIEWER ORIENTATION

The audio and video portions of the recording shall maintain viewer orientation. To this end, overall establishing views of all visible house and business addresses shall be utilized. In areas where the proposed construction location will not be readily apparent to the video viewer, highly visible yellow flags shall be placed by the Contractor in such a fashion as to clearly indicate the proposed centerline of construction. When conventional wheeled vehicles are used as conveyances for the recording system, the vertical distance between the camera lens and the ground shall not exceed ten feet (10’). The camera shall be firmly mounted such that transport of the camera during the recording process will not cause an unsteady picture.

105-8. LIGHTING

All recording shall be done during time of good visibility. No videoing 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.

105-9. SPEED OF TRAVEL

The average rate of travel during a particular segment of coverage shall be directly proportional to the number, size and value of the surface features within the construction area's zone of influence. The rate of speed in the general direction of travel of the vehicle used during videoing shall not exceed forty-four (44) feet per minute.

105-10. VIDEO LOG/INDEX

All videos shall be permanently labeled and shall be properly identified by video number and project title. Each video shall have a log of that video's contents. The log shall describe the various segments of coverage contained on the video in terms of the names of the streets or location of easements, coverage beginning and end, directions of coverage, video unit counter numbers, engineering survey or coordinate values (if reasonably available) and the date.

105-11. AREA OF COVERAGE

Video 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, drainage system features, mailboxes, landscaping, culverts, fences, signs, Contractor staging areas, adjacent structures, etc., within the area covered by the project. Of particular concern shall be the existence of any faults, fractures, or defects. Taped coverage shall be limited to one side of the Site, street, easement or right of way at any one time.

105-12. COSTS OF VIDEO SERVICES

The cost to complete the requirements under this section shall be included in the contract items provided in the proposal sheet. There is no separate pay item for this work.

106. STREET SIGNS

The removal, covering or relocation of street signs by the Contractor is prohibited.

All street signs shall be removed, covered or relocated by the City's Traffic Engineering Division in accordance with Sections 700, 994, 995, and 996 of FDOT's Standard Specifications.

The Contractor shall notify the City's Traffic Engineering Division a minimum of twenty-four (24) hours in advance of the proposed sign relocation, covering or removal.

107. WORK ZONE TRAFFIC CONTROL

107-1. CONTRACTOR RESPONSIBLE FOR WORK ZONE TRAFFIC CONTROL

The Contractor shall be responsible to furnish, operate, maintain and remove all work zone traffic control associated with the Project, including detours, advance warnings, channelization, hazard warnings and any other necessary features, both at the immediate work site and as may be necessary at outlying points.

107-2. WORK ZONE TRAFFIC CONTROL PLAN

The Contractor shall prepare a detailed traffic control plan designed to accomplish the level of performance outlined in the Scope of the Work and/or as may be required by construction permits issued by Pinellas County and/or the Florida Department of Transportation for the Project, incorporating the methods and criteria contained in Part VI, Standards and Guides for Traffic Controls for Street and Highway Construction, Maintenance, Utility and Incident Management Operations in the Manual on Uniform Traffic Control Devices published by the U.S. Department of Transportation and adopted as amended by the Florida Department of Transportation, or most recent addition. This plan shall be reviewed and approved by City Traffic Operations personnel regardless if MOT plan details are included in the contract plans.

107-2.1. WORK ZONE SAFETY

The general objectives of a program of work zone safety are to protect workers, pedestrians, bicyclists and motorists during construction and maintenance operations. This general objective may be achieved by meeting the following specific objectives:

- Provide adequate advance warning and information regarding upcoming work zones.
- Provide the driver clear directions to understanding the situation they will be facing as the driver proceeds through or around the work zone.
- Reduce the consequences of an out of control vehicle.
- Provide safe access and storage for equipment and material.
- Promote speedy completion of projects (including thorough cleanup of the site).
- Promote use of the appropriate traffic control and protection devices.
- Provide safe passageways for pedestrians through, in, and/or around construction or maintenance work zones.

Per the 2014 Design Standards (DS), Index 600 or latest revision:

“When an existing pedestrian way or bicycle way is located within a traffic control work zone, accommodation must be maintained and provision for the disabled must be provided. Only approved pedestrian longitudinal channelizing devices may be used to delineate a temporary traffic control zone pedestrian walkway. Advanced notification of sidewalk closures and marked detours shall be provided by appropriate signs.”

Per the 2014 Standard Specifications for Road and Bridge Construction or latest revision

FDOT Design Standards (DS): 102-5 Traffic Control, 102-5.1 Standards, are the minimum standards for the use in the development of all traffic control plans.

107-3. ROADWAY CLOSURE GUIDELINES

Roadway types: Major Arterials, Minor Arterials, Local Collectors, and Local

Following are typical requirements to be accomplished prior to closure. The number of requirements increases with traffic volume and the importance of access. Road closures affecting business or sole access routes will increase in process requirements as appropriate. For all but local streets, no road or lane closures are allowed during the Christmas holiday season and the designated "Spring Break" season without prior approval by the City Engineer.

107-3.1. ALL ROADWAYS

Obtain permits for Pinellas County or Florida Department of Transportation roadways.

Traffic control devises conform to national and state standards.

107-3.1.1. PUBLIC NOTIFICATION

Standard property owner notification prior to start of construction for properties directly affected by the construction process.

107-3.2. MAJOR ARTERIALS, MINOR ARTERIALS, LOCAL COLLECTORS

Consult with City Traffic Division staff for preliminary traffic control options.

Develop Formal Traffic Control Plan for Permit Submittal to Regulatory Agency as necessary.

107-3.2.1. PUBLIC NOTIFICATION

Message Board Display, Minimum of seven (7) day notice period prior to road closure and potentially longer for larger highway. The message board is to be provided by the Contractor.

107-3.3. MAJOR ARTERIALS, MINOR ARTERIALS

107-3.3.1. PUBLIC NOTIFICATION

C-View Release

107-3.4. MAJOR ARTERIALS

107-3.4.1. PUBLIC NOTIFICATION

News Release

The Message Board may need to be displayed for a period longer than seven (7) days.

107-4. APPROVAL OF WORK ZONE TRAFFIC CONTROL PLAN

The Contractor is invited and encouraged to confer in advance of bidding, and is required, as a specification of the work, to confer in advance of beginning any work on the Project, with the Traffic Operations Division, Municipal Services Building, 100 South Myrtle Avenue, telephone (727) 562-4747, for the purpose of approval of the Contractor's proposed detailed traffic control

plan. All maintenance of traffic (MOT) plans shall be signed and sealed by a Professional Engineer or an individual who is certified in the preparation of MOT plans in the State of Florida.

107-5. INSPECTION OF WORK ZONE TRAFFIC CONTROL OPERATION

The Traffic Operations Division may inspect and monitor the traffic control plan and traffic control devices of the Contractor. The City's Construction Inspector assigned to the project, may make known requirements for any alterations or adjustments to the traffic control devices. The Contractor shall take direction from the Project Engineer or Project Inspector.

107-6. PAYMENT FOR WORK ZONE TRAFFIC CONTROL

Payment for work zone traffic control is a non-specific pay item to be included in the construction costs associated with other specific pay items unless specifically stated otherwise.

107-7. CERTIFICATION OF WORK ZONE TRAFFIC CONTROL SUPERVISOR

The City may require that the Supervisor or Foreman controlling the work for the Contractor on the Project have a current International Municipal Signal Association, Work Zone Traffic Control Safety Certification or Worksite Traffic Supervisor Certification from the American Traffic Safety Association with additional current Certification from the Florida Department of Transportation. This requirement for Certification will be noted in the Scope of Work and/or sections of these Technical Specifications. When the certified supervisor is required for the Project, the supervisor will be on the Project site at all times while work is being conducted.

The Worksite Traffic Supervisor shall be available on a twenty-four (24) hour per day basis and shall review the project on a day-to-day basis as well as being involved in all changes to traffic control. The Worksite Traffic Supervisor shall have access to all equipment and materials needed to maintain traffic control and handle traffic related situations. The Worksite Traffic Supervisor shall ensure that routine deficiencies are corrected within a twenty-four (24) hour period.

The Worksite Traffic Supervisor shall be available on the site within 45 minutes after notification of an emergency situation, prepared to positively respond to repair the work zone traffic control or to provide alternate traffic arrangements.

Failure of the Worksite Traffic Supervisor to comply with the provisions of this Subarticle may be grounds for decertification or removal from the project or both. Failure to maintain a designated Worksite Traffic Supervisor or failure to comply with these provisions will result in temporary suspension of all activities except traffic and erosion control and such other activities deemed to be necessary for project maintenance and safety.

108. OVERHEAD ELECTRIC LINE CLEARANCE

108-1. CLEARANCE OPTIONS

When working in the vicinity of overhead power lines, the Contractor shall utilize one of the following options:

Option 1 - Having the power lines de-energized and visibly grounded.

Option 2 - Maintaining a minimum distance of twenty feet (20') of clearance for voltages up to 350 kV and fifty feet (50') of clearance for voltages more than 350 kV.

Option 3 - Determine the line voltage and provide clearance in accordance with the following table.

108-2. REQUIRED MINIMUM CLEARANCE DISTANCES

VOLTAGE (nominal, kV, alternating current)	**MINIMUM CLEARANCE DISTANCE (feet)**
Up to 50	10
Over 50 to 200	15
Over 200 to 350	20
Over 350 to 500	25
Over 500 to 750	35
Over 750 to 1,000	45
Over 1,000	(as established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electric power transmission and distribution)

Note: The value that follows "to" is up to and includes that value. For example, over 50 to 200 means up to and including 200kV.

109. PROJECT WEB PAGES

109-1. WEB PAGES DESIGN

If requested by the City, Engineer shall design the Project Web Site in accordance with the current City Web Site standards and styles. Project Web Site should include general project information as: Project Name & Number, Scope description, Location, Schedule, and Project Contacts.

Note: Occasionally City modifies the general design of the City's Web Site, and the Engineer shall consult the City Webmaster for the current requirements, before designing or updating the Project Web Pages.

109-2. WEB ACCESSIBILITY GUIDELINES

Project Web Pages should conform to the W3C Web Accessibility Guidelines and US Section 508 guidelines whenever possible:

http://www.w3.org/TR/1999/WAI-WEBCONTENT-19990505/

http://www.section508.gov/

In particular, use of variable-width tables, user-adjustable/relative font sizes, ALT text for images, CSS whenever possible, etc. Accessibility should be a priority over design/aesthetics.

109-3. THE "BRIGHT & BEAUTIFUL" LOGO AND ITS USE

The City's "Bright & Beautiful" logo should be used for everyday business, on all print and electronic material. It should be used on all internal correspondence, brochures, advertising, vehicles, apparel and signage. It should be used only in the manner presented here, in the proportion shown here, with no alterations. It should not be condensed, lengthened, or otherwise distorted to fit a space. The logo is approved for use by City departments and is not to be used by outside vendors without the permission of the City Manager, Assistant City Manager or Public Communications office. Electronic versions of the logo should be obtained from Public Communications.

109-4. MAPS AND GRAPHICS

Use of maps and graphics is recommended to illustrate the project; only approved graphics should be posted to the Project Web Pages.

109-5. INTERACTIVE FORMS

The site should also include an interactive form or other options to allow the Public's input sent back to the City regarding the Project.

109-6. POSTING

The site should be presented to the City's Webmaster for review and posting to the City's Web Server. Posting of the Project Web Pages to a different server than City's Web server, if approved, should be coordinated with the City's Webmaster for resolving all accessibility and conformity issues.

109-7. WEB PAGES UPDATES

Unless otherwise specified and agreed, Engineer is responsible for keeping the posted Web Pages up-to-date, by sending revisions and updates through the City Project Manager to the City's Webmaster for posting.

200 SERIES: SITEWORK

201. EXCAVATION FOR UNDERGROUND WORK

The Contractor is responsible to take all necessary steps to conduct all excavation in a manner which provides for the successful completion of the proposed work while at all times maintaining the safety of the workmen, the general public and both public and private property. The Contractor's methods of work will be consistent with the standard practices and requirements of all appropriate Safety Regulatory Agencies, particularly the Occupational Safety and Health Administration (OSHA) requirements for excavation. Unless otherwise specifically stated in these plans and specifications, the methods of safety control and compliance with regulatory agency safety requirements are the full and complete responsibility of the Contractor.

For the purposes of the Contractor's safety planning in the bidding process, the contractor is to consider all excavation to be done in the performance of this contract to be in soil classified as OSHA "Type C". The Contractor's attention is called to specific requirements of OSHA for excavation shoring, employee entry, location of excavated material adjacent to excavation, the removal of water from the excavation, surface encumbrances and in particular the requirement of a "Competent Person" to control safety operations. The Contractor will identify their Competent Person to City staff at the start of construction.

City staff is required from time to time to perform inspections, tests, survey location work, or other similar activity in an excavation prepared by the Contractor. City staff, in conformance with the OSHA Excavation Safety Requirements, is to only enter an excavation in compliance with these OSHA standards. The City's staff reserve the option to refuse entry into the Contractor's excavation if, in the opinion of the City's staff, the entry into the Contractor's excavation is unsafe or does not conform to OSHA requirements. If this circumstance occurs, the Contractor must either provide the necessary safety requirements or provide alternate means for the accomplishment of the City's work at the Contractor's expense.

The construction quantities, if any, contained in the bid proposal for this contract do not contain sufficient quantities to allow the Contractor to perform excavation work using strictly the "open cut" method whereby no shoring systems are used and trench side slopes are cut to conform to OSHA safety requirements without a shoring system. In addition to safety reasons, the Contractor is required to use excavation and trench-shoring methods in compliance with all safety requirements which allow the Contractor to control the amount of restoration work necessary to complete the project.

Not more than four hundred feet (400') of trench shall be opened at one time in advance of the completed work unless written permission is received from the Engineer for the distance specified. For pipe installation projects, the trench shall be a minimum of six inches (6") wider on each side than the greatest external horizontal width of the pipe or conduit, including hubs, intended to be laid in them. The bottom of the trench under each pipe joint shall be slightly hollowed, to allow the body of the pipe to rest throughout its length. In case a trench is excavated at any place, excepting at joints, below the grade of its bottom as given, or directed by the Engineer, the filling and compaction to grade shall be done in such manner as the Engineer shall direct, without compensation.

202. OBSTRUCTIONS

Any pipes, conduits, wires, mains, footings, driveways, or other structures encountered shall be carefully protected from injury or displacement. Any damage thereto shall be fully, promptly, and properly repaired by the Contractor to the satisfaction of the Engineer and the owner thereof. Any survey monument or benchmark which must be disturbed shall be carefully referenced before removal, and unless otherwise provided for, shall be replaced upon completion of the work by a registered land surveyor. Any concrete removed due to construction requirements shall be removed to the nearest expansion joint or by saw cut. Contractor shall consult Inspector for the approved means.

203. DEWATERING

203-1. GENERAL

Unless specifically authorized by the Engineer, all pipe, except subdrains, shall be laid "in the dry". The Contractor shall dewater trench excavation as required for the proper execution of the work, using one or more of the following approved methods: well point system, trenched gravity underdrain system, or sumps with pumps.

Well point systems must be efficient enough to lower the water level in advance of the excavation and maintain it continuously in order that the trench bottom and sides shall remain firm and reasonably dry. The well points shall be designed especially for this type of service, and the pumping unit used shall be capable of maintaining a high vacuum, and at the same time, of handling large volumes of air as well as of water.

The Contractor shall be responsible for disposing of all water resulting from trench dewatering operations and shall dispose of the water without damage or undue inconvenience to the work, the surrounding area, or the general public. Contractor shall not dam, divert, or cause water to flow in excess in existing gutters, pavements or other structures: and to do this Contractor may be required to divert the water to a suitable place of discharge as may be determined by the Engineer. Where possible, Contractor may contain produced groundwater on the project site, a dewatering plan must be submitted to the City for approval if a discharge permit is not obtained or required.

The cost of dewatering shall be included in the unit price bid per linear foot of pipe, or, in the case of other underground structures, in the cost of such structures.

203-2. PERMIT REQUIREMENTS

203-2.1. DEWATERING DISCHARGE

The Contractor shall be responsible for submitting the Notice of Intent to use the Generic Permit for the Discharge of Groundwater from Dewatering Operations and associated fee in accordance with Florida DEP Requirements, F.A.C. 62-621.300(2)(b) prior to discharging of produced groundwater into the City’s streets, storm sewers or waterways.

Prior to construction, a dewatering plan must be prepared and submitted to the City for review. It shall include site-specific notes and details presenting the Contractor’s proposed dewatering and disposal methods. The City will field-inspect the dewatering operation throughout construction.

204. UNSUITABLE MATERIAL REMOVAL

All unsuitable material, such as muck, clay, rock, etc., shall be excavated from under pipes, structures and roadways and removed from the site. All material removed is property of the Contractor, who shall dispose of said material off-site at their expense. The limits and depths of the excavation shall be determined in the field by the Engineer.

204-1. BASIS OF MEASUREMENT

The basis of measurement shall be the number of cubic yards of clean fill placed as determined by either cross sections of the excavation, truck measure, or lump sum as specified in the Scope of Work and Contract Proposal. Included in the cost of cubic yards of suitable material placed is the removal, hauling and disposal of unsuitable material.

204-2. BASIS OF PAYMENT

The unit price for the removal of unsuitable material shall include: all materials, equipment, tools, labor, disposal, hauling, excavating, dredging, placing, compaction, dressing surface and incidentals necessary to complete the work. If no pay item is given, the removal of unsuitable material shall be included in the most appropriate bid item.

205. UTILITY TIE IN LOCATION MARKING

The tie in locations for utility laterals of water, sanitary sewer, and gas shall be plainly marked on the back of the curb. Marking placed on the curb shall be perpendicular with respect to the curb of the tie in location on the utility lateral. Marks shall not be placed on the curb where laterals cross diagonally under the curb. The tie in location shall be the end of the utility lateral prior to service connection.

Markings shall be uniform in size and shape and colors in conformance with the code adopted by the American Public Works Association as follows:

SAFETY RED	Electric power, distribution & transmission Municipal Electric Systems
HIGH VISIBILITY SAFETY YELLOW	Gas Distribution and Transmission Oil Distribution and Transmission Dangerous Materials, Produce Lines, Steam Lines
SAFETY ALERT ORANGE	Telephone and Telegraph Systems Police and Fire Communications Cable Television
SAFETY PRECAUTION BLUE	Water Systems, Slurry Pipe Lines and Potable Water
SAFETY GREEN	Sewer Systems
LAVENDER	Reclaimed Water, Irrigation and Slurry Lines

WHITE	Proposed Excavation
PINK	Temporary Survey Markings

Marks placed on curbs shall be rectangular in shape and placed with the long dimension perpendicular to the flow line of the curb. Marks placed on valley gutter and modified curb shall be six inch (6”) x three inch (3”) and placed at the back of the curb. Marks placed on State Road and vertical curb shall be four inch (4”) x two inch (2”) and be placed on the curb face.

206. CLEARING AND GRUBBING

The work included in this specification includes the removal and disposal of all structures, appurtenances, asphalt, concrete, curbs, walls, trees, roots, vegetation, boulders, conduits, poles, posts, pipes, inlets, brush, stumps, debris and other obstructions resting on or protruding through the ground surface necessary to prepare the area for construction.

Clearing and grubbing shall be performed in accordance with Section 110 of FDOT's Standard Specifications. Unless otherwise specified in the contract documents, the Contractor shall take ownership of all removed material and dispose of them off-site in accordance with all Local, State and Federal Requirements.

206-1. BASIS OF MEASUREMENT

The basis of measurement shall be either a lump sum quantity or the number of acres cleared and grubbed as specified on the plans or directed by the Engineer.

206-2. BASIS OF PAYMENT

The pay item for clearing and grubbing shall include: all removal and disposal of materials and structures as well as all materials, hauling, equipment, tools, labor, leveling of terrain, landscape trimming and all incidentals necessary to complete the work.

207. EROSION AND SEDIMENT CONTROL

207-1. GENERAL

Erosion and sediment control shall conform to the requirements of the FDOT Standard Specifications for Prevention, Control, and Abatement of Erosion and Water Pollution. Contractor shall use temporary erosion and sediment control features found in the State of Florida Erosion and Sediment Control Designer and Reviewer Manual (E&SC Manual) or the City of Clearwater Standard Indices.

207-2. TRAINING OF PERSONNEL

The City may require that the Supervisor or Foreman controlling the work for the Contractor on the Project have a current Florida Department of Environmental Protection (FDEP) Florida Stormwater, Erosion, and Sedimentation Control Inspector Training & Certification. All personnel working on the Project shall complete illicit discharge training once per calendar year. Contractor shall provide documentation to the City prior to Notice To Proceed. Example of training and

training sign-in sheet will be provided by the City to the Contractor at the Pre-Construction Meeting.

207-3. STABILIZATION OF DENUDED AREAS

No disturbed area may be denuded for more than thirty (30) calendar days unless otherwise authorized by the City Engineer. During construction, denuded areas shall be covered by mulches such as straw, hay, filter fabric, seed and mulch, sod, or some other temporary vegetation. Within sixty (60) calendar days after final grade is established on any portion of a project site, that portion of the site shall be provided with established permanent soil stabilization measures per the original site plan, whether by impervious surface or landscaping.

207-4. PROTECTION AND STABILIZATION OF SOIL STOCKPILES

Fill material stockpiles shall be protected at all times by on-site drainage controls which prevent erosion of the stockpiled material. Control of dust from such stockpiles may be required, depending upon their location and the expected length of time the stockpiles will be present. In no case shall an unstabilized stockpile remain after thirty (30) calendar days.

207-5. PROTECTION OF EXISTING STORM SEWER SYSTEMS

During construction, all storm sewer inlets in the vicinity of the project shall be protected by temporary erosion and sediment control features found in the State of Florida Erosion and Sediment Control Designer and Reviewer Manual (E&SC Manual) or the City of Clearwater Standard Indices, or equals approved by the City Engineer before installation.

207-6. SWALES, DITCHES AND CHANNELS

All swales, ditches and channels leading from the site shall be sodded within three (3) days of excavation. All other interior swales, etc., including detention areas will be sodded prior to issuance of a Certificate of Occupancy.

207-7. UNDERGROUND UTILITY CONSTRUCTION

The construction of underground utility lines and other structures shall be done in accordance with the following standards: no more than 400 linear feet of trench shall be open at any one time; and, wherever consistent with safety and space consideration, excavated material shall be cast to the uphill side of trenches. Trench material shall not be cast into or onto the slope of any stream, channel, road ditch or waterway.

207-8. MAINTENANCE

All erosion and siltation control devices shall be checked regularly, especially after each rainfall and will be cleaned out and/or repaired as required.

207-9. COMPLIANCE

Failure to comply with the aforementioned requirements may result in a fine and/or more stringent enforcement procedures such as (but not limited to) issuance of a "Stop Work Order".

208. CONSTRUCTION AND REPAIR OF SEAWALLS AND OTHER BEACH EROSION CONTROL STRUCTURES.

Other beach erosion control structures, accompanied by a certified survey showing the location of the groin or other beach erosion control structure and adjoining groins or other beach erosion control structures, shall be presented to the city council for final approval. Where steps are necessary to provide access along the beach to the public, then such steps shall be shown as part of the plan for groin construction prior to issuance of the permit, and such steps shall be constructed and maintained in a safe condition at all times.

208-1. EXISTING SEAWALLS AND REVETMENTS

Existing seawalls and revetments on natural waterbodies may be replaced with a revetment or with a vertical seawall with the provision of rip rap placed at the base of the wall up to the mean high water line for the entire length of the seawall. Revetments and seawalls may be replaced with a vertical seawall in manmade waterbodies, provided that the seawall is within the property line and maintains the established shoreline.

208-2. TOP OF CAP ELEVATION

The top of cap elevation for all replacement and new seawalls and seawall caps shall not exceed 4.8 feet N.A.V.D. If the top of a seawall cap is constructed at an elevation differing from the adjacent property owner top of cap elevation by greater than one foot, then a return wall is required to sufficiently provide for the break in grade at the property line. Seawalls exceeding 4.8 feet N.A.V.D. in height prior to the effective date of this article may be maintained, repaired and replaced to their current height.

208-3. SEAWALLS AND REVETMENTS LOCATED SEAWARD OF THE CCL

Seawalls and revetments located seaward of the coastal construction setback line are controlled by regulations of the Division of Beaches and Shores of the Florida Department of Environmental Protection. Replacement of a seawall or revetment that is located seaward of the coastal construction setback line necessitates submission of a permit application to the state department of environmental protection.

208-4. PLACEMENT OF NEW SEAWALL

The placement of a new seawall waterward of an existing seawall is permitted, subject to the following conditions:

(a) A Florida registered professional engineer must certify the new seawall design.
(b) The new seawall shall not extend more than 18 inches from the waterward face of the original alignment of the existing vertical seawall location.

(c) The new seawall shall be placed vertically plumb.
(d) Placing a seawall in front of an existing seawall shall only be permitted once unless the seawall behind the new seawall is removed.
(e) Existing seawall sections that interfere with new seawall location shall be removed.
(f) The new seawall shall include an adequate closure of gaps at each property line.
(g) For zoning purposes, the setbacks for the property will be measured from either the property line or the waterside of the original seawall slab, whichever is more restrictive, and will not be adjusted to accommodate the new seawall addition. For purposes of pier construction, the shore normal dimensions will be measured from the waterside of the original seawall slab.

208-5. POST CONSTRUCTION SURVEY

Prior to final inspection and approval of a new or replacement seawall or seawall cap, a post-construction survey shall be required. Repairs of existing seawalls and seawall caps which do not alter the height or location shall not be subject to this requirement.

208-6. RIP-RAP

On all-natural waterways, an apron of rip-rap shall be placed at the base of all new and repaired seawalls up to the mean high water line for the entire length of the seawall to absorb the wave energy and protect the underlying soft earth or sand from being carried away, as well as to provide habitat for desirable marine species. This rip-rap shall be required at the base of all new seawalls and at the time that an existing seawall is repaired where the replacement constitutes greater than 50 percent of the entire length of the seawall or includes the replacement of a panel.

208-7. RETAINING WALL IN LIEU OF VERTICAL SEAWALL

A retaining wall may be built as an alternative to a vertical seawall, provided that all activities, including dredging, filling, slope grading, or equipment access and similar activities and all portions of the wall are located landward of the mean high water line.

300 SERIES: MATERIALS

301. CONCRETE

The Contractor shall notify the Construction Inspector or City a minimum of twenty-four (24) hours in advance of all concrete placement.

Unless otherwise noted elsewhere or directed, the following requirements shall be adhered to:

All concrete work shall be performed in accordance with the latest editions of the Design and Control of Concrete Mixtures by the Portland Cement Association, the American Concrete Institute, and FDOT's Standard Specifications. Unless otherwise specified, all concrete shall have fiber mesh reinforcing and have a minimum compressive strength of 3000 psi at twenty-eight (28) days. The cement type shall be Type I and shall conform to AASHTO M-85. The aggregate shall conform to ASTM C-33. All ready-mix concrete shall conform to ASTM C-94. The slump for all concrete shall be in the range of three inches (3") to five inches (5"), except when admixtures or special placement considerations are required.

All concrete shall be tested in the following manner:

Placement of less than five cubic yards (5 cy) shall be tested at the Engineer's discretion. Otherwise, for each class, for each day, for every 50 cy or part thereof exceeding five cubic yards (5 cy), one set of three (3) compressive strength cylinders will be required (1 at 7 days and 2 at 28 days). At the discretion of the Engineer, unacceptable test results may require the Contractor to provide further tests, as determined by the Engineer, to determine product acceptability, or need for removal, and compensation or denial thereof.

302. EXCAVATION AND FORMS FOR CONCRETE WORK

302-1. EXCAVATION

Excavating for concrete work shall be made to the required depth of the subgrade or base upon which the concrete is to be placed. The base or subgrade shall be thoroughly compacted to a point six inches (6") outside said concrete work before the forms are placed.

302-2. FORMS

Forms for concrete work shall be either wood or metal, except curbs. Curb forms shall be metal only, unless at radius, intermittent sections less than ten (10) linear feet or by written permission from Engineer. They shall be free from warps or bends, shall have a depth equal to the dimensions required for the depth of the concrete deposited against them and shall be of sufficient strength when staked to resist the pressure of concrete without moving or springing.

303. REINFORCEMENT

When required, reinforcement shall be placed in the concrete work. Bar reinforcement shall be deformed: ASTMA-A 615, steel shall be billet Intermediate or Hard Grade: Rail Steel A.A.S.H.T.O. M42. Twisted Bars shall not be used, Fabric Reinforcement shall conform to the requirements of AASHTO M55 (ASTM A185). Welded deformed steel wire fabric for Concrete reinforcement shall meet the requirements of AASHTO M 221 (ASTM A497). Welded wires shall

be elevated by the use of chairs. Epoxy coated reinforcing Steel Bars shall meet ASTM A775/A77 requirements.

303-1. BASIS OF PAYMENT

Reinforcement shall not be paid for separately. The cost of such work shall be included in the contract unit price for the item of work specified.

304. BACKFILL

304-1. MATERIALS AND GENERAL

Material for backfill other than under Gabion mattress shall be carefully selected from the excavated material or from other sources as may be required by the Engineer. Such material shall be granular, free from clay, muck, organic matter or debris, contain no rocks or other hard fragments greater than three inches (3") in the largest dimension and all fill shall be similar material.

Material for backfill under Gabion mattress shall be an A-1 soil meeting AASHTO M145.

Backfill shall be carried up evenly in layer not exceeding eight inches (8”) in thickness and shall be compacted into place by mechanical tamping before the next layer is applied. A hydro-hammer shall not be used for compaction. Backfill placed around pipes shall be carefully placed around the sides and top of pipe by hand shovels and thoroughly compacted to twelve inches (12") above the pipe by tamping or other suitable means.

For backfill in small areas that do not permit any type of tamping, Contractor may use flowable fill to achieve required density. Flowable fill shall adhere to Section 121 of FDOT specifications.

Where wet conditions are such that dewatering by normal pumping methods would not be effective, as determined by the Engineer, Contractor may use #57 stone (meeting FDOT’s specifications) and hand tamping until backfill has reached an elevation and condition such as to make the use of the mechanical tampers practical. Fully wrap the stones with a layer of Type D filter fabric of FDOT Index 199. Do not place stones within four feet (4’) of the ends of trench or ditch; use normally accepted backfill material at the ends.

Where new cast-in-place concrete work is performed, do not place backfill until the specified twenty-eight (28) days compressive strength occurs.

Do not allow heavy construction equipment to cross over pipes or culverts until placing and compacting backfill material to the finished earthwork grade or to an elevation of at least four feet (4’) above the top of the pipe or culvert.

The cost of backfill, flowable fill, alternative approved material for wet conditions, and extra dewatering effort to achieve required density, etc., shall be included in the contract unit price or lump sum price for the item of the work specified.

304-2. TESTING AND INSPECTION

Contractor shall employ and pay for the services of an independent testing laboratory, approved by the Owner, to perform density testing on backfilled material. All testing shall be witnessed by

the Owner's Representative. The test shall be repeated until satisfactory results are obtained. The Contractor shall be charged for all retests and re-inspection services.

Backfill under all type of impervious areas and around structures: Backfill in these areas shall be compacted to a minimum of 98% Modified Proctor Test in accordance with ASTM D 1557 or ASSHTO T 180. Tests shall be performed up to the proposed bottom of pavement elevation.

Backfill outside of impervious areas: Backfill in these areas shall be compacted to a minimum of 95% Standard Proctor Test in accordance with ASTM D-698 or AASHTO T-99. Tests shall be performed up to the proposed finished grade.

Backfill Testing: The Contractor shall demonstrate the adequacy of backfill compaction by performing density testing. For each test location, density testing shall be performed at eight inch (8") lifts. The character of the backfill material will be observed during the excavation for density testing to determine conformance with the specifications. Density testing shall be performed using nuclear field density equipment or conventional weight-volume methods. If the weight-volume method is used, volume shall be determined by using the sand replacement test (ASTM D 1556) or liquid displacement methods (ASTM D 2167). If nuclear methods are used, the trench correction effect shall be accounted for by recalibrating the nuclear gauge on its calibration block at the location of each test prior to taking the density measurement. The Contractor shall furnish all equipment, tools, and labor to prepare the test site for testing.

Normal Testing Frequency: One test shall be performed for each one hundred feet (100') of backfill or fraction thereof or for each single run of pipe/culvert connecting two (2) successive structures whichever is less. The location of the test within each section shall be selected by the Owner's Representative. Testing shall progress as each one hundred foot (100') section is completed. Four (4) tests equally spaced around each structure shall be performed on each eight inch (8") lift. Testing which indicates that unacceptable material has been incorporated into the backfill, or that insufficient compaction is being obtained shall be followed by expanded testing to determine the limits of the unacceptable backfill.

Expanded Testing Requirements: If normal testing within a testing section indicates unacceptable backfill, the Owner's Representative may require additional testing within the same test section to determine the limits of unacceptable backfill. Additional testing required by the Owner's Representative shall be paid for by the Contractor and shall not exceed testing of four (4) additional locations within the test section. Unacceptable backfill within the limits established by the testing shall be removed and replaced by the Contractor at no additional cost to the Owner. Additional testing beyond that required may be performed by the Contractor at his expense to further delineate limits of unacceptable backfill.

305. RIPRAP

The work included in this specification includes the construction of riprap as shown on the plans. The riprap shall be constructed per Section 530 of FDOT's Standard Specifications.

305-1. BASIS OF MEASUREMENT

The basis of measurement for riprap shall be the dry weight in tons.

305-2. BASIS OF PAYMENT

The pay item for sand-cement riprap shall include: all materials, testing, labor, grout, hauling, equipment, excavation, backfill, dressing and shaping for placement of sand-cement and all incidentals necessary to complete the work.

The pay item for rubble riprap shall include: all materials, required bedding stone, dressing and shaping for placement of bedding stone, filter fabric, testing, hauling, excavating, backfill, dressing and shaping for placement of rubble, and all incidentals necessary to complete the work. No payment will be granted if concrete or stone that exists on-site is used as rubble riprap.

400 SERIES: SANITARY SEWER

401. SANITARY MANHOLES

401-1. BUILT UP TYPE

Manholes shall be constructed of brick with cast iron frames and covers as shown on the drawings. Invert channels shall be constructed smooth and semicircular in shape conforming to inside of adjacent sewer section. Changes in direction of flow shall be made in a smooth curve of as large a radius as possible. Changes in size and grade of channels shall be made gradually and evenly. Invert channels shall be formed by one of the following methods: form directly into concrete manhole base, build up with brick and mortar, lay half tile in concrete, or lay full section of sewer pipe through manhole and break out top half of pipe.

The manhole floor outside of channels shall be made smooth and sloped toward channels.

Free drop in manholes from inlet pipe invert to top of floor outside the channels shall not exceed twenty four inches (24”).

Standard Drop Manholes shall be constructed wherever free drop exceeds twenty four inches (24”).

Manhole steps shall not be provided. Joints shall be completely filled, and the mortar shall be smoothed from inside of manholes.

The entire interior and exterior of brick manholes shall be plastered with one half inch (1/2”) of mortar.

Brick used may be solid only. Brick shall be laid radially with every sixth course being a stretcher course.

401-2. PRECAST TYPE

Precast Sanitary Manholes shall conform to this specification unless otherwise approved by the City Engineer.

AASHT0 M 85 Type II cement shall be used throughout with a minimum wall thickness of five inches (5”). The precast sections shall conform to ASTM C 478 latest revision. Section joints shall be a tongue and groove with "ram neck" gasket or "O" ring to provide a watertight joint. Minimum concrete strength shall be 4000 psi at 28 days.

Three sets of shop drawings and location inventory shall be submitted to the City Engineer for approval. Approval of shop drawings does not relieve Contractor of responsibility for compliance to these specifications unless letter from Contractor requesting specific variance is approved by the City Engineer.

Location inventory submitted with shop drawing shall detail parts of manhole per manhole as numbered on the construction plans. All manhole parts shall be numbered or lettered before being sent to the job site to permit proper construction placement. A plan or list of the numbering system shall be present on the job site when manhole components are delivered.

Precast manhole dimensions, drop entry, grout flow of channel, etc., shall be as shown on City of Clearwater Engineering Index #302 Sheets 1 and 2 of 2.

Manhole sections shall be rejected if abused during shipping or placement and if pipe openings are not properly aligned. The "break in" to precast manholes for pipe entry will not be allowed.

The manhole base shall be set on a pad of A 1 or A 2 Classification soil approximately five inches (5”) thick to secure proper seating and bearing.

401-2.1. MANHOLE ADJUSTMENT RINGS (GRADE RINGS)

Between the top of the manhole cone and the manhole cover frame, a manhole adjustment ring shall be installed. The intent of the manhole adjustment ring is to accommodate future grade changes without disturbing the manhole. See Section IV, Article 703-7, Asphaltic Concrete – Adjustment of Manholes.

401-3. DROP MANHOLES

Standard drop inlets to manholes shall be constructed of commercial pipe, fittings and specials as detailed on the drawings.

401-4. FRAMES AND COVERS

Manhole frames and covers shall be set in a full bed of mortar with the top of the cover flush with or higher than finished grade as directed. Refer to Index 30l.

401-5. MANHOLE COATINGS

The exterior and interior of all built up manholes shall be coated with two (2) coats of Type II Asphalt emulsion, moisture and damp proof (Specification ASTM D 1227 Type II Class I) as manufactured by W.R. Meadows Sealtite or approved equal.

The exterior of all precast manholes shall have a 15 mil dry thickness of Sherwin Williams Targuard® Coal Tar Epoxy or approved equal. The interior shall be AGRU SUREGRIP HDPE or PP-R Liner with a minimum thickness of two millimeters (2 mm).

401-6. CONNECTIONS TO MANHOLES

Connections to existing sanitary manholes using approved PVC sewer main shall be made with a manhole adapter coupling by NPC Kor-N-Seal® or approved water stop coupling.

402. RAISING OR LOWERING OF SANITARY SEWER STRUCTURES

Sanitary Sewer Structures shall be raised or lowered as indicated on the plans or as indicated by the Engineer.

402-1. BASIS OF PAYMENT

Payment, unless covered by a bid item, shall be included in the cost of the work.

403. SANITARY SEWERS AND FORCE MAINS

403-1. MATERIALS

403-1.1. GRAVITY SEWER PIPE

GRAVITY SEWER PIPE SHALL BE POLYVINYL CHLORIDE OR DUCTILE IRON. Polyvinyl chloride pipe and fittings shall conform to ASTM specification D 3034 for S.D.R. 35. Sewer pipe with more than ten feet (10') of cover shall be SDR 26. The pipe shall be plainly marked with the above ASTM designation. The bell end of joints and fittings shall have a rubber sealing ring to provide a tight flexible seal in conformance with ASTM D 3212. The laying length of pipe joints shall be a maximum of twenty feet (20').

Unless otherwise noted in these specifications or construction plans, Ductile Iron pipe and fittings for gravity sewer shall conform to Article 501 of these Technical Specifications for DIP water main except pipe shall be interior Protecto 401 ceramic epoxy lined in accordance with manufacturer's recommendations. Where sanitary sewer main is to be placed between building lots in a sideline easement, the sewer main shall, insofar as possible, be constructed without manholes or lateral connections within the side easement. The pipe material in the side easement between streets shall be C 900, SDR 18 polyvinyl chloride water main pipe as described in these Technical Specifications Article 501. A two-way cleanout shall be installed on each lateral at the property line.

403-1.2. FORCE MAIN PIPE

FORCE MAIN PIPE SHALL BE POLYVINYL CHLORIDE OR DUCTILE IRON. Unless otherwise noted in the specifications or construction plans, both polyvinyl chloride and ductile iron force main pipe and fittings shall conform to Article 501 of these Technical Specifications for water main pipe except that DIP shall be Protecto 401 ceramic epoxy lined in accordance with manufacturer's recommendations.

All polyvinyl chloride pipe which has become deteriorated due to exposure to ultra violet radiation shall be rejected.

403-2. INSTALLATION

403-2.1. GRAVITY SEWER PIPE

Installation of Thermoplastic gravity sewer pipe shall be in conformance with recommended practices contained in ASTM D 2321.

The bottom trench width in an unsupported trench shall be limited to the minimum practicable width (typically pipe OD plus eight inches (8") to twelve inches (12") on each side) allowing working space to place and compact the haunching material. The use of trench boxes and movable sheeting shall be performed in such a manner that removal, backfill and compaction will not disturb compacted haunching material or pipe alignment.

Dewatering of the trench bottom shall be accomplished using adequate means to allow preparation of bedding, placement of the haunching material and pipe in the trench without standing water.

Dewatering shall continue until sufficient backfill is placed above the pipe to prevent flotation or misalignment.

Where pipe bedding is insufficient to adequately support pipe, the Contractor will be required to remove unsuitable material and bed pipe in Class I material (one half inch (1/2") diameter aggregate) to provide firm support of pipe.

Connections to manholes with sanitary pipe shall use a joint two (2) feet in length and shall use an approved water stop around pipe joint entry.

The laterals shown on the plans do not necessarily reflect exact locations. The Contractor is required to locate all existing laterals for reconnection and to coordinate with the construction inspector the location of all new laterals.

403-2.2. FORCE MAIN PIPE

Installation of force main pipe shall be in conformance with Article 501 of these Technical Specifications for water main pipe.

403-3. TESTING

403-3.1. TESTING OF GRAVITY SEWERS

The Contractor shall take all precautions to secure a perfectly water tight sewer under all conditions. The water tightness of a sewer which has a crown lying below groundwater level may be tested by measuring infiltration. The water tightness of sewers having crowns lying above groundwater level may be tested by filling the pipe with water so as to produce a hydrostatic head of two feet or more above the crown of the sewer at the upper end of the test section or the water table outside of the sewer, whichever is higher, and then measuring the exfiltration. In no case shall the infiltration or exfiltration exceed fifty (50) gallons per inch of diameter per mile per day. The Contractor shall furnish all labor, materials and equipment to test the amount of infiltration or exfiltration under the Engineer's direction. Where the infiltration or exfiltration is excessive, the Contractor at their own expense shall take the necessary steps to remedy such conditions by uncovering the sewer, remaking the joints or by replacing the entire length of sewer as required by the Engineer. No such repaired joints may be backfilled until after they have been tested and found to be acceptable. Care shall be taken to avoid flotation. The Contractor shall TV inspect all mains to verify the true and uniform grade and the absence of bellies or dropped joints prior to acceptance. Any dips or sags of more than five percent (5%) of the inside pipe diameter dimension shall be cause for rejection. The above tests shall be performed at the discretion of the Engineer on any or all sections of the line.

403-3.2. TESTING OF FORCE MAINS

Force mains shall be tested under a hydrostatic pressure of 150 psi for two (2) hours, as described in Article 501 of these Technical Specifications for the testing of water mains.

403-4. BASIS OF PAYMENT

403-4.1. GRAVITY SEWER PIPE

Payment for in place sanitary sewer gravity main pipe shall be the unit price per linear foot per appropriate range of depth of cut as contained in the contract proposal. Measurement for payment shall be along the centerline of the sewer main from center to center of manholes.

Payment for laterals shall be the unit price per linear foot of pipe as measured from the centerline of the sewer main pipe to the terminal end of the lateral pipe including a two-way cleanout at the property line.

Payment for sewer pipe shall include all labor, equipment and materials necessary to complete the installation. This shall include clearing and grubbing, excavation, shoring and dewatering, backfill and grading.

403-4.2. FORCE MAIN PIPE

Payment and measurement of force main pipe shall be the same as described in Article 501 of these Technical Specifications for water main pipe.

404. HDPE DEFORMED - REFORMED PIPE LINING

404-1. INTENT

It is the intention of this specification to provide for the trenchless restoration of eight inch (8") to twelve inch (12") sanitary sewers by the installation of a high density polyethylene, jointless, continuous, fold and form pipe liner which is watertight and chemically resistant to withstand exposure to domestic sewage including all labor, materials and equipment to provide for a complete, fully restored and functioning installation.

404-2. PRODUCT AND CONTRACTOR/INSTALLER ACCEPTABILITY

The City requires that all contractors be prequalified. See General Conditions regarding contractor prequalification. In addition, the City requires a proven extensive track record for the fold and form liner system to be used in this project. All contractors submitting for prequalification approval for this project must exhibit extensive satisfactory experience in the installation of the proposed liner system and satisfactory evidence that the proposed liner system has been extensively and successfully installed in the Unites States and the State of Florida. The installer must be certified by the liner system manufacturer for installation of the liner system. The City reserves full and complete authority to approve the satisfactory nature of the both the liner system and the installer.

404-3. MATERIALS

Pipe shall be made from P. E. 3408 polyethylene resins complying with ASTM D 3350, cell classification: P.E. 345434 D for High Density. It shall be Type 3, Grade 4, Class D, according to ASTM D 1248. The Contractor shall provide certified test results for review by the Engineer, from the manufacturer, that the material conforms with the applicable requirements. Material shall have

a minimum thickness of SDR 32.5. Pipe specimens shall comply with the minimum property values shown below with the applicable ASTM requirements:

Material	Property	ASTM Method	Value
HDPE	Tensile Strength	D 638	3,300 psi
HDPE	Elasticity Modulus		E=113,000 psi
	Impact Strength	D 256 A	3.0 ft-lb/in
	Flexure Modulus		E=136,000 psi
	Expansion Coeff.		c=0.009 in/in/deg F

At the time of manufacture, each lot of liner shall be reviewed for defects and tested in accordance with ASTM D 2837 and D 1693. At the time of delivery, the liner shall be homogeneous throughout, uniform in color, free of cracks, holes, foreign materials, blisters, or deleterious faults. The Contractor shall provide, as requested, certified test results for review by the Engineer, from the manufacturer, that the material conforms with the applicable requirements. The Engineer may at any time request the Contractor provide test results from field samples to the above requirements.

Liner shall be marked at five (5) foot intervals or less with a coded number, which identifies the manufacturer, SDR, size, material, date, and shift on which the liner was extruded.

Lining manufacturer shall submit to the Engineer for approval as requested, complete design calculations for the liner thickness. The criteria for liner design shall be HS-20 traffic loading, water table to the ground surface, minimum expected lifetime of fifty (50) years, and no structural strength retained from the existing pipe. Any liner system must be approved by the Engineer prior to receiving bids. Request for contractor prequalification and/or liner system approval must be received by the Engineer no later than fourteen (14) days prior to the date for receiving bids.

404-4. CLEANING/SURFACE PREPARATION

It shall be the responsibility of the Contractor to clean and prepare the existing pipes for rehabilitation. The Contractor will thoroughly clean the interior of the sewers to produce a clean interior surface free of all coatings, sand, rock, roots, sludge, or other deleterious materials prior to liner insertion. Bypass pumping will be provided by the Contractor as part of the unit cost of restoration. Bypass operations are to be so arranged as to cause minimum disruptions to local traffic, residents and particularly to commercial facilities. During the cleaning and preparation operations all necessary precautions shall be taken to protect the public, all property and the sewer from damage.

All material removed from the sewers shall be the Contractor's responsibility for prompt disposal in accordance with all regulatory agency requirements. The Contractor may be required to control the rate of sewer cleaning in the sanitary system to avoid heavy pollution loads at the City's treatment plants.

404-5. TELEVISION INSPECTION

After cleaning, and again after the rehabilitation work on each section of the project is completed, all pipe sections shall be visually inspected with a digital camera and recorded in DVD format as specified below.

404-5.1. VIDEO, PHOTO CAPTURE AND DATA COLLECTION REQUIREMENTS FOR MANHOLE AND PIPELINE INSPECTION

This section describes the requirements of the Contractor in providing the following minimum requirements for Video, Photo Capture and Database structure to the City. The City is currently using CUES Granite XP video and data collection software. The Contractor shall provide the TV Inspections in the same Granite XP database, photo and video capture format. The Contractor-provided TV Inspections, Database, DVDs, Photos and related files shall have the ability to direct synchronize to the City's existing Granite XP database.

404-5.2. IMAGE (PHOTOS) CAPTURE FORMAT AND REQUIREMENTS

The Inspection image files (pictures) shall have the ability to export to Industry Standard Formats to include JPEG, BMP, and TIFF formats and be transferable by disk, DVD and/or external hard drive to an external personal computer utilizing standard viewers and printers.

404-5.3. DIGITAL VIDEO FORMAT AND REQUIREMENTS

Digital video files (Inspection Videos) shall be captured and/or recorded in the MPEG 1, 2 or 4 format or as specified by the City. The Video capture files shall be in MPEG format with data linking (Inspection Observations) to the database file(s). The "Link" of the video capture file to the database observation file is required. The inspection observation(s) shall link to the video record in real-time.

The accompanying database shall support the following code systems: WRc, PACP, CUES standard, or current code system being utilized by the City. The Database and Software program (Granite XP V2.X) shall be able to import asset data from an ArcGIS (City current version) geo-database file utilizing the network features to associate Sewer Mains with corresponding Sewer Nodes.

The database structure shall retain information on the various structures found within a sewer or storm system. It is important that the structures, nodes, manholes and pipe identifiers and related attribute information be retained as separate tables from the Inspection allowing import of existing data from multiple sources. The data structure allows different projects to reside within a single database. Information gathered in projects shall be available to view by project or by system. Data gathered during project inspection shall be available to view by the selected structure. Therefore, all inspections can be viewed on a structure even if gathered in different projects.

404-5.4. SYNCHRONIZATION

The database shall have the ability to synch assets and inspections from replicated databases. The synch process should have built-in error checking for duplicates, updates and any modifications to

the data being synched. This allows for multiple sources of data to be effectively consolidated into a single unitary database for analysis and evaluation.

404-6. LINER INSTALLATION

Liner shall be sized to field measurements obtained by the Contractor to provide a tight fit to the full interior circumference of the existing sanitary sewer and shall be a continuous, jointless liner product from inside of manhole to inside of manhole. Contractor shall use installation methods approved by the liner manufacturer including liner placement, reforming to fit existing pipe, pressure and heat requirements and reconnection of laterals. The Contractor shall immediately notify the Engineer of any construction delays taking place during the insertion operation. Contractor shall maintain a reasonable backup system for bypass pumping should delays or problems with pumping systems develop. Liner entries at manholes shall be smooth, free of irregularities, and watertight. No pinholes, tears, cracks, thin spots, or other defects in the liner shall be permitted. Such defects shall be removed and replaced by the Contractor at their expense. OSHA requirements for installation procedures, in particular, confined spaces are to be met.

404-7. LATERAL RECONNECTION

Sanitary laterals shall be reconnected as soon as possible to renew service. Laterals are to be reconnected by means of robotics, by internally cutting out the liner to 100% of the area of the original opening. All lateral reconnections are to be grouted to prevent leakage. Grouting method and material is to be approved by the Engineer.

Any reconnections to laterals and connections to manholes which are observed to leak shall be resealed by the Contractor. All laterals discovered during the lining process are to be reconnected unless specifically directed otherwise by the City. Contractor shall notify all local system users when the sanitary system will not be available for normal usage by the delivery of door hangers with appropriate information regarding the construction project.

404-8. TIME OF CONSTRUCTION

Construction schedules will be submitted by the Contractor and approved by the Engineer. At no time will any sanitary sewer service connection remain inoperative for more than an eight (8) hour period without a service bypass being operated by the Contractor. In the event that sewage backup occurs and enters buildings, the Contractor shall be responsible for cleanup, repair and property damage costs and claims.

404-9. PAYMENT

Payment for sanitary sewer restoration shall be made per linear foot including all preparation, bypass pumping, equipment, labor, materials, operations, restoration, etc., to provide a fully completed and operational sewer. Payment shall be measured from center of manhole to center of manhole for the sanitary systems and from end of pipe to end of pipe for storm systems.

405. SANITARY MANHOLE LINER RESTORATION

405-1. SCOPE AND INTENT

It is the intent of this portion of the specification to provide for the structural rehabilitation of manhole walls and bases with solid preformed liners and made-in-place liner systems used in accordance with the manufacturer's recommendations and these specifications. In addition to these specifications, the Contractor shall comply with manufacturer's instructions and recommendations for work. Purpose of work is to eliminate infiltration, provide corrosion protection, repair voids and to restore the structural integrity of the manhole. For any particular system the Contractor will submit manufacturer's technical data and application instructions. All OSHA regulations shall be met.

405-2. PAYMENT

Payment for liners shall be per vertical foot of liner installed from the base to the top of the installed liner. Liners will generally be installed to the top of existing or new corbels. No separate payment will be made for the following items: Bypass pumping; Traffic Control; Debris Disposal; Excavation, including necessary pavement removal; Shoring and/or dewatering; Structural fill; Backfill and compaction; Grout and mortar; Brick; Resetting of the manhole ring and cover; Pipe extensions and connectors necessary to the installation; Replacement of unpaved roadway and grass or shrubbery plot; Replacement of roadway base and asphalt surface; and Appurtenant work as required for a complete and operable system. The cost of such work shall be included in the pay item, per linear foot of liner.

405-3. FIBERGLASS LINER PRODUCTS

405-3.1. MATERIALS

405-3.1.1. LINERS

Liners shall be fiberglass engineered to meet or exceed AASHTO H 20 loading of 16,000 pound vertical wheel load. Manhole liners are to be of the integral corbel design unless otherwise stipulated. Manhole liners are to be as large in diameter as will fit into the existing manhole. The Contractor shall measure the existing manhole immediately prior to ordering materials and is solely responsible for the fitting of the liner. Contractor will be required to submit factory certification for fiberglass liners. The manhole liner shall meet all requirements of ASTM D 3753.

405-3.1.2. MORTAR

Mortar shall be composed of one part Portland Cement Type I and between two (2) and three (3) parts clean, well graded sand, 100% of which shall pass a No. 8 sieve.

405-3.1.3. GROUTING

Grouting shall be a concrete slurry of four (4) bags of Portland Cement Type II per cubic yard of clean, well graded sand.

405-3.2. INSTALLATION AND EXECUTION

Excavate an area around the top of the existing manhole sufficiently wide and deep for the removal of the manhole ring and corbel section.

Remove the frame and cover and corbel section without damaging the existing manhole walls. Care is to be taken not to allow brick or soil to fall into the existing manhole.

Remove or reinsert loose brick which protrude more than one inch from the interior wall of the manhole and which could interfere with the insertion of the fiberglass liner.

If the shelf of the manhole invert is not level around the perimeter, form a flat shelf with mortar.

Cut the liner to the proper length. Cutouts in the manhole shall be made to accommodate existing inlet and outlet pipes, drops and cleanouts.

Lower the liner into the existing manhole and set the bottom of the liner into quick setting grout. Obtain a good bottom seal to prevent the loss of grout from the annular space between the outside of the liner and the inside wall of the existing manhole. Set the liner as nearly vertical as possible. Pour six inches (6”) of quick setting grout above the initial bottom seal in the annular void to insure an adequate bottom seal.

Bridge the gap from drops, laterals, force mains, cleanouts and all existing piping between the existing manhole wall and the new manhole liner with P.V.C. pipe. Use quick setting mortar to seal the area around the manhole liner and piping.

Fill the annular space between the manhole liner and the existing manhole interior walls with grout. Care must be taken not to deflect the manhole liner due to head pressure.

Set the existing manhole ring and cover using brick to make elevation adjustments as needed.

Observe water tightness and repair any visible leakage.

Backfill around the new liner and compact the backfill. Sod the disturbed area. Match existing sod.

Where manholes fall in paved areas, refer to Standard Detail Index 104, “Street and Driveway Replacement for Concrete and Asphaltic Concrete Surfaces”.

405-4. STRONG SEAL MS-2 LINER PRODUCT SYSTEM

This specification shall govern all work to spray apply a monolithic fiber reinforced cementitious liner to the wall and bench surfaces of brick, concrete or any other construction material; Strong Seal MS 2 product.

Described are procedures for manhole preparation, cleaning, application and testing. The applicator must be approved, trained and certified as having successfully completed factory training. The applicator/contractor shall furnish all labor, equipment and materials for applying the Strong Seal MS 2 product directly to the contour of the manhole to form a structural cementitious liner of a minimum one half inch (1/2") thickness using a machine specially designed for the application. All aspects of the installation shall be in accordance with the manufacturer's recommendations and with the following specifications which includes:

1. The elimination of active infiltration prior to making the application.
2. The removal of any loose and unsound material.

3. The spray application of a pre blended cementitious mix to form a monolithic liner in a two (2) coat application.

405-4.1. MATERIALS

405-4.1.1. PATCHING MIX

Strong Seal shall be used as a patching mix according to the manufacturer's recommendations and shall have the following minimum requirements:

1. Compressive Strength (ASTM C-109)	15 min., 200 psi	6 hrs., 1,400 psi
2. Shrinkage (ASTM C-596)	28 days, 150 psi	
3. Bond (ASTM C-952)	28 days, 150 psi	
4. Cement	Sulfate resistant	
5. Density, when applied	105 +/- 5 pcf	

405-5. INFILTRATION CONTROL

Strong Plug shall be used to stop minor water infiltration according to the manufacturer's recommendations and shall have the following minimum requirements:

1. Compressive strength (ASTM C-109) - 600 psi, 1 hr.; 1000 psi 24 hrs.
2. Bond (ASTM C-952) - 30 psi, 1 hr.; 80 psi, 24 hrs.

405-6. GROUTING MIX

Strong-Seal Grout shall be used for stopping very active infiltration and filling voids according to the manufacturer's recommendations. The grout shall be volume stable and have a minimum twenty-eight (28) day compressive strength of 250 psi and a one (1) day strength of 50 psi.

405-7. LINER MIX

Strong Seal MS 2 shall be used to form the monolithic liner covering all interior manhole surfaces and shall have the following minimum requirements at twenty-eight (28) days:

1. Compressive strength (ASTM C 109)	3,000 psi
2. Tensile strength (ASTM C 496)	300 psi
3. Flexural strength (ASTM C 78)	600 psi
4. Shrinkage (ASTM C 596)	0% at 90% R.H.
5. Bond (ASTM C 952)	130 psi
6. Density, when applied	105 + pcf

Product must be factory blended requiring only the addition of water at the Project site. Bag weight shall be 50 to 51 pounds and contents shall have dry bulk density of 54 to 56 pounds per cubic foot. Fiberglass rods which are contained in the product shall be alkaline resistant and shall be one-

half inch (1/2") to five-eighths inch (5/8") long with a diameter of 635 to 640 microns. Products shall, in the unmixed state, have a lead content not greater than two percent (2%) by weight.

Strong Seal MS 2C shall be made with Calcium Aluminate Cement and shall be used according to the manufacturer's recommendations in applications where there is evidence of severe sulfide conditions.

Product must be factory blended requiring only the addition of water at job site.

Bag weight shall be 50 to 51 pounds and contents must have a dry bulk density of 50 to 56 pounds per cubic foot.

Cement content must be 65% to 75% of total weight of bag.

One bag of product when mixed with correct amount of water must have a wet density of 95 to 108 pounds per cubic foot and must yield a minimum of 0.67 cubic foot of volume.

Fiberglass rods must be alkaline resistant with rod lengths not less than one-half inch (1/2") in length nor greater than five-eighths inch (5/8") in height.

Product shall not include any basic ingredient that exceeds maximum allowable EPA limit for any heavy metal.

Manufacturer must provide MSDS sheets for product(s) to be used in reconstruction process.

A two (2) coat application of liner material will be required (no exceptions) with the first coat rough troweled to force materials into cracks and crevices to set the bond. The second coat to be spray applied to assure a minimum of one-half inch (1/2") thickness after troweling or brush finishing to a relatively smooth finish.

405-8. WATER

Shall be clean and potable.

405-9. OTHER MATERIALS

No other material shall be used with the mixes previously described without prior approval or recommendation from the manufacturer.

405-10. EQUIPMENT

A specially designed machine consisting of an optimized progressive cavity pump capable of producing a minimum of 250 psi pumping pressure, contra blend mixer with twin ribbon paddles with discharge, and an air system for spray application of product. Equipment must be complete with water storage and metering system. Mixer and pump is to be hydraulically powered. Equipment is to be mounted to heavy duty construction tandem axle road worthy trailer complete with electric brakes and running lights. Internal combustion engine must be included to power the hydraulic system and air compressor.

405-11. INSTALLATION AND EXECUTION

405-11.1. PREPARATION

1. Place boards over inverts to prevent extraneous material from entering the sewer lines and to prevent up stream line from flooding the manhole.
2. All foreign material shall be removed from the manhole wall and bench using a high pressure water spray (minimum 1,200 psi). Loose and protruding brick, mortar and concrete shall be removed using a mason's hammer and chisel and/or scraper. Fill any large voids with quick setting patching mix.
3. Active leaks shall be stopped using quick setting specially formulated mixes according to the manufacturer's recommendations. Some leaks may require weep holes to localize the infiltration during the application after which the weep holes shall be plugged with the quick setting mix prior to the final liner application. When severe infiltration is present, drilling may be required in order to pressure grout using a cementitious grout. Manufacturer's recommendations shall be followed when pressure grouting is required.
4. Any bench, invert or service line repairs shall be made at this time using the quick setting mix and following the manufacturer's recommendations.
5. After all preparation has been completed, remove all loose material.

405-11.2. MIXING

For each bag of product, use the amount of water specified by the manufacturer and mix using the Spray Mate Model 35C or 35D equipment for thirty (30) seconds to one (1) minute after all materials have been placed in the mixing hopper. Place the mix into the holding hopper and prepare another batch with timing such that the nozzleman can spray in a continuous manner without interruption until each application is complete.

405-11.3. SPRAYING

The surface, prior to spraying, shall be damp without noticeable free water droplets or running water. Materials shall be sprayed, applied to a minimum uniform thickness to insure that all cracks, crevices and voids are filled and a somewhat smooth surface remains after light troweling. The light troweling is performed to compact the material into voids and to set the bond. Not before the first application has begun to take an initial set (disappearance of surface sheen which could be fifteen (15) minutes to one (1) hour depending upon ambient conditions) is the second application made to assure a minimum total finished thickness of one-half inch (1/2”). The surface is then troweled to a smooth finish being careful not to over trowel so as to bring additional water to the surface and weaken it. A brush finish may be applied to the finished coat to remove trowel marks. Manufacturer's recommendation shall be followed whenever more than twenty-four (24) hours have elapsed between applications. The wooden bench covers shall be removed, and the bench is sprayed such that a gradual slope is produced from the walls to the invert with the thickness at the edge of the invert being no less than one-half inch (1/2”). The wall bench intersection shall be rounded to a uniform radius, the full circumference of the intersection. The final application shall have a minimum of four (4) hours cure time before being subjected to active flow.

405-11.4. PRODUCT TESTING

At some point during the application, at least four (4) two inch (2”) cubes may be prepared each day or from every fifty (50) bags of product used, identified and sent, in accordance with the Owner's or Manufacturer's directions, for compression strength testing as described in ASTM C 109.

405-11.5. CURING

Ambient manhole conditions are adequate for curing so long as the manhole is covered. It is imperative that the manhole be covered as soon as possible after the application has been completed.

405-11.6. MANHOLE TESTING AND ACCEPTANCE

Manhole may be vacuum tested from the top of manhole frame to the manhole base. All pipes entering the manhole shall be plugged, taking care to securely place the plug from being drawn into the manhole. The test head shall be placed, and the seal inflated in accordance with the manufacturers' recommendations. A vacuum pump of ten inches (10”) of mercury shall be drawn and the vacuum pump shut off. With the valves closed, the time shall be measured for the vacuum to drop to nine inches (9”). The manhole shall pass if the time is greater than sixty (60) seconds for forty-eight inch (48”) diameter, seventy five (75) seconds for sixty inch diameter (60”), and ninety (90) seconds for seventy-two inch (72”) diameter manholes. If the manhole fails the initial test, necessary repairs shall be made. Retesting shall proceed until a satisfactory test is obtained. Tests shall be performed by the Contractor under the direction of the Project Engineer.

405-12. INNERLINE ENVIRONMENTAL SERVICES LINER PRODUCT SYSTEM

405-12.1. SCOPE

Materials and application procedures for manhole rehabilitation for the purpose of restoring structural integrity, providing corrosion resistance, and stopping infiltration by means of:

1. Hydraulic grouting, where required, as a preliminary measure to stop high volume infiltration.
2. Hydrophilic grouting (positive side waterproofing), where required, as follows:
    a. Hydrophilic foam-injected through wall of manhole to fill voids, and/or
    b. Hydrophilic gel-injected through wall of manhole to stop active leaks
3. Cementitious waterproofing with crystallization (negative side waterproofing)
4. Calcium aluminate cement lining, minimum of one-half inch (1/2”)
5. Epoxy coating, minimum of thirty (30) dry mils

405-12.2. MATERIALS

405-12.2.1. REPAIRING CEMENT

A quick setting hydraulic cement compound shall be used to plug all visible minor leaks and to instantly stop major leaks, so that further waterproofing processes may proceed unhindered. The repairing cement shall be nonshrinking, nonmetallic, and noncorrosive. The compound shall have the following properties:

Set Time	1-3 minutes
Tensile Strength	1 day 510 psi
ASTM C 307	3 days 745 psi
	28 days 855 psi
Compressive Strength	1 day 3,125 psi
ASTM -C 109	7 days 7,808 psi
	28 days 9,543 psi
Flexural Strength ASTM C 78	1 day 410 psi
	3 days 855 psi
	28 days 1,245 psi

405-12.2.2. HYDROPHILIC GROUTING

Based on conditions found in and around the manhole, the applicator shall pressure inject either one or both of the following materials:

1. An expansive foam grout shall be used to stop major intrusion of water and fill cracks and voids behind the structure's surface. Physical properties are as follows:

Tensile Strength	380 psi	ASTM D 3574-86
Elongation	400%	ASTM D 3574-86
Bonding Strength	250-300 psi	

2. A hydrophilic gel grout shall be used for soil stabilization behind the manhole to prevent seepage, to provide a damming effect, and to place a hydrostatic barrier around exterior of manhole. Physical properties are as follows:

Density	8.75-9.17 lbs/gal	ASTM D-3574
Tensile Strength	150 psi	ASTM D- 412
Elongation	250%	ASTM D-3574
Shrinkage	Less than 4%	ASTM D-1042
Toxicity	Non Toxic	

405-12.2.3. WATERPROOFING

A waterproofing component based on the crystallization process shall be applied. The system combines cementitious and silicate based materials that are applied to negative side surfaces to seal and stop leakage caused by hydrostatic pressure. A combination of five coats (using three components-two powders and a special liquid) react with moisture and the constituents of the substrate to form the crystalline structure. It becomes an integral part of the structure and blocks the passage of water. With moisture present, the crystallization process will continue for

approximately six (6) months. Upon completion, the color will be light grey. Physical properties are as follows:

Slant/Shear bond Strength to Calcium Aluminate Cement ASTM C882 Modified	1,200 1,800 psi	
Tensile Strength (7 day cure) ASTM C 190	380 psi (2.62 MPa) 325 psi (2.24 MPa)	at 100% RH at 50% RH
Permeability (3 day cure) CRD 48 55	8.1xlO$^{\wedge-10}$ cm/sec to 7.6xlO$^{\wedge-11}$ cm/sec	

405-12.2.4. CEMENT LINING

A self-bonding calcium aluminate cement shall be applied to restore structural integrity and provide corrosion resistance qualities. The cement (before adding fibers) shall have the following properties:

Calcium Aluminate Cement		12 Hrs	24 Hrs	7 Days	28 Days
Astm C 495	Compressive Strength, Psi	7000	11000	12000	13000
Astm C 293	Flexural Strength, Psi	1000	1500	1800	2000
Astm C 596	Shrinkage At 90% Humidity	--	<0.04	<0.06	<0.08
Astm C 666	Freeze-Thaw Aft 300 Cycle	No Damage			
Astm C 990	Pull - Out Strength	200 - 230 Psi Tensile			
Astm C 457	Air Void Content (7 Days)	3%			
Astm C 497	Porosity/Adsorption Test	4 - 5%			

Modules of Elasticity: 7.10 X 10 PSI after twenty-four (24) hours moist curing at 68 degrees Fahrenheit.

The calcium aluminate cement shall be reinforced with inert fibers which comply with ASTM C 1116 and ASTM C 1018, added at the rate of one (1) pound per cubic yard of concrete. The mixture shall be applied to a thickness of at least one half inch (1/2”), but no greater than two inches (2”). It will have a dark grey color.

405-12.2.5. EPOXY COATING

A high build, flexible waterproofing epoxy shall be applied to a minimum of thirty (30) dry mils. This epoxy will seal structure from moisture and provide protective qualities to the surface, including excellent resistance to chemical attack and abrasion. The epoxy shall be 100% solids, can be applied to damp surfaces, cures to a tile like finish, is easy to clean, and has no toxic fumes. Its uses include sewage treatment plants and other sewer structures. The epoxy shall have the following properties at 75 degrees Fahrenheit:

Mixing Ratio (Parts A:B), by volume	1:1
Color (other colors available on request)	Light Gray

Pot Life, hrs	1
Tensile Strength, psi, min	2,000
Tensile Elongation, %	10 –20
Water Extractable Substances, mg./sq. in., max	5
Bond Strength to Cement (ASTM 882) psi	1,800

405-12.2.6. CHEMICAL RESISTANCE

The sanitary sewer liner shall be resistant to: Alcohols, Trichloroethylene, Nitric Acid (3%), Jet Fuels, Water, Sulfuric Acid (3% 10%), MEK, Wine, Butyl Acetate, Beer, Lactic Acid (3%), Gasoline, Corn Oil, Aluminum Sulfate, Paraffin Oil, Vegetable Juice, Sodium Chloride, Motor Oil, Hydrochloric Acid (3%), and many others.

405-12.3. INSTALLATION AND EXECUTION

405-12.3.1. PROCEDURAL OVERVIEW

Work shall proceed as follows:

1. Remove rungs (steps), if desired by client.
2. Clean manhole and remove debris.
    a. Plug lines and/or screen out displaced debris.
    b. Apply acid wash, if necessary, to clean and degrease.
    c. Hydroblast and/or sand blast structure.
    d. Remove debris from work area.
3. Repair minor defects in walls, benches, and inverts, as required, with repairing cement. (Note: Major structural repairs, such as rebuilding of benches, will also be made as required by client.)
4. Inject hydrophilic grout through all surfaces, as needed, to eliminate infiltration.
5. Apply cementitious/crystallization waterproofing agents to all surfaces, repeating steps as needed.
6. Spray and/or hand apply calcium aluminate cement lining to all surfaces.
7. Spray apply epoxy coating to all surfaces.

NOTE: Steps 1-5 shall be executed consecutively with minimal delays; calcium aluminate (Step 6) shall require a cure time of at least twenty-four (24) hours for needed adhesion of epoxy (Step 7) to cement lining.

405-12.3.2. PREPARATION

An acid wash shall be used (if needed) to clean and degrease. Then, if the client desires, the rungs shall be removed. Next, the entire structure is thoroughly water and/or sand blasted to remove any loose or deteriorated material. Care shall be taken to prevent any loose material from entering lines and other areas by either plugging the lines (where feasible) or inserting protective screens.

405-12.3.3. STRUCTURAL REPAIR

Hand place or spray apply hydraulic cement material as necessary to prepared surface to fill cracks and voids in structure. Allow twenty (20) minutes before applying waterproofing/crystallization.

405-12.3.4. INFILTRATION CONTROL

Pressure injection of hydrophilic gel and hydrophilic foam.

1. Drill five-eighths inch (5/8") holes through active leaking surface.
2. Install all zert fittings, as recommended by manufacturer.
3. Inject material until water flow stops.
4. Remove fittings (if necessary).

405-12.3.5. WATERPROOFING/CRYSTALLIZATION PROCESS

1. Apply a slurry coat of powder #l to moist wall using a stiff brush, forming an undercoat.
2. Apply dry powder #2 to slurry coat by hand.
3. Brush or spray on sealing liquid during the application to penetrate and initiate the crystal forming process.
4. Repeat steps 2 and 3, until there are no visible leaks.
5. Apply powder #l as an overcoat.
6. Allow one (1) hour to cure before applying cement lining.

405-12.3.6. CEMENT LINING

1. Dampen surface.
2. Mix material in mixer as recommended for spray or hand trowel application.
3. Apply cement until required build up of at least one half inch (1/2”) (and no more than two inches (2”)) has been achieved.
4. Trowel to smooth finish, restoring contours of manhole.
5. Texture brush surface to prepare for epoxy finish.
6. Allow for a twenty-four (24) hour cure time prior to epoxy coating.

NOTE: If conditions of heavy humidity prevail, a dry air blower shall be used to facilitate curing times.

405-12.3.7. EPOXY COATING

Spray apply epoxy coating using airless spraying equipment until surface is visibly covered and a thickness of at least thirty (30) mils has been achieved. Manhole may be safely entered after six (6) hours, as epoxy will be hardened. Full cure strength will be achieved at forty eight (48) hours.

405-12.3.8. CLEAN UP

The work crew shall remove all debris and clean work area.

405-12.3.9. MANHOLE TESTING AND ACCEPTANCE

Manhole may be vacuum tested from the top of manhole frame to the manhole base. All pipes entering the manhole shall be plugged, taking care to securely place the plug from being drawn into the manhole. The test head shall be placed, and the seal inflated in accordance with the manufacturer's recommendations. A vacuum pump of ten inches (10") of mercury shall be drawn and the vacuum pump shut off. With the valves closed, the time shall be measured for the vacuum to drop to nine inches (9"). The manhole shall pass if the time is greater than sixty (60) seconds for a forty eight inch (48") diameter, seventy five (75) seconds for sixty (60) inches, and ninety (90) seconds for seventy-two inch (72") diameter manholes. If the manhole fails the initial test, necessary repairs shall be made. Retesting shall proceed until a satisfactory test is obtained. Tests shall be performed by the Contractor under the direction of the Project Engineer.

405-12.3.10. WARRANTY

All materials and workmanship shall be warranted to the Owner for a period of five (5) years, provided that all the above mentioned repair steps are used.

500 SERIES: POTABLE AND RECLAIMED WATER MAINS, FIRE LINES AND APPURTENANCES

501. SCOPE

The Contractor shall furnish all plant, labor, materials and equipment to perform all operations in connection with the construction of potable water mains, fire lines, reclaimed water mains and appurtenances including clearing, excavation, trenching, backfilling and clean up.

502. MATERIALS

502-1. GENERAL

Materials, equipment and supplies furnished and permanently incorporated into the project shall be of first quality in every respect and shall be constructed and finished to high standards of workmanship. Materials shall be suitable for service intended, shall reflect modern design and engineering and shall be fabricated in a first class workmanlike manner. All materials, equipment and supplies shall be new and shall have not been in service at any time previous to installation, except as required in tests or incident to installation. Machined metal surfaces, exposed bearings and glands shall be protected against grit, dirt, chemical corrosion and other damaging effects during shipment and construction.

502-2. PIPE MATERIALS AND FITTINGS

502-2.1. DUCTILE IRON PIPE

Ductile Iron Pipe shall be in accordance with ANSI/AWWA C151/A21.51 81 or latest revision. Pipe thickness class, wall thickness and working pressure shall conform to the following table:

Size	Class	Thickness (In.)	Rated Water Working Pressure (PSI)
4”	51	0.26	350
6”	50	0.25	350
8”	50	0.27	350
12”	50	0.31	350

The trench laying condition shall be Type 2, Flat bottom trench backfill lightly consolidated to centerline of pipe.

Pipe shall be manufactured in accordance with ANSI/AWWA C151/A21.51 81 or latest revision.

Pipe shall be asphalt coated on the outside and standard cement lined and sealed coated with approved bituminous seal coat in accordance with ANSI/AWWA C104/A21.4 80 or latest revision.

Ductile iron pipe shall be used for all hydrant installations and for fire line installations from the main to the backflow preventer.

502-2.2. POLYVINYL CHLORIDE (PVC) PIPE

Polyvinyl Chloride (PVC) Pipe four inch (4”) through eight inch (8”) shall be in accordance with ANSI/AWWA C900 or latest revision and the American Society for Testing Materials (ASTM) Standard D 2241 and PVC Resin Compound conforming to ASTM Specification D 1784.

Polyvinyl Chloride Pipe shall have the same O.D. as Cast and Ductile Iron Pipe and be compatible for use without special adapters with Cast Iron Fittings.

Pipe dimension ratio, working pressure and laying length shall conform to the following table:

Size	Dimension Ratio (OD/Thick.)	Rated Water Working Pressure (PSI)	Laying Length (Ft)
4	18	150	20
6	18	150	20
8	18	150	20

Pipe larger than eight inch (8”) shall be ductile iron. The City Engineer reserves the right to require the use of ductile iron in sizes four inch (4”) through eight inch (8”) when needed due to laying conditions or usage.

The bell of four inch (4”) and larger PVC pipe shall consist of an integral wall section with a solid cross section elastomeric ring which meets the requirements of ASTM D 1869.

Each length of pipe shall bear identification that will remain legible during normal handling, storage and installation and so designate the testing agency that verified the suitability of the pipe material for potable water service.

All polyvinyl chloride pipe shall be laid with two (2) strands of insulated twelve (12) gauge A.W.G. solid strand copper wire taped to the top of each joint of pipe with about eighteen inches (18”) between each piece of tape. It is to be installed at every valve box through a two inch (2”) PVC pipe to twelve inches (12”) minimum above the top of the concrete slab. The two inch (2”) PVC pipe shall be the same length as the adjustable valve box, and the two inch (2”) PVC pipe shall be plugged with a two inch (2”) removable brass plug with recessed nut. This wire is to be continuous with splices made only by direct bury 3M brand splice kit approved by the Engineer. This wire is to be secured to all valves, tees and elbows.

502-2.3. FITTINGS AND JOINTS

Fitting from four inch (4”) through sixteen inch (16”) in size will be compact ductile iron cast in accordance with ANSI/AWWA C153/A 21.53 with mechanical joint bells. Bolts, nuts and gaskets shall be in accordance with requirements of ANSI/AWWA C153/A 21.53. The working pressure rating shall be 350 psi. Ductile iron fittings shall be coated and lined in accordance with requirements of ANSI/AWWA C104/A21.4. Mechanical joint glands shall be ductile iron in accordance with ANSI/AWWA C111/A 21.11. When reference is made to ANSI/AWWA

Standards, the latest revisions apply. Only those fittings and accessories that are of domestic (USA) manufacture will be acceptable.

502-2.4. RESTRAINT

Restraint of plugs, caps, tees, bends, etc., shall be accomplished by the use of approved mechanical restraining rings or glands installed per manufacturer's recommendations. Hydrants shall be restrained by the use of swivel connecting joints. Restraining mechanical joint glands on hydrants shall be used only where hydrant runout length precludes the use of swivel joint connectors.

502-2.5. PIPE WITHIN CASING

All pipe placed within casings shall be slip joint ductile iron restrained by the use of restraining gaskets designed for use with the particular joint being installed and have properly sized casing spacers (Cascade Series) installed on the pipe so that the pipe will be centered within the casing. Each end of the casing shall be properly sealed to prevent the intrusion of soil, water, or debris within the casing itself. It shall be sealed by brick and mortar, cement or any approved method by the Engineer.

502-3. GATE VALVES

Discs of valves shall be operated by methods which will allow operation in any position with respect to the vertical. Gate valves for interior piping or exposed above grade outside structures, shall be hand wheel operated with rising stems. Valves four inches (4") and larger, buried in earth shall be equipped with two inch (2") square operating nuts, valve boxes and covers. Valves shall be fitted with joints suitable for the pipe with which they are to be used. The direction of opening for all valves shall be to the left (counter clockwise).

Unless otherwise shown or specified, valves for high pressure service shall be rated at not less than 150 psi cold water, non-shock.

The manufacturer's name and pressure rating shall be cast in raised letters on the valve body.

Installation shall be in accordance with good standard practice. Exposed pipelines shall be so supported that their weight is not carried through valves.

Two Inch (2") diameter and smaller are not allowed. These should be approved ball valves.

Three Inch (3") diameter are not allowed.

Gate Valves, four inch (4") to sixteen inch (16") diameter, inclusive, shall be resilient seated gate valves encapsulated with EPDM Rubber in conformance with ANSI/A.W.W.A. Standard Specification C509-515 latest revision. These valves shall include the following features consistent with C509-515, full opening unobstructed waterway, zero leakage at 200 psi differential pressure, all internal parts removable from bonnet without removing body from pressure main, corrosion resistant bronze or stainless steel nonrising stem with O-ring bonnet seal with epoxy coated inside and outside cast iron or ductile iron valve body.

Gate valves larger than sixteen inches (16") shall be suitable for the service intended and shall be resilient seated gate valves encapsulated with EPDM rubber in conformance with ANSI/AWWA. These valves shall include the following features consistent with C509-80, full opening unobstructed waterway, zero leakage at 200 psi differential pressure. All valves shall be equipped

with steel cut bevel gears, extended type gear case and rollers, bronze or babbitt tracks and scrapers and valved by-pass.

502-4. VALVE BOXES

Valve boxes shall be of standard extension design and manufacture and shall be made of cast iron. No PVC Risers or Derisers are allowed as part of a valve box assembly. They are to be three-piece valve box assemblies. The lower part of the assembly can be ordered in various heights to accommodate different depths. Suitable sizes of valve boxes and extension pieces shall be provided where shown. The valve box cover shall be of cast iron. Valve boxes and their installation shall be included in the bid price for valves. Refer to City Index No. 402; Sheet 1 of 5 & Sheet 2 of 5 for potable water valve pad detail, and City Index No. 502; Sheet 1 of 2 & Sheet 2 of 2 for reclaimed water valve boxes and pad detail.

502-5. HYDRANTS

No other hydrants, other than those listed below, may be used in extension to or replacement of the City of Clearwater potable water system:

- Kennedy Guardian #K 8lD Fire Hydrant,
- Mueller Super Centurion 25 Fire Hydrant
- AVK Nostalgic 2780.
- American Darling B-84-B.

No substitutions shall be allowed without the approval of the City of Clearwater.

Above hydrants shall be in accordance with the latest revision of the AWWA Specification C 502 and include the following modifications:

1. All shipments to be palletized and tailgate delivery.
2. Hydrants shall conform to A.W.W.A. Standard C-502 latest revision and must be UL/FM listed.
3. Hydrants shall be of the compression type, closing with line pressure.
4. The operating threads will be contained in an operating chamber sealed at the top and bottom with an O-ring seal. The chamber will contain a lubricating grease or oil.
5. Hydrants shall be of the traffic model breakaway type, with the barrel made in two sections with the break flange located approximately two inches (2”) above the ground line. Breakaway bolts are not allowed.
6. Operating nut shall be of one-piece bronze or ductile iron construction.
7. A dirt shield shall be provided to protect the operating mechanism from grit buildup and corrosion due to moisture.
8. A thrust washer shall be supplied between the operating nut and stem lock nut to facilitate operation.
9. Operating nut shall be a #7 one and a half inch (1-1/2”) pentagon nut.

10. Nozzles shall be of the tamper resistant, one quarter (1/4) turn type with O-ring seals or threaded into upper barrel. Nozzles shall be retained with a stainless steel locking device.
11. The main valve shall be of EPDM solid rubber.
12. The seat shall be of a bronze ring threaded to a bronze insert in the hydrant shoe, with O-rings to seal the barrel from leakage of water in the shoe.
13. The main valve stem will be 304 or higher grade stainless steel and made in two sections with a breakable coupling.
14. Hydrant shall have a six inch (6") Mechanical Joint epoxy lined elbow, less accessories.
15. Hydrant shall have a five and one quarter inch (5-1/4") valve opening, and shall be a left hand operation to open.
16. Hydrant shall be without drains.
17. Hydrant shall have two (2) two and one half inch (2-1/2") hose nozzles and one (1) four and one half inch (4-1/2") pumper nozzle. Threads shall be in accordance with the National Standard Hose Coupling Thread Specifications.
18. Hydrant body shall have a factory finish of yellow paint. All paints shall comply with AWWA standard C-502-85 or latest revision.

All hydrants will be shop tested in accordance with the latest AWWA Specification C 502.

Restrained joint assemblies shall be used which have bolted mechanical and swivel joints from the hydrant tee through to the hydrant. Restrained joints shall absorb all thrust and prevent movement of the hydrant.

All hydrants shall be provided with an auxiliary gate valve so that the water to the hydrant may be shut off without the necessity of closing any other valve in the distribution system.

No hydrants shall be installed on the reclaimed water system unless approved by the City of Clearwater's Engineering Department.

502-6. SERVICE SADDLES

Service saddles shall be used on all service taps to four inch (4") P.V.C. water main. The largest service connection allowable on four inch (4") main shall be one and one half inch (1-1/2"). Service saddles shall be used on all two inch (2") service connections to six inch (6") and larger mains. Service saddles (JCM 406 series or Ford FC 202 series) shall be wide bodied ductile iron with epoxy or nylon coating and shall have stainless steel straps.

502-7. TESTS, INSPECTION AND REPAIRS

1. All materials shall be tested in accordance with the applicable Federal, ASTM or AWWA Specification and basis of rejection shall be as specified therein. Certified copies of the tests shall be submitted with each shipment of materials.
2. All materials will be subject to inspection and approved by the Engineer after delivery; and no broken, cracked, misshapen, imperfectly coated or otherwise damaged or unsatisfactory material shall be used.

3. All material found during the progress of the work to have cracks, flaws, or other defects shall be rejected and promptly removed from the site.
4. If damage occurs to any pipe, fittings, valves, hydrants or water main accessories in handling, the damage shall be immediately brought to the Engineer's attention. The Engineer shall prescribe corrective repairs or rejection of the damaged items.

502-8. BACKFLOW PREVENTERS

The City of Clearwater owns and maintains all backflow prevention devices that are installed within their system. Therefore, any and all devices must be purchased from the City and installed by City work forces.

Backflow prevention devices installed on customer's service lines at the point of delivery (service connection) shall be of a type in accordance with AWWA specification C506 or latest revision.

Two (2) different types of backflow prevention devices are allowed. Type of device, and when required, is determined by the degree of hazard presented to the municipal water system from possible backflow of water within the customer’s private system. The types of devices allowed are:

1. Double Check Valve Assembly - a device composed of two (2) single, independently acting, approved check valves, including tightly closing shutoff valves located at each end of the assembly and suitable connections for testing the water tightness of each check valve.
2. Reduced pressure principle backflow prevention device - a device containing a minimum of two (2) independently acting, approved check valves, together with an automatically operated pressure differential relief valve located between the two check valves. The unit must include tightly closing shutoff valves located at each end of the device, and each device shall be fitted with properly located test cocks.

502-9. TAPPING SLEEVES

Steel body tapping sleeves shall be JCM Industries Inc., JCM 412 or Smith-Blair 622. All steel body tapping sleeves shall have heavy welded ASTM A 285, Grade C steel body, stainless steel bolts, manufacturer's epoxy coated body, and three-quarter inch (3/4”) bronze test plug.

502-10. BLOW OFF HYDRANTS

Blow offs are not allowed.

503. CONSTRUCTION

503-1. MATERIAL HANDLING

1. Pipe, fittings, valves, hydrants and accessories shall be loaded and unloaded by lifting with hoists or skidding so as to avoid shock or damage. Under no circumstances shall such materials be dropped. Pipe handled on skidways shall not be skidded or rolled against pipe already on the ground.

2. Pipe shall be so handled that the coating and lining will not be damaged. If, however, any part of the coating or lining is damaged, the repair shall be made by the Contractor at their expense in a manner satisfactory to the Engineer.
3. In distributing the material at the site of the work, each piece shall be unloaded opposite or near the place where it is to be laid in the trench.

503-2. PIPE LAYING

503-2.1. ALIGNMENT AND GRADE

The pipe shall be laid and maintained to the required lines and grades with fittings, valves and hydrants at the required locations, spigots centered in bells; and all valves and hydrant stems plumb. All pipe installed shall be pigged and properly blown off before any pressure testing and sterilization of the pipe can be completed.

The depth of cover over the water main shall be a minimum of thirty inches (30”) and a maximum of forty-two inches (42”) below finished grade, except where approved by the Engineer to avoid conflicts and obstructions. Whenever obstructions not shown on the plans are encountered during the progress of the work and interfere to such an extent that an alteration of the plans is required, the Engineer shall have the authority to change the plans and order a deviation from the line and grade or arrange with the Owners of the structures for the removal, relocation, or reconstruction of the obstructions.

503-2.2. INSTALLATION

Proper implements, tools, and facilities satisfactory to the Engineer shall be provided and used by the Contractor for the safe and convenient performance of the work. All pipe, fittings, valves and hydrants shall be carefully lowered into the trench piece by piece by means of a derrick, ropes, or other suitable tools or equipment in such a manner as to prevent damage to materials and protective coatings and linings. Under no circumstances shall materials be dropped or dumped in the trench.

If damage occurs to any pipe, fittings, valves, hydrants or accessories in handling, the damage shall be immediately brought to the Engineer's attention. The Engineer shall prescribe corrective repairs or rejection of the damaged items.

All pipe and fittings shall be carefully examined for cracks and other defects while suspended above the trench immediately before installation in final position. Spigot ends shall be examined with particular care as this area is the most vulnerable to damage from handling. Defective pipe or fittings shall be laid aside for inspection by the Engineer who will prescribe corrective repairs or rejection.

All lumps, blisters, and excess coating shall be removed from the bell and spigot end of each pipe, and the outside of the spigot and the inside of the bell shall be wire brushed and wiped clean and dry and free from oil and grease before the pipe is laid. Pipe joints shall be made up in accordance with the manufacturer's recommendations.

Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the line. If the pipe laying crew cannot put the pipe into the trench and in place without getting earth into the pipe, the Engineer may require that, before lowering the pipe into the trench, a heavy, woven canvas bag of suitable size shall be placed over each end and left there until the

connection is to be made to the adjacent pipe. During laying operation, no debris, tools, clothing or other materials shall be placed in the pipe.

As each length of pipe is placed in the trench, the spigot end shall be centered in the bell and the pipe forced home and brought to correct line and grade. The pipe shall be secured in place with approved backfill material tamped under it except at the bells. Precautions shall be taken to prevent dirt from entering the joint space.

At times when pipe laying is not in progress, the open ends of pipe shall be closed by a watertight plug or other means approved by the Engineer.

The cutting of pipe for inserting valves, fittings, or closure pieces shall be done in a neat and workmanlike manner without damage to the pipe or cement lining and so as to leave a smooth end at right angles to the axis of the pipe.

Pipe shall be laid with bell ends facing in the direction of laying unless directed otherwise by the Engineer. Where pipe is laid on the grade of ten percent (10%) or greater, the laying shall start at bottom and shall proceed upward with the bell ends of the pipe upgrade.

Wherever it is necessary to deflect pipe from a straight line, either in the vertical or horizontal plane to avoid obstructions or to plumb stems, or where long radius curves are permitted, the amount of deflection allowed shall not exceed that allowed under the latest edition of ANSI/AWWA C600-82 and C900 81 or latest revisions.

No pipe shall be laid when, in the opinion of the Engineer, trench conditions are unsuitable.

503-3. SETTING OF VALVES, HYDRANTS AND FITTINGS

503-3.1. GENERAL

Valves, hydrants, fittings, plugs and caps shall be set and joined to pipe in the manner specified above for installation of pipe.

503-3.2. VALVES

Valves in water mains shall, where possible, be located on the street property lines extended unless shown otherwise on the plans. All valves shall be installed at the tee in all cases, not to exceed eighteen inches (18”) from the main line.

The valve box shall not transmit any shock or stress to the valve and shall be centered and plumb over the wrench nut of the valve, with the box cover flush with the surface of the finished pavement or such other level as may be directed. Refer to City Index No. 402; Sheet 1 of 5 & Sheet 2 of 5 for potable water valve pad detail, and City Index No. 502; Sheet 1 of 2 & Sheet 2 of 2 for reclaimed water valve box and pad detail.

503-3.3. HYDRANTS

Hydrants shall be located as shown or as directed so as to provide complete accessibility and minimize the possibility of damage from vehicles or injury to pedestrians. All hydrants located ten feet (10’) of more from the main shall have a gate valve at the main and another gate valve at the hydrant location. No valve can be located anywhere in the hydrant run to circumvent the use of two valves. Refer to City Index No. 402; Sheet 4 of 4 for potable water hydrants. No hydrants shall

be installed on the reclaimed water system unless approved by the City of Clearwater's Engineering Department.

All hydrants shall stand plumb and shall have their nozzles parallel with, or at right angles to, the curb, with the pumper nozzle facing the curb. Hydrants shall be set to the established grade, with nozzles as shown or as directed by the Engineer.

Each hydrant shall be connected to the main with a six inch (6") ductile iron branch controlled by an independent six inch (6") gate valve. If hydrant is placed greater than ten feet (10') from the main, an additional valve shall be installed at the hydrant and shall be included in the hydrant assembly cost.

503-3.4. ANCHORAGE

Movement of all plugs, caps, tees, bends, etc., unless otherwise specified shall be prevented by attaching approved mechanical restraining rings or glands and installed per manufacturer's recommendations. Hydrants shall be held in place with restrained swivel joints. Restraining mechanical joint glands on hydrants may be used where hydrant run out length precludes the use of hydrant connecting swivel joints.

Where special anchorage is required, such anchorage shall be in accordance with details shown on the plans.

503-4. CONNECTIONS TO EXISTING LINES

Where shown on the plans or directed by the Engineer, the water lines constructed under this contract shall be connected to the existing lines now in place. No such connection shall be made until all requirements of the specifications as to tests, flushing, and sterilization have been met and the plan of the cut in to the existing line has been approved by the Engineer.

Where connections are made between new work and existing work, the connections shall be made in a thorough and workmanlike manner using proper materials and fittings to suit the actual conditions. All fittings shall be properly sterilized, and pipe will be properly swabbed before connections to existing facilities. All connections to existing facilities will be completed under the supervision of the City of Clearwater.

504. TESTS

504-1. HYDROSTATIC TESTS

After installation of water mains, complete with all associated appurtenances including service taps, all sections of newly laid main shall be subject to a hydrostatic pressure test of 150 pounds per square inch for a period of two (2) hours and shall conform to AWWA C600 latest revision. All mains shall be pigged and flushed to remove all sand and other foreign matter before any hydrostatic test can or will be performed. The pressure test shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Engineer. The pump, pipe connection and all necessary apparatus, together with operating personnel, shall be furnished by the Contractor at their expense.

The Contractor shall make all necessary taps into the pipe line. The Owner will furnish the water for the test. Before applying the test pressure, all air shall be expelled from the pipe line.

504-2. NOTICE OF TEST

The Contractor shall give the City of Clearwater's Owner Representative forty-eight (48) hours advance notice of the time when the installation is ready for hydrostatic testing.

505. STERILIZATION

Before the system is put into operation, all water mains and appurtenances and any item of new construction with which the water comes in contact, shall be thoroughly sterilized in accordance with AWWA C651.

505-1. STERILIZING AGENT

The sterilizing agent shall be liquid chlorine, sodium hypochlorite solution conforming to Federal Specification O-S-602B, Grade D, or dry hypochlorite, commonly known as "HTH" or "Perchloron".

505-2. FLUSHING SYSTEM

Prior to the application of the sterilization agent, all mains shall be thoroughly flushed. Flushing shall continue until a clean, clear stream of water flows from the hydrants. Where hydrants are not available for flushing, such flushing shall be accomplished at the installed blow off devices generally at the ends of the lines.

505-3. STERILIZATION PROCEDURE

All piping, valves, fittings and all other appurtenances shall be sterilized with water containing a minimum chlorine concentration of 75 ppm at any point in the system. This solution shall then remain in the distribution system for a minimum contact period of eight (8) hours and never more than twenty-four (24) hours before it is flushed out. All valves in the lines being sterilized shall be opened and closed several times during the contact period.

505-4. RESIDUAL CHLORINE TESTS

After the sterilization outlined above has been accomplished, flushing shall continue until free residual chlorine tests not less than 0.2 ppm nor more than 3.0 ppm. Residual chlorine test shall be in accordance with standard methods using a standard DPD test set.

505-5. BACTERIAL TESTS

After the water system has been sterilized and thoroughly flushed as specified herein, City of Clearwater Water Division or the Owner's Representative personnel shall take samples of water from remote points of the distribution system in suitable sterilized containers. The City shall forward the samples to a laboratory certified by the Florida State Board of Health for bacterial examination in accordance with AWWA C651. If tests of such samples indicate the presence of coliform organisms, the sterilization as outlined above shall be repeated until tests indicate the absence of such pollution. The bacterial tests shall be satisfactorily completed before the system is placed in operation and it shall be the Contractor's responsibility to perform the sterilization as outlined above.

If methods of sterilization differ materially from those outlined above, such methods shall be in accordance with directives of the Florida State Board of Health and all methods employed shall have the approval of that agency. Definite instructions as to the collection and shipment of samples shall be secured from the laboratory prior to sterilization and shall be followed in all respects. The City of Clearwater shall secure clearance of the water main from the Florida Department of Environmental Protection before the water distribution system is put into operation.

506. MEASUREMENT AND PAYMENT

506-1. GENERAL

Bids must include all sections and items as specified herein and as listed on the Bid Form. Payment for the work of constructing the project will be made at the unit price or lump sum payment for the items of work as set forth in the Bid, which payment will constitute full compensation for all labor, equipment, and materials required to complete the work. No separate payment will be made for the following items and the cost of such work shall be included in the applicable pay items of work:

- Clearing and grubbing
- Excavation, including necessary pavement removal
- Shoring and/or dewatering
- Structural fill
- Backfill
- Grading
- Tracer wire
- Refill materials
- Joint materials
- Tests and sterilization
- Appurtenant work as required for a complete and operable system.

506-2. FURNISH AND INSTALL WATER MAINS

506-2.1. MEASUREMENT

The quantity for payment shall be the actual number of feet of pipe of each size and type satisfactorily furnished and laid, as measured along the centerline of the completed pipe line, including the length of valves and fittings.

506-2.2. PAYMENT

Payment of the applicable unit price shall be full compensation for furnishing all plant, labor, materials and equipment, and constructing the water mains completely and ready for operation.

506-3. FURNISH AND INSTALL FITTINGS

506-3.1. MEASUREMENT

The quantity for payment will be the number of tons, or decimal part thereof, of ductile iron fittings satisfactorily furnished and installed. Fitting weights shall be based on weights stamped on the body of the fitting, provided such weights do not exceed the theoretical weights by more than the tolerances permitted in ANSI/AWWA C110/A 21.10 82, latest revision, in which case, the weight will be based upon the theoretical weight plus the maximum tolerance.

506-3.2. PAYMENT

Payment of the applicable unit price shall be full compensation for furnishing all plant, labor, materials, and equipment required to furnish and install ductile iron fittings.

506-4. FURNISH AND INSTALL GATE VALVES COMPLETE WITH BOXES AND COVERS

506-4.1. MEASUREMENT

The quantity for payment shall be the number of gate valves of each size satisfactorily furnished and installed.

506-4.2. PAYMENT

Payment of the applicable unit price for each size shall be full compensation for furnishing all plant, labor, material and equipment and installing the valve complete with box and cover.

506-5. FURNISH AND INSTALL FIRE HYDRANTS

506-5.1. MEASUREMENT

The quantity for payment shall be the number of fire hydrants satisfactorily furnished and installed. The only hydrants allowed to be installed in the City of Clearwater utilities system are listed in Article 501-2.5 of these Technical Specifications. No exceptions.

506-5.2. PAYMENT

Payment of the applicable unit price shall be full compensation for furnishing all plant, labor, material and equipment and installing the fire hydrant completely including necessary thrust anchorage, six inch (6”) pipe between the main and the hydrant and gate valve and valve box on the hydrant lead.

600 SERIES: STORMWATER

601. RAISING OR LOWERING OF STORM DRAINAGE STRUCTURES

Storm Drainage Structures shall be raised or lowered as indicated on the plans or as indicated by the Engineer.

601-1. BASIS OF PAYMENT

Payment, unless covered by a bid item, shall be included in the cost of the work.

602. UNDERDRAINS

The Contractor shall construct sub-surface drainage pipe as directed in the Scope of Work and detail drawings contained in the Project construction plans. In general, underdrain pipe shall be embedded in a bed of #6 FDOT aggregate, located behind the back of curb and aggregate surface covered with a non-degradable fibrous type filter material. A #57 aggregate may be used in lieu of #6 if it is washed and screened to remove fines. The aggregate may be stone, slag or crushed gravel. Unless otherwise noted on the plans, underdrain pipe shall be eight inches (8”) in diameter, polyvinyl chloride pipe, in conformance with ASTM F-758 “Standard Specification For Smooth Wall PVC Underdrain Systems for Highways” latest revision, minimum stiffness of 46 in conformance with ASTM D2412, perforations in conformance with AASHTO M-189 described in FDOT Section 948-1.5 or latest revision and in conformance with ASTM D3034 - SDR 35.

Alternate acceptable underdrain pipe material is Contech A-2000 which is a rigid PVC pipe that exceeds ASTM Specifications D1784, minimum cell classification of 12454B or 12454C, manufactured per ASTM F949-93a, minimum pipe stiffness of 50 psi, with no evidence of splitting, cracking or breaking when pipe is tested in accordance with ASTM D2412 at 60% flatting and with a double gasket joint.

Underdrain pipe placed beneath existing driveways and roadways shall be non-perforated pipe with compacted backfill. All poly-chloride pipe which has become deteriorated due to exposure to ultra violet radiation shall be rejected. Where ductile iron pipe is specified, pipe material shall be the same as specified for potable water pipe in these technical specifications. All underdrain aggregate shall be fully encased in a polyester filter fabric “sock” (Mirafi 140-N or approved equal) per the construction detail drawings.

Filter aggregate for underdrains shall be as specified in the FDOT Standard Specifications, Section 901 – Course Aggregate, and shall be either #6 or #57. If #57 is used, it must be washed and screened to remove fines. The aggregate may be stone, slag, or crushed gravel.

602-1. BASIS OF MEASUREMENT

Measurement shall be the number of linear feet of eight inch (8") Sub-drain in place and accepted.

602-2. BASIS OF PAYMENT

Payment shall be based upon the unit price per linear foot for underdrain as measured above, which shall be full compensation for all work described in this section of the specifications and shall include all materials, equipment, and labor necessary to construct the underdrain (specifically underdrain pipe, aggregate and filter fabric). Underdrain clean-outs, sod, driveway, road and sidewalk restoration shall be paid by a separate bid item.

603. STORM SEWERS

All storm drain pipe installed within the City of Clearwater shall be steel reinforced concrete unless otherwise approved by the City Engineer. Said pipe shall comply with Section 430 of FDOT Standard Specifications.

All reinforced concrete pipe joints shall be wrapped with Mirafi 140N filter fabric or equivalent (as approved by the City Engineer). The cost for all pipe joint wraps shall be included in the unit price for the pipe.

All pipe, just before being lowered into a trench, is to be inspected and cleaned. If any difficulty is found in fitting the pieces together, this fitting is to be done on the surface of the street before laying the pipe, and the tops plainly marked in the order in which they are to be laid. No pipe is to be trimmed or chipped to fit. Each piece of pipe is to be solidly and evenly bedded, and not simply wedged up. Before finishing each joint, some suitable device is to be used to find that the inverts coincide and pipe is clear throughout.

603-1. TESTING AND INSPECTION

The Contractor shall take all precautions to secure a watertight sewer under all conditions.

The work under this Article shall include the internal video recording of new stormwater drainage pipes and drainage structures. The Contractor shall provide the City with a video of the completed stormwater drainage system, and a written report. The Contractor shall pump down and clean the pipes and drainage structures, to the satisfaction of the City, prior to video recording. The video shall be of the standard DVD format, in color, with all the pertinent data and observations recorded as audio on the DVD. The data should include:

1) An accurate recorded footage of the pipe lengths.
2) The drainage structure number and pipe size.
3) The run of the pipe and direction of flow (i.e. from S-1 to S-2).
4) Details of structural defects, broken pipes, sags, dips, misalignments, obstructions and infiltration.

The written report shall include the four (4) items listed previously.

All visual and video recording inspections shall be completed by the Contractor and be in accordance with Section 430-4.8 of FDOT Standard Specifications. Any deficient or damaged pipe discovered during the video recording process shall be the responsibility of the Contractor to repair or replace at their own expense within the contractual duration.

As a complement to the video report, the Contractor shall also provide digital photos of areas of concern in electronic (computer CD/DVD) and hard copy form (in color).

All known pipe breaks or those breaks discovered after the video inspection shall be repaired by the Contractor regardless of the test allowances. Faulty sections of drainage pipes or drainage structures rejected by the Engineer shall be removed and re-laid by the Contractor. Sections of pipe that are repaired, re-laid or replaced shall be accompanied with a corresponding post construction video inspection at the Contractor's expense. In all cases that a leak is found, re-inspection shall be required at the Contractor's expense, to confirm that the problem has been resolved.

603-2. BASIS OF PAYMENT

Payment shall be the unit price per linear foot for storm sewer pipe in place and accepted, measured along the centerline of the storm sewer pipe to the inside face of exterior walls of storm manholes or drainage structures and to the outside face of endwalls. Said unit price includes all work required to install the pipe (i.e. all materials, equipment, filter fabric wrap, gravel bedding if needed for stabilization, labor and incidentals, etc.).

604. STORM MANHOLES, INLETS, CATCH BASINS OR OTHER STORM STRUCTURES

For details on specific design of a type of storm structure refer to Index Numbers 201 to 231.

When required, inlets, catch basins or other structures shall be constructed according to the plans and applicable parts of the specifications, Articles 301, 302, 303 and 202, and as approved by the Engineer. Said structures shall be protected from damage by the elements or other causes until acceptance of the work.

604-1. BUILT UP TYPE STRUCTURES

Built up type manholes shall be constructed of brick with cast iron frames and covers as shown on Index Numbers 201. Invert channels shall be constructed smooth and semi circular in shape conforming to inside of adjacent sewer section. Changes in direction of flow shall be made in a smooth curve of as large a radius as possible. Changes in size and grade of channels shall be made gradually and evenly. Invert channels shall be built up with grout.

The storm structure floor outside of channels shall be made smooth and sloped toward channels.

Manhole steps shall not be provided. Joints shall be completely filled and the mortar shall be smoothed from inside of the manholes.

The entire exterior of brick manholes shall be plastered with a skim coat of one half inch (1/2") of mortar.

Brick shall be laid radially with every sixth course being a stretcher course.

In cases where a storm pipe extends inside a structure, the excess pipe will be cut off with a concrete saw and shall not be removed with a sledge hammer.

604-2. PRECAST TYPE

Precast manholes shall be constructed as shown on Index 202. The manhole base shall be set on a pad of dry native sand approximately five inches (5”) thick to secure proper seating and bearing.

Precast Manholes and Junction Boxes: The Contractor may substitute precast manholes and junction boxes in lieu of cast in place units unless otherwise shown on the plans. Precast Inlets will not be acceptable. When precast units are substituted, the construction of such units must be in accordance with ASTM C 478, or the standard specifications at the manufacturer’s option.

Precast structures must also meet the requirement that on the lateral faces, either inside or outside, the distance between precast openings for pipe or precast opening and top edge of precast structure be no less than wall thickness. A minimum of four courses of brick will be provided under manhole ring so that future adjustment of manhole lid can be accommodated. Manhole steps shall not be provided.

604-3. BASIS OF PAYMENT

Payment for Junction Boxes, Manholes or other structures shall be on a unit basis.

605. GABIONS AND MATTRESSES

605-1. MATERIAL

605-1.1. PVC COATED WIRE MESH GABIONS & MATTRESSES

605-1.1.1. GABION & MATTRESS BASKETS

Gabion and mattress baskets units shall conform to ASTM A975, be of non-raveling construction and fabricated from a double twist by twisting each pair of wires through three half turns developing the appearance of a triple twist. The galvanized wire core shall have a diameter of 0.106 inches.

605-1.1.2. PVC (POLYVINYL CHLORIDE) COATING

The coating shall be gray in color and shall have a nominal thickness of 0.0216 inches but not less than 0.015 inches in thickness. The protective PVC plastic shall be suitable to resist deleterious effects from exposure to light, immersion in salt or polluted water and shall not show any material difference in its initial compound properties. The PVC compound is also resistant to attack from acids and resistant to abrasion.

The PVC coating shall be extruded and adhere to the wire core prior to weaving. The PVC coated wire shall be woven into a double twisted hexagonal mesh having uniform openings of 3 1/4 inches by 4 ½ inches. The overall diameter of the mesh wire (galvanized wire core plus PVC coating) shall be 0.146 inches. Selvedge and reinforcing wire shall be of heavily galvanized wire core, 0.134 inches in diameter, coated with PVC and having an overall diameter (galvanized wire core plus PVC coating) of 0.174 inches. Lacing and connecting wire shall be of soft tensile strength (75,000 PSI max), heavily galvanized wire core, 0.087 inches in diameter, coated with PVC and having an overall diameter (galvanized wire core plus PVC coating) of 0.127 inches. The use of alternate wire fasteners shall be permitted in lieu of tie wire providing the alternate fastener

produces a four (4) wire selvedge joint with a strength of 1200 lbs. per linear foot while remaining in a locked and closed condition. Properly formed interlocking fasteners shall be spaced from 4 to 6 inches and have a minimum 3/4 square inch inside area to properly confine the required selvedge wires.

605-1.1.3. GABION AND MATTRESS FILLER MATERIAL:

The filler stone shall be from a source approved by the Engineer before delivery is started. Representative preliminary samples of the stone shall be submitted by the contractor or supplier for examination and testing by the Engineer. The stone shall have a minimum specific gravity of 2.3 and be of a quality and durability sufficient to insure permanency in the structure. The individual stones shall be free of cracks, seams, and other defects that would tend to promote deterioration from natural causes, or which might reduce the stones to sizes that could not be retained in the gabion or mattress baskets.

All filler material shall be uniformly graded between 4 inch and 8 inch (equivalent spherical diameter) and shall be angular in form. Rounded stones shall not exceed 10% of the stone, by weight and 70% of the stone, by weight, shall exceed the largest dimension of the mesh opening. Crushed concrete shall not be used for filler material.

605-1.1.4. GEOTEXTILE FABRIC

Fabric shall conform to FDOT Standard Specifications, Section 985.

605-2. PERFORMANCE

Gabions and Reno Mattresses shall be installed according to the manufacturer's recommendations and as shown on the Drawings. Fabrication of gabion baskets shall be in such a manner that the sides, ends, lid and diaphragms can be assembled at the construction site into rectangular baskets of the sizes specified and shown on the Drawings. Gabions and mattresses shall be of single unit construction; the base, lid ends and sides shall be either woven into a single unit or one edge of these members connected to the base section of the gabion in such a manner that the strength and flexibility at the connecting point is at least equal to that of the mesh. Where the length of the gabion and mattress exceeds one and one-half its horizontal width, they shall be equally divided by diaphragms of the same mesh and gauge as the mattresses shall be furnished with the necessary diaphragms secured in proper position on the base so that no additional tying is required at this juncture. The wire mesh is to be fabricated so that it will not ravel. This is defined as the ability to resist pulling apart at any of the twists or connections forming the mesh when a single wire strand in a section of mesh is cut.

Each gabion or mattress shall be assembled by tying all untied edges with binding wire. The binding wire shall be tightly looped around every other mesh opening along seams so that single and double loops are alternated.

A line of empty gabions shall be placed into position according to the contract drawings and binding wire shall be used to securely tie each unit to the adjoining one along the vertical reinforced edges and the top selvedges. The base of the empty gabions placed on top of a filled line of gabions shall be tightly wire to the latter at front and back.

To achieve better alignment and finish in retaining walls, gabion stretching is recommended.

Connecting wires shall be inserted during the filling operation in the following manner: Gabions shall be filled to one third full and one connecting wire in each direction shall be tightly tied to opposite faces of each cell at one third height. The gabion shall then be filled to two thirds full and one connecting wire in each direction shall be tightly tied to opposite face of each cell at one two third height. The cell shall then be filled to the top.

Filler stone shall not be dropped more than twelve inches (12") into the gabions and mattresses.

Geotextile fabric shall be installed at locations shown in the Drawings. The surface to receive the cloth shall be prepared to a relatively smooth condition free of obstructions which may tear or cut the cloth. The panel shall be overlapped a minimum of 30 inches and secured against movement. Cloth damaged or displaced during installation, gabion work, or backfill shall be replaced or repaired to the satisfaction of the Engineer at the contractor’s expense. The work shall be scheduled so that the fabric is not exposed to ultraviolet light more than the manufacturer’s recommendations or five days, whichever is less.

In wet conditions, a base shall be established by spreading and compacting #57 stone prior to placement of geotextile fabric and gabions or mattresses.

700 SERIES: STREETS AND SIDEWALKS

701. RESTORATION OR REPLACEMENT OF DRIVEWAYS, CURBS, SIDEWALKS AND STREET PAVEMENT

Driveways, sidewalks, and curbs destroyed or damaged during construction shall be replaced and shall be the same type of material as destroyed or damaged, or to existing City Standards, whichever provides the stronger repair. All street pavement destroyed or damaged shall be replaced with the same type of material, to existing City Standards, unless the existing base is unsuitable as determined by the Engineer, then the base shall be replaced with City approved material. All replaced base shall be a minimum eight inches (8") compacted thickness, or same thickness as base destroyed plus two inches (2”), if over six inches (6”), and compacted to 98% of maximum density per AASHTO T-180.

Unless called for in the proposal as separate bid items, cost of the above work including labor, materials and equipment required shall be included in the bid price per linear foot of main or square yard of base.

The bid price for street pavement, restoration or replacement when called for in the proposals, shall include all materials, labor and equipment required to complete the work, and shall be paid for on a square yard basis. When replacement is over a trench for utilities, the area of replacement shall be limited to twice the depth of the cut plus twice the inside diameter of the pipe. All necessary restoration exceeding this footprint will be at the Contractor's expense.

The bid price for restoration or placement of driveways, curbs and sidewalks, when called for in the proposals, shall include all materials, labor and equipment required to complete the work and shall be paid for on the basis of the following units: Driveways, plant mix - per square yard: concrete - per square foot; curbs - per linear foot; sidewalk four inches (4") or six inches (6") thick - per square foot. Concrete walks at drives shall be a minimum of six inches (6") thick and be reinforced with 6/6 X 10/10 welded wire mesh (also see Articles 303 and 707). The Contractor shall notify the Project Inspector a minimum of twenty-four (24) hours in advance of all driveway, curb, sidewalk and street restoration and replacement work.

702. ROADWAY BASE AND SUBGRADE

702-1. BASE

This specification describes the construction of roadway base and subgrade. The Contractor shall refer to Section IV, Article 101 "Scope of Work" of the City’s Contract Specifications for additional roadway base and subgrade items.

Roadway base shall be eight inches (8") compacted minimum thickness unless otherwise noted on the plans or directed by the Engineer. The subgrade shall be twelve inches (12") compacted minimum thickness with a minimum Limerock Bearing Ratio (LBR) of 40 unless otherwise noted on the plans or directed by the Engineer. The Contractor shall obtain from an independent testing laboratory a Proctor and an LBR for each type material. The Contractor shall also have an independent testing laboratory perform all required density testing. Where unsuitable material is

found within the limits of the base, Section IV, Article 204 (Unsuitable Material Removal) of the City's Technical Specifications will apply.

Once the roadway base is completed, it shall be primed that same day (unless otherwise directed by the Engineer) per Section 300 of FDOT's Standard Specifications. Repairs required to the base that result from a failure to place the prime in a timely manner shall be done to the City's satisfaction, and at the Contractor's expense. No paving of the exposed base can commence until the City approves the repaired base. The cost for placement of prime material shall be included in the bid item for base.

The Contractor shall notify the Project Inspector a minimum of twenty-four (24) hours in advance of all base and subgrade placement or reworking.

The following base materials are acceptable:

1. **Shell Base:** Shell base shall be constructed in accordance with Sections 200 and 913 of FDOT's Standard Specifications and shall have a minimum compacted thickness as shown on the plans. The shell shall be FDOT approved. The cost of the prime coat shall be included in the bid item price for base.
2. **Limerock Base:** Limerock base shall be constructed in accordance with Sections 200 and 911 of FDOT's Standard Specifications and shall have a minimum compacted thickness as shown on the plans. The limerock shall be from a FDOT approved certified pit. The cost of the prime coat shall be included in the bid item price for base.
3. **Crushed Concrete Base:** Crushed concrete base shall be constructed in accordance with Sections 204 and 901 of FDOT's Standard Specifications and shall have a minimum compacted thickness as shown on the plans. The crushed concrete material shall be FDOT approved. The Contractor shall provide certified laboratory tests on gradation to confirm that the crushed concrete base material conforms to the above specifications. The LBR shall be a minimum of 100. LBR and gradation tests shall be provided to the City by the Contractor once a week for continuous operations, or every 1000 tons of material, unless requested more frequently by the City Engineer or designee. The cost of the prime coat shall be included in the bid item price for base.
4. **Superpave Asphalt Base:** Full depth asphalt base shall be constructed in accordance with Section 234 of FDOT's Standard Specifications and shall have a minimum compacted thickness as shown on the plans. The cost for preparation, placement, and compaction shall be included in the per ton unit cost for asphalt unless otherwise noted in the project scope and plans. The cost of the tack coat shall be included in the bid item price for asphalt or base.
5. **Reclaimed Asphalt Pavement Base:** Reclaimed asphalt pavement base shall be constructed in accordance with Section 283 of FDOT's Standard Specifications and shall have a minimum compacted thickness as shown on the plans. As per FDOT Section 283, RAP material shall be used as a base course only on non-limited access paved shoulders, shared use paths, or other non-traffic bearing applications. The cost for preparation, placement, and compaction shall be included in the per ton unit cost for asphalt unless otherwise noted in the project scope and plans. The cost of the tack coat shall be included in the bid item price for asphalt or base.

702-1.1. BASIS OF MEASUREMENT FOR BASE AND REWORKED BASE

The basis of measurement shall be the number of square yards of base in place and accepted as called for on the plans. The maximum allowable deficiency shall be a half-inch (l/2"). Areas deficient in thickness shall either be fixed by the Contractor to within acceptable tolerance, or if so approved in writing by the City Engineer, may be left in place. No payment, however, will be made for such deficient areas that are left in place.

702-1.2. BASIS OF PAYMENT FOR BASE AND REWORKED BASE

The unit price for base shall include: all materials, roadbed preparation, placement, spreading, compaction, finishing, prime, base, subgrade (unless the plans specify a separate pay item), stabilization, mixing, testing, equipment, tools, hauling, labor, and all incidentals necessary to complete the work. Payment for asphalt base shall be included in the per ton unit cost for asphalt unless otherwise noted in the project scope and plans.

702-2. SUBGRADE

All subgrade shall be stabilized and constructed in accordance with Sections 160 and 914 of FDOT's Standard Specifications unless otherwise noted herein. All subgrade shall have a minimum compacted thickness of 12" unless otherwise shown on the plans or directed by the Engineer. If limerock is used, it shall also meet the requirements of Section 911 of FDOT's Standard Specifications. Where unsuitable material is found within the limits of the subgrade, Section IV, Article 204 (Unsuitable Material Removal) of the City's Contract Specifications will apply. The extent of said removal shall be determined by the Engineer in accordance with accepted construction practices. The Contractor is responsible for clearing, grading, filling, and removing any trees or vegetation in the roadbed below the subgrade to prepare it per the plans. The cost of this work shall be included in the unit price for base or subgrade. The Contractor shall obtain from an independent testing laboratory the bearing value of the subgrade after the materials are mixed for the stabilized subgrade.

702-2.1. BASIS OF MEASUREMENT

The basis of measurement shall be the number of square yards of stabilized subgrade in place and accepted as called for on the plans. The maximum allowable deficiency for mixing depth shall be per Section 161-6.4 of FDOT's Standard Specifications. Acceptable bearing values shall be per Section 160-7.2 of FDOT's Standard Specifications. Areas deficient in thickness or bearing values shall either be corrected by the Contractor to within acceptable tolerance, or if so approved in writing by the City Engineer, may be left in place. No payment, however, will be made for such deficient areas that are left in place.

702-2.2. BASIS OF PAYMENT

The unit price for subgrade shall include roadbed preparation, placement, spreading, compaction, finishing, testing, stabilizing, mixing, materials, hauling, labor, equipment and all incidentals necessary to complete the work. If no pay item is given, subgrade shall be included in the bid item for base.

703. ASPHALTIC CONCRETE MATERIALS

This specification is for the preparation and application of all asphaltic concrete materials on roadway surfaces unless otherwise noted.

703-1. ASPHALTIC CONCRETE

703-1.1. AGGREGATE

All aggregates shall be obtained from an approved FDOT source and shall conform to Sections 901 through 915 of FDOT's Standard Specifications.

703-1.2. BITUMINOUS MATERIALS

All bituminous materials shall conform to Section 916 of FDOT's Standard Specifications.

703-2. HOT BITUMINOUS MIXTURES – PLANT, METHODS, EQUIPMENT & QUALITY ASSURANCE

The plant and methods of operation used to prepare all asphaltic concrete and bituminous materials shall conform to the requirements of Section 320 of FDOT's Standard Specifications. Unless otherwise noted, all acceptance procedures and quality control/assurance procedures shall conform to the requirements of Section 330 of FDOT's Standard Specifications.

The City shall have the right to have an independent testing laboratory select, test, and analyze, at the expense of the City, test specimens of any or all materials to be used. The results of such tests and analyses shall be considered, along with the tests or analyses made by the Contractor, to determine compliance with the applicable specifications for the materials so tested or analyzed. The Contractor hereby understands and accepts that wherever any portion of the work is discovered, as a result of such independent testing or investigation by the City, which fails to meet the requirements of the Contract documents, all costs of such independent inspection and investigation as well as all costs of removal, correction, reconstruction, or repair of any such work shall be borne solely by the Contractor.

Payment reductions for asphalt related items shall be determined by the following:

1. Density per FDOT's Standard Specifications.
2. Final surface or friction course tolerances per FDOT's Standard Specifications.
3. Thickness will be determined from core borings. Deficiencies of ¼" or greater shall be corrected by the Contractor, without compensation, by either replacing the full thickness for a length extending at least twenty-five feet (25') from each end of the deficient area, or when the Engineer allows for an overlay per FDOT's Standard Specifications. In addition, for excesses of one-quarter inch (¼") or greater, the Engineer will determine if the excess area shall be removed and replaced at no compensation, or if the pavement in question can remain with payment to be made based on the thickness specified in the contract.

The Contractor shall notify the Project Inspector a minimum of twenty-four (24) hours in advance of the placement of all asphalt.

703-3. ASPHALT MIX DESIGNS AND TYPES

All asphalt mix designs, acceptance procedures and quality control/assurance procedures shall conform to the requirements of Sections 330 and 334 of FDOT Standard Specifications. All asphalt mix designs shall be approved by the Engineer prior to the commencement of the paving operation. Reclaimed asphalt pavement (RAP) material may be substituted for aggregate in the asphaltic concrete mixes up to 25% by weight.

703-4. ASPHALT PAVEMENT DESIGNS AND LAYER THICKNESS

All asphalt pavement designs shall conform to the following requirements:

Type SP/Spec 334-1

Type FC/Spec 337-8

Type B/Spec 234-8

ATPB/287-8

703-5. GENERAL CONSTRUCTION REQUIREMENTS

The general construction requirements for all hot bituminous pavements (including limitations of operations, preparation of mixture, preparation of surface, placement and compaction of mixture, surface requirements, correction of unacceptable pavement, Quality Control Testing, etc.) shall be in accordance with Section 330 of FDOT's Standard Specifications.

703-6. CRACKS AND POTHOLE PREPARATION

703-6.1. CRACKS

Cracks in roadway pavement shall be repaired prior to the application of asphaltic concrete by the following steps:

1. All debris to be removed from cracks by compressed air or other suitable method.
2. Apply a multiple layered application of bituminous binder and fine aggregate, as appropriate to the depth of the crack until the void of the crack is completely filled to the level of the surrounding roadway surface.
3. If application of asphaltic concrete is not to begin immediately after crack repair, cracks are to be sanded to prevent vehicular tracking.
4. Payment for crack filling shall be included in the unit price for asphaltic concrete.

703-6.2. POTHOLES

Potholes shall be repaired prior to the application of asphaltic concrete by the following steps:

1. All debris is to be removed from potholes by hand, sweeping, or other suitable method.
2. A tack coat is to be applied to the interior surface of the pothole.
3. The pothole is to be completely filled with asphaltic concrete, and thoroughly compacted.

4. Payment for pothole preparation shall be included in the unit price for asphaltic concrete.

703-7. ADJUSTMENT OF MANHOLES

The necessary adjustments of sanitary sewer and storm drain manholes and appurtenances shall be accomplished by the Contractor. The Contractor shall be paid on a per unit basis for each item.

The use of manhole adjustment risers is acceptable under the following conditions:

> The riser shall meet or exceed all FDOT material, weld, and construction requirements. The riser shall consist of an A-36 hot rolled steel meeting or exceeding the minimum requirements of A.S.T.M. A-36. The riser shall be a single piece with a stainless steel adjustment stud and shall have a rust resistant finish. The use of cast iron, plastic, or fiberglass risers is not permitted. In addition, the installation of each riser shall be per manufacturer's specifications. Each manhole shall be individually measured, and each riser shall be physically marked to ensure that the proper riser is used. Also, the ring section shall be cleaned, and a bead of chemically resistant epoxy applied to the original casting, prior to installation of the riser. It is the Contractor's responsibility to ensure that the manholes are measured, the risers are physically marked, the ring sections are thoroughly cleaned, and that the epoxy is properly applied prior to installation of each riser.

If risers are not used, the adjustment of manholes shall be accomplished by the removal of pavement around manhole, grade adjustment of ring and cover, and acceptable replacement and compaction of roadway materials prior to paving. A full depth backfill using asphalt is acceptable. The use of Portland cement for backfill is not acceptable.

All manhole and valve adjustments shall be accomplished prior to the application of final asphaltic concrete surface. Unless otherwise noted in the specs or on the plans, the paving operation shall occur within seven (7) calendar days from the completion of the adjustment. On arterial roadways, the manholes are to be ramped with asphalt during the time period between initial adjustment and final resurfacing. Water and gas valves, sewer cleanouts, valve boxes, tree aeration vents, etc., will be adjusted by the Contractor with the cost for this work to be included in the unit cost of the asphalt. Care must be taken around said appurtenances to ensure that they are not paved over. It is the Contractor's responsibility to inform the owners of all utilities of impending work and coordinate their adjustments, so they are completed prior to the scheduled paving.

703-8. ADDITIONAL ASPHALT REQUIREMENTS

1. All impacted radius returns within project limits shall be paved unless otherwise directed by the Construction Inspector or Engineer, with payment to be included in the per ton bid item for asphalt.
2. All pavement markings impacted by placement of asphalt shall be replaced prior to the road being open to traffic unless otherwise noted in the contract scope and plans.
3. All project related debris shall be hauled off the job site by the Contractor in a timely manner and at their own expense in conformance with all regulatory requirements.
4. The Contractor shall pay particular attention to sweeping when paving. Prior to paving, all construction areas shall be swept with a Municipal type sweeper (either vacuum or mechanical type) that picks up and hauls off, dust and dirt. The sweeper must be equipped

with its own water supply for pre-wetting to minimize dust. Moreover, the Contractor shall sweep debris off of sidewalks, driveways, curbs and roadways each day before leaving the job site.

5. The application of tack and prime coats (either required or placed at the Engineer's discretion) shall be placed per Section 300 of FDOT's Standard Specifications. Tack shall also be applied to the face of all curbs and driveways. The cost (including heating, hauling and applying) shall be included in the per ton bid item for asphalt, unless otherwise noted in the project scope and plans.
6. Leveling course and spot patching shall be applied to sections of the road as noted on the plans, or as directed by the Engineer, per Section 330 of FDOT's Standard Specifications. The cost shall be included in the per ton unit cost for asphalt, unless otherwise noted in the project scope and plans.
7. If an asphalt rubber binder is required, it shall conform to the requirements of Section 336 of FDOT's Standard Specifications.
8. On all streets with curb and gutter, the final compacted asphalt shall be one-quarter inch (¼") above the lip or face of said curb per City Index 101.

703-9. BASIS OF MEASUREMENT

Basis of measurement will be the number of tons of asphaltic concrete completed, in place and accepted. Truck scale weights will be required for all asphaltic concrete used.

703-10. BASIS OF PAYMENT

Payment shall be made at the contract unit price for asphaltic concrete surface as specified and measured above. This price shall include all materials, preparation, hauling, placement, tack and/or prime coat either required or placed at Engineer's discretion, leveling, spot patching, filling of cracks, pothole repair, sweeping, debris removal, labor, equipment, tools, and incidentals necessary to complete the asphalt work in accordance with the plans and specifications.

704. ADJUSTMENT TO THE UNIT BID PRICE FOR ASPHALT

When this Article applies to the contract, the unit bid price for asphalt will be adjusted in accordance with the following provisions:

1. Price adjustment for asphalt shall only be made when the current FDOT Asphalt Price Index varies more than ten percent (10%) from the bid price at the time of the bid opening.
2. The Bituminous Material Payment Adjustment Index published monthly by the FDOT shall be used for the adjustment of unit prices. This report is available on FDOT's internet site. The address is: http://www.dot.state.fl.us/construction/fuel&bit/fuel&bit.shtm. For additional information, call FDOT at (850) 414-4252.
3. The FDOT Payment Adjustment Index in effect at the time of the bid opening will be used for the initial determination of the asphalt price.
4. The FDOT Payment Adjustment Index in effect at the time of placement of the asphalt will be used for payment calculation.

5. The monthly billing period for contract payment will be the same as the monthly period for the FDOT Payment Adjustment Index.
6. No adjustment in bid prices will be made for either tack coat or prime coat.
7. No price adjustment reflecting any further increases in the cost of asphalt will be made for any month after the expiration of the allowable contract time.
8. The City reserves the right to make adjustments for decreases in the cost of asphalt.

705. ASPHALT DRIVEWAYS

New driveways or existing asphalt driveways that must be altered for project construction shall be constructed or replaced in accordance with the specifications for paving the street with the exception that the base shall be six inches (6”). Remove only enough to allow adequate grade for access to the street. Use Article 703 Asphaltic Concrete, of these Technical Specifications, as specified for the street paving.

When the finished surface of the existing drive is gravel, replacement shall be of like material. Payment shall be the same as Asphalt Driveways.

705-1. BASIS OF MEASUREMENT

Measurement shall be the number of square yard of Asphalt Driveways in place and accepted.

705-2. BASIS OF PAYMENT

Payment shall be the unit price per square yard for Asphalt Driveways as measured above, which price shall be full compensation for all work described in this section of the specifications and shall include all materials, equipment, tools, labor and incidentals necessary to complete the work.

706. CONCRETE CURBS

Concrete Curbs shall be constructed to the line, grade and dimensions as shown on the plans. Unless otherwise noted, all concrete curbs shall have fiber mesh reinforcement and have a minimum strength of 3000 psi at 28 days. Expansion joints shall be placed at intervals not to exceed 100 feet, and scored joints shall be placed at intervals not to exceed ten feet (10’). In addition, all the requirements of City Articles 301, 302 and 303 shall also apply. The Contractor shall notify the Project Inspector a minimum of twenty-four (24) hours in advance of the placement of all concrete curbs.

706-1. BASIS OF MEASUREMENT

The basis of measurement shall be linear feet of curb in place and accepted.

706-2. BASIS OF PAYMENT

Payment shall be the unit price per linear foot of curb, which price shall be full compensation for all work described in this and other applicable parts of the specifications and shall include all materials, equipment, tools, labor and incidentals necessary to complete the work.

707. CONCRETE SIDEWALKS AND DRIVEWAYS

707-1. CONCRETE SIDEWALKS

Concrete sidewalks shall be constructed to the line, grade and dimensions as shown on the plans or herein specified. Unless otherwise noted, all concrete sidewalks shall have fiber mesh reinforcement and have a minimum strength of 3000 psi at 28 days. Unless otherwise specified, all concrete sidewalks shall have a minimum width of four feet (4’). Concrete sidewalks shall have a minimum thickness of four inches (4”), except at driveway crossings where a minimum thickness of six inches (6”) is required. Also, 6/6 X 10/10 welded wire mesh reinforcement is required for all sidewalk that crosses driveways. The welded wire mesh shall be positioned in the middle to upper third of the placement. No compensation shall be given if the welded wire mesh is not properly placed. Expansion joints shall be placed at intervals of not more than 100 hundred feet, and scoring marks shall be made every five feet (5’). Concrete shall be poured only on compacted subgrade. In addition, all the requirements of Articles 301, 302 and 303 of these Technical Specifications shall also apply.

707-2. CONCRETE DRIVEWAYS

Concrete driveways, whether new construction or replacement, shall be a minimum of six inches (6’) in thickness with 6/6 x 10/10 welded wire mesh reinforcement and a minimum horizontal distance between expansion joints of no less than four feet (4’) measured in any direction. The welded wire mesh shall be positioned in the middle to upper third of the placement. No compensation shall be given if the welded wire mesh is not properly placed. Concrete shall be poured only on compacted subgrade. In addition, all the requirements of Articles 301, 302 and 303 of these Technical Specifications shall also apply.

The Contractor shall notify the Project Inspector a minimum of twenty-four (24) hours in advance of the placement of all concrete sidewalks and driveways.

707-3. CONCRETE CURB RAMPS

The contractor is responsible for constructing ADA compliant concrete curb ramps per the plans and installing detectable warning surfaces on said ramps as called for in the plan set. Concrete curb ramps and detectable warning surfaces are to be constructed per FDOT Standards and Specifications.

707-4. BASIS OF MEASUREMENT

The basis of measurement shall be the number of square feet of four inch (4") concrete sidewalk, six inch (6") concrete sidewalk, and six inch (6") concrete driveways in place and accepted.

707-5. BASIS OF PAYMENT

Payment shall be the unit price per square foot for each item as measured above, which shall be full compensation for all work described in this section and other applicable parts of the specifications and shall include all materials, equipment, tools, welded wire mesh where required, labor and incidentals necessary to complete the work.

708. MILLING OPERATIONS

708-1. EQUIPMENT, CONSTRUCTION & MILLED SURFACE

Unless otherwise noted in the specs, plans or this Article, the milling operation shall be performed in accordance with Section 327 of FDOT's Standard Specifications. The Contractor shall notify the City of Clearwater Project Representative a minimum of twenty-four (24) hours in advance of all milling.

708-2. ADDITIONAL MILLING REQUIREMENTS

1. If the milling machine is equipped with preheating devices, the Contractor is responsible to secure any necessary permits, and for complying with all local, state and federal environmental regulations governing operation of this type of equipment.
2. All milled surfaces must be repaved within seven (7) days from the time it was milled, unless otherwise noted in the contract documents.
3. Prior to paving, all milled areas shall be swept with a Municipal type sweeper either of the vacuum or the mechanical type that picks up and hauls off, dust and dirt. The sweeper must be equipped with its own water supply for pre-wetting to minimize dust. Moreover, the Contractor shall sweep debris off of sidewalks, driveways and curbs in addition to the roadways before leaving the job site.
4. In cases where concrete valley swales are present, the adjoining pavement shall be milled to allow for the new asphalt grade to be flush with the concrete surface.
5. The Contractor shall be responsible for removing any asphalt that remains in the curb line and/or median curbs after the milling operation of a street is complete. The cost of this removal shall be included in the bid item for milling.
6. All radius returns on streets to be milled shall also be milled unless otherwise directed by the Engineer, with payment to be included in the bid item for milling.
7. Any leveling or base replacement required after milling shall be applied to sections of the road as noted on the plans, or directed by the Engineer, per Section 330 of FDOT's Standard Specifications The cost shall be included in the per ton unit cost for asphalt, unless otherwise noted in the project scope and plans.
8. Any roadway base material exposed as a result of the milling operation shall be primed that same day (unless otherwise directed by the Engineer) per Section 300 of FDOT's Standard Specifications. Repairs required to said base that result from a failure to place the prime in a timely manner shall be done to the City's satisfaction, and at the Contractor's expense. No paving of the exposed base can commence until the City approves the repaired base. The cost of said prime shall be included in the bid item for milling.
9. Prior to the placement of asphalt, the face of all curbs and driveways shall be tacked after the milling operation is complete.

708-3. SALVAGEABLE MATERIALS

Unless otherwise specified, all salvageable materials resulting from milling operations shall remain the property of the City. The transporting and stockpiling of salvageable materials shall be performed by the Contractor. The Contractor shall contact the City Project Representative to schedule delivery of material at least 48 hours prior to starting work.

708-4. DISPOSABLE MATERIALS

All surplus materials not claimed by the City shall become the responsibility of the Contractor. The Contractor shall dispose of the material in a timely manner and in accordance with all regulatory requirements in areas provided by the Contractor at no additional expense to the City.

708-5. ADJUSTMENT AND LOCATION OF UNDERGROUND UTILITIES

All private utilities and related structures requiring adjustment shall be located and adjusted by their owners at the owner's expense. City-owned utilities and structures shall be located by the Owner/City and adjusted by the contractor. The Contractor shall arrange their schedule to allow utility owners the time required for such adjustments (minimum 48 hours' notice per State Statute). All utility adjustments shall be completed prior to the commencement of milling and resurfacing operations.

708-6. ADJUSTMENT OF UTILITY MANHOLES

The necessary adjustments of sanitary sewer and stormwater utility manholes and appurtenances shall be accomplished by the Contractor in accordance with Section IV, Article 703-7 of the City's Technical Specifications.

708-7. TYPES OF MILLING

There are two types of milling used by the City:

A. Wedge – This will consist of milling a six foot (6') wide strip along the curb line of the pavement adjacent to the curb so the new asphalt will align with the original curb height and pavement cross section.

B. Full Width – This will consist of milling the entire roadway (i.e. curb line/edge of pavement to curb line/edge of pavement). All existing horizontal and vertical geometry shall remain unless otherwise indicated or approved by the Engineer.

708-8. MILLING OF INTERSECTIONS

Intersections, as well as other areas (including radius returns) are to be milled and repaved to restore and/or improve the original drainage characteristics. Said work should extend approximately fifty (50) to one hundred (100) feet in both directions from the low point of the existing swale.

708-9. BASIS OF MEASUREMENT

The quantity to be paid for will be the area milled, in square yards, completed and accepted.

708-10. BASIS OF PAYMENT

The unit price for milling shall include: all materials, preparation, hauling, transporting and stockpiling of salvageable materials, disposal of all surplus material, any required milling of radius returns and intersections, prime and/or tack coat either required or placed at Engineer's discretion, removal of asphalt from curbs, sweeping, labor, equipment, and all incidentals necessary to complete the milling in accordance with the plans and specifications.

800 SERIES: TRAFFIC SIGNALS, SIGNS AND MARKINGS

801. TRAFFIC SIGNAL EQUIPMENT AND MATERIALS

All traffic signal work shall be performed per FDOT's Standard Specifications (Sections 603 through 699), unless otherwise specified in the contract documents and plans.

This specification includes, but is not limited to, the following items: all necessary equipment, materials, guaranties, acceptance procedures, signal timings, field tests, grounding, conduit, signal and interconnect cable, span wire assemblies, pull and junction boxes, electrical power service assemblies, poles, signal assemblies, pedestrian assemblies, inductive loop detectors, pedestrian detectors, traffic controller assemblies, controller cabinets and accessories, removal of existing traffic signal equipment, and internally illuminated signs.

All traffic signal installations shall be mast arms and conform to the requirements of FDOT's Mast Arm Assembly standard and shall be signed and sealed by a professional engineer registered in the State of Florida. All mast arm calculations, as well as the geotechnical report, shall also be signed and sealed by a professional engineer registered in the State of Florida. All mast arm colors shall be determined and approved by the City prior to ordering from the manufacturer.

All traffic signal indicators for vehicles and pedestrians shall be LEDs and, approved by both the City and FDOT. In addition to this, all pedestrian signal indicators shall utilize countdown features.

Contractor changes to the operation of an existing signal is prohibited unless directed by the City's Traffic Engineering Division.

All damaged inductive loop detectors shall be restored by the contractor per FDOT Index 17781.

801-1. BASIS OF MEASUREMENT AND PAYMENT

The basis of measurement and payment shall be specified in the contract documents and/or plans and shall include all equipment, preparation, materials, testing and incidentals required to complete the work per the plans.

802. SIGNING AND MARKING

All signing and marking work shall be performed per FDOT's Standard Specifications, unless otherwise specified in the contract documents and plans.

This specification includes the following work: RPM's (Section 706), painted traffic stripes and markings (Section 710), thermoplastic stripes and markings (Section 711) and tubular delineators/flex posts (Sections 705 and 972).

The Contractor is responsible to ensure that striping is correctly placed. Errors in striping or markings shall be "blacked-out" with paint, unless otherwise directed by the Engineer. No payment will be made for these incorrect or "blacked-out" areas. Omissions in striping or markings shall be corrected to the City's satisfaction prior to any payment being made.

The Contractor is responsible for restoring all striping in paint and reflective beading per the FDOT indices mentioned above. The City's Traffic Engineering department shall follow up with thermoplastic striping at a later date unless otherwise specified.

802-1. BASIS OF MEASUREMENT AND PAYMENT

The basis of measurement and payment shall be specified in the contract documents and/or plans and shall include all equipment, preparation, materials and incidentals required to complete the work per the plans.

803. ROADWAY LIGHTING

All roadway lighting shall be constructed per Sections 715 and 992 of FDOT's Standard Specifications, unless otherwise specified in the contract documents and plans.

803-1. BASIS OF MEASUREMENT AND PAYMENT

The basis of measurement and payment shall be specified in the contract documents and/or plans and shall include all equipment, materials, testing and incidentals required to complete the work per the plans.

900 SERIES: LANDSCAPING/RESTORATION

901. WORK IN EASEMENTS OR PARKWAYS

Restoration is an important phase of construction, particularly to residents affected by the construction progress.

The Contractor will be expected to complete restoration activities within a reasonable time following primary construction activity. Failure by the Contractor to accomplish restoration within a reasonable time shall be justification for a temporary stop on primary construction activity or a delay in approval of partial payment requests.

Reasonable care shall be taken for existing shrubbery. Contractor shall replace all shrubbery removed or disturbed during construction. No separate payment shall be made for this work.

The Contractor shall make provision and be responsible for the supply of all water, if needed, on any and all phases of the contract work. The Contractor shall not obtain water from local residents or businesses except as the Contractor shall obtain written permission.

Reuse water is available for the Contractor's use without charge from the City's Water Reclamation Facilities, provided the water is used on City of Clearwater contractual work. Details for Contractor to obtain and reuse water from the Water Reclamation Facilities will be coordinated at the pre-construction conference. The Contractor's use of reuse water must conform to all regulatory requirements.

902. GENERAL PLANTING SPECIFICATIONS

902-1. IRRIGATION

902-1.1. DESCRIPTION

A. The work specified in this Section consists of the installation of an automatic underground irrigation system as shown or noted in the plans. Provide all labor, materials, equipment, services and facilities required to perform all work in connection with the underground sprinkler irrigation system, complete, as indicated on the drawings and/or specified. Work noted as “NIC”, “existing”, or “by others” is not included in this pay item.

B. The irrigation plans are schematic in nature. Valves and pipes shall be located in the turf/landscape areas except at road/paving crossings. All piping under paving shall be sleeved. Changes in the irrigation system layout shall be modified with the approval of the Engineer.

902-1.1.1. QUALITY ASSURANCE

A. The irrigation work shall be installed by qualified personnel or a qualified irrigation subcontracting company that has experience in irrigation systems of similar size, scope, mainline, system pressure, controls, etc.

B. All applicable ANSI, ASTM, FED.SPEC. Standards and Specifications, and all applicable building codes and other public agencies having jurisdiction upon the work shall apply.

C. Workmanship: All work shall be installed in a neat, orderly and responsible manner with the recognized standards of workmanship. The Engineer reserves the right to reject material or work which does not conform to the contract documents. Rejected work shall be removed or corrected at the earliest possible time at the Contractor's expense.

D. Operation and Maintenance Manuals: The Contractor shall prepare and deliver to the Engineer within ten (10) calendar days prior to completion of construction a minimum of three (3) hard cover binders, with three rings, containing the following information:

1. Index sheet stating the Contractor's address and business telephone number, twenty-four (24) hour emergency phone number, person to contact, list of equipment with name(s) and address(es) of local manufacturer's representative(s) and local supplier where replacement equipment can be purchased.
2. Catalog and part sheet on every material and equipment installed under this contract.
3. Complete operating and maintenance instructions on all major equipment.
4. Provide the Engineer and the City of Clearwater maintenance staff with written and "hands on" instructions for major equipment and show evidence in writing to the Engineer at the conclusion of the project that this service has been rendered.
    a. Four-hour instruction (minimum) for the Drip Emitter equipment operation and maintenance.
    b. Two-hour instruction (minimum) for automatic control valve operation and maintenance.

902-1.1.2. PROJECT CONDITIONS

A. The Contractor shall coordinate the work with all other trades, all underground improvements, the location and planting of trees and all other planting. Verify planting requiring excavation of twenty-four inch (24") diameter and larger with the Engineer prior to installation of main lines.

B. Provide temporary irrigation at all times to maintain plant materials.

C. The Contractor is responsible to maintain the work area and equipment until final acceptance by the Engineer. Repairs and replacement of equipment broken, stolen, or missing as well as regular maintenance operations shall be the obligation of the Contractor.

D. The Contractor shall submit a traffic control plan (per FDOT specifications) to the Engineer prior to initiating construction on the site. The Contractor shall be responsible for the maintenance of traffic signs, barriers, and any additional equipment to comply with the FDOT standards and to ensure the safety of its employees and the public.

902-1.1.3. WARRANTY

A. The Manufacturer(s) shall warrant the irrigation system components to give satisfactory service for one (1) year period from the date of acceptance by the Engineer and the City of Clearwater. Should any problems develop within the warranty period due to inferior or faulty materials, they shall be corrected at no expense to the City of Clearwater.

902-1.2. PRODUCTS

902-1.2.1. GENERAL

A. All materials throughout the system shall be new and in perfect condition. No deviations from the specifications shall be allowed except as noted.

902-1.2.2. PIPING

A. The irrigation system pipe shall be as stated herein and shall be furnished, installed and tested in accordance with these specifications.

B. All pipe is herein specified to be Polyvinyl Chloride (PVC) Pipe, 1120, Schedule 40, conforming to ASTM D2665 and D1785.

C. All nipples, pipe connections, bushings, swing joints, connecting equipment to the mainline is required to be threaded Polyvinyl Chloride (PVC) Pipe, Schedule 80.

902-1.2.3. PIPE FITTINGS

A. All pipe fittings for Schedule 40 PVC pipe shall be as follows: Fittings shall conform to the requirements of ASTM D2466, Standard Specification for Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 80. All fittings shall bear the manufacturer's name or trademark, material designation, size, applicable IPS schedule and NSF seal of approval. The connection of mainline pipe to the automatic control valve shall be assembled with threaded Schedule 80 fittings and threaded Schedule 80 nipples.

902-1.2.4. PVC PIPE CEMENT AND PRIMER

A. Provide solvent cement and primer for PVC solvent weld pipe and fittings as recommended by the manufacturer. Pipe joints for solvent weld pipe to be belled end.

B. Purple primer shall be applied after the pipe and fittings has been cut and cleaned. The Primer shall be of contrasting color and be easily recognizable against PVC pipe.

902-1.2.5. THREADED CONNECTIONS

A. Threaded PVC connections shall be made using Teflon tape or Teflon pipe sealant.

902-1.2.6. GATE VALVES

902-1.2.6.1. MANUAL GATE VALVES TWO INCHES (2") AND SMALLER

A. Provide the following, unless otherwise noted on Drawings:

1. 200-250 psi Ball Valve
2. PVC body - with Teflon Ball Seals
3. Threaded-Dual end Union Connectors
4. Non-Shock Safe-T-Shear Stem
5. Safe-T-Shear True Union Ball Valve as manufactured by Spears Manufacturing Company, Sylmer, California, or approved equal.

902-1.2.6.2. GATE VALVES TWO AND A HALF INCHES (2½") AND LARGER

A. Provide the following, unless otherwise noted on Drawings:
   1. AWWA-C-509
   2. 200 lb. O.W.G.
   3. Cast Iron body - ASTM A 126 Class B
   4. Deep socket joints
   5. Rising stem
   6. Bolted bonnet
   7. Double disc
   8. Equipped with two inch (2") square operating key with tee handle

B. Provide two (2) operating keys for gate valve three inches (3") and larger. The “street key” shall be five feet (5') long with a two inch (2") square operating nut.

902-1.2.7. SLEEVES

A. Sleeves: (Existing by City of Clearwater)

902-1.2.8. REMOTE CONTROL VALVES

A. The remote control valve shall be a solenoid actuated, balance-pressure across-the diaphragm type capable of having a flow rate of 25-30 gallons per minute (GPM) with a pressure loss not to exceed 6.1 pounds per square inch (PSI). The valve pressure rating shall not be less than 150 psi.

B. The valve body and bonnet shall be constructed of high impact weather resistant plastic, stainless steel and other chemical/UV resistant materials. The valve’s one-piece diaphragm shall be of durable santoprene material with a clog resistant metering orifice.

C. The valve body shall have a one inch (1") (FNPT) inlet and outlet or a one inch (1”) slip by slip inlet and outlet for solvent weld pipe connections.

D. The valve construction shall be as such to provide for all internal parts to be removable from the top of the valve without disturbing the valve installation.

E. The valve shall be as manufactured by Rain Bird Sprinkler Mfg. Corp., Glendora, California, or approved equal.

F. Identify all control valves using metal I.D. tags numbered to match drawings.

902-1.2.9. VALVE BOXES

A. For remote control drip valve assembly and UNIK control timer use a Brooks #36 concrete value box with #36-T cast iron traffic bearing cover or approved equal.

B. For flush valve assembly use an Ametek #181014 ten inch (10") circular valve box with #181015 cover comparable to Brooks, or approved equal.

C. For air relief assembly use an Ametek #182001 (6") economy turf box with #182002 cover comparable to Brooks or approved equal.

902-1.2.10. DRIP IRRIGATION

902-1.2.10.1. CONSTRUCTION

A. Techline shall consist of nominal sized one-half inch (1/2”) low-density linear polyethylene tubing with internal pressure compensating, continuously self-cleaning, integral drippers at a specified spacing (12”, 18”, or 24” centers). The tubing shall be brown in color and conform to an outside diameter (O.D.) of 0.67 inches and an inside diameter (I.D.) of 0.57 inches. Individual pressure compensating drippers shall be welded to the inside wall of the tubing as an integral part of the tubing assembly. These drippers shall be constructed of plastic with a hard plastic diaphragm retainer and a self-flushing/cleaning elastomer diaphragm extending the full length of the dripper.

902-1.2.10.2. OPERATION

A. The drippers shall have the ability to independently regulate discharge rates, with an inlet pressure of seven to seventy (7-70) pounds per square inch (PSI), at a constant flow and with a manufacturer’s coefficient of variability (Cv) of 0.03. Recommended operating pressure shall be between 15-45 PSI. The dripper discharge rate shall be 0.4, 0.6, or 0.9 gallons per hour (GPH) utilizing a combination turbulent flow/reduced pressure compensation cell mechanism and a diaphragm to maintain uniform discharge rates. The drippers shall continuously clean themselves while in operation. The dripperline shall be available in 12”, 18” and 24” spacing between drippers unless otherwise specified. Techline pipe depth shall be under mulch unless otherwise specified on Plans. Maximum system pressure shall be 45 PSC. Filtration shall be 120 mesh or finer. Bending radius shall be seven inch (7”).

B. For on-surface or under mulch installations, six inch (6”) metal wire staples (TLS6) shall be installed three feet (3’) to five feet (5’) on center, and two staples installed at every change of direction.

902-1.2.10.3. LINE FLUSHING VALVES

A. The sub-surface system shall utilize Automatic Line Flush Valves at the end of each independent zone area. This valve shall be capable of flushing one gallon at the beginning of each irrigation cycle. The valves shall match the dripline manufacturer and connect directly to the dripline.

902-1.2.10.4. AIR/VACUUM RELIEF VALVE

A. Each independent irrigation zone shall utilize an Air/Vacuum Relief Valve at its high point(s). The air and vacuum relief valve shall seal effectively from 2 to 110 psi.

902-1.2.10.5. PRESSURE REGULATORS

A. The pressure regulator shall be designed to handle steady inlet pressures over 150 pounds per square inch (psi) and maintain a constant outlet pressure of 25 psi. Regulating accuracy shall be within +/-6%. The pressure regulator shall be manufactured from high-impact

engineering grade thermoplastics. Regulation shall be accomplished by a fixed stainless steel compression spring which shall be enclosed in a chamber separate from the water passage.

902-1.2.10.6. FILTERS

A. The filter shall be a multiple disc type filter with notation indicating the minimum partial size to travel through or the mesh size of the element being used. The discs shall be constructed of chemical resistant thermoplastic for corrosion resistance.

902-1.2.10.7. FITTINGS

A. All connections shall be made with barb or compression type fitting connections. Fittings and dripline shall be as manufactured by the manufacturer of the dripline to ensure the integrity of the subsurface irrigation system.

902-1.2.11. AUTOMATIC CONTROL TIMER

A. The irrigation controller (control module) shall be programmable by a separate transmitter device only. The program shall be communicated to the Control Module from the Field Transmitter via an infrared connection. The controller shall be of a module type which may be installed in a valve box underground. The controller shall function normally if submerged in water and the communication from the transmitter shall function if submerged in water.

B. The control module shall be housed in an ABS plastic cabinet and shall be potted to insure waterproof operation. The control module shall have two mounting slots for screws allowing the module to be securely mounted inside a valve box.

C. The controller shall operate on one nine volt (9V) alkaline battery for one full year regardless of the number of stations utilized. The controller shall operate 1, 2, or 4 stations either sequentially or independently.

D. The controller shall have three (3) independent programs with eight (8) start times each, station run time capability from one (1) minute to twelve (12) hours in one (1) minute increments, and a seven (7) day calendar. The controller shall turn on stations via latching solenoids installed on the valves. Manual operations shall be initiated by attaching the Field Transmitter to the Control Module and programming a manual start. The controller shall be capable of manual single station or manual program operation.

E. The controller shall be as manufactured by Rain Bird Sprinkler Mfg. Corp., Glendora, California USA.

902-1.2.12. FIELD TRANSMITTER

A. The irrigation controller shall be programmable by a separate transmitter device (Field Transmitter) only. The Field Transmitter shall communicate to the Control Module via an infrared connection. The Field Transmitter shall be water resistant and housed in ABS plastic and have a removable, reversible protective sheath. The Field Transmitter shall operate on one nine volt (9V) alkaline battery.

B. The Field Transmitter shall have a large LCD screen and a seven-key programming pad. A beep sound shall confirm every key stroke. The screen shall automatically turn off after one minute when not in use.

C. The Field Transmitter shall be capable of programming an unlimited number of UNIK Control Modules.

D. The Field Transmitter shall be as manufactured by Rain Bird Sprinkler Mfg. Corp., Glendora, California USA.

902-1.2.13. LATCHING SOLENOID

A. The Latching Solenoid shall be supplied with an installed, filtered adapter allowing installation of the solenoid onto any Rain Bird DV, PGA, PEB, PES-B, GB, of EFB series valve.

B. The Latching Solenoid shall be as manufactured by Rain Bird Sprinkler Mfg. Corp., Glendora, California USA.

902-1.3. EXECUTION

902-1.3.1. GENERAL INSTALLATION REQUIREMENTS

A. Before work is commenced, hold a conference with the Engineer to discuss general details of the work.

B. Verify dimensions and grades at job site before work is commenced.

C. During the progress of the work, a competent superintendent and any assistants necessary shall be on site, all satisfactory to the Engineer. This superintendent shall not be changed, except with the consent of the Engineer. The superintendent shall represent the Contractor in Contractor’s absence and all directions given to the superintendent shall be as binding as if given to the Contractor.

D. Obtain and pay for all irrigation and plumbing permits and all inspections required by outside authorities.

E. All work indicated or notes on the Drawings shall be provided whether or not specifically mentioned in these Technical Specifications.

F. If there are ambiguities between the Drawings and Specifications, and specific interpretation or clarification is not issued prior to bidding, the interpretation or clarification will be made only by the Engineer, and the Contractor shall comply with the decisions. In the event the installation contradicts the directions given, the installation shall be corrected by the Contractor at no additional cost.

G. Layout of sprinkler lines shown on the Drawing is diagrammatic only. Location of sprinkler equipment is contingent upon and subject to integration with all other underground utilities. Contractor shall employ all data contained in the contract Documents and shall verify this information at the construction site to confirm the manner by which it relates to the installation.

H. Do not proceed with the installation of the sprinkler system when it is apparent that obstructions or grade differences exist or if conflicts in construction details, legend, or specific notes are discovered. All such obstructions, conflicts, or discrepancies shall be brought to the attention of the Engineer.

I. The disturbance of existing paving will not be permitted. Install all required sleeving prior to roadway base.

902-1.3.2. EXCAVATING AND BACKFILLING

902-1.3.2.1. TRENCHING - GENERAL

A. Dig sides of trenches straight. Provide continuous support for pipe on bottom of trenches. Lay pipe to uniform grade. Trenching excavation shall follow layout indicated on Drawings.

B. Maintain six inch (6”) horizontal and minimum clearance between sprinkler lines and between all lines of other trades.

C. Do not install sprinkler lines directly above another line of any kind.

D. Maintain six inch (6”) vertical minimum between sprinkler lines which cross at angles of 45 degrees to 90 degrees.

E. Exercise care when excavating, trenching and working near existing utilities.

902-1.3.2.2. BACKFILLING

A. All pressure supply lines (mainline) shall have eighteen inches (18") of fill placed over the pipe.

B. Initial backfill on all lines shall be of a fine granular material with no foreign matter larger than one half inch (½”).

C. Compact backfill according to Section 125 of FDOT Standard Specifications.

D. Do not, under any circumstances, use equipment or vehicle wheels for compacting soil.

E. Restore grades and repair damages where settling occurs.

F. Compact each layer of fill with approved equipment to achieve a maximum density per AASHTO T 180. Under landscaped area, compaction shall not exceed 95% of maximum density.

G. Compaction shall be obtained by the use of mechanical tampers or approved hand tampers. When hand tampers are used, the materials shall be deposited in layers not more than six inches (6") thick. The hand tampers shall be suitable for this purpose and shall have a face area of not more than 100 square inches. Special precautions shall be taken to prevent damage to the irrigation system piping and adjacent utilities.

902-1.3.2.3. ROUTING OF PIPING:

A. Routing of pressure and non-pressure piping lines are indicated diagrammatically on Drawings.

B. Coordinate specimen trees and shrubs with routing of lines.

1. Planting locations shall take precedence over sprinkler and piping locations.
2. Report to Owner any major deviation from routing indicated.

C. Conform to Drawings layout without offsetting the various assemblies from the pressure supply line.

D. Layout drip tube and make any minor adjustments required due to differences between site and Drawings. Any such deviations in layout shall be within the intent of the original Drawings, and without additional cost.

E. Layout all systems using an approved staking method and maintain the staking of approved layout.

902-1.3.3. INSTALLATION

902-1.3.3.1. WATER SUPPLY

A. Connections to the water sources shall be at the approximate locations indicated on the Drawings. Make minor changes caused by actual site conditions without additional cost to the Owner.

902-1.3.3.2. ASSEMBLIES

A. Routing or pressure supply lines as indicated on Drawings is diagrammatic only. Install lines and required assemblies in accordance with details on Drawings.

B. Do not install multiple assemblies on plastic lines. Provide each assembly with its own outlet. When used, the pressure relief valve shall be the last assembly.

C. Install all assemblies in accord with the respective detail Drawings and these Technical Specifications.

D. Plastic pipe and threaded fittings shall be assembled using Teflon tape, applied to the male threads only.

902-1.3.3.3. SLEEVES: (EXISTING BY CITY OF CLEARWATER)

A. The Contractor shall verify the location of all existing sleeves as shown on the roadway, utility and/or irrigation plans and notify the Engineer of any discrepancies.

902-1.3.3.4. PLASTIC PIPE

A. Install plastic pipe in accord with manufacturer's recommendations.

B. Prepare all welded joints with manufacturer's cleaner prior to applying solvent.

1. Allow welded joints as least fifteen (15) minutes setup/curing time before moving or handling.
2. Partially center load pipe in trenches to prevent arching and shifting when water pressure is on.

3. Do not permit water in pipe until a period of at least four (4) hours has elapsed for solvent weld setting and curing, unless recommended otherwise by solvent manufacturer.

C. Curing

1. When the temperature is above 80 degrees F., allow soluble weld joints at least twenty-four (24) hours curing time before water is introduced under pressure.

D. Flushing the system:

1. After all sprinkler pipe lines and risers are in place and connected, open the control valves and flush out the system with a full head of water.

E. Installing piping under existing pavement:

1. Piping under existing pavement may be installed by jacking & boring.
2. Secure permission from the Engineer before cutting or breaking any existing pavement. All repairs and replacements shall be approved by Engineer and shall be accomplished at no additional cost.

902-1.3.3.5. CONTROLLERS

A. Install all automatic controllers as shown in the plans.

1. The location of all controllers shall be approved by the Engineer's representative prior to installation.

902-1.3.3.6. REMOTE CONTROL VALVES

A. Install at sufficient depth to provide not more than six inches (6"), nor less than four inches (4") cover from the top of the valve to finish grade.

B. Install valves in a plumb position with twenty-four inch (24") minimum maintenance clearance from other equipment, three feet (3') minimum from edges of sidewalks, buildings, and walls, and no closer than seven feet (7') from the back of curb or edge of pavement along roadways.

C. Contractor shall adjust the valve to provide the proper flow rate or operating pressure for each sprinkler zone.

902-1.3.3.7. GATE VALVES

A. Install where indicated and with sufficient clearance from other materials for proper maintenance.

B. Check and tighten valve bonnet packing before backfill.

902-2. LANDSCAPE

902-2.1. GENERAL

902-2.1.1. REQUIREMENTS OF REGULATORY AGENCIES

A. Comply with Federal, State, Local, and other duly constituted authorities and regulatory agencies, without additional cost to the Owner in matters pertaining to codes, safety, and environmental matters.

B. Any permits for the installation or construction of any of the work included under the contract, which are required by any of the legally constituted authorities having jurisdiction, shall be arranged for by the Contractor and paid for directly by the Contractor, unless otherwise agreed upon in writing.

902-2.1.2. SCOPE OF WORK

A. All provisions of Contract, including General and Special Provisions and Plans, apply to the work specified in this Article. The Scope of Work includes everything for and incidental to executing and completing all landscape work shown on the Plans, Schedules, Notes and as specified herein.

B. Furnish and provide all labor, plants and materials tools and equipment necessary to prepare the soil for plantings, to install and care for all plant materials (including finish grading if necessary); to remove and/or transplant existing plants if indicated; to furnish, plant, fertilize, guy and brace, water, mulch and prune all new plant materials; and to execute all other Work as described herein or indicated on the Plans.

C. Work under this Article shall include labor and materials for final grading and raking to prepare the site for sodding, sprigging, or seeding, so finished lawn or playing field will appear even and uniform, will drain adequately, and will comply with the intent of the landscape drawings.

D. Initial maintenance of landscape materials as specified in this document.

902-2.1.3. QUALITY ASSURANCE

A. Landscape work shall be contracted to a single firm specializing in landscape work, who shall in turn subcontract no more than 40% of the work specified. All subcontractors under the control of the Contractor involved in the completion of the landscape work, shall be made known to the Owner and the Landscape Architect prior to their commencement of work on the project.

B. All work of this Article shall conform to the highest standard of landscape practices.

C. The Plant Material Schedule included with these Plans is provided only for the Contractor's convenience; it shall not be construed as to conflict or predominate over the Plans. If conflict between the Plans and Specifications exists, the Plans shall predominate and be considered the controlling document.

D. During this work, the Contractor shall be responsible for maintaining safety among persons in their employ in accordance with the standards set by The Occupational Safety and Health

Act of 1970 (and all subsequent amendments). Owner and Landscape Architect shall be held harmless from any accident, injury or any other incident resulting from compliance or non-compliance with these standards.

E. The Contractor shall cooperate with and coordinate with all other trades whose work is built into or affects the work in this Article.

F. All appropriate utility companies and agencies shall be contacted 72 hours prior to excavation. Call “One Call”/“Sunshine 811” at 8-1-1; “Sunshine 811” administrative offices may be reached at (800) 638-4097.

G. The Contractor shall carefully examine the site and all existing conditions affecting the work, such as: soil, obstructions, existing trees, utilities, etc. Report any conditions in conflict with the work to the Landscape Architect.

902-2.1.4. SUBMITTALS

A. The Contractor is required to submit prior to the expiration of the required maintenance period, two (2) copies of typewritten instructions recommending procedures to be established by the Owner for maintenance of landscape work for a period of one (1) year.

B. Furnish unit prices for all plant materials and inert materials, including labor for all specified work.

902-2.1.5. ALTERNATES, ADDITIONS, DELETIONS, SUBSTITUTIONS

A. If there are additions/alternates included in these Plans and Specifications, the Contractor must propose prices to accomplish the work stated as additions/alternates at the time of bidding.

B. The Owner, through their Project Representative, reserves the right to add or deduct any of the work stated herein without rendering the Contract void.

C. The Contractor must have written approval by the Project Representative for any substitutions not previously agreed to in the purchase agreement: installation without approval is entirely at the Contractor’s risk.

D. All material acquired through additions or substitutions shall be subject to all conditions and warranties stated herein.

902-2.1.6. ABBREVIATIONS/DEFINITIONS

O.A. or HT.: The over-all height of the plant measured from the ground to the natural, untied state of the majority of the foliage, not including extreme leaves, branches or fronds.

C.T.: Clear trunk is measured from the ground to the bottom of the first leaf or frond stem with no foliage from ground to specified height. For example, on Canary Island Date Palms or similar, the clear trunk measurement includes the “nut” at the base of the fronds.

C.W.: Clear wood is measured from the ground to the bottom of the base of the lowest leaf sheath or boot, trimmed in a natural manner. For example, on Canary Island Date Palms or similar, the clear wood measurement does not include the “nut” at the base of the fronds.

SPR.: Spread, branches measured in natural untied position to the average crown diameter, not including extreme leaves, branches or fronds.

ST.TR.: Straight trunk.

MIN.: Minimum.

GAL.: Gallon container size, i.e., 1 gallon, 3 gallon, 7 gallon, etc.

O.C.: On center, distance between plant centers.

DIA.: Diameter.

LVS.: Leaves.

D.B.H.: Diameter or caliper of main trunk of tree as measured at breast height at 4-1/2 feet above grade.

CAL.: Caliper, the outside diameter of up to a four inch tree is measured six inches above grade, larger trees are measured at 12 inches above grade.

B&B: Balled and burlapped in accordance with horticultural standards of the American Association of Nurserymen.

PPP: Plants per pot.

FG: Field grown.

STD.: Standard, single, straight trunk.

Owner: To be known as that entity which holds title or control to the premises on which the work is performed.

Owner's Representative: Owner's on-site representative shall be responsible for approval of quantity and quality of *materials specified and execution of installation.*

Contractor: Shall refer to that person or enterprise commonly known as the Landscape Contractor.

Landscape Architect: This person or firm is the responsible representative of the Owner who produces the landscape Plans and Specifications.

902-2.1.7. PRODUCT DELIVERY, STORAGE, AND HANDLING

902-2.1.7.1. PLANT MATERIALS

A. Provide container-grown or, if appropriate, freshly dug trees and shrubs. Do not prune prior to delivery. Do not bend or bind trees or shrubs in such a manner as to damage bark, break branches or destroy natural shape. Provide protective covering during delivery. If plant delivery is made in open vehicles, the entire load shall be suitably covered.

B. All plants are to be handled at all times so that roots or root balls are adequately protected from sun, cold, or drying winds. No root balls for trees and container plants that have been cracked or broken shall be planted except upon special approval. Plants shall not be pulled by the tops or stems, nor handled in a rough or careless manner at any time.

C. Balled and burlapped ("B & B") plants shall be moved with firm, natural, balls of soil, not less than one foot (1') diameter of ball to every one inch (1") caliper of trunk; root ball depth shall not be less than two-thirds (2/3) of root ball diameter. B & B plants which cannot be planted upon delivery shall have their root balls covered with moist soil or mulch.

D. Trees shall be dug with adequate balls, burlapped, and wire bound if needed. Root pruning to be done a minimum of four (4) weeks before removal from the field and planting at the site. Root balls may not be encased in "grow bags" or other synthetic material, except plastic shrink wrap for transport only.

E. Remove all fronds form sabal palms prior to planting, but leave a minimum of twelve inches (12") of new frond growth above the bud. Do not damage bud. On all other palms, only a minimum of palm fronds shall be removed from crown to facilitate moving and handling. Clear trunk shall be determined after minimum fronds have been removed. Boots shall be removed from trunk unless otherwise specified. Palms shall be planted within twenty-four (24) hours of delivery.

F. Deliver trees and shrubs after preparations for planting have been completed and plant immediately. If planting is delayed more than 6 hours after delivery, set trees and shrubs in shade, protect from weather and mechanical damage, and cover to keep the roots moist.

G. Label at least one tree and one shrub of each variety with a securely attached waterproof tag bearing legible designation of botanical and common name.

H. Time delivery so that sod will be placed within twenty-four (24) hours after stripping. Protect sod against drying and breaking by covering palettes of sod or placing in a shaded area.

902-2.1.8. JOB CONDITIONS

902-2.1.8.1. ACCEPTANCE OF JOB CONDITIONS.

A. The Contractor shall examine the sub-grade, verify elevations, observe the conditions under which work is to be performed and notify the Landscape Architect or Project Representative in writing of unsatisfactory conditions prior to beginning work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Landscape Architect. Start of work shall indicate acceptance of conditions and full responsibility for the completed work.

B. Proceed with and complete the landscape work as rapidly as portions of the site become available, working within the seasonal limitations for each kind of landscape work and following the approved schedule. If seasonal limitations apply, notify the Landscape Architect for adjustments to the Schedule.

C. Determine locations of all underground utilities and review for conflicts with planting procedures.

D. When adverse conditions to plant growth are encountered, such as rubble fill, drainage conditions or obstruction, the Contractor shall notify the Landscape Architect in writing prior to planting.

E. Plant trees and shrubs after final grades are established and prior to sod installation or seeding lawns. Protect existing lawn, trees, and promptly repair damages from planting operations.

902-2.1.8.2. SCHEDULING OF WORK

A. The work shall be carried out to completion with the utmost speed. Immediately upon award of contract, the Contractor shall prepare a construction schedule and furnish a copy to the Owner's Representative and/or the Landscape Architect for approval. The Contractor shall carry out the work in accordance with the approved schedule.

B. If the Contractor incurs unforeseen costs, such as overtime hours, holidays, etc., in order to complete the work within the time stated in the Contract, and/or to maintain the progress schedule, all said costs shall be borne by the Contractor at no additional cost to the Owner.

C. The Owner's Representatives may request work stoppage in writing. Upon written request from the Owner's Representative, the Landscape Contractor shall suspend delivery of material and stop all work for such a period as deemed necessary by the Owner, the Owner's Representative, or the General Contractor, with respect to any additional costs which may result from work stoppage.

902-2.1.8.3. UTILITIES

A. The Contractor shall perform work in a manner which will avoid conflicts with utilities. Hand excavate, as required, to minimize possibility of damage to underground utilities. Maintain grade stakes set by others until removal is mutually agreed upon by all parties concerned.

902-2.2. PRODUCTS

902-2.2.1. MATERIALS

902-2.2.1.1. PLANT MATERIALS: NOMENCLATURE

A. Plant species, sizes, etc., shall be per Plans and Specifications on Plant Material Schedule. Nomenclature is per Manual of Cultivated Plant, Standard Encyclopedia of Horticulture, L.H. Bailey, or Standardized Plant Names Dictionary, American Joint Committee on Horticultural Nomenclature (latest editions) or conforms with names accepted in the nursery trade.

902-2.2.1.2. PLANT MATERIALS: QUALITY ASSURANCE

A. Provide healthy, vigorous stock grown under climatic conditions similar to conditions in the locality of the project. Plants shall have a habit of growth that is normal for the species and be sound, healthy, vigorous and free from insects, pests or their eggs, plant diseases, defects and injuries. Plants shall be well branched and densely foliated when in leaf and shall have healthy, well-developed root systems.

B. Trees shall be heavily branched or, in the case of palms, be heavily leafed. Some plant materials may be collected stock with the approval of the Landscape Architect. Provided

tree species that have a single main trunk (central leader), unless otherwise stated. Trees that have the main trunk forming a "Y" shape or parallel branching are not acceptable.

C. Plant materials shall be specified and shall be Florida #1 or better as to shape and quality for the species as outlined in Grades and Standards for Nursery Plants Part I and II, Florida Department of Agriculture and Consumer Services (latest edition).

D. The Owner or Landscape Architect reserves the right to inspect plant materials either at the place of growth or at the project site prior to planting for compliance with requirements for name, variety, size, quality, or designated area.

E. Landscape materials shall be shipped with certificates of inspection as required by governmental authorities. The Contractor shall comply with all governing regulations that are applicable to landscape materials.

F. Do not make substitutions. If specified landscape material is not available, submit to the Landscape Architect proof of it being non-available. In such event, if the Landscape Architect designates an available source, such shall be acquired from designated source. When authorized, a written change order for substitute material will be made by adjustment to Contract amount.

G. Height and/or width of trees shall be measured from ground up; width measurement shall be normal crown spread of branches with plants in the normal position. This measurement shall not include immediate terminal growth. All measurements shall be taken after pruning for specified sizes. All trees and shrubs shall conform to measurements specified in the plant material schedule, except that plant material larger than specified may be used with the approval of the Owner or Landscape Architect, with no increase to the Contract price. Plant materials shall not be pruned prior to delivery.

H. Plant Material shall be symmetrical, typical for variety and species. Plants used where symmetry is required shall be matched as nearly as possible.

I. Balled and burlapped plants shall have firm, natural balls of earth of sufficient diameter and depth to encompass the feeding root system necessary for full development of the plant and to conform with the standards of the American Association of Nurserymen. Root balls and tree trunks shall not be damaged by improper binding and B & B procedures.

J. Container-grown plants may be substituted for balled and burlapped plants or vice-versa provided the quality is equal or better than specified and the Landscape Architect approves the substitution.

K. Container-grown stock shall have been grown in containers for at least four months, but not over two years. If requested, samples must be shown to prove no root bound condition exists.

902-2.2.1.3. GRASSES: SOD OR SEED

A. Sod or seed (as/if specified) shall be a species as stated on the Plan. Solid sod shall be of even thickness and with a good root structure, 95% free of noxious weed, freshly mowed before cutting, and in healthy condition when laid. It must not be stacked more than twenty-four (24) hours before laying and it must be grown in soil compatible to that in which it will be installed. Sod must be kept moist prior to and after installation.

B. Seed shall be delivered to the site in unopened bags with certification tags in place. Purity, germination and weed content shall be as certification requirements.

902-2.2.1.4. MULCH

A. Mulch shall be as specified in the plans or by the project manager.

B. Install mulch to an even depth of three inches (3") before compaction, as shown in the PLANTING DETAILS in the plans.

902-2.2.1.5. FERTILIZER

A. Granular fertilizer shall be uniform in composition; free flowing and suitable for application with approved equipment; received at the site in full, labeled, unopened bags bearing the name, trade name or trademark and warranty of the producer; fully conforming to State of Florida fertilizer laws.

B. All fertilizer shall bear the manufacturer's statement of analysis and shall contain the appropriate minimum amounts of elements for the type of use specified herein.

C. Agriform 20-10-5 fertilizer tablets or approved equal, shall be placed in planting pit for all plant materials at time of installation and prior to completion of pit backfilling.

D. Ground cover and annual areas shall receive fertilization with Osmocote Time Release Fertilizer according to product instructions and rate.

E. For sod and seeded areas, fertilize with a complete granular fertilizer on Bahia and St. Augustine grasses at the rate of one pound (1 lb.) of nitrogen per one thousand square feet (1000 sq ft). Fertilizer shall be commercial grade, mixed granules, with 30% to 50% of the nitrogen being in slow or controlled release form. The ratio of nitrogen to potash will be 1:1 or 2:1 for complete fertilizer formulations. Phosphorus shall be no more than one-fourth (¼) the nitrogen level. They shall also contain magnesium and micronutrients (i.e. manganese, iron, zinc, copper, etc.).

902-2.2.1.6. STAKES AND GUYS

A. For trees, approved plastic or rubber guys shall be used between the stakes and the tree trunk. Galvanized steel guy wire shall not be used.

B. Stakes shall be cut from 2" x 4" pressure treated (p.t.) stock for trees over two inch (2") caliper. Stakes shall be 2" x 2" pressure treated (p.t.) stock for trees two inch (2") caliper and under. A minimum of two (2) stakes per tree or an optional three (3) stakes per tree shall be used.

C. For single trunk palms, stakes shall be cut from 2" x 4" pressure treated (p.t.) stock, with a minimum of three (3) stakes per palm. Batten consisting of 5 layers of burlap and 5 - 2" x 4" by 16" wood connected with two – three-quarter inch (¾") steel bands shall be used around the palm trunk.

D. Other tree staking systems may be acceptable if approved.

902-2.2.1.7. PLANTING SOIL

A. Unless stated on the plans or in the specifications, install plant material in tilled and loosened native soil backfill. It is the responsibility of the Landscape Contractor to test, prior to planting and at no additional cost to the City, any soils which may be unsuitable for the vigorous growth of plants. Unsuitable conditions shall be reported to the Landscape Architect immediately in writing.

B. When required, planting soil media shall be provided by the Contractor and shall consist of one-third (1/3) peat and two-thirds (2/3) sandy loam, with no lumps over one inch (1”).

C. Backfill and clean fill dirt provided by the Contractor shall be in a loose, friable soil. There must be slight acid reaction to the soil (about 6.0 – 6.5 pH) with no excess of calcium or carbonate, and it shall be free from excess weeds, clay lumps, stones, stumps, roots and toxic substances or any other materials that might be harmful to plant growth or a hindrance to grading, planting, and maintenance procedures and operations. No heavily organic soil, such as muck or peat shall be used as fill dirt.

D. Bed preparation for annual beds under one (1) gallon container size shall consist of three inches (3”) of Florida peat or other approved organic soil amendment spread over full length and width of planting area. Rototil organic layer six inches (6”) to eight inches (8”) into native soil.

902-2.2.1.8. SOIL AMENDMENTS

A. Terra-Sorb AG or approved equal, soil amendment shall be mixed with native or planting soil for all trees, shrubs, ground cover, and annuals according to manufacturer’s recommended application rates and methods, if specified on the Plans.

902-2.2.1.9. TREE PROTECTION

A. Wood fencing shall be 2” x 4” pressure treated (p.t.) stock with flagging on horizontal members. Space vertical members six feet (6’) to eight feet (8’) on center. The barricade shall be placed so as to protect the critical protection zone area, which is the area surrounding a tree within a circle described by a radius of one foot (1’) for each inch of the tree’s diameter at breast height DBH (four and one half feet)’) above grade.

902-2.2.1.10. ROOT BARRIER SYSTEM

A. Root barrier fabric shall be installed when specified in the plans and/or specifications for protection of adjacent paved surfaces according to specific product name or equal. Install as directed by the manufacturer.

902-2.2.1.11. PACKAGED MATERIALS

A. Deliver packaged materials in containers showing weight, analysis and name of manufacturer. Protect materials from deterioration during delivery and while stored at the site.

902-2.2.1.12. PESTICIDES

A. Pesticides shall be only approved, safe brands applied according to manufacturer’s directions.

902-2.3. EXECUTION

902-2.3.1. PREPARATION

902-2.3.1.1. OBSTRUCTIONS BELOW GROUND

A. It shall be the responsibility of the Contractor to locate and mark all underground utilities, irrigation lines and wiring prior to commencement of the work.

B. If underground construction, utilities or other obstructions are encountered in excavation of planting areas or pits, the Landscape Architect shall be immediately notified to select a relocated position for any materials necessary.

902-2.3.1.2. GRADING AND PREPARATION FOR PLANT MATERIALS

A. All proposed landscape areas containing existing turf grass or weeds shall be treated with Monsanto's "Round-Up" per manufacturer's specifications. All proposed landscape areas adjacent to water bodies shall be treated with "Rodeo" per the manufacturer's specifications.

B. New plant materials will not be installed until a 98% weed/turf eradication has been achieved. More than one application may be required to produce an acceptable planting bed.

C. Pre-emergent herbicides are not a substitute for spray treatment of "Round-Up" or "Rodeo" and may be used only with the written approval of the Landscape Architect.

D. Should any plant material in the same or adjacent beds be damaged by these chemicals, the same size, quantity and quality of plants shall be immediately replaced by the Contractor at no cost to the Owner.

E. Any necessary corrections or repairs to the finish grades shall be accomplished by the Contractor. All planting areas shall be carefully graded and raked to smooth, even finish grade, free from depressions, lumps, stones, sticks or other debris and such that they will conform to the required finish grades and provide uniform and satisfactory surface drainage without puddling.

F. The Contractor shall remove debris (sticks, stones, rubbish) over one and one half inches (1½") in any dimension from individual tree, shrub and hedge pits and dispose of the excavated material off the site.

902-2.3.1.3. PREPARATION FOR ANNUAL BED PLANTING

A. Prepare native subgrade by rototilling or loosening by hand methods. Spread three inches (3") of one-third (1/3) Florida peat and two-thirds (2/3) sandy, or other approved organic soil amendment over the full length and width of planting area for annuals. Rototill organic layer six inches (6") to eight inches (8") into the native soil. Grade the planting bed by "crowning' to ensure that surface drainage, percolation, and aeration occur at rapid rates. Add Osmocote time release fertilizer according to product instructions and rate.

902-2.3.1.4. PREPARATION FOR SEEDING AND SOD AREAS

A. All proposed sod areas containing existing turf grass or weeds shall be treated with Monsanto's "Round-Up" per manufacturer's specifications. All proposed sod areas adjacent to water bodies shall be treated with "Rodeo" per the Manufacturer's Specifications.

B. Limit preparation to areas which will be planted promptly after preparation. Loosen sub-grade of seed and sod areas to a minimum depth of four inches (4").

C. Immediately prior to any turf work, the Contractor shall finish grade the soil to a smooth, even surface assuring positive drainage away from buildings and the subsequent turf flush to the tops of adjacent curbs and sidewalks. The surface shall be sloped to existing yard drains.

D. A complete fertilizer shall be applied to St. Augustine or Bahia grass at a rate of one pound (1 lb.) of nitrogen per one thousand square feet (1000 sq ft). Fertilizer shall be commercial grade, mixed granules, with 30% to 50% of the nitrogen being in slow or controlled release form. Thoroughly work fertilizer into the top four inches (4") of soil.

E. Moisten prepared seed and sod areas before planting if soil is dry. Water thoroughly and allow surface moisture to dry before planting lawns. Do not create a muddy soil condition.

902-2.3.2. INSTALLATION

902-2.3.2.1. BERM CONSTRUCTION (IF SPECIFIED)

A. Install berms at location and design shown on Plans and at the height and slope indicated. Height stated is for finished berm with soil at natural compaction.

B. Exact location and configuration of berms may require modification to allow proper drainage; such changes will be coordinated with the Landscape Architect.

C. If shown on the Plan, construct berms using clean sandy loam fill dirt which is well-drained, free of rocks, roots, or other debris, with a soil pH of an acid Nature (about 6.0 - 6.5). No heavily organic soil, such as muck or peat shall be used in berm construction.

902-2.3.2.2. LAYOUT OF PLANT MATERIALS

A. Unless otherwise stipulated, plant materials shall be approximately located per the plans by scale measurements using established building, columns, curbs, screen walls, etc., as the measuring reference point. Slight shifting may be required to clear wires, prevent blockage of signage, etc.

B. Shrubs and ground covers shall be located and spaced as noted on the plant material schedule (if provided), otherwise plants will be placed in the planting beds at the normally accepted spacing for each species.

C. Leave an eighteen inch (18") (450 millimeters) border of mulched space between outer leaves of installed plant material and the bed line, curb, or building foundation wall for all plant sizes.

D. Any necessary "minor" adjustments in the layout of planting shall be made by the Contractor with the approval of the Landscape Architect in order to conform as nearly as possible to the intent of the Plans.

902-2.3.2.3. PLANTING PROCEDURES

A. All shrubs, trees and ground covers or vines shall be planted in pits having vertical sides and being circular in outline. Planting pit shall be three (3) to five (5) times the width of the root ball.

B. Plants shall be set straight or plumb, in the locations shown, at such level that after settlement normal or natural relationship of the top of the root ball with the ground surface will be established. With regards to proper nursery practices, plants under certain conditions (i.e. low and wet areas) will benefit from being planted "high" with the root ball about one inch (1") higher than the surrounding grade.

C. All plant materials shall be fertilized with Agriform 20-10-5 planting tablets, or approved equal, at time of installation and prior to completion of pit backfilling. Agriform planting tablets shall be placed uniformly around the root mass at a depth that is between the middle and the bottom of the root mass.

Application rate:

1 gallon	1 - 21 gram tablet
3 gallon	2 - 21 gram tablet
5 gallon	3 - 21 gram tablet
7 gallon	4 - 21 gram tablet
Trees	3 tablets each ½" (12 millimeters) caliper
Palms	7 - 21 gram tablets

D. Native soil shall be used in back-filling plant pits or as specified. The Contractor shall be responsible for providing additional soil for building tree saucers.

E. When balled and burlapped plants are set, undisturbed native soil shall be left under the base of the root ball to prevent voids. Backfill tilled and loosened native soil around the sides of the root ball. Remove the top 4 four inches (4") (100 millimeters) of burlap wire, and all tie-down material from the root ball. Do not remove these materials from the bottom of the root ball. Thoroughly water-in before bringing the back-fill up to the proper grade. Roots of bare plants shall be properly spread out, and planting soil carefully worked in among them. Failure to comply is cause for rejection.

F. Containerized plants shall be installed with undisturbed native soil left under the base of the root ball to prevent voids. Planting pit shall be three (3) to five (5) times the width of the root ball. Backfill tilled and loosened native soil around the sides of the root ball. Thoroughly water-in before bringing the backfill up to the proper grade.

G. Plant spacing shall be "on center" and varies with the different plant species. Space each variety of plant equally in the planting areas. Shrubs and ground covers adjacent to straight or curved edges shall be triangular - spaced in rows parallel to those edges. Plant a minimum of eighteen inches (18") from the back of the curb to the outside edge of the plant.

H. All azaleas shall be placed into a prepared bed of amended soil containing 50% weed-free Florida peat or approved equivalent. Root balls shall be scarified vertically at 120 degree angles in a triangular pattern.

I. Sabal palms may be planted deeper than normal if conditions warrant and if approved.

902-2.3.2.4. SODDING

A. During periods of drought, sod shall be watered sufficiently at its origin to moisten the soil adequately to the depth to which it is to be cut.

B. An application of 6-6-6, 40% organic, slow or controlled release fertilizer shall be made to all lawn areas just prior to the laying of the sod at a rate of one pound (1 lb.) of nitrogen per one thousand square feet (1000 sq ft). The ground shall be moistened before the sod is laid in place.

C. Solid sod shall be laid tightly with closely abutting staggered joints with an even surface edge and sod edge, in a neat and clean manner to the edge of all the paving and shrub areas. Cut down soil level to one inch (1") to one and one half inches (1-1/2") below top of walks prior to laying sod.

D. Within two (2) hours after installing sod and prior to rolling, irrigate the sod. Sufficient water shall be applied to wet the sod thoroughly and to wet the sod to a depth of two inches (2") (50 millimeters). Watering shall be done in a manner that will avoid erosion due to the application of excessive quantities, and the watering equipment shall be a type that will prevent damage to the finished sod surface. Watering shall be repeated as necessary to keep sod moist until rooted to subgrade.

E. The sod shall be pressed firmly into contact with the sod bed using a turf roller or other approved equipment so as to eliminate air pockets, provide a true and even surface and insure knitting without any displacement of the sod or deformation of the surfaces of sodded areas. After the sodding operation has been completed, the edges of the area shall be smooth and shall conform to the grades indicated.

F. If, in the opinion of the Landscape Architect, top dressing is necessary after rolling, clean silica sand shall be used to fill voids. Evenly apply sand over the entire surface to be leveled, filling-in dips and voids and thoroughly washing into the sod areas.

G. On slopes 3:1 or steeper, and as required, a geotextile fabric shall be installed per manufacturer's specifications prior to placing sod. The sod shall be fastened in place with suitable wooden pins or by other approved method.

902-2.3.2.5. SEEDING

A. Seed shall be installed per the specifications of the State of Florida Department of Transportation. See plan for type of seed.

902-2.3.2.6. TREE GUYING, BRACING AND STAKING

A. Tree guying, staking and bracing shall be the responsibility of the Contractor per sound nursery practices, and shall be done per details shown on the Plans. For trees, a minimum of two (2) stakes per tree or an optional three (3) stakes per tree at 120 degree spacing shall be used. Stakes shall be driven in at an angle, then tightened to vertical supported by approved plastic or rubber guys. Trees shall be staked with a minimum of four feet (4') height of stake above grade and a minimum of thirty inches (30") of stake below grade.

B. For single trunk palms, a minimum of three (3) stakes per palm at 120 degree spacing shall be used. Toenail the stakes to batten consisting of five (5) layers of burlap and five (5) - 2

inch x 4 inch x 16 inch wood connected with two (2) three-quarter inch (3/4") steel bands. Palms shall be staked with a minimum of five feet (5') of stake above grade.

C. Contractor shall remove all tree guying, staking, and bracing from trees six (6) months after the date of final acceptance of the landscape work.

D. Stake only trees that require support to maintain a plumb position or are in potentially hazardous areas.

902-2.3.2.7. MULCHING

A. All planting beds shall be weed-free prior to mulching.

B. All curb, roadway, and bed line edges will be "trenched" to help contain the applied mulch. Mulch should be below top of curb and resistant to washout from stormwater run-off.

C. All plant beds and tree rings shall be mulched evenly with a three inch (3") layer (before compaction) of 100% Grade B recycled cypress bark mulch, or other mulch as specified on the Plans or General Notes.

D. Mulch shall not be placed against the trunks of plant materials or foundations of buildings. Maintain a minimum three inch (3") clearance for trees and shrub trunks and a minimum six inch (6") clearance for the walls of buildings.

E. For beds of annual flowers, a 12 inch wide x 3 inch deep band of mulch shall be installed in front of the first row of annuals. Maintain a minimum six inches (6") of non-mulched clearance from the outside edge of annuals.

902-2.3.2.8. PRUNING

A. Pruning shall be done by an experienced certified Arborist to maintain the natural shape and form of the plant.

B. Upon acceptance by the Owner, prune any broken branches, remove crossed branches, and branches hanging below the clear trunk of the tree.

902-2.3.2.9. CLEAN-UP

A. During landscape work, store materials and equipment where directed by the Owner.

B. The Contractor shall promptly remove any materials and equipment used on the job, keeping the area neat at all times. Upon completion of all planting, dispose of all excess soil and debris leaving pavements and work areas in safe and orderly condition.

C. The clean-up of the site shall include the removal and proper disposal of the tree guying, staking, and bracing materials as described in specifications.

902-2.3.2.10. PROTECTION

A. The Contractor shall provide safeguards for the protection of workmen and others on, about, or adjacent to the work, as required under the parameters of the Occupational Safety and Health Administration (O.S.H.A.) standards.

B. The Contractor shall protect the Owner's and adjacent property from damage.

C. The Contractor shall protect the landscape work and materials from damage due to landscape operations. Maintain protection during installation and maintenance periods.

D. The Contractor shall provide protection (tree barricades) for all existing trees and palms as specified.

902-2.3.2.11. REPAIR OF DAMAGES

E. The Contractor shall repair all damage caused by their operations to other materials, property, or trades to a level equal in quality to the existing condition prior to damage.

F. The Contractor shall be held responsible for all damage done by their work or employees to other materials or trades' work. Patching and replacement of damaged work may be done by others, at the Owner's direction, but the cost of same shall be paid by the Contractor who is responsible for the damage.

902-2.3.3. MAINTENANCE

A. The Contractor shall maintain all plant materials in a first class condition from the beginning of landscape construction until Final Acceptance.

B. Operations:

1. Maintenance shall include, but not be limited to, watering of turf and planting beds, mowing, fertilizing, cultivation, weeding, pruning, disease and pest control, replacement of dead materials, straightening, turf or planter settlement corrections, replacement of rejected materials, staking and guying repair and tightening, wash-out repairs and regrading, and any other procedures consistent with the good horticultural practice necessary to insure normal, vigorous and healthy growth of all work under the Contract. Mowing shall be consistent with the recommended height per the University of Florida Cooperative Extension Service.

2. Within the warranty period, the Contractor shall notify the Owner of any maintenance practices being followed or omitted which would be detrimental to the healthy, vigorous growth of the landscape.

3. The Contractor shall be responsible for the final watering of not less than one inch (1") of water for all planted materials before leaving the site.

902-2.3.4. INSPECTION, REJECTION, AND ACCEPTANCE

902-2.3.4.1. INSPECTION

A. Upon completion of the installation, the Contractor will notify the Owner or the Owner's Representative that the job is ready for inspection. Within fifteen (15) days of notifications, the installation will be inspected by the Landscape Architect. A written and/or graphic inspection report will be sent to the Owner and/or Landscape Contractor.

902-2.3.4.2. REJECTION AND REPLACEMENT

A. The Landscape Architect shall be final judge as to the suitability and acceptability of any part of the work. Plant material will be rejected if it does not meet the requirements set forth in the Plans and Specifications.

B. Replace any rejected materials immediately or within fifteen (15) days and notify the Landscape Architect that the correction has been made.

902-2.3.4.3. ACCEPTANCE

A. After replacement of rejected plant material, if any, have been made, and completion of all other correction items, the Owner or Project Representative will accept the project in writing.

B. Upon Final Acceptance, the Owner assumes responsibility for maintenance within the terms of the Contract. Acceptance will in no way invalidate the Contractor's warranty period.

C. The Contractor's warranty period will begin after final acceptance of the project by the Owner.

1. If evidence exists of any lien or claim arising out of or in connection with default in performance of this Contract, the Owner shall have the right to retain any payment sufficient to discharge such claim and all costs in connection with discharging such claim.

2. Where the Specifications call for any stipulated item or an "approved equivalent", or in words to that effect, the Contractor shall indicate the price of the type and species specified in the proposal, giving the price to be added or deducted from their Contract price. The final selection rests with the Owner or their representative.

3. Where plants installed do not meet specifications, the Owner reserves the right to request plant replacement or an appropriate deduction from the Contract amount to compensate for the value not received from the under-specified plant materials. No additional compensation will be made to the Contractor for plants installed that exceed specifications.

902-2.3.5. WARRANTY

A. The Contractor shall warranty all palms and trees furnished under this contract for a period of one (1) year and all shrubs for a period of six (6) months. Material which is either dead or in poor health during this period or at completion will be replaced at no charge to the Owner. Should any of the plant materials show 50% or more defoliation during the warranty period, due to the Contractor's use of poor quality or improper materials or workmanship, the Contractor upon notice, shall replace without delay same with no additional cost to the Owner. Should any plant require replacing, the new plant shall be given the equal amount of warranty.

903. SODDING

Unless otherwise noted herein, the Contractor shall place all sod, either shown on the plans or at the direction of the Engineer, in conformance with Sections 575, 981, 982 and 983 of FDOT's Standard Specifications. The area for sod application shall be loosened and excavated to a suitable depth and finished to a grade compatible with existing grass and structures. Sod shall be placed with edges in close contact and shall be compacted to uniform finished grade with a sod roller immediately after placement. In sloped areas, the sod shall be graded and placed so as to prohibit

erosion and undermining of the adjacent sidewalk. No sod that has been cut for more than seventy-two (72) hours can be used unless authorized by the Engineer in advance. The sod shall be thoroughly watered immediately after placement. The Contractor shall continue to water sod as needed and/or directed by the Engineer as indicated by sun exposure, soil, heat and rain conditions, to establish and assure growth, until termination of the contract. Dead sod, or sod not acceptable to the Engineer, shall be removed and replaced by the Contractor at no additional compensation. Any questions concerning the type of existing sod shall be determined by the Engineer.

Unless otherwise noted on the plans, payment for sod (including labor, equipment, materials, placement, rolling, watering, etc.) shall be included in other bid items. Payment for these associated bid items may be withheld until the Contractor provides the City a healthy, properly placed stand of grass. When this work is given as a separate bid item, it shall cover all labor, equipment and materials, (including water) required for this work and shall be paid for on the basis of each square foot in place and accepted. No payment for sod shall be made until the Contractor provides the City a healthy, properly placed stand of grass.

904. SEEDING

Seed, or seed and mulch, shall only be used when specified for certain demolition projects. The seed and/or mulch shall be placed as called for on the plans in the following manner. The area to be seeded shall be brought to the required line and grade, fertilized and seeded in basic conformance with FDOT's Standard Specifications Sections 570, 981, 982 and 983. However, no wildflower seed shall be used, and Argentine Bahia Seed shall be used instead of Pensacola Bahia. No sprigging will be required. Also, the addition of 20 lb. of Rye Seed (to total 60 lb. of seed per acre) will be required during the stated periods. It is also required that the Contractor maintain said seed until growth is assured.

When this work is given as a bid item, the item shall cover all labor, material, equipment (including water), required for this work, and shall be paid for on the basis of each square yard in place and accepted. If called for on the plans, but not shown as a bid item, then the cost of such work as stated above shall be included in the cost of other work.

905. LAWN MAINTENANCE SPECIFICATIONS

905-1. SCOPE

To remove trash and debris from landscape and paved area; maintenance and fertilization of plant beds and landscape materials; maintenance, repair, and operation of irrigation systems; ornamental pest control; palm pruning; maintenance of traffic; and the cleaning of hard surfaces at designated areas. The Contractor is to work with the City in coordinating maintenance activities and reporting irregularities in the work zone.

The Contractor(s) will provide the labor and materials required to maintain the specified landscaped street areas including:

- Traffic safety and Maintenance of Traffic;
- Trash and debris removal from the job site;
- Removal of weeds in landscaped areas and hard surfaces;
- Proper trimming and pruning of landscape plants and palms;

- Proper fertilization and pest control of landscape and palms (may be subcontracted);
- Irrigation service and repair;
- Mulch replacement;
- Cleaning of hard surfaces; and the
- Reporting of irregularities at the job site.

905-2. SCHEDULING OF WORK

The Contractor(s) shall accomplish all landscape maintenance required under the contract between the hours of 7:00 a.m. and 6:00 p.m. Monday through Saturday, excluding observed holidays. The City may grant, on an individual basis, permission to perform contract maintenance at other hours.

All work shall be completed in a continuous manner, such as cleanup, weeding, trimming, etc., be completed before leaving the job site.

905-3. WORK METHODS

905-3.1. MAINTENANCE SCHEDULING

The Contractor(s) will adhere to a work schedule provided by the City (see Level of Service). Any variations to that schedule, requested by either party, must be approved, either verbally or in writing by an authorized representative of the other party.

905-3.2. DUTIES PER SERVICE VISIT

The Contractor(s) shall provide the following service at each scheduled visit to the designated location:

905-3.2.1. LITTER AND DEBRIS

Remove trash and debris from the project site. Proper disposal of collected trash and debris is the Contractor's responsibility. Extraordinary amounts of debris caused by hurricanes, tornadoes, vandalism, etc., would be the responsibility of the City to clean up. The Contractor should report such accumulations of debris when they are encountered. Bids for the extraordinary cleanup from the Contractor would be considered. Work sites should be left in a clean and neat appearance upon completion. All debris from pruning process is to be removed from the job site and disposed of by the Contractor.

905-3.2.2. VISUAL CHECK

The site should be checked for irregularities, such as irrigation leaks, vehicle damage, dead or damaged plant material, vandalism, etc., which should be reported to the City within twenty-four (24) hours after providing the service.

905-3.2.3. PLANT TRIMMING AND PALM PRUNING

All plant material should be trimmed in a manner that promotes the natural shape and mature size of the particular species. Trimming should be performed at intervals that will maintain plants in a neat appearance. Trimming should be performed to promote fullness of the plants, while

maintaining height restrictions in Clear Sight Zones as established on the landscape plans. Plants shall be kept trimmed to the back of curb. Brown foliage shall be removed from Liriope.

Palm pruning to be performed at least once per year, preferably in late June or July following flower formation, consistent with the following specification:

905-3.2.3.1. PHOENIX SPECIES (CANARY DATE, INDIA DATE, PYGMY DATE, ETC.)

Remove all descending fronds, to the base of the frond; all parallel and ascending fronds are to remain in order to leave a full, rounded head; seed heads may remain, but remove old faded heads that are encountered in the pruning process; and remove loose frond boots; remove vegetation, such as strangler figs, Brazilian Pepper, Asparagus fern, etc., growing in the frond boots or on the trunk. Provide the rounded, classic cut on all Medjool palm boots. No climbing spikes allowed on palms.

905-3.2.3.2. TRAFFIC CONTROL

Proper and safe work zones in vehicular traffic areas are to be set up and maintained by the Contractor, according to the approved Maintenance of Traffic specifications.

905-3.2.3.3. PEDESTRIAN SAFETY

Contractor is responsible for maintaining safe work zones in areas where pedestrian and park users are present. The City reserves the right to limit the hours of operation in certain high pedestrian use areas.

905-3.2.4. PLANT FERTILIZATION

All tree and plant material should be fertilized with the appropriate amount of 20-6-12 sulfur coated, slow release, ornamental fertilizer, three times per year. Applications should be made in mid-February, early June, and mid-September, for the first two years. Fertilizer types and amounts will change with requirements of maturing landscape materials.

905-3.2.5. WEED REMOVAL IN LANDSCAPED AREA

Weeds should be removed on a regular basis in order to keep them from being visibly noticeable. Weed control with the use of appropriate herbicides is allowable, given they are properly applied by a certified applicator. Herbicide damage to landscape material will be remedied by Contractor at their expense.

905-3.2.6. MULCH CONDITION

Should be maintained at a thickness that will discourage weed growth as well as help retain soil moisture, usually three inches (3”).

905-3.2.7. IRRIGATION SERVICE AND REPAIR

Should be performed at each visit to assure the system’s proper operation and timing. Drip tubing should be kept covered with mulch. Timer should be checked for proper time of day and operating schedule. Leaks or breaks in the system should be repaired before the next scheduled system running time.

905-3.2.8. LAWN AND ORNAMENTAL PEST CONTROL

Should be performed by a properly licensed and certified applicator to keep pest populations at a less than damaging level. Landscape materials lost to or extensively damaged by pests will be replaced by the Contractor at the Contractor's expense. Diazinon products are not to be used on City properties.

905-3.2.9. PALM FERTILIZATION

Apply three (3) pounds of Magnesium sulfate and one pound of Potassium evenly, per tree, across the root zone (typically within the dripline), annually in early February.

905-3.2.10. FREEZE PROTECTION

The City will provide a freeze/frost protection fabric for the Contractor to install over freeze/frost sensitive plants (Lantana and Pentas). The covering material will be stored at a City facility. Contractor will remove the covering material from storage and install over the sensitive plants, securely fastening edges of the material to the ground per manufacturer's directions. The City will furnish metal pins needed for securing fabric to the ground. The City will notify the Contractor one (1) day or twenty-four (24) hours minimum prior to the need to protect plant material. After uses, the Contractor will prepare the fabric for storage and return it to the designated City facility. Protective covering shall be removed the following afternoon or remain in place as directed by the City. The City shall notify the Contractor by 11:00 a.m. about removing the cover or keeping it in place due to continued freezing temperatures. The City may cancel the freeze protection event at any time prior to the end of the scheduled installation day (5:00 p.m.) The Contractor will be compensated for the number of hours mobilization or on-site work at the contracted rate per man-hour unit price. The Contractor shall provide a unit price for the installation and removal of the covering fabric on a per event basis, as well as an hourly rate per employee required. The City and Contractor will coordinate appropriate irrigation operations with weather conditions. Should freeze/frost damage occur, the Contractor shall perform remedial work as per unit basis, as directed by the City.

906. LEVEL OF SERVICE

The Project Site is to be serviced weekly. Repairs to damage or vandalism to be made within seven (7) working days of reported irregularity. Weekly visits should occur no closer than six (6) and no further than ten (10) calendar days apart.

907. COMPLETION OF WORK

Within twenty-four (24) hours of completing work the City either in person or by phone of said completion. It is acceptable to leave a phone message.

908. INSPECTION AND APPROVAL

Upon receiving notification from the Contractor, the City shall inspect the serviced location the following business day. If, upon inspection, the work specified has not been completed, the City shall contact the Contractor to indicate the necessary corrective measures. The Contractor will be

given forty-eight (48) hours from this notification to make appropriate corrections. If the work has been completed successfully then the City will pay for services billed.

909. SPECIAL CONDITIONS

1. This location will be newly installed and under warranty by the installer for a twelve (12) month period on plants, trees and palms. Landscape installer will coordinate irrigation operation with the Maintenance contractor to assure adequate irrigation to the landscape materials. Installer will also be responsible for the untying of palm heads/fronds as they feel appropriate.
2. All listed acreage or square footage figures are estimates.
3. All work shall be performed in a good and workmanlike manner, consistent with trade practices and standards which prevail in the industry.
4. The Contractor shall be responsible for damage to any plant material or site feature caused by the Contractor or their employees. The Contractor shall be notified in writing of the specific nature of the damage and cost of repair. The City shall, at its option, invoice the Contractor for the payment, or reduce by the amount of the repairs on the next regular payment to the Contractor.
5. Occasionally circumstances (standing water, prolonged inclement weather, parked vehicles, etc.) may make all or portions of a location unserviceable during the regular schedule. The Contractor shall notify the City Supervisor of such occurrences and shall schedule to perform the required work to the location as soon as the pertaining circumstances are relieved.

910. TREE PROTECTION

910-1. TREE BARRICADES

A. A protective barrier shall be placed around all protected trees and palms prior to land preparation or construction activities within or adjacent to the work zone, including all staging and/or lay down areas. Protective barriers shall be installed as follows:
   1. At or greater than the full dripline of all species of Mangroves and Cabbage Palms.
   2. At or greater than the full dripline or all protected native pine trees and other conifer species.
   3. At or greater than two-thirds (2/3) of the dripline of all other protected species
   4. At or greater than the full dripline of trees within a specimen tree stand.

B. Protective barriers are to be constructed using no less than two inch (2”) lumber for upright posts. Upright posts are to be at least four feet (4’) in length with a minimum of one foot (1’) anchored in the ground. Upright posts are to be placed at a maximum distance of eight feet (8’) apart. Horizontal rails are to be constructed using no less than one inch (1”) by four-inch (4”) lumber and shall be securely attached to the top of the upright post. The City’s representative must approve any variation from the above requirements.

C. Whenever a protective barrier is required, it shall be in place until all construction activity is terminated. The area within the barrier limits shall remain undisturbed by any activity during construction. Native ground cover and understory vegetation existing within the barriers shall remain throughout construction. Exotic plant species may only be removed by manual labor utilizing hand tools or by other means if authorized in writing by the City's representative.

D. Prior to the erection of any required protective barrier, all surface foreign material, trash or debris shall be removed from the area enclosed by the barrier, and after erection of the barrier no such material or litter shall be permitted to remain within the protected area. No equipment, chemicals, soil deposits or construction materials shall be placed within such protective barriers.

E. No signs, building permits, wires, or other attachments of any kind shall be attached to any protected tree or palm.

F. At all times, due care shall be taken to protect the critical root zone of trees protected by this section, and root pruning requirements shall apply to such trees.

910-2. ROOT PRUNING

A. Where proposed construction improvements involve excavation and/or impacts to the critical root zone of protected trees, the Contractor shall be required to have an International Society of Arboriculture (ISA) certified arborist perform, or directly supervise root pruning to reduce the impacts of construction. The critical root zone is equivalent to the tree's dripline. Prior to any clearing, grubbing or excavation activities, the affected roots must be severed by clean pruning cuts at the point where grubbing or excavation impacts the root system. Roots can be pruned utilizing specified root pruning equipment designed for that purpose or by hand digging a trench and pruning roots with a pruning saw, chain saw or other equipment designed for tree pruning. Root pruning by trenching equipment or excavation equipment is strictly prohibited. Roots located in the critical root zone that will be impacted by construction activities shall be pruned to a minimum depth of eighteen inches (18") below existing grade or to the depth of the proposed impact if less than eighteen inches (18") from existing grade. The City's Representative on Engineering Department projects for Root Pruning issues is the Senior Landscape Architect and can be reached at (727) 562-4747, or through the construction inspector assigned to the project.

B. Root pruning shall only be performed by or under the direct supervision of an International Society of Arboriculture (ISA) certified arborist.

C. Any proposed root pruning trenches shall be identified on site (i.e. staked or painted) inspected and approved by the City's representative prior to actual root pruning.

D. Root pruning shall be performed as far in advance of other construction activities as is feasible, but at a minimum shall be performed prior to ANY impacts to the soil. Associated tree protection measures should be implemented upon completion of said root pruning.

E. If there is a likelihood of excessive wind and/or rain exceptional care shall be taken on any root pruning activities.

F. Root pruning shall be limited to a minimum of ten inches (10”) per one inch (1”) of the trunk diameter from the tree base. Any exception must be approved by the City’s representative prior to said root pruning.

G. Roots shall be cut cleanly, as far from the trunk of the tree as possible. Root pruning shall be done to a minimum depth of eighteen inches (18”) from existing grade, or to the depth of the disturbance if less than eighteen inches (18”).

H. Root pruning shall be performed using a root cutting machine specifically designed for this purpose. Alternate equipment or techniques must be approved by the City’s representative, prior to any work adjacent to trees to be preserved.

I. Root pruning shall be completed, inspected and accepted prior to the commencement of any excavation or other impacts to the critical root zones of trees to be protected.

J. Excavations in an area where root are present shall not cause the tearing or ripping of tree roots. Roots must first be cleanly severed prior to continuing with the excavation, or tunneled around to prevent damage to the root.

K. Tree roots shall not be exposed to drying out. Root ends shall be covered with native soil or burlap and kept moist until final backfill or final grades has been established.

L. When deemed appropriate (e.g., during periods of drought) the City representative may require a temporary irrigation system be utilized in the remaining critical root zones of root pruned trees.

M. When underground utility lines are to be installed within the critical root zone, the root pruning requirement may be waived if the lines are installed via tunneling or directional boring as opposed to open trenching.

910-3. PROPER TREE PRUNING

A. All tree pruning and/or root pruning on existing trees to remain shall only be performed by or under the direct supervision of an International Society of Arboriculture (ISA) certified arborist. Furthermore, all tree work shall conform to the American National Standards Institute (ANSI) 2001, American National Standard for tree care operations – Tree, Shrub and other Woody Plant Maintenance – Standard practices (pruning) ANSI A-300.

B. Proper pruning techniques for all lateral branches of protected trees are required. Flush cuts (pruning cuts that remove the branch collar) and stub cuts (cuts that leave a stub on the tree) are improper techniques. Any protected tree that has been improperly pruned will not be recognized as a tree left on the project in a healthy growing condition, and will require replacement consistent with the current City Code of Ordinances and Community Development Code.

C. No protected tree shall have more than thirty percent (30%) of its foliage removed.

D. No protected tree shall be topped, hat racked or lion-tailed. Any protected tree that has been improperly pruned will not be recognized as a tree left on the project in a healthy growing condition, and will require replacement consistent with the current City Code of Ordinances and Community Development Code.

E. Tree Trunks and limbs shall be protected. The use of tree spikes or other devices that damage trunk and bark tissue on protected trees shall be prohibited. Any protected tree that has been damaged in such a manner will not be recognized as a tree left on the project in a healthy growing condition and will require replacement consistent with the current City Code of Ordinances and Community Development Code.

SECTION IV-A

SUPPLEMENTAL TECHNICAL SPECIFICATIONS

01____ GENERAL REQUIREMENTS

01021_SOILS REPORTS AND OTHER INFORMATION
01025_MEASUREMENT AND PAYMENT
01040_COORDINATION
01070_ABBREVIATIONS OF TERMS AND ORGANIZATONS

02____ SITE CONSTRUCTION

02223 TRENCHING BACKFILLING AND COMPACTING
02441_HORIZONTAL DIRECTIONAL DRILLING
02518 CONCRETE UNIT PAVING
02713 RECLAIM CONCRETE AGGREGATE BASE
02750 COLORED CONCRETE
02800 LANDSCAPE
02810 SODDING
02820 IRRIGATION SYSTEMS
02900 SITE FURNISHINGS

03____ CONCRETE

03103_FRAMEWORK, REINFORCING AND CONCRETE

15____ MECHANICAL

15056_DUCTILE IRON PIPE
15057_COPPER TUBING
15058_PVC PIPE AND FITTINGS, 3 INCHES AND SMALLER
15075_CONNECTIONS BETWEEN DISSIMILAR MATERIALS
15100_VALVES AND OPERATORS

16____ ELECTRICAL

16000_BASIC ELECTRICAL REQUIREMENTS
16110_RACEWAYS
16120 WIRES AND CABLES
16452 GROUNDING

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SECTION 01021

SOILS REPORTS AND OTHER INFORMATION

I. SCOPE

A. Information on soils tests, subsurface soil and groundwater conditions, and pavement cores relating to existing pavement, at the project site may be provided by this Section subject to the provisions in SECTION III - General Conditions.

II. INFORMATION PROVIDED

A. A report entitled: "Report of the Geotechnical Investigation Cleveland Street – Phase III" conducted by Driggers Engineering Services Inc. dated July 28, 2017, was utilized by the DESIGN ENGINEER in the preparation of the Contract Documents. Electronic copies of the report are included as attachment A.

END OF SECTION

SECTION 01025

MEASUREMENT AND PAYMENT

A. Scope

This section covers methods of measurement and payment for items of Work under this Contract, subject to the provisions in SECTION IV – TECHNICAL SPECIFICATIONS

B. General

The total Contract Amount shall cover all Work required by the Contract Documents. All costs in connection with the proper and successful completion of the Work, including permit fees; furnishing all materials, equipment, supplies, and appurtenances; providing all construction equipment and tools; providing all necessary temporary facilities; and performing all necessary labor and supervision to fully complete the Work, shall be included in the unit and lump sum prices bid. All Work not specifically set forth as a pay item in the Bid Form that is required for a complete installation shall be considered a subsidiary obligation of CONTRACTOR and all costs in connection therewith shall be included in the prices bid.

Payment for each item listed in the Bid Form shall be made on the basis of the actual quantities utilized or constructed, measured in the field, and the unit prices indicated on the Bid Form, as described.

The quantities included in the Bid Form are the line item quantities required for the each portion of the project. Payment will be made on a unit price basis. Unit prices for a given line item shall be the same as identified and used throughout the bid form, except for line items that differ materially from others. Total Contract Amount will be the sum of the itemized totals from the bid form.

C. Estimated Quantities

All estimated quantities stipulated in the Bid Form or other Contract Documents for construction are approximate and are to be used only (a) as a basis for estimating the probable cost of the Work and (b) for the purpose of comparing the bids submitted for the Work. The actual amounts of work done and materials furnished under unit price items for construction may differ from the estimated quantities. The basis of payment for work and materials will be based on the actual amount of work done and materials furnished. CONTRACTOR agrees that it will make no claim for damages, anticipated profits, or otherwise on account of any difference between the amounts of work actually performed and materials actually furnished for the project and the estimated amounts thereof.

D. Work Failure

If evidence indicates that the work is not constructed in accordance with the specifications to the satisfaction of the ENGINEER, the ENGINEER may order repairs or alterations to be

made by the CONTRACTOR to bring the work into compliance with the specifications at no additional cost to the OWNER.

E. Bid Form Payment Items are subject to the provisions in SECTION III – General Conditions and SECTION IV – Technical Specifications, such as, but not limited to:

Item 1 – Mobilization and Demobilization:

a. Payment for mobilization and demobilization will be on a lump sum basis for mobilization of the project. Mobilization and demobilization shall include, but is not limited to:

1) Transporting tools, equipment, personnel and materials to the work site; construction offices, temporary facilities and,

2) Installation and maintenance of erosion and sediment control measures.

3) Also included in this Bid Item is the cost of all contractually required submittals, bonds and insurance.

4) Cleanup and removal of debris from work site and stored material locations;

5) Removal of all construction equipment Maintenance of Traffic (MOT) products and any unused materials and supplies; and

6) Delivery of contractually required documents such as record drawings and operation and maintenance manuals.

Item 2 – Public Involvement

a. Payment for public involvement will be included in the construction cost associated with other related specific pay items. The Contractor shall provide all labor, equipment, and materials to give affected residents notification of the beginning of Work in their area, including oral notification of utility service interruptions. This item shall include: but is not limited to;

1) Furnishing and erecting signs defining the project at the outer perimeter of each Work area;

2) Coordinating with City of Clearwater personnel and preparing and sending written notification to each affected resident at least two weeks prior to the beginning of Work;

3) Holding two neighborhood meetings to answer resident questions prior to beginning of Work;

4) Orally advising each resident of service interruption immediately prior to such interruption, and cooperating with resident requests or needs to minimize resident inconvenience; and

5) Obtaining permission from the resident prior to commencing any Work on that resident’s property.

END OF SECTION

SECTION 01040

COORDINATION

A. Coordination:

1. It shall be the CONTRACTOR's responsibility to coordinate activities of all subcontractors. The CONTRACTOR shall also coordinate the activities of all utility companies, with equipment or utilities in the construction area with the Work, including underground, road crossing conduits, and overhead.

2. The CONTRACTOR shall coordinate with City of Clearwater Public Works and any other local authorities and agencies as necessary to provide traffic control in accordance with the Manual of Uniform Traffic Control Devices and the FDOT Safety Manual. The CONTRACTOR shall coordinate with all permitting authorities to post placards, acquire inspections, and meet permit requirements.

3. Some of the work under this contract is being performed in public right-of-ways, adjacent to, and on (temporary construction easement), private property. As such, the CONTRACTOR shall coordinate his work with any other construction that may occur during the project within and adjacent to the project area.

4. A list of agencies, authorities, and utilities that may be impacted by work within the project area is found on the Drawings for reference. The CONTRACTOR shall be responsible for verifying all existing utilities, which may include agencies, authorities and utilities not shown. CONTRACTOR responsible for all coordination with impacted entities.

B. Connection to Existing Facilities

1. Unless otherwise specified or indicated, CONTRACTOR shall make all necessary connections to existing facilities, including structures, drain lines, and utilities such as water, sewer, gas, telephone, and electric. In each case, CONTRACTOR shall request in writing and receive permission from the utility owner 14 days prior to undertaking connections. CONTRACTOR shall protect facilities against deleterious substances and damage.

2. Connections to existing facilities which are in service shall be thoroughly planned in advance, and all required equipment, materials, and labor shall be on hand at the time of undertaking the connections. Work shall proceed continuously (around the clock) if necessary to complete connections in the minimum time. Operation of valves or other appurtenances on existing utilities, when required, shall be by or under the direct supervision of the owning utility.

C. Notices to Owners and Authorities

1. CONTRACTOR shall, as provided in the General Conditions, notify owners of adjacent property and utilities when prosecution of the Work may affect them. When any utility service connection must be interrupted, CONTRACTOR shall give notices sufficiently in advance to enable the affected persons to provide for their needs.

D. Preconstruction Conference.

1. Prior to the commencement of Work at the Site, a preconstruction conference will be held at a mutually agreed time and place. ENGINEER will schedule the preconstruction conference. The conference shall be attended by:

   CONTRACTOR and its superintendent.
   Principal Subcontractors.
   Representatives of principal Suppliers and manufacturers as appropriate.
   ENGINEER and its Resident Project Representative, if applicable.
   Representatives of OWNER.
   Government representatives as appropriate.
   All Affected Utility Representatives to be identified and notified by the Contractor
   Others as requested by CONTRACTOR, OWNER, or ENGINEER

2. CONTRACTOR shall bring to the conference a preliminary schedule for each of the following:
   Progress Schedule.
   Procurement Schedule.
   Schedule of Values for progress payment purposes.
   Schedule of Shop Drawings and other submittals.

3. The purpose of the conference is to designate responsible personnel and establish a working relationship. Matters requiring coordination will be discussed and procedures for handling such matters established. The ENGINEER will preside at the preconstruction conference and will arrange for keeping the minutes and distributing the minutes to all persons in attendance.

E. Project Meetings

1. On days as mutually agreed upon in the pre-construction conference, the ENGINEER will schedule progress meetings to review the progress of the work.

2. CONTRACTOR, ENGINEER and all subcontractors active on the construction contract shall be represented at each meeting. If a subcontractor is not present, the CONTRACTOR must be able to answer for all work being performed by the subcontractor. CONTRACTOR may at its discretion request attendance by representatives of its suppliers, manufacturers, and other subcontractors.

3. ENGINEER shall preside at the meetings and prepare meeting agenda. The purpose of the meetings will be to review the progress of the Work, maintain coordination of efforts, discuss changes in scheduling, and resolve other problems which may develop.

END OF SECTION

SECTION 01070

ABBREVIATIONS OF TERMS AND ORGANIZATIONS

LIST OF ABBREVIATIONS. Reference to standards and organizations in the Specifications shall be by the following abbreviated letter designations:

AA	Aluminum Association
AABC	Associated Air Balance Council
AAMA	Architectural Aluminum Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
ABMA	American Boiler Manufacturers Association
ACI	American Concrete Institute
ACPA	American Concrete Pipe Association
AEIC	Association of Edison Illuminating Companies
AFBMA	Antifriction Bearing Manufacturers Association
AFPA	American Forest & Paper Association
AGA	American Gas Association
AGMA	American Gear Manufacturers Association
AHA	American Hardboard Association
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMCA	Air Moving and Conditioning Association
ANSI	American National Standards Institute
APA	American Plywood Association
API	American Petroleum Institute
ARI	American Refrigeration Institute
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
ASSE	American Society of Sanitary Engineers
ASTM	American Society for Testing and Materials
AWG	American Wire Gage
AWI	Architectural Woodwork Institute
AWPA	American Wood-Preservers' Association
AWPB	American Wood Preservers Bureau
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
CISPI	Cast Iron Soil Pipe Institute
CMAA	Crane Manufacturers Association of America
CRA	California Redwood Association
CRSI	Concrete Reinforcing Steel Institute
CS	Commercial Standard (U.S. Department of Commerce)
DHI	Door and Hardware Institute
DIPRA	Ductile Iron Pipe Research Association
EEI	Edison Electric Institute
EJCDC	Engineers' Joint Contract Documents Committee
EPA	Environmental Protection Agency
FAC	Florida Administrative Code
Fed Spec	Federal Specification
FCI	Fluid Controls Institute
FDEP	Florida Department of Environmental Protection
FGMA	Flat Glass Marketing Association
FHWA	Federal Highway Administration
FIA	Factory Insurance Association
FM	Factory Mutual
FSA	Fluid Sealing Association
FS	Federal Specification
FTI	Facing Tile Institute
HEI	Heat Exchange Institute
HMI	Hoist Manufacturers Institute
HPMA	Hardwood Plywood Manufacturers Association
HTI	Hand Tools Institute
I-B-R	Institute of Boiler and Radiator Manufacturers
IEEE	Institute of Electrical and Electronics Engineers
IES	Illuminating Engineering Society
IFI	Industrial Fasteners Institute
IPCEA	Insulated Power Cable Engineers Association
IRI	Industrial Risk Insurers
ISA	Instrument Society of America
MHI	Materials Handling Institute
MIL	Military Specification
MMA	Monorail Manufacturers Association
MSS	Manufacturers Standardization Society of Valve and Fitting Industry
NAAMM	National Association of Architectural Metals Manufacturers
NBBPVI	National Board of Boiler and Pressure Vessel Inspectors
NBHA	National Builders Hardware Association
NBS	National Bureau of Standards
NCSPA	National Corrugated Steel Pipe Association
NEBB	National Environmental Balancing Bureau
NEC	National Electrical Code
NECA	National Electrical Contractors Association

NEMA	National Electrical Manufacturers Association
NEMI	National Elevator Manufacturing Industry
NFPA	National Fire Protection Association
NIST	National Institute of Standards and Technology
NLA	National Lime Association
NPC	National Plumbing Code
NPT	National Pipe Thread
NRMCA	National Ready Mixed Concrete Association
NSC	National Safety Council
NSF	National Sanitation Foundation
NTMA	National Terrazzo and Mosaic Association
NWMA	National Woodwork Manufacturers Association
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute
PS	Product Standard
RTI	Resilient Tile Institute (formerly AVATI)
SAE	Society of Automotive Engineers
SCPRF	Structural Clay Products Research Foundation
SDI	Steel Door Institute
SFPA	Southern Forest Products Association
SI	Système International des Unitès (International System of Units)
SIGMA	Sealed Insulating Glass Manufacturers Association
SJI	Steel Joist Institute
SJRWMD	St Johns River Water Management District
SFWMD	South Florida Water Management District
SMA	Screen Manufacturers Association
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SPFA	Steel Plate Fabricators Association
SPI	Society of the Plastics Industry
SPTA	Southern Pressure Treaters Association
SSI	Scaffolding and Shoring Institute
SSPC	Steel Structures Painting Council
UL	Underwriters' Laboratories
USBR	U.S. Bureau of Reclamation

END OF SECTION

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SECTION 02223

TRENCHING, BACKFILLING, AND COMPACTING

PART I - GENERAL

1.1 DESCRIPTION OF WORK

A. Provide all labor, materials, equipment and transportation required to complete the clearing, excavating, grading and backfilling and related activities such as sheeting bracing and dewatering as required for the construction of the utility systems consisting of piping and appurtenances as shown on the Drawings and specified herein.

1.2 QUALITY ASSURANCE

A. Comply with SECTION IV – for Existing Conditions Assessment requirements.

B. Testing and inspections: Performed by a qualified independent testing laboratory, under the supervision of a registered professional engineer, specializing in soils engineering.

C. Laboratory and Soils Engineer shall be acceptable to the Engineer.

D. Materials and methods of construction shall comply within the standards indicated.

1.3 SUBMITTALS

A. Provide samples of materials proposed for use and forward samples to testing laboratory for testing as directed by the Engineer.

B. Submit test reports to the Engineer for the following:
1. Maximum dry density of on-site excavated materials to be used as fill.
2. Maximum dry density of fill materials from off-site locations.
3. Infield density tests of backfilled trenches.

1.4 PROJECT CONDITIONS

A. Known underground and surface utility lines are indicated on the drawings, however it is expected that there are unknown utilities within the project limits.

B. Protect existing plants, trees, lawns, and other features designated to remain as part of the landscaping work. In the event of damage, immediately make all repairs and replacements necessary at no additional cost to the Owner.

C. Protect excavations by shoring, bracing, sheeting, underpinning, or other methods, as required to prevent cave-ins or loose dirt from entering excavations. Barricade

and cover open excavations and post warning lights at work adjacent to public streets and walks to protect pedestrians and workmen.

D. Underpin adjacent structure(s), including utility service lines, which may be damaged by excavation operations.

E. Promptly repair damage to adjacent facilities caused by earthwork operations. Cost of repair at Contractor's expense.

F. Promptly notify the Engineer of unexpected sub-surface conditions.

G. Grade at excavations to prevent surface water draining into excavated areas.

PART 2 - PRODUCTS

2.1 BEDDING AND FOUNDATIONS

A. Class A (Concrete Cradle or Concrete Arch Bedding)

1. This class of bedding shall be used only where specifically shown in the Drawings or directed by the Engineer. If the use of a concrete cradle is required the pipe shall be bedded in a monolithic concrete cradle with a minimum thickness equal to 3 the outside pipe diameter or to a minimum of four inches under the barrel, whichever is greatest, and. Extending up the sides of the pipe to a height equal to 2 of the outside of the pipe diameter. The cradle shall have an overall width equal to 13 of the outside diameter of the pipe or a minimum width equal to the outside diameter of the pipe plus eight inches, whichever is greater. The concrete shall have a day compressive strength of 3,000 psi.

B. Class B (First-Class Bedding)

1. Where Class B Bedding is required, the trench shall be excavated below the planned bottom of the pipe to a depth equal to 3 the nominal diameter of the pipe, or 6 inches, whichever is greater. The over-excavated depth shell be backfilled using either Type 1 or Type 3 materials carefully compacted and shaped using hand tools to provide a uniform support for the lower portion of the pipe barrel. Shaping under the pipe bells shall be so that the bell does not support the pipe and joints can be made without bedding material interference.
2. At the option of the Contractor, Class B Bedding may be used in place of Class C (Ordinary Bedding) provided that the exercise of this option shall create no additional expense to the Owner.

C. Class C (Ordinary Bedding)

1. For Class C Bedding the pipe shall be placed on undisturbed native soil and in such a manner that the lower portion of the pipe barrel is uniformly supported for the full length of the barrel. The trench bottom shall be hand shaped to provide a firm support for the pipe. Excavation under the bell shall be sufficient so that the bell does not support the pipe and be made without interference.
2. Class C Bedding shall be used for all pipe line construction unless shown otherwise on the Drawing or unless the Contractor exercises the option to use Class B Bedding at no extra cost to the Owner.

D. Unsuitable Bedding Material

1. If the materials encountered at the normal bottom of the trench excavation are in the sole judgment of the Engineer or his authorized representative, unsuitable to act as foundation for the pipe, such material shall be excavated to the depth necessary to obtain a suitable foundation. The unsuitable material shall be removed as soon as possible and backfill placed in accordance with the requirements for Class B Bedding.

2.2 BACKFILL MATERIAL

All backfill material shall be Type 1, or Type 2, or Type 3 as described below.

A. Type I - Type 1 material shall be well-graded crushed stone or crushed gravel meeting the requirements of FDOT Gradation 67 (: inch to No. 4 Sieve). This material shall be used primarily for pipeline and manhole foundations.

B. Type 2 - Type 2 material shall be unclassified material obtained from the Contractor's excavations and approved by the Engineer. The material shall be substantially free from wood, roots, humus, peat, muck, and other organic materials. It shall not contain clods, stones, masonry rubble, and the like greater than 6 inches through the largest dimension. In general, Type 2 material shall consist of sand, loam, sandy-loam, clayey-sand, gravel, or crushed stone.

C. Type 3 - Type 3 material shall be select granular material, free from organic matter, of such size and gradation that the desired compaction can be readily attained. Material from the Contractor's excavations may be used, if it meets the above requirements. Otherwise it must be imported.

PART 3 - EXECUTION

3.1 CLEARING

A. The Contractor shall perform all clearing necessary for the proper installation of all piping and appurtenances in the locations shown on the Drawings. Plantings, shrubbery, trees, utility poles or structures subject to damage resulting from the

excavation shall be transplanted, relocated, braced, shored, or otherwise protected and preserved unless otherwise directed by the Engineer.

3.2 EXISTING UTILITIES

A. Before starting grading and excavation, establish the location and extent of underground utilities in the work area. Exercise care to protect existing utilities during earthwork operations. Perform excavation work near utilities by hand and provide necessary shoring, sheeting, and supports as the work progresses.

B. Maintain, protect, relocate, or extend as required existing utility lines to remain which pass through the work area. Pay costs for this work, except as covered by the applicable utility companies.

C. Protect active utility services uncovered by excavation.

D. Remove abandoned utility service lines from areas of excavation. Cap, plug, or seal abandoned lines and identify termination points at grade level with markers

E. Accurately locate and record abandoned and active utility lines rerouted or extended on project record documents.

3.3 EXCAVATION

A. The Contractor shall perform all excavation of every description and of whatever substances encountered, to the dimensions and depth shown on the Drawings, or as directed. All excavations shall be made by open cut. All existing utilities such as pipes, poles and structures shall be carefully supported and protected from injury, and in case of damage, they shall be restored at no cost to the Owner.

B. Trench walls shall be kept vertical; and, if required to protect the safety of workmen the general public, this or other work or structures, or to maintain trench widths within the limits hereinafter specified, shall be properly sheeted and braced. Where wood sheeting or certain designs of steel sheeting are used, the sheeting shall be cut off at a level 2-foot above the top of the installed pipe and that portion below that level shall be left in place. If interlocking steel sheeting is used, it may be removed providing removal can be accomplished without disturbing the bedding, pipe or alignment of the constructed utility. Any disturbance caused by removal of sheeting shall be cause for rejection of the affected portion of the work. Not more than 200-feet of trench shall be opened ahead of pipe laying operations at one time unless a greater length of open trench is approved by the Engineer.

C. In areas where trench widths are not limited by right-of-way, and/or easement widths, property line restrictions, existing adjacent improvement, including pavements, structures and other utilities, and maintenance of traffic, the trench sides may be sloped to a stable angle of repose of the excavated material. A substantially and safely constructed movable shield, "box" or "mole" may be used in place of

sheeting when the trench is opened immediately ahead of the shield and closed immediately behind the shield as pipe laying proceeds inside the shield.

D. Ladders or steps shall be provided for and used by workmen to enter and leave trenches.

E. Pipe trenches for utility lines shall be excavated to a width within the limits of the top of the pipe and the trench bottom so as to provide a clearance on each side of the pipe barrel, measured to the face of the excavation or sheeting, if used, of 8-inches to 12-inches. Where the pipe size exceeds 12-inches, the clearance shall be from 12-inches to 18-inches. All pipe trenches shall be excavated to a level of 8-inches below the outside bottom of the proposed pipe barrel where the existing material is unsuitable for building.

F. Excavation for appurtenances shall be sufficient to provide a clearance between their outer surfaces and the face of the excavation or sheeting, if used, of not less than 12-inches. Manhole excavations shall be carried to sufficient depth to permit their construction on the undisturbed bottom of the excavation.

G. Materials removed from the trenches shall be stored and disposed of in such a manner that they will not interfere unduly with traffic on public streets and sidewalks and they shall not be placed on private property. In congested areas, such materials as cannot be stored adjacent to the trench or used immediately as backfill shall be removed to convenient places of storage.

H. All materials suitable for use as backfill shall be hauled to and used in areas where not enough suitable material is available from the excavation.

I. Suitable material in excess of backfill requirements and all unsuitable material shall become the property of the Contractor and shall be removed from the work area and disposed of by the Contractor at his expense.

3.4 DEWATERING

A. It is a basic requirement of these specifications that excavations shall be free from water before pipe or structures are installed.

B. The Contractor shall provide all necessary pumps, underdrains, well-point systems, and other means for removing water from trenches and other parts of the work. The Contractor shall continue dewatering operations until the backfill has progressed to a sufficient depth over the pipe to prevent flotation or movement of the pipe in the trench and so that it is above the natural water table. The trench shall be excavated no more than the available pumping facilities are capable of handling.

C. Water from the trenches and excavation shall be disposed of in such a manner as will not cause injury to public health, to public or private property, to the work completed or in progress, to the surface of the streets, or cause any interference with

the use of the same by the public. At no time shall any pumps emit an unacceptable noise level or contractor will be required to shut down pumping operations. The discharge from pumps shall be routed to settling basins or other acceptable erosion and sedimentation control devices prior to discharging to natural or existing drainage channels or storm sewers.

D. The Contractor shall submit his proposed methods of handling trench water and locations at which the water will be disposed of to the Engineer for approval before starting and shall receive approval before excavation.

E. Any and all permits required for dewatering are the responsibility of the Contractor and shall be obtained prior to commencement of construction. It is the responsibility of the Contractor to prepare, submit and obtain all required permits.

F. All Costs associated with Expected and Unexpected Dewatering Work is the responsibility of the Contractor.

3.5 PIPE BEDDING

A. As described above, all pipe trenches shall be excavated to a level 8-inch below the outside bottom of the proposed pipe barrel in areas where the existing material is unsuitable for bedding. The resulting excavation shall be backfilled with approved pipe bedding material, up to the level of the lower one-third of the proposed pipe barrel. This backfill shall be tamped and compacted to provide a proper bedding for the pipe and shall then be shaped to receive the pipe. Bedding shall be provided under the branch of all fittings to furnish adequate support and bearing under the fitting.

B. Any excavation below the levels required for installation of the pipe bedding, except for "Additional Excavation", as hereinafter specified, shall be backfilled with approved bedding material, tamped, compacted and shaped to provide proper support for the proposed pipe, at no additional cost to the Owner.

3.6 TRENCH STABILIZATION

A. No claim for extras or additional payment will be considered for cost incurred in the stabilization of trench bottoms which are rendered soft or unstable as a result of construction methods, such as improper or inadequate sheeting, dewatering or other causes. In no event shall pipe be installed when such conditions exist and the Contractor shall correct such conditions so as to provide proper bedding or foundations for the proposed installation at no additional cost to the Owner.

3.7 TRENCHING, BACKFILLING & COMPACTING FOR UTILITY SYSTEMS

A. Backfilling of utility trenches will not be allowed until the work has been approved by the Engineer, pressure tested if required, and the Engineer indicates that backfilling may proceed. Any work which is covered or concealed without the

knowledge and consent of the Engineer shall be uncovered or exposed for inspection at no cost to the Owner.

B. Backfill material placed within 1-foot of piping and appurtenances shall not contain any stones or rocks larger than 1-inch in diameter.

C. If a sufficient quantity of suitable backfill material is not available from the trench or other excavations within the site of the work, the Engineer will order the Contractor to provide additional material suitable for this purpose. The additional material shall be installed as specified herein.

D. Selected backfill material containing no stone or rocks larger than 2-inches shall be placed in 6-inch layers and thoroughly tamped to a depth of 12-inches over the top of the pipe. Particular attention and care shall be exercised in obtaining thorough support for the branch of all service connection fittings. Care shall be taken to preserve the alignment and gradient of the installed pipe.

E. After the backfill has been placed to a level 12-inch over the pipe, the remainder of the backfill shall be placed in layers, not to exceed 9-inches, and compacted with mechanical vibrators or other suitable equipment to obtain a density of the backfilled material of not less than 98 percent of its maximum dry density as hereinafter defined.

F. No more than 400-feet of trench with pipe in place shall be partially backfilled at any time.

3.8 ADDITIONAL EXCAVATION AND BACKFILL

A. Where organic material, such as roots, muck, or other vegetable matter, or other material which, in the opinion of the Engineer, will result in unsatisfactory foundation conditions, is encountered below the level of the proposed pipe bedding material, it shall be wholly or partially removed as directed by the Engineer and wasted. Sheeting shall be installed if necessary to maintain pipe trenches within the specified limits. The resulting excavation shall be backfilled with suitable backfill material, placed in 6-inch layers, tamped and compacted up to the level of the bottom of the proposed pipe bedding material. Sufficient compaction of this material shall be performed to protect the proposed pipe against settlement. Construction shall then proceed in accordance with the provisions of Article 3.05 - Pipe Bedding.

B. Additional excavation shall be performed only when ordered by the Engineer. Where organic or other unsuitable material is encountered in the excavation, the Contractor shall bring the condition to the attention of the Engineer and obtain his determination as to whether or not the material will require removal, prior to preparing the pipe bedding.

C. Additional backfill material, if required, shall be furnished in accordance with the

provisions therefore in Article 3.9 – Field Quality Control.

3.9 FIELD QUALITY CONTROL

A. Provide field quality control soils testing and inspection during utility system installation.

B. Contractor shall provide adequate notice, cooperate with, provide access to the work, obtain samples, and assist testing agency representatives in execution of their function.

C. Test proposed backfill materials to verify suitability for use, gradations of material, moisture density relation, and percent of organic materials.

D. Methods of control and testing of backfill construction to be employed in this work are:
   1. Maximum density of the material in trenches shall be determined by AASHTO T-180.
   2. Field density of the backfill material in place shall be determined by AASHTO T-238.

E. Backfilling Operations: Test and lift to verify compaction meets specified requirements. Provide periodic inspection and testing during backfilling operations. Make one test per 200 cubic yards of backfill material to be used. Compacted backfill shall be tested for in-place density at the rate of one test location per 500-lineal feet of trench as shown on the plans. In-place density tests shall be taken at each test location in 9-inches intervals beginning at a depth of 12-inches above the pipe.

F. Trench backfill which does not comply with the specified densities, as indicated by such tests, shall be reworked and recompacted until the required compaction is obtained.

3.10 RESTORATION OF EXISTING SURFACES

A. Paved and grassed areas disturbed by the operations required under this section shall be restored as indicated on the Drawings and/or specified herein.

END OF SECTION 02223

SECTION 02441

HORIZONTAL DIRECTIONAL DRILLING

PART 1 - GENERAL

A. Description

This section includes furnishing and installing underground water mains using horizontal directional drilling (HDD), and all piping services, equipment, materials and labor, for the complete and proper installation, testing, restoration and environmental protection.

B. Quality Assurance

1. The Contractor shall have a minimum of four years of demonstrated successful experience installing pipelines using the HDD process. Show at least three projects with similar diameters, installation lengths, and ground and ground water conditions, the successful use of the guidance and tracking system on at least two projects, and successful experience with down hole pressure and load monitoring devices on at least one project. For each of the projects provide the project owner, owner's representative, project name, location, diameter, length, depth, ground conditions, any problems encountered or any claims and how resolved.

2. The Contractor shall employ skilled, experienced superintendent(s), drill rig operators, and key personnel. The superintendent(s) and drill rig operators shall have a minimum three years of successful experience using the HDD process, on at least five projects with similar diameters, pull back length and ground conditions. The superintendent(s), drill rig operator, and key personnel shall demonstrate successful completion of at least three projects where pipe was installed with horizontal directional drilling techniques. Furnish resumes of the superintendent(s), operators and key personnel. Personnel experience records should include the project names, locations, pull back lengths, ground conditions, pipe materials, project description, project owner, Engineer, and references with names, addresses and telephone numbers. The superintendent and operators listed in the submittal are to be on site during all construction related activities required for HDD installation.

3. Daily logs and records are to be maintained by the Contractor which includes drilling lengths, location of drill head, drilling fluid pressures and flow rates, drilling fluid losses, inadvertent returns, drilling times required for each pipe joint, any instances of retraction and re-drilling of the pilot bore or segments thereof, and any other relevant observations, including any observed settlement, heave, frac-outs or surface spills. The drilling fluid pressures shall be measured at the entry point and within the annular space within 30 feet of the drill head and recorded at least twice per drill pipe length during the pilot bore, reaming, and pullback operations. Record the measured mud and/or drilling fluid densities, and viscosity used during pilot boring and reaming of the bore measured at a minimum of three times per shift with at least two hours between

readings or at least once per two hundred (200) feet of drilled or reamed length, whichever is more frequent. Note modifications to the drilling fluid additives and time introduced. Monitor and record the circulating volume. These records shall be maintained and provided daily to the Owner or Owner's Representative. The position of the drill head shall be continuously tracked and recorded by a tracking locator system A plot of actual locations of the bore path shall be maintained and updated daily, or more frequently, as directed by the Owner or Owner's Representative.

4. Contractor shall provide at least seventy-two (72) hours advance written notice to the Owner or Owner's Representative of the planned inception of major drilling activities, including pilot bore launch, pre-reaming, reaming, and product pipe pullback, pre and post pullback pressure testing and disinfection of the water main. The Contractor shall immediately notify the Owner or the Owner's Representative, in writing, when any significant problems are encountered or if ground conditions are considered by the Contractor to be materially and significantly different than those represented within the Contract Documents. The Contractor shall perform the pilot bore in the presence of the Owner or Owner's Representative, unless prior written approval to perform such work in their absence has been provided.

5. All surveying equipment used for down hole wireline surveying and/or tracking of the bore path and drill head and layout of the surface wire grid system for the "Tru-Tracker" or equivalent tracking system shall be inspected and calibrated by the equipment manufacturer prior to use. Proof of this inspection and calibration shall be provided to the Owner or Owner's Representative prior to the commencement of drilling operations.

C. Submittals

1. Submit shop drawings in accordance with the General Conditions, and the following.

2. Submit a Work plan including drawings and written description of the proposed method of construction and sequence of operations to be performed during construction. Address the following requirements:

   a. Pre-construction walkover and site inspection.

      (1) Utilities location within the limits of the HDD project.

      (2) Video tape and take photographs of nearby structures which may be affected by inadvertent fluid returns.

      (3) Review as-built drawing and prior soil reports of past projects in the area, if available. Discuss the scope of the proposed project with at a minimum City, County and State Agencies that may have previous project construction knowledge in the vicinity.

   b. Establish a drill profile between the entry and exit point by taking into consideration entry and exit angle, slant tangential sections, radii of curvature, cover, and borehole diameter to ensure, that the intended theoretical drilling profile line can also be realized in practice.

If deviating from the bid document HDD Profile, submit additional drawings with the new HDD Profile for approval. Include a HDD profile, plan view and cross-section(s). Submit drawings for site layout plans (rig and product pipe layout site) and pipeline stringing area (rollers).

3. Submit anticipated drilling rates for pilot bore, reaming and pullback procedures. These drilling rates shall be used to calculate drilling fluid volumes required for pilot hole, each reaming pass and pullback. Guarantee the pump capacity and that the drilling fluid cleaning system is capable of sustaining the anticipated drilling rates during the pilot bore, reaming and pullback.

4. Submit qualification documents for the HDD superintendent, operators and key personnel in accordance with Section 1.B.1 and 1.B.2 above. The contractor shall have personnel with a Florida/OSHA Certification for the site Safety Representative.

5. The Contractor shall submit a detailed schedule for the HDD installation at least fifteen (15) days prior to mobilization. The schedule shall identify all major construction activities and durations, with beginning and completion dates shown. The detail schedule shall be updated at least every two weeks or more frequently, as directed by the Owner or Owner's Representative, and shall include but not limited to the following items:
   a. Pre-construction walk over and inspection.
   b. Regular mobilization and set-up.
   c. Pilot bore
   d. Pre-reaming and reaming.
   e. Layout and thermal butt fusing of pipe.
   f. Pressure testing of pipe prior to pullback.
   g. Final reaming and pullback of product pipe.
   h. Annulus grouting after installation (optional).
   i. Mandrel/pig test to confirm deformations of product pipe are within allowable tolerances.
   j. Cleanup, surface restoration, and demobilization.
   k. Pre-pullback pressure test, flushing, final pressure testing and disinfection of the product pipe after installation.

6. Submit complete, legible, written daily logs and records as called for in Section 1.B.3. Document any deviations from the actual plan and profile of the bore path and the location shown on the plans. The Contractor shall notify the Owner or Owner's Representative immediately upon discovery of any deviations from the design plans.

7. Submit records of equipment calibrations and certifications for all equipment used for down hole wireline survey and tracking of the drill head along with procedures for operating the equipment shall be described, including measures to verify the accuracy of the equipment readings. Submit a drawing with the surveyed location of the surface wire grid system for the "Tru-Tracker" or equipment tracking system. Submit methods for surveying the coordinates of any surface wire grid system both on shore and across or under waterway(s). During pilot bore, reaming passes, and pipe pullback the

Contractor shall electronically record the following information once per drill pipe or every thirty (30) feet, whichever is most frequent. The information shall be provided to the Engineer, as it is being created or no later than noon of the day following the shift for which the records were taken.

a. Rate of Penetration
b. Rotation
c. Thrust
d. Pump Rates
e. Measured Depth
f. Annular Pressure
g. Flow Meter (Returns Suction Line)

8. Submit a Frac-out and Surface Spill Contingency Plan prior to construction. Submit a letter of intent signed by an authorized representative of Contractor, confirming that the plan will be followed. The contingency plan for inadvertent returns/hydrofracture shall address all potential pathways for release of drilling fluid, containment, cleanup, and mitigation measures as well as reporting procedures and points of contact for regulatory and permitting agencies for releases to the ground surface and to waterways. Stand-by equipment shall be provided by the Contractor to recover fluids from the waterway via truck and via boat. Floating turbidity barriers shall be part of the stand-by equipment to minimize dispersion in the event that drilling fluids reach the waterway.

9. Soil Separation Plant and Plans for Disposal

   a. Submit details on the pump and cleaning plant. Include dimensions, manufacturer's specifications, pump capacity, noise rating, and soundproofing details on the system. Include details on the generator, including dimensions, and soundproofing. Confirm that the generator and other on-site equipment can be operated without exceeding the maximum allowable noise tolerances specified in the Contract Documents or by the controlling regulatory agency whichever is more stringent.

   b. Submit plans for disposal of waste materials including drilling fluids, cuttings, waste oil, fuel, discharge water, etc. Identify the disposal site and submit a letter indicating willingness and legal authority to accept the described and anticipated waste products.

10. Submit details on measures to be taken to monitor and protect adjacent utilities, structures, and roadways, and provide details on monitoring equipment and provisions, including the layout of all settlement points, and other monitoring points. Provide two copies of preconstruction survey of adjacent structures and photographs with captions to document conditions prior to beginning HDD construction.

11. Submit a Safety Plan, including the name of the Site Safety Representative, emergency telephone numbers for medical facilities, and precautions for handling and disposal of any hazardous or flammable materials. The Safety Plan shall include a code of safe

practices and an emergency plan in accordance with OSHA and Florida/OSHA requirements.

12. Submit detailed descriptions of all equipment and materials to be used. Equipment and material submittals shall include directional drill rig, drill rig anchoring system, the mud system, drill bits, mud motors, reamers or hole openers, pipe rollers for pullback, drilling fluid and additives, pipe pull head, and pipe pulling swivel. Descriptions of equipment shall include manufacturers' specifications, calibrations, appropriate drawings, photographs, and descriptions of any modifications since manufacture. Descriptions of drilling fluid additives shall be accompanied by Materials Safety Data Sheets (MSDS) and manufacturers' descriptions and warranties.

13. Submit an as-built profile of the pilot bore within twenty-four (24) hours of completion of the pilot bore. In addition, maintain at the construction site a complete set of field drawings for recording the as-built conditions. Plot the as-built conditions on the field drawings, noting location in plan and elevation of the drill string, reaming head, and installed pipe every 30 feet, at the completion of every production shift, and every change of direction.

14. Submit design calculations that demonstrate the proposed pipe, equipment and means and methods comply the Contract Documents. The calculation shall be based on the design borepath, installation means and methods, hydrostatic, earth and live loads, temperature and site conditions. Address the considerations and guidelines presented in ASTM F1962. The following minimum calculations shall be included.
    a. Maximum allowable pipe loading limits.
    b. Pullback load calculation based on the proposed drill path plan and profile.
    c. Bouyancy effect calculation.
    d. Effects of ballasting plan on pullback forces.
    e. Hydro-fracture analysis.
    f. Confirmation that design parameters do not exceed predicted installation stresses including factors such as tensile load, buckling and deformation.

PART 2 - MATERIALS

A. Pipe

All product pipe is to be High Density Polyethylene (HDPE) or PVC with restrained joints (Certalok or equal) or Restrained Joint Ductile Iron Pipe (DIP)

B. Drilling Fluid

Drilling fluid shall be bentonite and water or a combination of bentonite and polymers and water formulated to move cuttings to the surface and lubricate the pipe during pullback.

C. Drill Pipe

Drill pipe shall be steel with sufficient strength to withstand the maximum rated pullback and pushing load of the drilling equipment. Drill pipe joints shall be flush and capable of transmitting maximum rated torque of the drilling equipment.

D. Drilling Equipment

1. The directional drilling machine shall consist of a power system to rotate, push and pull hollow drill pipe into the ground at a variable angle while delivering a pressurized fluid mixture to a guidable drill head. The equipment is to be anchored to the ground. The power system is to be self-contained with sufficient pressure and volume to power drilling operation. The hydraulic system is to be free of leaks.
2. The rig shall have a system to monitor and record pull-back pressure during pull-back operations. The rig shall be grounded. There shall be a system to detect electrical current from the drilling string and an audible alarm which automatically sounds when an electrical current is detected.
3. Contractor will comply with all local noise ordinances. At a minimum, the drilling equipment shall have a maximum sound power level of 55 dBA (as defined in ANSI S1.4) if within five feet of the nearest occupied building. Measure sound power level in accordance with ISO 3740 and 3744.
4. Mixing, pumping, and holding/separation tanks shall be capable of delivering mixed drilling fluid to the cutting head. Drilling fluids circulating equipment shall be designed to minimize spillage.

E. Downhole Tools

1. Cutting heads, backreamers, and hole openers shall be suitable for the soil conditions anticipated by the Contractor.
2. Grips, pulling heads, and swivels shall be compatible with the pipe material. Design to transmit without distortion the maximum rated pullback force of the equipment used. Grips, pulling heads, and swivels shall be specifically engineered for directional drilling applications.

F. Guidance System

1. The guidance system wireline, wireless or gyroscopic guidance system shall provide real time electronic data to the operator and the inspector on request. All daily data and project data shall be displayed on the “As Built”. The guidance system shall be capable of tracking at all depths up to forty feet (40’) below the maximum proposed depth and in any soil condition, including hard rock. It shall enable the driller to guide the drill head by providing immediate information on the tool face, azimuth (horizontal direction), and inclination (vertical direction). The guidance system shall be capable of determining the location of the cutting head at depth within ±3 inches.
2. The guidance system shall be of a proven type and shall be operated by personnel trained and experienced with this system. The Operator shall be aware of any magnetic

anomalies on the surface of the drill path and shall consider such influences in the operation of the guidance system if using a magnetic system.

3. Down-hole and surface grid tacking system: Contactor shall monitor and record the x, y, and z coordinates relative to an established surface benchmark. The data shall be continuously monitored and recorded at least twice per drill pipe length.

4. Deviations between the recorded and design bore path shall be calculated and reported on the daily log. If the deviations exceed plus or minus 3 feet (horizontal or vertical deviation) from the design path, such occurrences shall be reported immediately to Owner or Owner's Representative. The Contractor shall undertake all necessary measures to correct deviations and return to design line and grade.

G. Pipe Rollers

Pipe rollers shall be of sufficient size to fully support the weight of the pipe while being hydro-tested and during pull-back operations. A sufficient number of rollers shall be used to prevent excess sagging of pipe. The rollers shall be comprised of a non-abrasive material arranged in a manner to provide support to the bottom and bottom quarter points of the pipeline allowing for free movement of the pipeline during pullback. Do not drag the pipe along the ground.

PART 3 - EXECUTION

A. General

1. The Contract Documents show existing utilities that are believed to be near the directional drill alignment. There is no guarantee that these utilities are located as shown or that other utilities may not be present. The Contractor is responsible to field verify and locate existing utilities in advance of the work so as not to delay work and avoid conflict or disruption of utility services

2. The Contractor shall provide adequate control of surface water and drilling fluids drainage and runoff, and provide silt fences and hay bales to prevent surface water or drilling fluids from entering any adjacent areas or environmentally sensitive areas.

3. The Contractor shall not initiate HDD until all submittals are received, reviewed, and approved.

4. The Contractor shall not initiate HDD until all required permits are obtained.

5. Maintain the work area in a manner that shall minimize adverse impacts on other public use activities. The Contractor shall proceed with work in a safe, orderly manner, while maintaining the work site free of debris and unnecessary equipment and materials.

6. Follow all requirements of the Frac-Out and Surface Spill Contingency Plan as submitted and approved and control operational pressures, drilling mud weights, drilling speeds, and any other operational factors required to avoid hydro-fracture, fluid losses to formations, and drilling fluid spillage. This includes any spillages or returns at entry and exit locations or at any intermediate point. All inadvertent returns or spills shall be promptly contained and cleaned up. Maintain on-site mobile spoil removal

equipment during all drilling, pre-reaming, reaming, and pull back operations and shall be capable of quickly removing spoils. The Contractor shall immediately notify Owner or Owner's Representative of any inadvertent returns or spills and immediately contain and clean up the return or spill.

7. Combustible materials (fuel, oil, lubricants, etc.) shall be stored off-site or in a well-ventilated storage facility removed from the immediate vicinity of the drilling area by at least twenty (20) feet.

8. Provide maintenance of traffic plans, in accordance with approved Traffic and Safety Requirements, erect appropriate barriers, warning lights, and signs, painted with approved colors, warnings, and graphics to ensure adequate warning to motorist and the public.

9. Install an enclosure fence and/or barrier walls around the work area. The enclosure fence shall include a lockable gate and should be adequate to prevent entry of unauthorized persons, when practical.

10. At the completion of construction, remove all temporary facilities installed by the Contractor. Unused soil, aggregate, and other materials shall be removed and disposed of at approved sites in accordance with all Federal, State, and Local regulations. Any damage to streets, lawns, common areas, and sidewalks shall be restored to original or better conditions. All disturbed areas shall be re-vegetated.

B. Installation

1. At all times during the work, provide and maintain the tracking and guidance system.

2. The pilot bore shall follow the design path of the bore shown on the Drawings.

   a. Horizontal and vertical deviations shall be less than plus or minus three (3) feet from the design path centerline. The Contractor shall continuously monitor horizontal and vertical position and record the position as specified herein.

   b. The radius of curvature shall not be less than that shown in the Contract Documents. The radius of curvature shall be calculated over the distance of three drill pipe sections.

   c. The location of the entry and exit points shall be as shown in the Contract Documents. The Contractor shall be solely responsible for all work necessary to correct excessive deviations from line and grade, including re-drilling, redesigning connections, and acquiring additional easement, at no additional cost to the Owner and without schedule extension.

   d. If the pilot bore could not be successfully completed, then do not proceed with the reaming procedure until the Owner, Owner's Representative, and Contractor have met to discuss alternative options for the pipeline crossing.

3. The pilot bore shall be pre-reamed and reamed using the equipment and methods submitted by the Contractor. The Contractor shall completely ream the borehole to the

final diameter prior to pull back, when practical or as directed by the Owner or the Owner's Representative.

4. The Contractor shall perform hydrostatic water pressure test in accordance with SECTION IV - Technical Specifications.

5. Pipe Pullback
   a. Where the staging area permits, join entire length of pipe to be pulled through bore prior to commencement of pullback operation. If not feasible because of the length of the bore and the size of the staging area, join as much pipe together as the staging area allows and fuse to the previous section before the pullback. Support weight of joined pipe suspended on rollers to minimize pulling forces.
   b. The pipe shall be installed by pulling it into the reamed bore path in a continuous operation when practical, behind a final reaming tool.
   c. The pipe shall be isolated from excessive torsional and axial stresses by a swivel device with a pre-established breakaway tensile capacity that is lower than the allowable tensile strength of the product pipe.
   d. All measurements shall be made, recorded, and submitted on the daily logs during final reaming and pipe pull back.
   e. The maximum pull (axial tension force) exerted on the pipelines shall be measured continuously and limited to the maximum allowed by the pipe manufacturer with an appropriate factor of safety (≥ 2) so that the pipe or joints are not overstressed.
   f. The pipelines shall be adequately supported during installation so as to prevent overstressing or buckling. Provide adequate support/rollers along the pipe layout area to support the required length of the pipe for each bore. Such support/rollers shall be spaced at a maximum of sixty (60) feet on centers. The pipe layout area shall be cleared of all large stones, construction debris, or other foreign objects that could damage the pipe during pull back.
   g. The end of the pipe shall be closed during the pullback operation.
   h. Each length of pipe shall be inspected and cleaned as necessary to be free of debris immediately before joining.
   i. The tracer wires, per Section 15297, will be attached to the leading end of the pipe pulling head and shall extend the full length of the installed pipe.
   j. The Contractor shall at all times handle the pipe in a manner that does not overstress or otherwise damage the pipe. Vertical and horizontal curves shall be limited so that wall stresses do not exceed fifty (50) of yield stress for flexural bending of the pipe or joint. If the pipe is buckled or otherwise damaged, the damaged section shall be removed and replaced by the Contractor at his expense. The Contractor shall take appropriate steps during pullback to ensure that the pipe and tracer wires (if required) will be installed without damage
   k. The pipe shall be filled with water as it enters the borehole to reduce pull back loads and to ensure that adequate internal pressure is maintained at all points to counter balance collapse pressures.
   l. The Contractor shall monitor and inspect pipe rollers and method for suspending product pipe at exit pit during the pullback operation to avoid damage to the pipe.

m. The Contractor shall cease pull back operations if the pipe is damaged and shall remove the product pipe from the bore and repair the pipe using the manufacturer's recommended procedure or replace the damaged pipe before resuming installation.

n. Damage to the product pipe resulting from manufacturer defects, installation, contact grouting, or grouting of the annulus is the responsibility of the Contractor, including costs for replacement and labor and materials. To confirm no damage to the pipe, upon completion of pull back and grouting, the Contractor shall perform the following test on the completed pipeline:

   A sphere or pig, one inch less in diameter than the internal diameter of the product pipe, which is capable of allowing water to pass through it, complete with a pulling cable on either side of sphere or pig, shall be pulled through the entire length of the pipeline. If the pig or sphere cannot pass through the pipe, it shall be considered collapsed and damaged.

o. The Contractor shall notify the Owner or Owner's Representative immediately in the event that any obstruction is encountered that prevents further advancement of the drill pipe, or pull back of the pre-reamer, reamer, and/or pipe. The Contractor shall make all diligent and reasonable efforts to advance past the object by drilling slowly through the object, pulling back, and drilling along a new bore path that avoids the object, or excavating, exposing, and removing the object, and all other reasonable attempts to continue the bore. The Contractor shall notify the Owner or Owner's Representative of proposed measures to attempt to advance past the object, prior to initiating the attempt. If the Contractor attempts to pull back the product pipe and re-drill, the Contractor shall adhere to line and grade tolerances established in this specification section, unless a variance has been provided, in writing, prior to the Contractor's attempt to re-drill. The Contractor and Owner shall investigate the cause and together determine an appropriate response. Appropriate response may include revisions to equipment or methods, retraction and re-drilling of a portion of the borehole, or abandonment of the borehole. If abandonment is deemed necessary, the Contractor shall recover, to the extent practicable, any drill pipe, product pipe, and tools in the borehole, and properly abandon the borehole by contact grouting, unless otherwise directed in writing. If the borehole is abandoned, the Contractor shall be allowed to begin a second attempt to install the pipeline at an alternate location subject to approval, in writing from the Owner. The Contractor shall take all reasonable actions to complete the installation with minimal delays.

p. After the product pipe is completely pulled through the borehole, a sufficient relaxation period, if recommended by the pipe manufacturer, shall be provided before the final pipe testing and tie-in.

q. After pullback is complete, pressure test and disinfect the pipe in accordance with Series 500 of the Technical Specifications.

r. The Contractor shall remove all equipment, materials, drilling fluids, muck, waste, and debris from the site and restore the site to its original condition upon

completion of the installation. Restoration and demobilization shall be completed by the Contractor within seven days of the completion of the pipeline installation.

s. The Contractor shall monitor for settlement or heave before and during drilling and grouting operations.

END OF SECTION

SECTION 02518

CONCRETE UNIT PAVERS

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. Provide interlocking concrete unit paving as shown and specified. The work includes:

1. Interlocking concrete unit paving over a concrete base.

2. Interlocking concrete unit paving over a crushed concrete base.

3. Paver edge restraints.

3. Base and bedding.

B. Related work:

1. FDOT Standard Specification 120 Excavation and Embankment
2. FDOT Standard Specification 346 Portland Cement Concrete
3. FDOT Standard Specification 522 Concrete Sidewalk and Driveways
4. FDOT Standard Specification 526 Architectural Pavers

1.2 QUALITY ASSURANCE

A. Materials and methods of construction shall comply with the following standards:

1. American Society for Testing and Materials, (ASTM).

2. American Association of State and Highway Transportation Officials, (AASHTO).

B. Installation: Performed only by skilled workmen with satisfactory record of performance on completed projects of comparable size and quality.

C. Do not change source of interlocking concrete unit pavers during the course of the work.

1.3 SUBMITTALS

A. Submit manufacturer's product data and installation instructions for interlocking concrete paver units.

B. Submit a minimum of 5 full size samples of each color paver unit required. Include the full range of style, size, exposed finish, color, and texture proposed for the work.

C. Submit manufacturer's certification that paver units comply with specified material and physical requirements.

D. Submit material certificates for bedding materials.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect paving units from damage, chipping, and soiling during delivery and storage. Store off the ground on pallets or wood platforms.

B. Store loose granular materials in a well drained area on a solid surface to prevent mixing with foreign materials.

1.5 PROJECT CONDITIONS

A. Review installation procedures and coordinate paving work with other work affected by the interlocking concrete unit paving work.

B. Protect partially completed paving against weather damage when work is not in progress.

C. Provide temporary barricades and warning lights as required for protection of project work and public safety.

D. Protect adjacent work from damage, soiling, or staining during paving operations.

PART 2 PRODUCTS

2.1 MATERIALS

A. Concrete Pavers

1. Vehicular Paver Thickness: 3-1/8” (80MM)

2. Detectable Warning Paver

i. Product: 12” x 12” Moduline ADA Truncated Dome Paver
Color: Charcoal
Finish: Truncated Domes
Thickness: 2-3/8” (60MM)
Manufacturer: Belgard www.belgard.com

ii. Or Approved Equal.

B. Paver Edge Restraints

1. When no concrete band or sidewalk is adjacent to the proposed pavers as shown in the plans. Contractor shall construct a concrete mortar wedge up against the pavers to secure them. The wedge should be a minimum of 3” x 3” in size and be below the top finished grade of the paver to be able to be concealed with soil.

C. General: Paver unit materials and fabrication shall meet or exceed the requirements of USPSI Designation CPS7180 Standard Specifications for Interlocking Concrete Paving Stone and Grass Pavers. Pavers shall be as supplied by Tremron, Inc., or equal. Provide colors and sizes as indicated on the plans and in these specifications.

1. Portland cement: ASTM C150, Type 1.

1. Bedding Sand: ASTM C33

2. Joint Sand: ASTM C144

4. Compressive strength: Average compressive strength shall be 8,000 psi at time of delivery. No individual paver shall be less than 7,500 p.s.i. at time of delivery.

5. Absorption: Maximum 5%.

6. Freeze-thaw test: ASTM C67, no breakage and maximum 1% loss in dry weight after 50 cycles.

7. Abrasion resistance: ASTM C418, maximum volume loss 15 cu. cm. per 50 cu. cm. Average thickness loss 3 mm.

8. Dimension tolerances: Length maximum 1/6" (1.5 mm), height maximum 1/8" (3mm) from standard dimension.

9. Provide only sound units free of defects that would interfere with proper placing of units or impair strength or permanence of construction. Minor cracks and minor chipping incidental to methods of manufacture, handling in shipment, and delivery will be acceptable subject to Owner’s Representative's review and acceptance. Excessive cracks and chipping, as determined by the Owner’s Representative, will be rejected as not complying with specification requirements.

10. Provide test reports certifying materials and physical requirements compliance. Tests shall have been conducted not more than 12 months prior to manufacture.

D. Base material:

1. Provide limerock/ crushed concrete setting bed or poured concrete on compacted subgrade at all pedestrian (sidewalk) locations. See construction plans for details.

2. Poured concrete bed shall be at all vehicular locations. See construction plans for details.

E. Bedding and leveling material: ASTM C33 or AASHTO M43, #10 graded clean coarse concrete sand or limerock screenings. Mix bedding sand with portland cement in a 4 parts bedding sand to 1 part Portland cement ratio.See plans for details.

F. Joint Sand: ASTM C144

G. Efflorescence Cleaner: by Tremron, Inc. #4L(141-534)

H. Sealer: by Tremron Inc., #WL1 Protective Sealer (or equal concrete and paver sealer & joint sand stabilizer).

PART 3 EXECUTION

3.1 INSPECTION

A. Examine substrates and installation conditions. Do not start interlocking concrete unit paving work until unsatisfactory conditions are corrected.

3.2 PREPARATION

A. Do not use paving units with chips, cracks, voids, discolorations, or other visible defects.

B. Cut paving units with motor-driven saw equipment designed to cut masonry with clean, sharp unchipped edges. Cut units as required to provide pattern shown and to fit adjoining work neatly. Use full units without cutting wherever possible. Avoid the use of small pieces of pavers or large joint spaces.

C. Set interlocking concrete unit pavers in patterns indicated with level surface and uniform joints of widths indicated.

D. Install edging at indicated areas to provide suitable restraint for paving edges not contained by adjacent paving materials.

3.3 INSTALLATION: BASE MATERIALS

A. Limerock base course:

1. Obtain Owner Representative's inspection and acceptance of subgrade surface before placing of limerock or concrete base.

2. Compact subgrade materials with suitable compaction equipment to 95% modified proctor T-180.

B. Bedding and leveling course:

1. Obtain Resident Project Representative's inspection and acceptance of finished poured concrete / crushcrete / limerock base course before placing bedding and leveling course materials.

2. Spread bedding and leveling course materials evenly over the entire area to be paved, screed to a minimum level that will provide a minimum 1" thickness for when the paving stones have been placed and vibrated.

3. Protect screeded and leveled bedding and leveling course from damage until covered with paver units. Do not precompact bedding and leveling course.

3.4 INSTALLATION: INTERLOCKING CONCRETE PAVERS

A. Lay paver units in pattern indicated on the drawings. Paver layout indicated on plans has been designed to minimize cutting of individual paver units. Paver units must be installed in such a manner as to assure minimized paver cuts. Maintain desired pattern and provide uniform 1/16" joints between units.

B. Fill gaps at the edge of the paved surface with standard edge pieces or with paver units cut to fit. Provide cut units with straight even cut surfaces, free from cracks or chips.

C. Vibrate paver units to their final level with 3 or more passes of a vibrating plate compactor.

D. After first vibration, brush sand over the surface and vibrate into the joints with additional passes of the plate vibrator. Completely fill joints.

E. After final vibrating the surface shall be true to grade and shall not vary by more than 1/4" when tested with a 10'-0" straightedge at any location on the surface.

3.5 PROTECTION

A. Protect interlocking concrete unit paving from damage until final acceptance.

3.6 CLEANING

A. Remove and replace interlocking concrete paving units which are broken, chipped, stained or otherwise damaged.

B. Perform cleaning during installation of work and upon completion of the work. Remove from site all excess materials, debris, and equipment. Repair damage resulting from interlocking concrete unit paving operations.

END OF SECTION

SECTION 02713

RECLAIM CONCRETE AGGREGATE BASE

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. This item consists of a base course composed of recycled concrete aggregate (RCA), crushed to meet a particular gradation, constructed on a prepared course in accordance with these specifications and in conformity to the dimensions and typical cross sections shown on the plans.

B. The term "Crush Concrete Base" means: RCA Base.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 32 1413 - Road Unit Paving

1.3 QUALITY ASSURANCE

A. Testing Requirements References:

ASTM C 29	Unit Weight of Aggregate
ASTM D 1557	Moisture-Density Relations of Soils and Soil-Aggregate Mixtures (Rammer and 18 in (457-mm) Drop)
ASTM D 6938	In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods
ASTM D 4643	Determination of Moister Content of Soil by Oven Heating

B. Aggressive Soils: RCA base shall not be used in locations with high sulfate content soils above 1%. Contractor shall inform Engineer if such soils are encountered on site, prior to roadway construction begins.

1.4 SUBMITTALS:

A. Submit record documents in accordance with Division 1 Requirements.

B. Product Data: Submit manufacturer’s RCA data.

C. Aggregate Sample - Provide sample upon request by the Engineer.

D. Test Data - Provide compaction test results upon request by the Engineer.

PART 2 - PRODUCTS

2.1 AGGREGATE

A. RCA: Recycled concrete aggregate (RCA) shall consist of Portland Cement Concrete or other concrete containing pozzolanic binder material. The recycled concrete material shall be free of reinforcing steel, expansion material. Asphalt concrete overlays shall be removed from the PCC surface prior to pavement removal and crushing. Virgin aggregates may be added to meet the 90 percent minimum concrete requirement. Fine aggregate passing the No. 4 (4.75-mm) sieve shall consist of fines from the operation of crushing the recycled concrete aggregate. If necessary, fine aggregate may be added to produce the correct gradation. The fine aggregate shall be produced by crushing stone, gravel, or recycled concrete that meet the requirements for wear and soundness specified for coarse aggregate.

B. Sampling and Testing. RCA samples for preliminary testing shall be furnished by the Contractor prior to the start of base construction. Samples of recycled concrete aggregate to check gradation shall be taken at least once daily. Sampling shall be in accordance with ASTM D 75, and testing shall be in accordance with ASTM C 136 and C 117.

C. Material Batches. The Contractor may purchase RCA in two sizes of such gradations that when properly proportioned and blended (60% fines and 40% coarse), the resultant field mixture meets the required specifications. Allows for field mixture of fines over coarse aggregates to promote proper size distribution.

D. Gradation Requirements. The gradation (job mix) of the final mixture shall fall within the design range indicated in Table 1. The final gradation shall be continuously graded from coarse to fine and shall not vary from the low limit on one sieve to the high limit on an adjacent sieve or vice versa.

Table 1 Requirements for Gradation Of Recycled Concrete Aggregate

Sieve Size	Percentage by Weight Passing Sieves	Job Mix Tolerances Percent
2 in (50.8 mm)	100	--
1-1/2 (37.5 mm)	95 - 100	+/- 3
3/4 in (19.0 mm)	65 - 90	+/- 5
3/8 in (9.5 mm)	45 - 75	+/- 5
No. 4 (4.75 mm)	35 - 60	+/- 5
No. 30 (0.60 mm)	5 - 25	+/- 3
No. 200 (0.075 mm)	0 - 10	+/- 3

The job mix tolerances in Table 1 shall be applied to the job mix gradation to establish a job control gradation band. The full

tolerance still will apply if application of the tolerances results in a job control gradation band outside the design range.

2.2 EQUIPMENT

A. EQUIPMENT. All equipment necessary to mix, transport, place, compact, and finish the recycled concrete aggregate base course shall be furnished by the Contractor. Upon request the Contractor shall provide written certification to the Engineer that all equipment meets the requirements for this section.

B. MIXING EQUIPMENT. Base course shall be thoroughly mixed in a plant suitable for recycled concrete aggregate. The mixer shall be a batch or continuous-flow type and shall be equipped with calibrated metering and feeding device that introduce the aggregate and water into the mixer in specified quantities. If necessary, a screening device shall be installed to remove oversized material greater than 2 in (50 mm) from the recycled concrete aggregate feed.

C. HAULING EQUIPMENT. The mixed recycled concrete aggregate base course shall be transported from the plant to the job site in hauling equipment having beds that are smooth, clean, and tight. Truck bed covers shall be provided and used to protect the mixed recycled concrete aggregate base course from rain during transport.

D. PLACING EQUIPMENT. Recycled concrete aggregate shall be placed using a mechanical spreader or machine capable of receiving, spreading, and shaping the material without segregation into uniform layer or lift. The placing equipment shall be equipped with a strike off plate that can be adjusted to the layer thickness.

E. COMPACTION EQUIPMENT. Recycled concrete aggregate base course compaction shall be accomplished using one or a combination of the following pieces of equipment: Steel-wheeled roller - Vibratory roller - Pneumatic-tire roller - Hand-operated power tampers (for areas inaccessible to rollers)

F. FINISHING EQUIPMENT. Trimming of the compacted recycled concrete aggregate to meet surface requirements shall be accomplished using a self-propelled grader or trimming machine.

PART 3 - EXECUTION

3.1 CONSTRUCTION METHODS

A. WEATHER LIMITATIONS. Construction is allowed only when the atmospheric temperature is at or above 35 °F (2 °C).

B. PREPARING UNDERLYING COURSE. The underlying course shall be checked before

placing and spreading operations are started. Any ruts or soft yielding places caused by improper drainage conditions, hauling, or any other cause shall be corrected at the Contractor's expense before the base course is placed thereon.

C. PLACING. The recycled concrete aggregate base material shall be placed on the moistened subgrade or base in layers of uniform thickness with an approved mechanical spreader.

D. The maximum depth of a compacted layer shall be 7-in (178 mm).In multi-layer construction, the material shall be placed in approximately equal-depth layers. The previously constructed layer shall be cleaned of loose and foreign material prior to placing the next layer. The surface of the compacted material shall be kept moist until covered with the next layer.

E. EDGES OF BASE COURSE. The RCA shall be placed so that the completed section will be wider, on all sides, than the next layer that will be placed above it, as shown on the plans. Approved fill material shall be placed along the free edges of the recycled concrete aggregate in sufficient quantities to compact to the thickness of the course being constructed. If the RCA base course material is to be placed adjacent to another pavement section, then the layers for both of these sections shall be placed and compacted along the edge at the same time.

F. COMPACTION. Immediately upon completion of the spreading operations, the recycled concrete aggregate shall be compacted. The number, type, and weight of rollers shall be sufficient to compact the material to the required density. Each lift of the RCA base course shall be compacted to the required density using the compaction equipment. The moisture content of the material during placing operations shall not be within 1.5% of the optimum moisture content.

G. The compaction shall continue until each layer has a degree of compaction for the specified density through the full depth of the layer. The contractor shall make adjustments in compacting or finishing techniques to obtain true grades, to minimize segregation and degradation, to reduce or increase water content and to ensure a satisfactory base course. Any materials found to be unsatisfactory shall be removed and replaced with satisfactory material or reworked, so that the requirements of this specification are met.

H. TESTING FOR DENSITY. The RCA sampling locations will be determined on a random basis in accordance with statistical procedures contained in ASTM D 3665. Each lift will be tested for density. The in-place field density shall be determined in accordance with: Florida Method of Test Designation FM 1 T-180. - The RCA LRB (Limerock Bearing Ratio) Value must be no less than 200 (LRB 200). In lieu of FM 1 T-180 method of field density determination, acceptance testing may be accomplished using a nuclear gauge in accordance with ASTM D 6938. When using the nuclear method, ASTM D 6938 shall also be used to determine the moisture content of the material. If a nuclear gauge is used for density determination, two random measurements shall be made and averaged for each Lift.

I. FINISHING. The surface of the recycled concrete aggregate base course shall be finished

by equipment designed for this purpose. In no case will thin layers of material be added to the top of base course to meet grade. If the finished surface is above plan grade, it shall be cut back to grade and rerolled. Should the surface become rough, corrugated, uneven in texture, or traffic marked prior to completion, the unsatisfactory portion shall be scarified, and recompacted or replaced at Contractor's expense.

J. SURFACE TOLERANCES. The finished surface shall not vary more than 3/8 in (9 mm) when tested with a 12 ft (3.66 m) straightedge applied parallel with or at right angles to the centerline. The Contractor shall correct any deviation in excess of this amount, at the Contractor's expense.

K. THICKNESS CONTROL. The completed thickness of the base course shall be within 0.5 in (13 mm) of the design thickness. Where the thickness is deficient by more than 0.5 in (13 mm), the Contractor shall correct such areas at no additional cost by excavating to the required depth and replacing with new material. Additional test holes may be required to identify the limits of deficient areas.

L. TRAFFIC. Equipment used in construction may be routed over completed portions of the base course, provided no damage results and provided that the equipment is distributed evenly over the full width of the base course to avoid rutting or uneven compaction.

M. MAINTENANCE. The base course shall be maintained until the base course is completed and accepted. Maintenance will include immediate repairs to any defects and shall be repeated as often as necessary to keep the completed work intact. Any area of the RCA base course that is damaged shall be reworked as necessary.

3.2 MEASUREMENT AND PAYMENT

A. Measurement. The quantity of RCA base course to be paid will be determined by measurement of the number of square yards (square meters) of material actually constructed to the installed depth indicated in plans, and accepted as complying with the plans and specifications.

B. Payment. Payment shall be made at the contract unit price per square yard (square meter) for recycled concrete aggregate base course. This price shall be full compensation for furnishing all materials, for preparing and placing these materials, and for all labor, equipment tools, and incidentals necessary to complete the item.

END OF SECTION

SECTION 02752

INTEGRALLY COLORED CONCRETE

PART 1 - GENERAL

1.SUMMARY

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to Work of this Section.

Section Includes:

Integrally colored concrete deck at interactive fountain.
Curing of integrally colored concrete.

Related Sections:

1 Division 2 Section "Cement Concrete Pavement" for concrete pavement and walks.
Division 3 Section "Cast-In-Place Concrete" for general applications of concrete and coordination of sample submittal [and color selection].
Division 7 Section "Joint Sealants" for colored sealant for joints.

2.REFERENCES

Other useful publications about integrally colored concrete include:
PCA PA124 - Finishing Concrete Slabs with Color and Texture.
PCA SP021 - Color and Texture in Architectural Concrete.

American Concrete Institute (ACI):

ACI 301 "Specification for Structural Concrete for Buildings."
ACI 302 IR "Recommended Practice for Concrete Floor and Slab Construction."
ACI 303.1 "Standard Specification for Cast-In-Place Architectural Concrete."
ACI 304 "Recommended Practice for Measuring, Mixing, Transporting and Placing of Concrete."
ACI 305R "Recommended Practice for Hot Weather Concreting."
ACI 306R "Recommended Practice for Cold Weather Concreting."

American Society for Testing and Materials (ASTM):

ASTM C309 "Liquid Membrane-Forming Compounds for Curing Concrete."
ASTM C494 "Standard Specification for Chemical Admixtures for Concrete."
ASTM C979 "Standard Specification for Pigments for Integrally Colored Concrete."

American Association of State Highway and Transportation Officials (AASHTO):

AASHTO M194 "Chemical Admixtures."

3.SUBMITTALS

Product Data: Submit manufacturer's complete technical data sheets for the following:
- Colored admixture.
- Curing compound.

Design Mixes: For each type of integrally colored concrete.

Samples for Initial Selection: Manufacturer's color charts showing full range of colors available.

Qualification Data: For firms indicated in "Quality Assurance" Article, including list of completed projects.

4.QUALITY ASSURANCE

Manufacturer Qualifications: Manufacturer with 10-years experience in the production of specified products.

Installer Qualifications: An installer with 5-years experience with work of similar scope and quality.

Comply with the requirements of ACI 301.

Obtain each specified material from same source and maintain high degree of consistency in workmanship throughout Project.
- Retain samples of cements, sands, aggregates and color additives used in mockup for comparison with materials used in remaining work.
- Accepted field sample provides visual standard for work of Section.
- Field sample shall remain through completion of work for use as a quality standard for finished work.
- Remove field sample when directed.

5.DELIVERY, STORAGE AND HANDLING

Colored Admixture: Comply with manufacturer's instructions. Deliver colored admixtures in original, unopened packaging. Store in dry conditions.

6.PROJECT CONDITIONS

Integrally Colored Concrete Environmental Requirements:
- Schedule placement to minimize exposure to wind and hot sun before curing materials are applied.
- Avoid placing concrete if rain, snow, or frost is forecast within 24-hours. Protect fresh concrete from moisture and freezing.

Comply with professional practices described in ACI 305R and ACI 306R.

Schedule delivery of concrete to provide consistent mix times from batching until discharge. Mix times shall meet manufacturer's written recommendations.

7.PRE-JOB CONFERENCE

One week prior to placement of integrally colored concrete a meeting will be held to discuss the Project and application materials.

It is suggested that the Landscape Architect, General Contractor, Construction Manager, Subcontractor, Ready-Mix Concrete Representative, and a Manufacturer's Representative be present.

PART 2 - PRODUCTS

1.MATERIALS

Colored Admixture for Integrally Colored Concrete: Admixture shall be a colored, water-reducing, admixture containing no calcium chloride with coloring agents that are limeproof and ultra-violet resistant.

Colored admixture shall conform to the requirements of ACI 303.1, ASTM C979, ASTM C494 and ASSHTO M194.

Curing Compound for Integrally Colored Concrete: Curing compound shall comply with ASTM C309 and be of same manufacturer as colored admixture, for use with integrally colored concrete.

Curing and Sealing Compound: Curing and sealing compound shall comply with ASTM C309 and be of same manufacturer as colored admixture, for use with integrally colored concrete.

SUBSTITUTIONS: The use of products other than those specified will be considered providing that the Contractor requests its use in writing within 14-days prior to bid date. This request shall be accompanied by the following:

A certificate of compliance from material manufacturer stating that proposed products meet or exceed requirements of this Section, including standards ACI 303.1, ASTM C979, ASTM C494 and AASHTO M194.

Documented proof that proposed materials have a 10-year proven record of performance, confirmed by at least 5 local projects that Landscape Architect can examine.

2.COLORS

Concrete Color[s]:
Cement: Color shall be as selected Landscape Architect
Sand: Color shall be locally available natural sand
Colored Admixture: As selected Landscape Architect

Concrete Color[s]: [Provide cement, sand, aggregate and colored admixture as required to match Landscape Architect's sample.

Curing Compound: Color to match integrally colored concrete.

3.CONCRETE MIX DESIGN

Slump of concrete shall be consistent throughout Project at 4-inches or less. At no time shall slump exceed 5-inches. If super plasticizers or mid-range water reducers are allowed, slump shall not exceed 8-inches.

Do not add calcium chloride to mix as it causes mottling and surface discoloration.

Supplemental admixtures shall not be used unless approved by manufacturer.

Do not add water to the mix in the field.

Add colored admixture to concrete mix according to manufacturer's written instructions.

PART 3 - EXECUTION

1.INSTALLATION

Install concrete according to requirements of Division 3 Section "Cast-In-Place Concrete."

Do not add water to concrete mix in the field.

Surfaces shall be finished uniformly with the following finish:
Broomed: Pull broom across freshly troweled concrete to produce medium texture in straight lines perpendicular to main line of traffic. Do not dampen brooms.
Swirl: Float concrete. Work float flat on surface using pressure in swirling manner to produce series of uniform arcs and twists.
Trowel: Precautions should be taken to ensure that the surface is uniformly troweled so that it will not be slippery. Do not over-trowel or burnish the surface.
Rock Salt and broom concrete. Then sprinkle salt on concrete and press into surface leaving only tops of salt grains exposed. After 24 hours, wash salt away with water and brush. Allow surface and impressions to dry before applying curing compound.

Sandblast: Allow concrete to cure to sufficient strength so that it will not be damaged by blasting but not less than seven days. Use heavy sandblasting to remove cement mortar from surface and expose aggregate to match originally approved field sample.

Exposed Aggregate: Finish concrete and apply chemical surface retarder according to manufacturer's written instructions. Wash surface to match originally approved field sample.

CURING

Integrally Colored Concrete: Apply [curing] [curing and sealing] compound for integrally colored concrete according to manufacturer's instructions using manufacturer's recommended application techniques. Apply [curing] [curing and sealing] compound at consistent time for each pour to maintain close color consistency.

Curing compound shall be same color as the colored concrete and supplied by same manufacturer of the colored admixture.

Precautions shall be taken in hot weather to prevent plastic cracking resulting from excessively rapid drying at surface as described in CIP 5 *Plastic Shrinkage Cracking* published by the National Ready Mixed Concrete Association.

Do not cover concrete with plastic sheeting.

2.TOLERANCES

Minor variations in appearance of integrally colored concrete, which are similar to natural variations in color and appearance of uncolored concrete, are acceptable.

END OF SECTION

SECTION 02800

LANDSCAPING

PART 1 - GENERAL

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.

b. Section 02231 Tree Protection and Trimming

c. Section 02810 Sodding

d. Section 02820 Irrigation Systems

2. DESCRIPTION OF WORK

a. This Section includes the following:

1 Soil Preparation

2 Trees, plants, and ground covers.

3 Planting mixes.

4 Mulch and planting accessories.

5 Maintenance.

3. DEFINITIONS

a. Balled and Burlapped Stock: Exterior plants dug with firm, natural balls of earth in which they are grown, with ball size not less than sizes indicated; wrapped, tied, rigidly supported, and drum-laced as recommended by ANSI Z60.1.

b. Container-Grown Stock: Healthy, vigorous, well-rooted exterior plants grown in a container with well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for kind, type, and size of exterior plant required.

c. Finish Grade: Elevation of finished surface of planting soil.

d. Planting Soil: Native or imported topsoil, manufactured topsoil, or surface soil modified to become topsoil; mixed with soil amendments.

e. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill, before placing planting soil.

4. SUBMITTALS

a. Submit the following material samples:
   1 Mulch
   2 Planting accessories.

b. Submit certifications for the following materials:

   1 Topsoil source and PH value.
   2 Fertilizer

c. Material Test Reports: For existing surface soil and imported topsoil.

d. Record Drawings: Contractor responsible for providing the Owner with as-built landscape plan drawings. Legibly mark drawings to record actual construction. Indicate actual planting locations and identify any field changes to size or quantity of material.

5. QUALITY ASSURANCE

a. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of exterior plants.

   1 Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when landscape installation is in progress.

b. Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

c. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1, "American Standard for Nursery Stock."

d. Plant names indicated comply with “Standardized Plant Names” as adopted by the latest edition of the American Joint Committee of Horticultural Nomenclature. Names of varieties not listed conform generally with names accepted by the nursery trade. Provide stock true to botanical name and legibly tagged.

e. Plant material shall be graded Florida No. 1 or better as outlined under Grades and Standards for Nursery Plans, State Plant Board of Florida.

f. All plants shall be nursery grown under climatic conditions similar to those in the locality of the project for a minimum of two years.

g. Tree and Shrub Measurements: Measure according to ANSI Z60.1 with branches and trunks or canes in their normal position. Do not prune to obtain required sizes. **Take caliper measurements 4 ½ ft. above grade for all trees.** Measure main body of tree or shrub for height and spread; do not measure branches or roots tip-to-tip. Stock furnished shall be at least the minimum size indicated. Larger stock is acceptable, at no additional cost, and providing that the large plans will not be cut back to size indicated.

h. Observation: Landscape Architect may observe trees and shrubs either at place of growth or at site before planting for compliance with requirements for genus, species, variety, size, and quality. Landscape Architect retains right to observe trees and shrubs further for size and condition of balls and root systems, insects, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.

6. DELIVERY, STORAGE, AND HANDLING

a. Deliver fertilizer materials in original, unopened, and undamaged containers showing weight, analysis, and name of manufacturer. Store in manner to prevent wetting and deterioration.

b. Take all precautions customary in good trade practice in preparing plants for moving. Workmanship that fails to meet the highest standards will be rejected. Do not prune trees and shrubs before delivery, except as approved by Landscape Architect. Protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during delivery. Do not drop plants during delivery. Handle planting stock by root ball
   1 Inspection certificates required by law shall accompany each shipment invoice or order to stock and on arrival, the certificate shall be filed with the Landscape Architect.

c. Cover plants transported on an open vehicle with a protective covering to prevent windburn.

d. Deliver exterior plants after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set exterior plants trees in shade, protect from weather and mechanical damage, and keep roots moist.
   1 Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
   2 Do not remove container-grown stock from containers before time of planting.
   3 Water root systems of exterior plants stored on-site with a fine-mist spray. Water as often as necessary to maintain root systems in a moist condition. Water in heeled-in plants daily.

7. COORDINATION

a. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit.

b. Work notification: Notify Landscape Architect at least 7 working days prior to installation of plant material.

c. Protect existing utilities, paving, and other facilities from damage caused by landscaping operations.

d. **The irrigation system will be installed, tested, and functioning prior to planting**. Locate, protect, and maintain the irrigation system during the planting operations. Repair irrigation system components, damaged during planting operations, at Landscape Contractor's expense.

e. Coordination with Sodding and Sprigging: Plant trees and shrubs after finish grades are established and before planting lawns, unless otherwise acceptable to Architect.
   1 When planting trees and shrubs after lawns, protect lawn areas and promptly repair damage caused by planting operations.

f. A complete list of plants, including a schedule of sizes, quantities, and other requirements is shown on the drawings. In the event that quantity discrepancies or material omissions occur in the plant materials list, the planting plans shall govern.

8. WARRANTY

a. Special Warranty: Warrant the trees, shrubs and ground covers for the warranty period indicated, against defects including death and unsatisfactory growth, or defects resulting from lack of adequate maintenance. Warranty shall not include damage or loss of trees, plants, or ground covers caused by fires, floods, freezing rains, lightning storms, or winds over 50 miles per hour, winter kill caused by extreme cold and sever winter conditions not typical of planting area, acts of vandalism, or negligence on the part of the Owner.

   1 Warranty Period for Landscape Material: One year from date of Substantial Completion. Inspection of plants will be made by Landscape Architect at completion of planting.
   2 Replace, in accordance with the drawings and specifications, all plants that are dead or, as determined by the Landscape Architect, are in an unhealthy or unsightly condition, and have lost their natural shape due to dead branches, or other causes due to the Contractor's negligence. The cost of such replacement(s) is at Contractor's expense. Warrant all replacement plants for one year after installation.
   3 Replace landscape material that is more than 25 percent dead or in an unhealthy condition at end of warranty period.
   4 A limit of one replacement of each plant will be required, except for losses or replacements due to failure to comply with requirements.

9. MAINTENANCE

a. Trees, Shrubs and Ground Covers: Maintain landscaping through final acceptance by pruning, cultivating, watering, weeding, fertilizing, restoring planting saucers, tightening and repairing stakes and guy supports, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings. Spray as required to keep trees and shrubs free of insects and disease. Restore or replace damaged tree wrappings.

PART 2 - PRODUCTS

1. PLANT MATERIAL

a. General: Furnish nursery-grown trees, shrubs and ground cover complying with Florida "Grades and Standards for Nursery Plants", with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sunscald, injuries, abrasions, and disfigurement.

b. Grade: Provide trees, shrubs and ground covers of sizes and grades complying with Florida "Grades and Standards for Nursery Plants" for type of trees, shrubs and ground cover required. Trees, shrubs and ground cover of a larger size may be used if acceptable to Landscape Architect, with a proportionate increase in size of roots or balls.

c. Dig balled and burlapped plants with firm, natural balls of earth of sufficient diameter and depth to encompass the fibrous and feeding root system necessary for full recovery of the plant. Provide ball sizes complying with the latest edition of the "American Standards for Nursery Stock." Cracked or mushroomed balls are not acceptable. Synthetic burlap is not acceptable.

d. Container-grown stock: Grown in a container for sufficient length of time for the root system to have developed to hold its soil together, firm and whole.
   1 No plants shall be loose in the container.
   2 Container stock shall not be pot bound

e. Provide tree species that at heights (when mature) over 25'-0" with a single main trunk. Trees that have the main trunk forming a "Y" shape are not acceptable

f. Plants planted in rows shall be matched in form.

g. The height of the trees, measured from the crown of the roots to the tope of the top branch, shall not be less than the minimum size designated in the plant list.

h. No pruning wounds shall be present with a diameter of more than 1" and such wounds must show vigorous bark an all edges.

i. Shrubs and ground covers shall meet the requirements for spread and height indicated in the plant list.
   1 The measurements for height shall be taken from the ground level to the average height of the top of the plant and not the longest branch.
   2 Single stemmed or thin plants will not be accepted.
   3 Side branches shall be generous, well twigged, and the plant as a whole well bushed to the ground.
   4 Plants shall be in a moist, vigorous condition, free from dead wood, bruises or other root or branch injuries.

2. ORGANIC SOIL AMENDMENTS

a. Peat: Brown to black in color, weed and seed free granulated raw peat or baled peat, containing not more than 9% mineral on a dry basis.

3. FERTILIZER

a. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

   1 Composition: 12 percent nitrogen, 10 percent phosphorous, and 12 percent pot ash, by weight. ¼ of nitrogen in the form of nitrates, ¼ in the form of ammonia salt and ½ in the form of organic nitrogen.

4. MULCHES

a. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:

   1 Type: Premium grade ‘Mini Nugget’ Pine Bark.

5. STAKES AND GUYS

a. Stakes for Staking: Rough-sawn, sound, new hardwood, redwood, or pressure-preservative-treated softwood, free of knots, holes, cross grain, and other defects. See construction drawings for sizes.

b. Stakes for Guying: Hardwood. See construction drawings for sizes.

c. Guy/ Staking Wire: No. 10 or 12 gauge galvanized wire.

d. Turnbuckles: Galvanized steel of size and gauge required to provide tensile strength equal to that of the wire. Turnbuckle openings shall be at least 3".

e. Staking and Guying Hose: Two-ply, reinforced garden hose not less than 1/2" inside diameter.

f. Flags: Standard surveyor's plastic flagging tape, white, 6 inches (150 mm) long.

6. SOIL AMENDMENTS

a. 'Agrodiamond' super absorbent, or approved equal, installed as per manufacturer's specifications and recommended rate.

PART 3 - EXECUTION

1. EXAMINATION

a. Examine areas to receive landscaping for compliance with requirements and conditions affecting installation and performance. Proceed with installation only after unsatisfactory conditions have been corrected.

2. PREPARATION

a. Protect structures, utilities, sidewalks, pavements, and other facilities, and lawns and existing exterior plants from damage caused by planting operations.

b. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

c. Planting shall be performed only by experienced workmen familiar with planting procedures under the supervision of a qualified supervisor.

d. Locate plants as indicted or as approved in the filed by Landscape Architect after staking by the Contractor. If obstructions are encountered that are not shown on the drawings, do not proceed with planting operations until alternate plant locations have been selected. Make minor adjustments as required.

3. INSTALLATION

a. Planting Pits: Excavate circular plant pits with vertical sides, except for plants specifically indicated to be planted in beds. Depth of pit shall accommodate the root system. Excavate circular pits with sides sloped inward. Trim base leaving center area raised slightly to support root ball and assist in drainage. Do not further disturb base. Scarify sides of plant pit smeared or smoothed during excavation. Scarify the bottom of the pit to a depth of 4".

1 Excavate approximately three times as wide as ball diameter for balled and burlapped, container-grown or fabric bag-grown stock.
2 Excavate at least 12 inches (300 mm) wider than root spread and deep enough to accommodate vertical roots for bare-root stock.

b. Backfill all planting pits with a mixture of ½-excavated material and ½ planting soil mix.

c. Obstructions: Notify Landscape Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

1 Hardpan Layer: Drill 6-inch- (150-mm-) diameter holes into free-draining strata or to a depth of 10 feet (3 m), whichever is less, and backfill with free-draining material if hardpan layer is detected.

d. Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub pits.

e. Set plant material in the planting pit to proper grade and alignment. Set plants upright, plumb, and faced to give the best appearance or relationship to each other or adjacent structure. Set plant material 2" above the finish grade. No filling will be permitted around trunks or stems. Backfill the pit with planting mixture. Do not use frozen or muddy mixtures for backfilling.

1 Space ground cover plants in accordance with indicated dimensions. Adjust spacing as necessary to evenly fill planting bed with indicated quantity of plants. Plant to within 12" of the trunks of trees and shrubs within planting bed and to within 6" of edge of bed.

2 Do not use ball and burlap planting stock if root ball is cracked or broken before or during planting operation.

3 Place planting soil mix around root ball in layers, tamping to settle mix and eliminate voids and air pockets. After balled and burlapped plants are set, muddle planting soil mixture around bases of balls and fill all voids.

4 When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed. Water again after placing and tamping final layer of planting soil mix.

f. Mulching: Apply 3-inch (75-mm) average thickness of organic mulch extending 12 inches (300 mm) beyond edge of planting pit or trench. Mulch shrub and groundcover areas immediately after planting. Do not place mulch within 3 inches (75 mm) of trunks or stems. Thoroughly water mulched areas. After watering, rake mulch to provide a uniform finished surface.

4. GUYING AND STAKING

a. Stake/guy all trees immediately after sodding/ sprigging operations and prior to acceptance. When high winds or other conditions that may affect tree survival or appearance occur, the Landscape Architect may require immediate staking/guying.

b. Stake deciduous trees under 3" caliper. Stake evergreen trees under 8'-0" tall.

c. Guy deciduous trees over 3" caliper. Guy evergreen trees over 8'-0" tall.

d. All work shall be acceptable to the Landscape Architect.

5. MAINTENANCE

a. During exterior planting, keep adjacent paving and construction clean and work area in an orderly condition.

b. Protect exterior plants from damage due to landscape operations, operations by other contractors and trades, and others. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged exterior planting.

c. Maintain plantings until completion and acceptance of the entire project.

d. Maintenance shall include pruning, cultivating, weeding, watering, mowing sod, and application of appropriate insecticides and fungicides necessary to maintain plants free of insects and disease.
   1 Re-set settled plants to proper grade and position. Restore planting saucer and adjacent material and remove dead material.
   2 Tighten and repair guy wires and stakes as required.
   3 Correct defective work as soon as possible after deficiencies become apparent and weather and season permit

6. CLEANING

a. Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess materials, soil, debris, and equipment, and legally dispose of them off Owner's property. Repair damage resulting from planting operations.

3.7 ACCEPTANCE

A. Inspection to determine acceptance of planted areas will be made by the Landscape Architect, upon Contractor's request. Provide notification at least 10 working days before requested inspection date.
   1. Planted areas will be accepted provided all requirements, including maintenance, have been compiled with and plant materials are alive in a healthy and vigorous condition.

B. Upon acceptance, the Owner will assume responsibility for plant maintenance.

END OF SECTION 02800

SECTION 02810

SODDING

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. Provide sodded lawns as shown and specified. The work includes:

1. Soil preparation.
2. Sodding common areas, pavement edges, and other indicated areas.
3. Maintenance.

1.2 RELATED REQUIREMENTS:

1. Section 02800: Landscaping.
2. Section 02820: Irrigation Systems

1.3 SUBMITTALS

A. Submit sod growers certification of grass species. Identify source location.

1.4 QUALITY ASSURANCE

A. Sod: Comply with American Sod Producers Association (ASPA) classes of sod materials.

B. Provide and pay for materials testing. Testing agency shall be acceptable to the Landscape Architect. Provide the following data:

1. Topsoil:

a. Ph factor.
b. Mechanical analysis.
c. Percentage of organic content.
d. Recommendations on type and quantity of additives required to establish satisfactory Ph factor and supply of nutrients to bring nutrients to satisfactory level for planting.

1.5 DELIVERY, STORAGE AND HANDLING

A. Cut, deliver and install sod within a 24-hour period.

1. Do not harvest or transport sod when moisture content may adversely affect sod survival.
2. Protect sod from sun, wind, and dehydration prior to installation.

3. Do not tear, stretch, or drop sod during handling and installation.

1.6 PROJECT CONDITIONS

A. Work notification: Notify Landscape Architect at least 7 working days prior to start of sodding operations.

B. Protect existing utilities, paving, and other facilities from damage caused by sodding operations.

C. Perform sodding work only after irrigation and other work affecting ground surface has been completed. The irrigation system will be installed, tested, and functional prior to sodding and sprigging. Locate, protect, and maintain the irrigation system during sodding and sprigging operations. Repair irrigation system components damaged during sodding operations at the Contractor's expense.

D. Provide hose and lawn watering equipment as required.

1.7 WARRANTY

A. Provide a uniform stand of grass by watering, mowing and maintaining lawn areas until final acceptance. Re-sod areas which fail to provide a uniform stand of grass with specified materials, until all affected areas are accepted by the Landscape Architect.

PART 2 PRODUCTS

2.1 MATERIALS

A. Sod: Argentine Bahia

B. Provide healthy, well-rooted, material, free of diseases, nematodes and soil borne insects. Provide sod uniform in color, leaf texture, density, and free of weeds, undesirable grasses, stones, roots, thatch, and extraneous material; viable and capable of growth and development when planted.

1. Furnish sod machine stripped and of Supplier's standard width, length, and thickness: Uniformly 1-1/2" to 2" thick with clean cut edges. Mow sod before stripping.

D. Fertilizer for sodded areas:

1. Granular, non-burning product meeting the requirement of Federal Specification O-F-24LS, with percentages of nitrogen, phosphoric acid, and potash as herein specified.

8N-8P-8K

Fertilizer shall be furnished in bags or other standard containers with name, weight, guaranteed analysis of contents clearly marked thereon. Combined

N-P-K content shall be not less than 20% of the total and N content shall be not less than 5% of the total by weight.

E. Water: Free of substance harmful to sod growth. Hoses or other methods of transportation furnished by Contractor.

PART 3 EXECUTION

3.1 INSPECTION

A. Examine finish surfaces, grades, topsoil quality and depth. Do not start sodding work until unsatisfactory conditions are corrected.

3.2 PREPARATION

A. Limit preparation to areas that will be immediately sodded.

B. Loosen topsoil of lawn areas to minimum depth of 2". Remove stones over 1" in any dimension and sticks, roots, rubbish, and extraneous matter.

C. Grade lawn areas to smooth, free draining and even surface with a loose, uniformly fine texture. Roll and rake; remove ridges and fill depressions as required to drain. Grade immediately before sodding. Verify grading follows engineering plans. Contractor will be responsible for regarding if sod are not placed in a timely manner and wash out or other erosion causes grades to deviate from engineering plans.

D. Apply fertilizer for sodded areas by mechanical rotary or drop type distributor, thoroughly and evenly incorporated by raking or other approved method. Fertilize areas inaccessible to power equipment with hand tools and incorporate it into soil.

E. Dampen dry soil prior to sodding.

F. Restore prepared areas to specified condition if eroded, settled, or otherwise disturbed after fine grading and prior to sodding.

3.3 INSTALLATION

A. Sodding:

1. Lay sod to form a solid mass with tightly-fitted joints. Butt ends and sides of sod strips. Do not overlay edges. Stagger strips to offset joints in adjacent courses. Remove excess sod to avoid smothering of adjacent grass. Provide sod pad top flush with adjacent curbs, sidewalks, and drains.
2. Do not lay dormant sod or install sod on saturated soil.
3. Water sod thoroughly with a fine spray immediately after laying.
4. Roll a minimum of four (4) times with a medium weight roller to ensure contact with sub-grade.

B. Sod indicated areas within contract limits and areas adjoining contract limits disturbed as a result of construction operations.

3.4 MAINTENANCE

A. Maintain sodded lawn areas, including watering, spot weeding, mowing, application of herbicides, fungicides, insecticides and resodding until a full, uniform stand of grass free of weed, undesirable grass species, disease, and insects is achieved and accepted by the Landscape Architect.

SODDING:

1. Water sod thoroughly every day, as required to establish proper rooting.
2. Repair, rework, and resod all areas that have washed out or are eroded. Replace undesirable or dead areas with new sod.
3. Mow lawn areas as soon as lawn top growth reaches a 3" height. Cut back to 2" height. Not more than 40% of grass leaf shall be removed at any single mowing.

3.5 ACCEPTANCE

A. Inspection to determine acceptance of sodded lawns will be made by Landscape Architect, upon Contractor's request. Provide notification at least 7 working days before required inspection date.

1. Sodded areas will be acceptable provided all requirements, including maintenance, have been complied with, and a healthy, even-colored viable lawn is established, free of weeds, undesirable grass species , disease and insects.

B. Upon acceptance, the Owner will assume responsibility for lawn maintenance.

C. If not accepted at the time of the inspection, the Contractor will be required to prepare a maintenance schedule for all grassed areas for the City. The City may require this maintenance schedule if construction is delayed or for any reason the City deems necessary to ensure that the grass is well maintained.

3.6 CLEANING

A. Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess materials, debris and equipment. Repair damage resulting from sodding operations.

END OF SECTION 02810

SECTION 02820

IRRIGATION SYSTEMS

PART 4 - GENERAL

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.

2. DESCRIPTION OF WORK

a. This Section includes piping, valves, sprinklers, specialties, controls, and wiring for an automatic-control irrigation system.

3. PERFORMANCE REQUIREMENTS

a. Installer's qualifications: Have satisfactorily installed irrigation systems on at lease five (5) other projects of comparable complexity.

b. Location of Sprinklers and Specialties: Design layout is diagrammatic. Make minor adjustments necessary to avoid plantings and fixed obstructions. Maintain 100 percent water coverage of landscape areas indicated.

4. SUBMITTALS

a. Submit manufacturer's product data and installation instructions for each of the system components for the following. Product Data: Include pressure ratings, rated capacities, and settings of selected models for the following:

1 Backflow Preventer.
2 Electric Valves.
3 Gate Valves
4 Rain Sensor
5 Controller
6 Mainline
7 Lateral Lines
8 Wiring/Control Cables.
9 Control Valve Box
10 Sprinklers.
11 Any other components for a complete system.

b. Record Drawings: Contractor responsible for providing Owner with As-Built drawings of the irrigation system as installed. Show piping and major system components. Legibly mark drawings to record actual construction. Indicate horizontal and vertical locations reference to permanent surface improvements. Identify field changes of dimension and detail and changes made in the field.

c. Operation and Maintenance Data: For irrigation systems, to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section "Closeout Procedures" include data for the following:

1 Automatic-control valves.
2 Sprinklers.
3 Controllers.

5. QUALITY ASSURANCE

a. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

6. DELIVERY, STORAGE, AND HANDLING

a. Deliver irrigation system components in manufacturer’s original undamaged and unopened containers with labels intact and legible.

b. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

7. PROJECT CONDITIONS

a. Protect existing trees, plants lawns and other features designed to remain as part of the final landscape work.

b. Promptly noifty the Landscape Architect of unexpected subsurface conditions.

PART 5 - PRODUCTS

1. GENERAL

a. Provide only new materials without flaws or defects and of the highest quality of their specified class and kind.

B. Comply with pipe sizes indicated. No substitution of smaller pipes will be permitted. Larger sizes may be subject to acceptance of the Landscape Architect. Remove damaged and defective pipe.

C. Provide pipe continuously and permanently marked with manufacturer's name or trademark, size schedule and type of pipe, working pressure at 73 degrees F.

2. PIPES, TUBES, AND FITTINGS

a. Polyvinyl chloride pipe: ASTM D2241, rigid, unplasticized PVC, extruded from virgin parent material. Provide pipe homogeneous throughout and free from visible cracks, holes, foreign materials, blisters, wrinkles and dents.
   1 Lateral Lines Class 160
   2 Mainline and Sleeve Schedule 40

b. PVC pipe fittings: ASTM D2241 schedule 40 PVC molded fittings suitable for solvent weld, slip joint ring tight seal, or screwed connections. Fittings made of other materials are not permitted.

c. All pipe under paved areas will be sleeved with Schedule 40 P.V.C. The Contractor will provide a minimum of 2" Schedule 40 P.V.C. under all paved areas to produce access for electrical control wire.

3. VALVE BOXES

a. Plastic Valve Boxes: Box and cover, with open bottom and openings for piping; designed for installing flush with grade. Include size as required for valves and service.

   1 Box: Tapered enclosure of rigid plastic material comprised of fibrous components chemically inert and unaffected by moisture corrosion and temperature changes.
   2 Cover Material: Provide lid of same material, green in color.

4. SPRINKLERS

a. Refer to drawing’s materials list.

   1 Sprinklers: All Sprinkler heads shall be as indicated on the drawings. All sprinkler heads on risers of 12 inches or more shall be secure in plumb position using a 30 inch angle iron stake and stainless steel clamps. All risers shall be painted; color to be determined by Landscape Architect.

5. AUTOMATIC-CONTROL SYSTEM

a. Refer to drawing’s materials list.

1 Controller: Irrigation contractor shall furnish electric controller as indicated on the drawing. Controller shall be installed in the area shown on the drawing. Power from the electrical panel to the irrigation controller shall be furnished by others. All wiring from the irrigation controller to the remote control valves shall be furnished and installed by the irrigation contractor in the same trench as the main line.

b. Wiring: UL 493, Type UF-B multi-conductor, with solid-copper conductors and insulated cable; suitable for direct burial.

1 Wire color code: Provide control or “hot” wires red in color. Provide common or “ground” wires white in color.
2 Splicing Materials: Manufacturer's packaged kit consisting of insulating, spring-type connector or crimped joint and epoxy resin moisture seal; suitable for direct burial.

PART 6 - EXECUTION

1. INSPECTION

a. Examine final grades and installation conditions. Do not start irrigation system work until unsatisfactory conditions are corrected.

2. PREPARATION

a. Layout and stake the locations of each pipe run and all sprinkler heads and sprinkler valves. Obtain Owners Representative acceptance of layout prior to excavating.

b. Schedule 40 sleeves to be used under paved vehicular use areas shall be placed prior to compaction of paved areas. Coordinate all sleeve placement with general contractor.

c. Place sleeves as indicated for installation of piping and control wire.

3. INSTALLATION

A. Excavating and backfilling:

1.All excavation shall be considered and unclassified excavation and include all materials encountered.
2.Excavate trenches of sufficient depth and width to permit proper handling of installation of pipe and fittings.
3.Excavate to depths required to provide 2" depth of earth fill or sand bedding for piping when rock or other unsuitable bearing materials in encountered.
4. Fill to match adjacent grade elevations with approved earth fill material. Place and compact fill in layers not greater than 8" depth.

a. Provide approved earth fill or sand to a point 4" above the top of the pipe.
b.Fill to within 6" of final grade with approved excavated fill materials free of lumps or rocks larger than 3" in any dimension.
c. Provide clean topsoil fill free of rocks and debris for top 6" of fill.

5. Except as indicated, install irrigation mains with a minimum cover of 18" based on finished grades. Install irrigation laterals with a minimum cover of 12" based on finished grades.
6. Excavate trenches and install piping and fill during the same working day. Do not leave open trenches or partially filled trenches open overnight.
7.Replace stripped sod in sufficient time to allow for satisfactory sod recovery and growth. Water stripped and reinstalled sod until irrigation system is placed in operation.

B. Plastic pipe:

1. Install plastic pipe in accordance with manufacturer's installation instructions. Provide for thermal expansion and contraction.
2.Saw cut plastic pipe. Use a square-in-sawing vice to ensure a square cut. Remove burrs and shavings at cut ends prior to installation.
3. Make plastic to plastic joints with solvent weld joints or slip seal joints. Use only solvent recommended by the pipe manufacturer. Install plastic pipe fittings in accordance with pipe manufacturer's instructions. Contractor shall make arrangements with pipe manufacturer for all necessary field assistance.
4. Make plastic to metal joints with plastic male adapters.
5. Make solvent weld joints in accordance with manufacturer's recommendations.
6. Allow joints to set at last 24 hours before pressure is applied to the system.

C. Sprinklers, fittings, valves and accessories:

1.Install fittings, valves, sprinkler heads, risers and accessories in accordance with manufacturer's instructions, except as otherwise indicated.

a. Provide concrete thrust blocks where required at fittings and valves.

2. Set sprinkler heads perpendicular to finished grades, except as otherwise indicated.
3.Obtain Landscape Architect's review and acceptance of height for proposed sprinkler heads and valves prior to installation.
4. Locate sprinkler heads to assure proper coverage of indicated areas. Do not exceed sprinkler head spacing distances indicated.
5. Install risers for spray heads in shrub or flower bed areas and planters of sufficient height to prevent interruption of the stream by the plan material.

a. Provide risers of 1/2" PVC pipe, threaded each end.
b. Paint exposed galvanized risers with 1 coat black paint.
c. Set risers in a row with top level and in-line.

6. Install pop-up gear driven sprinklers with flex-pipe connected to a barbed ell.
7. Install controller as detailed.
8. Install in-ground control valves in a valve access box as indicated.
9. Install valve access boxes on a suitable base of gravel to provide a level foundation at proper grade and to provide drainage of the access box.
10. Seal threaded connections on pressure side of control valves with teflon tape or approved plastic joint type compound.

D. Control wiring.

1. Install electric control cable in the piping trenches wherever possible. Place wire in trench adjacent to pipe. install wire with slack to allow for thermal expansion and contraction. Expansion joints in wire may be provided at 200-foot intervals by making 5-6 turns of the wire around a piece of 1/2" pipe instead of slack. Where necessary to run wire in a separate trench, provide a minimum cover of 12".
2. Provide sufficient slack at site connections at remote control valves in control boxes and at all wire splices to allow raising the valve bonnet or splice to the surface without disconnecting the wires when repair is required.
3. Connect each remote control valve to one station of a controller except as otherwise indicated.
4. Connect remote valves to common ground wire system.
5. Make wire connections to remote control electric valves and splices of wire in the field, using wire connectors an sealing cement in accordance with manufacturer's recommendations.
6. Provide tight joints to prevent leakage of water and corrosion build-up of the joint.

E. Sleeves:

1. Provide new sleeves for all locations where existing sleeves are not indicated. Install new sleeves prior to paving installation wherever possible. Coordinate with general contractor.
2. Install pipe sleeves under existing concrete or asphalt surface by jacking, boring, or hydraulic driving of the sleeve. Remove and replace existing concrete and asphalt surfaces where cutting is necessary. Obtain Owner's permission before cutting existing concrete and asphalt surfaces. Where piping is shown under paved areas which are adjacent to turf areas, install the piping in the turf areas.

F. Flushing, testing and adjustment:

1. After sprinkler piping and risers are installed and before sprinkler heads are installed, open control valves and flush out the system with full head of water.
2. Perform system testing upon completion of each section. Make necessary repairs and retest repaired sections as required.
3. Adjust sprinklers after installation for proper and adequate distribution of the water over the coverage patter. Adjust for the proper arc of coverage.
4. Tighten nozzles on spray type sprinklers after installation. Adjust sprinkler adjusting screw on lateral line or circuit as required for proper radius. Interchange

nozzles' patterns as directed by the Landscape Architect to give best arc of coverage.

5. Adjust all electric remote control valve flow control stems for system balance.
6. Test and demonstrate the controller by operating appropriate day, hour, and station selection features as required to automatically start and shut down irrigation cycles to accommodate plant requirements.

3.4 DISPOSAL OF WASTE MATERIALS

A. Stockpile, haul from site, and legally dispose of waste materials, including unsuitable excavated materials, rock, trash, and debris.

3.5 ACCEPTANCE

A. Test and demonstrate to the Landscape Architect and Owner the satisfactory operation of the system free of leaks. All main lines shall be hydrostatically tested at a pressure of 100 psi for a period of time not less than 3 hours. Should any leaks be found, it shall be repaired. The line shall then be retested until satisfactory.

B. Instruct the Owner's designated personnel in the operation of the system, including adjustment of sprinklers, controller(s) and valves.

C. Upon acceptance, the Owner will assume operation of the system.

3.6 GUARANTEES

A. The irrigation contractor shall furnish warranties in writing certifying that the quality and workmanship of all materials and installation furnished is in accordance with these specifications and in accordance with the original manufacturers' warranties. Irrigation contractor shall further see to the fulfillment of all manufacturers' warranties. Irrigation contractor shall warrant the installation workmanship for a period of one (1) year from date of completion of acceptance of the job or any accepted portion of the job.

3.7 CLEANING

A. Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess materials, soil, debris, and equipment. Repair damage resulting from irrigation system installation.

END OF SECTION 02820

SECTION 02900

SITE FURNISHINGS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Provide all labor, materials, equipment and incidentals to install site furnishings, shown on the drawings and as specified. Items of work are:

1. Bench
2. Littler Receptacle
3. Bike Rack
4. Removable Bollards

1.2 QUALITY ASSURANCE

A. All furnishings described herein shall be installed by qualified tradesmen.
B. All installation work and materials to be per manufacturer's specifications, or as directed by the Engineer.

1.3 PRODUCT HANDLING

A. Store in a secure and weather-protected area.
B. Return all damaged products to the manufacturer/distributor for replacement.
C. Any product damaged by Contractor will be replaced at the Contractor's cost (shipping and product) at no additional cost to the Owner.
D. All products shall be inspected by the Engineer for damage and chipped or marred finish prior to installation.

1.4 PROJECT CONDITIONS

A. Verify all work to field locations and dimensions and coordinate work being done by others.

PART 2 - PRODUCTS

2.1 MATERIALS

A. As indicated on the plans.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install furnishings in locations as indicated on the plans and as per manufacturer's specifications.
B. Comply with manufacturer's written installation instructions, unless more stringent requirements are indicated. Complete field assembly of site and street furnishings, where required.
C. Unless otherwise indicated, install site and street furnishings after landscaping and paving have been completed.
D. Install site and street furnishings level, plumb, true, and securely anchored at locations as per manufacturer's specifications.

3.2 ACCEPTANCE

A. The Owners Representative will review each installation to determine compliance with plans and specifications prior to final acceptance of the work.
B. Any work not installed in accordance with the plans and specifications and rejected by the Engineer shall be removed and replaced at the Contractor's expense.

3.3 GUARANTEES

A. The contractor shall furnish warranties in writing certifying that the quality and workmanship of all materials and installation furnished is in accordance with these specifications and in accordance with the original manufacturers' warranties. The Contractor shall warrant the installation workmanship for a period of one year from the date of final acceptance of the job, or any accepted portion of the job.

3.4 CLEANING

A. Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess materials, soil, debris, and equipment. Inspect components. Repair damaged finishes to match original finish or replace component.

END OF SECTION 02900

SECTION 03103

FORMWORK, REINFORCING AND CONCRETE

PART 1 - GENERAL

A. Description

This section includes materials, testing and construction of the reinforced concrete elements described on the drawings.

PART 2 - PRODUCTS

A. Concrete

All concrete will be made from Type I cement and size #67 aggregate with a minimum 28-day compressive strength of 3,000 psi, slump 4 inches, ± 1 inch, and with an ASTM C494, a water reducing admixture.

B. Reinforcement

Use deformed bars conforming to ASTM A615, Grade 60 and free from loose rust and scale. No welding is permitted.

C. Forming

Use forms of either wood or metal with a depth equal to the plan dimensions for the depth of concrete being deposited against them.

D. Preformed Expansion Joint Filler

Unless otherwise specified, use bituminous type preformed expansion joint filler conforming to the requirements of ASTM Designation D994.

E. Curing Compound

ASTM C309, Type I, clear with fugitive dye or Type II, white pigmented. Use compounds that contain no ingredient which will adversely affect the bond of coatings or toppings.

F. Admixtures

Air entraining admixtures as specified in ASTM C260.

PART 3 - EXECUTION

A. Foundation

Excavate or backfill to the required depth. Compact the foundation material upon which the concrete is to be set to a minimum of 95 percent of the maximum density as determined by AASHTO T-180, with an even surface, true to line, grade and cross section, and soaking wet at the time that the concrete is placed.

B. Forms

Set the forms straight, free from warp or bends, and true to line and grade. Make the forms of sufficient strength when braced or tied to resist the pressure of the concrete without deviation from line and grade. Clean the forms each time they are used, and oil or saturate with water prior to placing the concrete.

C. Reinforcing

Set bars in form and support so concrete will flow under them.

D. Placing

Place concrete in the forms to the required depth. Tamp and spade until mortar entirely covers its surface.

E. Joints

Form expansion joints as shown on the drawings.

F. Finishing

1. Strike off the concrete by means of a wood or metal screed used perpendicular to the forms in order to obtain the required grade, and remove surplus water and laitance.

2. Finish the concrete surface as shown on the drawings. The surface variations shall not be more than 1/4 inch under a 10-foot straight edge, nor more than 1/8 inch on a 5-foot transverse section.

G. Curing

1. Continuously cure the concrete for a period of at least seven days. Commence curing after finishing has been completed and as soon as the concrete has hardened sufficiently to permit application of the curing material without marring the surface. Replace immediately any curing material removed or damaged during the curing

period. Cure the concrete by wetting the wooden forms, covering the surface with set burlap, keeping the surface wet with water or using curing compound.

2. It is the responsibility of the CONTRACTOR to select the appropriate curing method in response to climatic and/or site conditions occurring at the time of concrete placement. Implement the measures described in ACI 305 and 306 for protecting and curing concrete during hot and cold weather or use whatever other methods may be necessary.

H. Joints and Cracking

1. Saw joints before the formation of uncontrolled cracking (i.e., cracking that occurs at locations other than construction, control or contraction joints) and as soon as the concrete has hardened sufficiently to permit cutting without chipping, spalling or tearing. Saw joints both during the day and night as required.

2. Cracking: If the concrete cracks at locations other than at construction, control or contraction joints, if the defects are serious or affect the strength of the structure, or if patching does not satisfactorily restore the quality and appearance to the surface, the CONTRACTOR may be required to remove and replace the concrete in accordance with the provisions of this section, all at no additional cost to the OWNER.

I. Backfilling and Compacting

After the concrete has sufficiently set, refill the spaces adjacent to the concrete to the required elevation with suitable material. Perform earthwork in accordance with Section 02665.

J. Testing

Sample and cure the concrete in accordance with ASTM C31, except take not less than three 6-inch by 12-inch cylinders for each cubic yard poured or each day's pour if less than 75 cubic yards. A slump test may be taken in conformity with ASTM C143, and the cylinders shall be tested in accordance with ASTM C39.

END OF SECTION

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SECTION 15056

DUCTILE-IRON PIPE

PART 1 - GENERAL

A. Description

This section describes materials, testing, and installation of ductile-iron pipe and fittings 30 inches and smaller.

B. Submittals

1. Submit shop drawings in accordance with the General Conditions.

2. Provide an affidavit of compliance with standards referenced in this specification, e.g., AWWA C151. Submit copy of report of pressure tests for qualifying the designs of all sizes and types of AWWA C153 fittings that are being used in the project. The pressure test shall demonstrate that the minimum safety factor described in AWWA C153, Section 53-5.5, is met.

3. Submit piping layout profile drawings showing location and dimensions of pipe and fittings; submit after equipment and valve submittals have been reviewed and marked "Resubmittal not required." Include laying lengths of valves, meters, in-line pumps, and other equipment determining piping dimensions. Label or number each fitting or piece of pipe. Piping having identical design pressure class, laying lengths, and bell-and-spigot dimensions that is to be placed in long straight reaches of alignment may have the same identifying label or number.

4. Provide the following information:

    a. Mortar lining thickness.

    b. Wall thickness.

    c. Material test data for this project.

    d. Show deflections at push-on and mechanical joints.

    e. Show joint and fitting details.

5. Submit calculations and test data proving that the proposed restrained joint arrangement can transmit the required forces with a minimum safety factor of 1.5.

6. Submit certificate that cement for mortar lining complies with ASTM C 150, designating type.

7. Submit test report on physical properties of rubber compound used in the gaskets.

8. Submit drawing or manufacturer's data sheet showing flange facing, including design of facing serrations.

9. Submit weld procedure specification, procedure qualification record, and welder's qualifications prior to any welding to ductile-iron pipe.

10. Submit certification that materials intended to contact potable water are approved per NSF Standard 61.

PART 2 - MATERIALS

A. Pipe

Pipe shall be DIP as shown in the plans.

B. Pipe Marking

Plainly mark each length of straight pipe and each fitting at the bell end to identify the design pressure class, the ductile-iron wall thickness, and the date of manufacture, and the proper location of the pipe item by reference to the layout schedule. Mark the spigot end of restrained joint pipe to show clearly the required depth of insertion into the bell.

C. Design Criteria

Obtain the following information from the drawings.

a. Elevation of the pipe invert and of the completed ground.

b. Alignment of the pipeline.

c. Nominal internal diameter, ID.

d. Joint type(s).

D. Pipe Wall Thickness

Minimum wall thickness for pipe having push-on or mechanical joints, restrained joints, plain ends, or cast flange ends shall be Class 350, unless otherwise shown in the drawings.

E. Fittings

1. Fittings shall be as specified on the plans or bid. Material shall be ductile iron. Flanges shall be flat faced.

2. Mechanical joint fittings conforming to AWWA C153 may be used in lieu of AWWA C110 fittings.

3. Material for fittings with welded-on bosses shall have a Charpy notch impact value of minimum 10 ft-lbs under the conditions defined in AWWA C151. Test completed welds by the liquid penetrant method per ASTM E 165.

F. Flanges

1. Flanges shall be solid back, Class 125 per AWWA C115. Flanges on pipe shall be either cast or threaded.

2. Flanged pipe and fittings shall be shop fabricated, not field fabricated. Threaded flanges shall comply with AWWA C115. Flanges shall be individually fitted and machine tightened in the shop, then machined flat and perpendicular to the pipe barrel. Flanges shall be backfaced parallel to the face of flange. Prior to assembly of the flange onto the pipe, apply a thread compound to the threads to provide a leak-free connection. There shall be zero leakage through the threads at a hydrostatic test pressure of 250 psi without the use of the gasket.

3. Material for blind flanges shall be ductile iron.

G. Pipe Lining--Cement Mortar

1. Line pipe interior and fittings with cement-mortar per AWWA C104. Lining thickness shall be the single thickness listed in AWWA C104, Section 4.8. Lining material shall conform to ASTM C 150, Type II.

2. Maintain a moist environment inside the lined pipe and fittings by sealing the ends with polyethylene sheet.

3. Loose areas of cement mortar lining are not acceptable. Remove and reconstruct lining in areas where quality is defective, such as sand pockets, voids over sanded areas, blisters, drummy areas, cracked areas, and thin spots. Longitudinal cracks in excess of 1/32 inch in width or where crack extends to metal shall be repaired with epoxy. Repair all cracks larger than 1/16 inch with epoxy.

H. Gaskets for Mechanical, Push-On, and Restrained Joints

Synthetic rubber in accordance with AWWA C111.

I. Outlets and Nozzles

1. Provide outlets 2 inches and smaller by tapping the pipe and attaching a service clamp as specified in Section 15123.

2. For outlets larger than 2 inches, use a tee with a flanged outlet.

J. Joints

1. Joints in buried piping shall be of the push-on type per AWWA C111 except where flanged joints are required to connect to valves, meters, and other equipment. Provide unrestrained buried joints except where restrained joints are specifically shown in the drawings.

   a. Mechanical thrust restraint shall be Megalug 1100 Series or SUR-Grip installed in accordance to AWWA C600 and DIPRA thrust restraint design.
   b. Restrained joint gaskets shall be Field Lok or Fast-Grip gaskets.

K. Painting and Coating

Provide asphaltic coating on buried pipe per AWWA C151.

PART 3 - EXECUTION

A. Delivery, Unloading, and Temporary Storage of Pipe at Site

1. Pipe and fittings shall only be strung on-site in quantities representing the current and next day's installation. Surplus materials shall be stored in accordance with the General Conditions.

2. Use unloading and installation procedures that avoid cracking of the lining. If necessary, use plastic sheet bulkheads to close pipe ends and keep cement-mortar lining moist.

3. Deliver the pipe alongside the pipelaying access road over which the pipe trailer-tractors can travel under their own power. Place the pipe in the order in which it is to be installed and secure it from rolling.

4. Do not move pipe by inserting any devices or pieces of equipment into the pipe barrel. Field repair linings damaged by unloading or installation procedures.

B. Sanitation of Pipe Interior

1. During laying operations, do not place tools, clothing, or other materials in the pipe.

2. When pipelaying is not in progress, close the ends of the installed pipe by a child- and vermin-proof plug.

C. Installing Buried Piping

1. Install in accordance with Section 02665 and as follows.

2. Assemble restrained joints per manufacturer's instructions.

D. Joint Deflections for Buried Pipe

1. Do not exceed the following deflection angles for unrestrained buried pipe joints:

Pipe Size (inches)	Maximum Deflection (degrees) Push-On Joint	Mechanical Joint
4	4	6-1/2
6	4	5-1/2
8	4	4
10	4	4
12	4	4
14	2-1/2	3
16	2-1/2	3
18	2-1/2	2-1/2
20	2-1/2	2-1/2
24	2-1/2	2
30	2-1/2	2

2. For restrained joints, do not exceed 80% of the manufacturer's recommended maximum deflections.

3. Small angular changes (less than 7 degrees) in horizontal alignment defined in the drawings by a point of inflection (PI) with no accompanying curve data shall be approximated as a curve by deflecting by equal amounts equal length pipe segments to create a curve equally distributed on both sides of the given PI. Accomplish a larger (greater than or equal to 7 degrees) change in horizontal alignment where a curve is not called for in the drawings through the use of an elbow placed at the station of the PI shown in the drawings. Provide thrust restraint as required in the drawings.

4. Small angular changes (less than 5 degrees) in vertical alignment may be accomplished by the use of pulled joints. For larger vertical deflections, place an elbow at the station and elevation of the vertical PI shown in the drawings. Provide thrust restraint as required in the drawings.

5. Assemble joints in accordance with AWWA C600 and the manufacturer's recommendations.

E. Cleaning Pipe

After interior joints have been pointed and mortar has hardened, sweep pipe clean of all dirt and debris. If hardened mud exists in the pipe, remove with the use of pressurized water hoses.

F. Hydrostatic Testing

Pressures test in accordance with Section 02684.

G. Disinfection of Pipe

Flush and disinfect in accordance with AWWA C651 and City of Clearwater standard procedures

END OF SECTION

SECTION 15057

COPPER TUBING

PART 1 - GENERAL

A. Description

This section includes materials, installation, and testing of copper tubing for water service.

B. Submittals

1. Submit shop drawings in accordance with the General Conditions.

2. Submit materials list showing material of tubing and fit-tings with ASTM reference and grade.

3. Submit certification that materials intended to contact potable water are listed under NSF 61.

PART 2 - MATERIALS

A. Tubing

1. Copper tubing shall conform to ASTM B 88 in sizes of 1” and 2” outside diameter. Tubing shall be soft annealed, type K, self-tempered and 250-psi test.

2. Tubing shall be provided with circumference over the entire length sufficient to receive CTS fittings. Tubing shall not be egg-shaped or flattened in any way.

B. Solder Joints

Solder joints shall not be permitted. Small service supply tubing shall be installed in continuous runs.

C. Fittings

See Section 02676, Services, for fittings.

PART 3 - EXECUTION

A. Joint and Fitting Selection

Do not use solder joints and fittings in copper tubing service. Use flared end, threaded end or compression joints per Section 02676.

B. Pressure Testing

Test copper piping at 200 psi for leakage in accordance with Section 02684. See Piping Schedule in drawings for test pressures.

C. Installation

1. Do not drag tubing across cement, asphalt, gravel, or any other surface which could scratch it.

2. Tube cutters shall always be sharp. Do not take too deep a cut with each turn of the cutter or back and forth motion of a saw blade.

3. Cut tubing square and remove burrs. Clean both the inside and outside of fitting and pipe ends with steel wool and muriatic acid before connecting. Prevent annealing of fittings and tubing when making connections. Do not miter joints for elbows or notch straight runs of pipe for tees.

4. Bends in soft copper tubing shall be long sweep. Shape bends with shaping tools. Form bends without flattening, buckling, or thinning the tubing wall at any point.

5. Install tube and pipe without springing, forcing, or stressing the pipe or any adjacent connecting valves or equipment.

6. Clean threaded joints by wire brushing or swabbing. Apply Teflon joint compound or Teflon tape to male pipe threads before installing threaded fitting. Joints shall be watertight.

7. Install buried tubing in accordance with Section 02665.

D. Hydrostatic Testing

Pressures test in accordance with Section 02684.

E. Disinfection of Pipe

Flush and disinfect in accordance with AWWA C651 and City of Clearwater standard procedures

END OF SECTION

SECTION 15058

PVC PIPE AND FITTINGS, 3 INCHES AND SMALLER

PART 1 - GENERAL

A. Description

This section includes materials, installation, and testing of polyvinyl chloride (PVC) pipe and fittings of size 3 inches and smaller for use in piping having a maximum operating pressure of 150 psi and having a maximum operating temperature of 105°F.

B. Submittals

1. Submit shop drawings in accordance with the General Conditions.

2. Submit materials list for review. Submit manufacturer's recommended method of installing buried pipe.

3. Submit certification that materials intended to contact potable water are listed under NSF 61.

PART 2 - MATERIALS

A. Pipe

Use 3-inch or smaller, Compression Joint PVC Pipe conforming to ASTM D2241. The outside dimension (O.D.) shall be the same as galvanized Schedule 40 pipe. The color shall be blue or have continuous blue markings to conform to the AWWA adopted color code. Compression joint PVC shall have an elastomeric gasket bell on one end and connections shall be made using an elastomeric gasket conforming to ASTM D3139. Coupling end pipe shall not be used.

B. Fittings

Fittings shall be compatible with compression joint PVC pipe used.

C. Joints

Pipe and fitting joints shall be compression type except where flanged joints are required to connect to valves, other pipes and equipment.

D. Gaskets for Flanged Joints

Gaskets shall be full-faced, 1/8-inch thick, made of EPR having a hardness of 50 to 70 durometer A. When the mating flange has a raised face, provide a flat ring gasket filler between the PVC flange gasket and the adjacent flange.

PART 3 - EXECUTION

A. General

1. Do not install PVC pipe when the temperature is below 40 F. Store loose pipes on racks with a maximum support spacing of 3 feet. Provide shades for pipe stored outdoors or installed outdoors until the pipe is filled with water.

   Piping not to be used during current day's activities shall not be present at work site.

2. Store fittings indoors in their original cartons.

3. Before installation, check pipe and fittings for cuts, scratches, gouges, buckling, kinking, or splitting on pipe ends. Remove any pipe section containing defects by cutting out the damaged section as a complete cylinder.

B. Flanged Joints

1. Lubricate carbon steel bolt threads with graphite and oil before installation.

2. Tighten bolts on PVC flanges by tightening the nuts diametrically opposite each other using a torque wrench. Complete tightening shall be accomplished in stages and the final torque values shall be as shown in the following table:

Pipe Size (inches)	Final Torque (Foot-Pounds)
½ to 1-½	10 to 15
2 to 3	20 to 30

C. Installing Buried Pipe

1. Install in accordance with Section 02665 and as follows.

2. Do not drag PVC pipe over the ground, drop it onto the ground, or drop objects on it. Remove all burrs, chips, and filings before joining pipe or fittings.

3. Place the pipe in the trench per the pipe manufacturer's recommendations to allow for thermal expansion and contraction of the pipe.

4. Support the pipe uniformly and continuously over its entire length on firm, stable soil. Do not use blocking to change pipe grade or to support pipe in the trench.

5. Install buried PVC pipe in accordance with ASTM D 2774 and the pipe manufacturer's recommendations. Backfill materials in the zone between the trench bottom and to a point 8 inches above the top of the pipe shall be backfill per Section 02665. Compact by means of vibratory equipment or by flooding. Backfill and compact according to Section 02665.

D. Hydrostatic Testing

Pressures test in accordance with Section 02684.

E. Disinfection of Pipe

Flush and disinfect in accordance with AWWA C651 and City of Clearwater procedures

END OF SECTION

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SECTION 15075

CONNECTIONS BETWEEN DISSIMILAR MATERIALS

PART 1 - GENERAL

A. Description

This section includes materials and installation of connections used to join pipes and fittings made of dissimilar materials.

B. Submittals

1. Submit shop drawings in accordance with the General Conditions.

2. Submit certification that materials intended to contact potable water are listed under NSF 61.

PART 2 - MATERIALS

A. General

All pipe-to-pipe and pipe-to-fitting connections involving dissimilar materials shall be made using mechanical joint type connectors.

B. Ductile Iron to PVC Connections

Connections between ductile iron pipe or fittings and PVC pipe or fittings shall use ductile iron mechanical joint glands conforming to AWWA C111 and AWWA C153. Gaskets, bolts and hexagonal nuts shall be standard rubber gaskets conforming to AWWA C111. Follower gland shall match class 350 “compact” fittings.

C. Ductile Iron to HDPE Connections

1. Connections between ductile iron pipe or fittings and HDPE pipe or fittings shall use ductile iron mechanical joint glands conforming to AWWA C111 and AWWA C153. Mechanical joints shall be fully thrust restrained. Gaskets, bolts and hexagonal nuts shall be standard rubber gaskets conforming to AWWA C111. Follower gland shall match class 350 “compact” fittings.

2. HDPE pipe stiffeners shall be constructed of stainless steel and shall be flanged on one end to prevent overinsertion into the receiving pipe.

D. PVC to HDPE Connections

1. The joining end of the HDPE pipe shall have a butt-fused flange piece attached in accordance with manufacturer's recommendations.

2. Connection to PVC shall use a fully-restrained ductile iron mechanical joint conforming to the requirements of AWWA C111 and C153.

PART 3 - EXECUTION

A. Ductile Iron to PVC or HDPE

1. Install mechanical joints in accordance with AWWA C600 and manufacturer's recommendations.

2. When connection is being made to HDPE pipe or fitting, insert pipe stiffener into connection end of HDPE pipe until flared end seats against cut face.

B. PVC to HDPE

1. Butt-fuse flange end piece to connection end of HDPE pipe in accordance with manufacturer's recommendation.

2. Install fully restrained mechanical joint on PVC connection end in accordance with AWWA C600 and manufacturer's recommendation.

END OF SECTION

SECTION 15100

VALVES AND OPERATORS

PART 1 - GENERAL

A. Description

This section includes materials, testing, and installation of valves and valve operators.

B. Submittals

1. Submit shop drawings in accordance with the General Conditions.

2. Submit manufacturer's catalog data and detail construction sheets showing all valve parts. Describe each part by material of construction, specification (such as AISI, ASTM, SAE, or CDA), and grade or type.

3. Show valve dimensions including laying lengths. Show port sizes. Show dimensions and orientation of valve actuators, as installed on the valves. Show location of internal stops for gear actuators. State differential pressure and fluid velocity used to size actuators. For worm gear actuators, state the radius of the gear sector in contact with the worm and state the handwheel diameter.

4. Show valve linings and coatings. Submit manufacturer's catalog data and descriptive literature.

5. Submit six copies of a report verifying that the valve interior linings and exterior coatings have been tested for holidays and lining thickness. Describe test results and repair procedures for each valve. Do not ship valves to project site until the reports have been returned by the OWNER’S REPRESENTATIVE and marked "Resubmittal not required."

6. For butterfly valves, show the clear diameter or size of the port. Show the actual area of the port as a percentage of the area as calculated for the nominal valve size.

PART 2 - MATERIALS

A. General

1. Install valves complete with operating nuts and wrenches required for operation.

2. Valves shall have the name of the manufacturer and the size of the valve cast or molded onto the valve body or bonnet or shown on a permanently attached plate.

3. For buried locations, valves with mechanical joint ends may be substituted for the flanged ends specified provided the mechanical joint ends are compatible with the pipe ends.

B. Valve Actuators

1. Provide 2-inch AWWA operating nuts for buried valves.

2. For buried or submerged service, provide watertight shaft seals and watertight valve and actuator cover gaskets. Provide totally enclosed actuators designed for buried or submerged service.

3. Valve actuators, handwheels, or levers shall open by turning counterclockwise.

C. Valve Boxes for Buried Valves

Valve boxes shall be of the cast iron slip or sliding type with a 5-1/4" shaft extension. Tops and bottoms of valve boxes shall be cast iron. 5-1/4" drop lid shall bear the marking "City of Clearwater" and weigh 13 pounds minimum. Acceptable manufacturers are Opelinka Foundry, Russell Pipe & Foundry, Tyler Pipe, and Star Pipe.

D. Extension Stems for Buried and Submerged Valve Actuators

1. Where the depth of the valve is such that its centerline is more than 4 feet below grade, provide operating extension stems to bring the operating nut to a point 6 inches below the surface of the ground and/or box cover. Where the valve is submerged, provide operating extension stems to bring the operating nut to 6 inches above the water surface. Extension stems shall be Type 316 stainless steel, solid core, and shall be complete with 2-inch-square operating nut. The connections of the extension stems to the operating nuts and to the valves shall withstand without damage a pull of 300 foot-pounds.

2. Extension stem diameters shall be as tabulated below:

Valve Size (inches)	Minimum Extension Stem Diameter (inches)
2	3/4
3, 4	7/8
6	1
8	1-1/8
10, 12	1-1/4
14	1-3/8
16, 18	1-1/2

20, 24, 30 1-3/4

E. Painting and Coating

The interior areas of the cast iron valve bodies shall be provided with a two part thermosetting epoxy protective coating, minimum 4 mils, and shall function as a physical, chemical, and electrical barrier between the base metal to which it is applied and the surrounding medium. The coating shall be non-toxic and shall not impart taste to the water. The coating must be formulated from materials deemed acceptable per the Food and Drug Administration Document Title 21 of the Federal Regulations on Food Additives, Section 175.300, entitled, Resins and Plymeric Coatings, and in accordance with NSF Standard No. 61. The coating shall have a successful record of performance in valves, pipe and other allied equipment.

F. Packing, O-Rings, and Gaskets

Unless otherwise stated in the detailed valve specifications, packing, O-rings, and gaskets shall be one of the following nonasbestos materials:

1. Teflon.
2. Kevlar aramid fiber.
3. Acrylic or aramid fiber bound by nitrile. Products: Garlock "Bluegard," Klinger "Klingersil C4400," or equal.
4. EPDM.

G. Rubber Seats

Rubber seats shall be made of a rubber compound that is resistant to free chlorine and chloramine concentrations up to 10 mg/l in the fluid conveyed.

H. Valves

1. Gate Valves:

a) Resilient Seat Gate Valves:

All resilient seat gate valves shall as a minimum conform to AWWA Standard C509 and latest revisions thereto. The resilient seat gate valve body and bonnet shall be made of Class B grey iron meeting ASTM 126 and shall be provided with mechanical joint ends complete with accessories and suitable for 200 PSI working pressure. Test pressure shall be twice the rated working pressure and at all times zero leakage will be maintained. The dual sealing mechanism must be a replaceable reinforced specially contoured molded runner wedge or disc. Valve stem seals will be “O” ring.

Resilient seat gate valves are to operate in a vertical position, shall open left (counter clockwise) with non-rising stem and have a 2-inch square operating nut.

Accessories for the mechanical joint ends shall include rubber gaskets with glands, COR-TEN bolts and nuts packaged in the proper manner to accommodate each individual (M.J.) valve end.

Acceptable manufacturers are AFC, American-Darling Valve, Clow Valve, Kennedy Valve, M&H Valve, Mueller, U.S. Pipe & FoundryWaterous, and AVK.

b) Tapping Gate Valves 4 inches through 12 inches

Four inch through twelve inch tapping valves shall be Class 250 resilient seat conforming to AWWA C509 and the latest revisions thereto. The valves shall have a mechanical joint end and a tapping valve end. They must operate in the vertical position, open left or counter clockwise with a non-rising stem and a 2 inch square operating nut.

Acceptable manufacturers are AFC, American-Darling Valve, AVK, Clow Valve, Kennedy Valve, M&H Valve, Mueller, and U.S. Pipe & Foundry (4-8" only), Waterous (10" and 12" only).

c) Tapping Gate Valves 14 Through 24 Inches:

Valves shall conform to AWWA C500 and the following. Valves shall be iron bodied, solid bronze internal working parts, parallel faced, bottom wedging double-discs, and O-ring seals. Discs shall either be solid bronze or shall be cast iron with bronze facings. The minimum designated water working pressure shall be 200 psi. Bronze for internal working parts, including stems, shall not contain more than 2% aluminum nor more than 7% zinc. Bronze shall conform to ASTM B 62 or ASTM B 584 (Alloy C83600), except that stem bronze shall have a minimum tensile strength of 60,000 psi, a minimum yield strength of 30,000 psi, and a minimum of 10% elongation in 2 inches (ASTM B 584, Alloy C87600). Body bolts shall be Type 316 stainless steel, ASTM A 276. Ends shall be flanged, Class 125, ANSI B16.1. One end shall have slotted bolt holes to fit tapping machines. Seat rings shall be oversized to permit the use of full size cutter. The exterior and interior of the cast iron valve shall be lined with a thermosetting epoxy protective coating, minimum 4 inch. Valves shall be Clow, Mueller, American Flow Control, Kennedy Valve, M & H Valve and U.S. Pipe & Founding, or equal.

PART 3 - EXECUTION

A. Joints

1. Bolt holes of flanged valves shall straddle the horizontal and vertical centerlines of the pipe run to which the valves are attached. Clean flanges by wire brushing before installing flanged valves. Clean flange bolts and nuts by wire brushing, lubricate threads with oil and graphite, and tighten nuts uniformly and progressively. If flanges leak under pressure testing, loosen or remove the nuts and bolts, reseat or replace the gasket, reinstall or retighten the bolts and nuts, and retest the joints. Joints shall be watertight.

2. Clean threaded joints by wire brushing or swabbing. Apply Teflon joint compound or Teflon tape to pipe threads before installing threaded valves. Joints shall be watertight.

B. Installing Buried Valves

1. Connect the valve and place and compact the backfill to the height of the valve stem.

2. Place block pads under the extension pipe to maintain the valve box vertical during backfilling and repaving and to prevent the extension pipe from contacting the valve bonnet.

3. Mount the upper slip pipe of the extension in midposition and secure with backfill around the extension pipe. Pour the concrete ring allowing a depression so the valve box cap will be flush with the pavement surface.

4. In streets without concrete curbs and in open areas, install the valve box as for a paved area with concrete curb except include a marker post. Cut the marker post from 4 x 4" dense structural grade redwood or Southern Pine surfaced on four sides to a length of 5 feet. Chamfer the top. Set the post in concrete, 2 feet into the ground, away from traffic, and to the side of the pipeline. Coat with a seal and finish coat of white alkyd exterior paint. On the side facing the valve, letter in black the word "VALVE" and the distance in feet from the marker post to the valve box cap.

C. Valve Leakage Testing

Test valves for leakage at the same time that the connecting pipelines are tested. See Section 02684 for pressure testing requirements. Protect or isolate any parts of valves, actuators, or control and instrumentation systems whose pressure rating is less than the pressure test. Valves shall show zero leakage. Repair or replace any leaking valves and retest.

D. Valve Field Testing

Operate manual valves through three full cycles of opening and closing. Valves shall operate from full open to full close without sticking or binding. Do not backfill buried valves until after verifying that valves operate from full open to full closed. If valves stick or bind, or do not operate from full open to full closed, repair or replace the valve and repeat the tests.

E. As-built location

All valves, bends, fittings, and dead ends shall be referenced with at least two measurements taken from permanent structures such as building corners (identified by address), curbs, edge of pavement, centerlines of streets or driveways (by address), or manholes. Contractor shall select the permanent structures in accordance with City of Clearwater standard method of referencing. Contractor shall meet with City of Clearwater staff to discuss and understand City of Clearwater's standard method prior to performing the fieldwork.

Furnish and install 4" x 4" x 2'0" long concrete survey monument at locations directed by Owner. Set monument an inch above grade and paint blue.

END OF SECTION

SECTION 16000

BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this and other section of Division 16.

SUMMARY

This Section includes general administrative and procedural requirements for electrical installations. The following administrative and procedural requirements are included in this Section to expand the requirements specified in Division 1:

A. Submittals.
B. Coordination drawings.
C. Record documents.
D. Maintenance manuals.
E Rough-ins.
F. Electrical installations.
G. Cutting, patching, and painting.
H. Standards

RELATED SECTIONS:

The following sections contain requirements that relate to this section:

Division 16 Section "BASIC ELECTRICAL MATERIALS AND METHODS," for materials and methods common to the remainder of Division 16, plus general related specifications including:

Access to electrical installations.

Excavation for electrical installations within the building boundaries and from building to utility connections.

PART 2 PRODUCTS

GENERAL:

Follow the procedures specified in Division 1 Section "SUBMITTALS."

Product Data: 1 additional copy of each item.

RECORD DOCUMENTS:

Prepare record documents in accordance with the requirements in Division 1 Section "PROJECT CLOSE-OUT." In addition to the requirements specified in Division 1, installed conditions for:

1. Major raceway systems, size and location, for both exterior and interior; locations of control divides; distribution and branch electrical circuitry; fuse; and circuit breaker size and arrangements.

2.. Equipment locations (exposed and concealed), dimensioned from prominent building lines.

3. Approved substitutions, Contract Modifications, and actual equipment and materials installed.

MAINTENANCE MANUALS:

Prepare maintenance manuals in accordance with Division 1, Section "PROJECT CLOSE-OUT." In addition to the requirements specified in Division 1, include the following information for equipment items:

1. Description of function, normal operating characteristics and limitations, performances curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.

2. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.

3. Servicing instructions and lubrication charts and schedules.

DELIVERY, STORAGE, AND HANDLING:

Delivery products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification. Store in clean dry conditions. Handle in careful workman like manner to prevent damage.

PART 3 - EXECUTION

ROUGH-IN

Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

ELECTRICAL INSTALLATIONS

A. Coordinate electrical systems, equipment, and materials installation with other building components and site work.

B Verify all dimensions by field measurements.

CUTTING, PATCHING AND PAINTING

General: Perform cutting and patching in accordance with Division 1 Section "CUTTING AND PATCHING." In addition to the requirements specified in Division 1, the following requirements apply:

1. Perform cutting, fitting, and patching of electrical equipment and materials required to:
   Uncover Work to provide for installation of ill-timed Work.
   Remove and replace defective Work.
   Remove and replace Work not conforming to requirements of the Contract Documents.

2. Firestop all penetrations resulting from this project.

3 Return areas of cutting and patching to original surface finish, i.e. paint, tile, etc.

STANDARDS

Compliance with the following standards is required for this project.

National Electrical Code

NEMA Standards: As applicable

UL Standards: As applicable.

END OF SECTION

SECTION 16110

RACEWAYS

PART 1 - GENERAL

RELATED DOCUMENTS

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

Requirements of the following Division 16 Sections apply to this Section:

"Basic Electrical Requirements."
"Basic Electrical Materials and Methods."

SUMMARY

This Section includes raceways for electrical wiring. Types of raceways in this section include the following:

Electrical metallic tubing (EMT).
Electrical nonmetallic tubing (ENT).
Flexible metal conduit.
Intermediate metal conduit.
Liquidtight flexible conduit.
Underground plastic utilities duct.
Rigid metal conduit.
Rigid nonmetallic conduit.
Surface raceways.

SUBMITTALS

General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

Product Data for the following products:
Surface raceway and fittings.

QUALITY ASSURANCE

Electrical Component Standard: Components and installation shall comply with NFPA 70 "National Electrical Code."

PART 2 - PRODUCTS

MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

Conduit Bodies:
Adalet-PLM
American Electric
Appleton Electric Co.
Carlon

Surface Metal Raceway:
Allied Tube & Conduit
American Electric
Butler Mfg. Co.
Erickson Electrical Equipment Co.
Square D Co.

METAL CONDUIT AND TUBING

Rigid Steel Conduit: ANSI C80.1.

Electrical Metallic Tubing and Fittings: ANSI C80.3.

Flexible Metal Conduit: UL 1, zinc-coated steel.

Liquidtight Flexible Metal Conduit and Fittings: UL 360. Fittings shall be specifically approved for use with this raceway.

PVC Conduit and Tubing Fittings: NEMA TC 3

NONMETALLIC CONDUIT AND DUCTS

Electrical Nonmetallic Tubing (ENT): NEMA TC 13.

Rigid Nonmetallic Conduit (RNC): NEMA TC 2 and UL 651,
Schedule 40 or 80 PVC.

PVC Conduit and Tubing Fittings: NEMA TC 3 : match to conduit or tubing type and material.

Underground PVC and ABS Plastic Utilities Duct: NEMA TC 6, Type I for encased burial in concrete, Type II for direct burial.

PVC and ABS Plastic Utilities Duct Fitttings: NEMA TC 9; match to duct type and material.

Liquidtight Flexible Nonmetallic Conduit and Fittings: UL 1660. Fittings shall be specifically approved for use with this raceway.

Conduit, Tubing, and Duct Accessories: Types, sizes, and materials complying with manufacturer's published product information. Mate and match accessories with raceway.

CONDUIT BODIES

General: Types, shapes, and sizes as required to suit individual applications and NEC requirements. Provide matching gasketed covers secured with corrosion-resistant screws.

Metallic Conduit and Tubing: Use metallic conduit bodies. Use bodies with threaded hubs for threaded raceways.

Conduit Bodies 1 Inch and Smaller: Use bodies with compression-type EMT connectors.

Nonmetallic Condit and Tubing: Use nonmetallic conduit bodies conforming to UL 514 B.

SURFACE RACEWAYS

General:. Provide fittings that match and mate with raceway.

Surface Nonmetallic Raceway: Two-piece construction, manufactured of rigid PVC compound with Matte texture and manufacturer’s standard color. Raceway and system components shall meet UL 94 requirements for nonflammable, self-extinguishing characteristics.

PART 3 - EXECUTION

INSTALLATION

General: Install electrical raceways in accordance with manufacturer's written installation instructions, applicable requirements of NEC.

Conceal Conduit and Electrical Tubing, unless indicated otherwise, within finished walls, ceilings, and floors. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot water pipes. Install raceways level and square and at proper elevations.

Elevation of Raceway: Where possible, install horizontal raceway runs above water and steam piping.

Complete installation of electrical raceways before starting installation of conductors within raceways.

Provide supports for raceways as specified elsewhere in Division 16.

Prevent foreign matter from entering raceways by using temporary closure protection.

Protect stub-ups from damage where conduits rise from floor slabs. Arrange so curved portion of bends is not visible above the finished slab.

Use raceway fittings that are of types compatible with the associated raceway and suitable for the use and location.

Tighten set screws of threadless fittings with suitable tool.

Terminations: Where raceways are terminated with locknuts and bushings, align the raceway to enter squarely and install the locknuts with dished part against the box. Where terminations cannot be made secure with one locknut, use two locknuts, one inside and one outside the box.

Install pull wires in empty raceways. Use no. 14 AWG zinc-coated steel or monofilament plastic line having not less than 200-LB tensile strength. Leave not less than 12 inches of slack at each end of the pull wire.

Flexible Connections: Use short length (maximum of 6 ft.) of flexible conduit for recessed and semirecessed lighting fixtures, for equipment subject to vibration, noise transmission, or movement; and for all motors. Use liquidtight flexible conduit in wet locations. Install separate ground conductor across flexible connections.

ADJUSTING AND CLEANING

Upon completion of installation of raceways, inspect interiors of raceways; clear all blockages and remove burrs, dirt, and construction debris.

END OF SECTION

SECTION 16120

WIRES AND CABLES

PART 1 - GENERAL

RELATED DOCUMENTS

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

Requirements of the following Division 16 Sections apply to this section:

Basic Electrical Requirements.

SUMMARY

This Section includes wires, cables, and connectors for power, lighting, signal, control and related systems rated 600 volts and less.

Related Sections: The following Sections contain requirements that relate to this section:

Division 2 Section "Earthwork" for trenching and backfilling.

Division 16 Section "Electrical Boxes and Fittings" for connectors for Terminating Cables in boxes and other electrical enclosures.

SUBMITTALS

Product Data for electrical wires, cables and connectors.

QUALITY ASSURANCE

Regulatory Requirements: Comply with provisions of the following code:

NFPA 70 "National Electrical Code."

UL Compliance: Provide components which are listed and labeled by UL under the following standards.

UL Std. 83 Thermoplastic-Insulated Wires and Cables.

UL Std. 486A Wire Connectors and Soldering Lugs for Use with Copper Conductors.

NEMA/ICEA Compliance: Provide components which comply with the following standards:

WC-5 Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy
WC-7 Cross Linked Thermosetting Polyethylene-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy

IEEE Compliance: Provide components which comply with the following standard.
Std. 82 Test procedures for Impulse Voltage Tests on Insulated Conductors.

PART 2 - PRODUCTS

MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

Wire and Cable:
American Insulated Wire Corp.
Brintec Corp.
Carol Cable Co. Inc.
Senator Wire and Cable Co.
Southwire Company.

Connectors for Wires and Cable Conductors:
Scotch Lock
3M Company.
O-Z/Gedney Co.
Square D Company.

WIRES AND CABLES

General: Provide wire and cable suitable for the temperature, conditions and location where indicated.
Conductors: Provide solid conductors for power and lighting circuits no. 10 AWG and smaller. Provide stranded conductors for sizes no. 8 AWG and larger.

Conductor Material: copper for all wires and cables.

ALUMINUM NOT ACCEPTABLE

Insulation: Provide THHN/THWN insulation for all conductors size 500MCM and larger, and no. 8 AWG and smaller. For all other sizes provide THW, THHN/THWN or XHHW insulation as appropriate for the locations where installed.

Color Coding for phase identification in accordance with Table 1 in Part 3 below.

Jackets: Factory-applied nylon or PVC external jacketed wires and cables for pulls in raceways over 100-feet in length, for pulls in raceways with more than three equivalent 90 deg. bends, for pulls in conduits underground or under slabs on grade, and where indicated.

Cables: Provide the following type(s) of cables in NEC approved locations and applications where indicated. Provide cable UL listed for particular application:

Portable Cord: Type S.

CONNECTORS FOR CONDUCTORS

Provide UL-listed factory-fabricated, solderless metal connectors of sizes, ampacity ratings, materials, types and classes for applications and for services indicated. Use connectors with temperature ratings equal to or greater than those of the wires upon which used.

PART 3 - EXECUTION

INSTALLATION OF WIRES AND CABLES

General: Install electrical cables, wires, and connectors in compliance with NEC.

Coordinate cable installation with other Work.

Pull conductors simultaneously where more than one is being installed in same raceway.
Use UL listed pulling compound or lubricant, where necessary.

Use pulling means including, fish tape, cable, rope, and basket weave wire/cable grips which will not damage cables or raceways. Do not use rope hitches for pulling attachment to wire or cable.

Install exposed cable parallel and perpendicular to surfaces or exposed structural members, and follow surface contours, where possible.

Keep conductor splices to minimum.

Install splice and tap connectors which possess equivalent or better mechanical strength and insulation rating than conductors being spliced.

Use splice and tap connectors which are compatible with conductor material.

Provide adequate length of conductors within electrical enclosures and train the conductors to terminal points with no excess. Bundle multiple conductors, with conductors larger than no.10 AWG cabled in individual circuits. Make terminations so there is no bare conductor at the terminal.

Tighten electrical connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torque specified in UL 486A.

FIELD QUALITY CONTROL
Prior to energizing, check installed wires and cables with megohm meter to determine insulation resistance levels to assure requirements are fulfilled.

Prior to energizing, test wires and cables for electrical continuity and for short-circuits.

Subsequent to wire and cable hook-ups, energize circuits and demonstrate proper functioning. Correct malfunctioning units, and retest to demonstrate compliance.

TABLE 1: Color Coding for Phase Identification:
Color code secondary service, feeder, and branch circuit conductors with factory applied color as follows:

208y/120 Volts	Phase
Black	A
Red	B
Blue	C
White	Neutral
Green	Ground

END OF SECTION

SECTION 16452

GROUNDING

PART 1 - GENERAL

RELATED DOCUMENTS

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

Requirements of the following Division 16 Sections apply to this Section:

"Basic Electrical Requirements."
"Basic Electrical Materials and Methods."

SUMMARY

This Section includes solid grounding of electrical systems and equipment. It includes basic requirements for grounding for protection of life, equipment, circuits, and systems. Grounding requirements specified in this Section may be supplemented in other sections of these Specifications.

Related Sections: The following sections contain requirements that relate to this Section:

Division 16 Section "Wires and Cables."

SUBMITTALS

General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

Product data for ground rods, connectors and connection materials, and grounding fittings.

Field-testing organization certificate, signed by the Contractor, certifying that the organization performing field tests complies with the requirements specified in Quality Assurance below.

Report of field tests and observations certified by the testing organization.

QUALITY ASSURANCE

Listing and Labeling: Provide products specified in this Section that are listed and labeled. The terms "listed" and "labeled" shall be defined as they are in the National Electrical Code, Article 100.

Electrical Component Standard: Components and installation shall comply with NFPA 70, "National Electrical Code" (NEC).

UL Standard: Comply with UL 467, "Grounding and Bonding Equipment."

PART 2 - PRODUCTS

MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

A.B. Chance Co.
Engineered Products Co.
GB Electrical, Inc.

GROUNDING AND BONDING PRODUCTS

Products: Of types indicated and of sizes and ratings to comply with NEC. Where types, sizes, ratings, and quantities indicated are in excess of NEC requirements, the more stringent requirements and the greater size, rating, and quantity indications govern.

Conductor Materials: Copper.

General: Comply with Division 16 Section "Wires and Cables." Conform to NEC Table 8, except as otherwise indicated, for conductor properties, including stranding.

Equipment Grounding Conductor: Green insulated.

Grounding Electrode Conductor: Stranded cable.

Bare Copper Conductors: Conform to the following:

Solid Conductors: ASTM B-3.
Assembly of Stranded
Conductors: ASTM B-8.

Tinned Conductors: ASTM B-33.

MISCELLANEOUS CONDUCTORS

Ground Bus: Bare annealed copper bars of rectangular cross section.

Braided Bonding Jumpers: Copper tape, braided No. 30 gage bare copper wire, terminated with copper ferrules.

Bonding Strap Conductor/Connectors: Soft copper, 0.05 inch thick and 2 inches wide, except as indicated.

CONNECTOR PRODUCTS

General: Listed and labeled as grounding connectors for the materials used.

Pressure Connectors: High-conductivity-plated units.

Exothermic Welded Connections: Provided in kit form and selected for the specific types, sizes, and combinations of conductors and other items to be connected.

GROUNDING ELECTRODES

Ground Rods: Copper-clad steel with high-strength steel core and electrolytic-grade copper outer sheath, molten welded to core.

Size: 3/4 inch by 10 feet.

PART 3 - EXECUTION

APPLICATION

Equipment Grounding Conductor Application: Comply with NEC Article 250 for sizes and quantities of equipment grounding conductors, except where larger sizes or more conductors are indicated.
Use raceway as the equipment ground conductor where feasible and permitted by NEC for the following:

Feeders and branch circuits except as otherwise indicated
Lighting circuits.
Receptacle circuits.
Nonmetallic Raceways: Install an insulated equipment ground conductor in nonmetallic raceways unless they are designated for telephone or data cables.

Underground Conductors: Bare, tinned, stranded copper except as otherwise indicted.

Signal and Communications: For telephone, alarm, and communication systems, provide a #4 AWG minimum green insulated copper conductor in raceway from the grounding electrode system to each terminal cabinet or central equipment location.

Separately derived systems required by NEC to be grounded shall be grounded in accordance with NEC paragraph 250-26.

INSTALLATION

General: Ground electrical systems and equipment in accordance with NEC requirements except where the Drawings or Specifications exceed NEC requirements.

CONNECTIONS

General: Make connections in such a manner as to minimize possibility of galvanic action or electrolysis. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.

FIELD QUALITY CONTROL

Ground/resistance maximum values shall be as follows:

Equipment rated 500 kVA and less: 10 Ohms

Deficiencies: Where ground resistance exceeds specified value, and if directed, modify the grounding system to reduce resistance values. Where measures are directed that exceed those indicated the provisions of the Contract, covering changes will apply.

Report: Prepare test reports, certified by the testing organization, of the ground resistance at each test location. Include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

END OF SECTION

SECTION V

CONTRACT DOCUMENTS

Table of Contents

Bond No.: _____

PUBLIC CONSTRUCTION BOND

(1)

This bond is given to comply with § 255.05, Florida Statutes, and any action instituted by a claimant under this bond for payment must be in accordance with the notice and time limitation provisions in subsections (2) and (10).

Pursuant to § 255.05(1)(b), Florida Statutes, "**Before commencing the work** or before recommencing the work after a default or abandonment, **the contractor shall provide to the public entity a certified copy of the recorded bond**. Notwithstanding the terms of the contract or any other law governing prompt payment for construction services, the public entity may not make a payment to the contractor until the contractor has complied with this paragraph."

CONTRACTOR	SURETY	OWNER
[*name*]	[*name*]	City of Clearwater Engineering 100 S. Myrtle Avenue Clearwater, FL 33756 (727) 562-4750
[*principal business address*]	[*principal business address*]	
[*phone number*]	[*phone number*]	

PROJECT NAME: Cleveland St. Streetscape Phase III and Festival Core

PROJECT NO.: 16-0003-EN & 19-0026-EN

PROJECT DESCRIPTION: Full width reconstruction of two City streets totaling about one mile. Improvements include, but not limited to: Stormwater sewers, gravity sanitary sewer, water main, reclaim water main, and associated utility adjustments. Asphalt pavement with curbing and associated signage and striping. Concrete sidewalks, off-street bicycle trail, landscaping and associated lighting.

BY THIS BOND, We, _____, as Contractor, and _____, a corporation, as Surety, are bound to the City of Clearwater, Florida, herein called Owner, in the sum of $[x,xxx,xxx.xx], for payment of which we bind ourselves, our heirs, personal representatives, successors, and assigns, jointly and severally.

THE CONDITION OF THIS BOND is that if Contractor:

1. Performs the contract dated _____, between Contractor and Owner for construction of Cleveland St. Streetscape Phase III and Festival Core, the contract documents being made a part of this bond by reference (which include the Advertisement for Bids, Proposal, Contract, Surety Bond, Instructions to Bidders, General Conditions, Plans, Technical Specifications and Appendix, and such alterations as may be made in said Plans and Specifications as therein provided for), at the times and in the manner prescribed in the contract; and

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

Bond No.:_____

PUBLIC CONSTRUCTION BOND
(2)

3. Pays Owner all losses, damages, expenses, costs, and attorney's fees, including appellate proceedings, that Owner sustains because of a default by Contractor under the contract; and
4. To the limits of § 725.06(2), Florida Statutes, shall indemnify and hold harmless Owner, their officers and employees, from liabilities, damages, losses and costs, including, but not limited to, reasonable attorney's fees, to the extent caused by the negligence, recklessness, or intentional wrongful misconduct of Contractor and persons employed or utilized by Contractor in the performance of the construction contract; and
5. Performs the guarantee of all work and materials furnished under the contract for the time specified in the contract, then this bond is void; otherwise it remains in full force.
6. Any action instituted by a claimant under this bond for payment must be in accordance with the notice and time limitation provisions in Section 255.05(2), Florida Statutes.
7. Any changes in or under the contract documents and compliance or noncompliance with any formalities connected with the contract or the changes does not affect Surety's obligation under this bond, and Surety does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the work or to the specifications.

IN TESTIMONY WHEREOF, witness the hands and seals of the parties hereto this _____ day of _____, 20___.

(If sole Ownership or Partnership, two (2) Witnesses required).
(If Corporation, Secretary only will attest and affix seal).

[TYPE LEGAL NAME OF CONTRACTOR]

By: _____
Title: _____
Print Name: _____

WITNESS:

_____
Corporate Secretary or Witness
Print Name: _____

(affix corporate seal)

WITNESS:

_____
Print Name: _____

_____
(Corporate Surety)

By: _____
ATTORNEY-IN-FACT
Print Name: _____

(affix corporate seal)

(Power of Attorney must be attached)

CONTRACT

(1)

This **CONTRACT** made and entered into this ___ day of _____, 20___ by and between the City of Clearwater, Florida, a municipal corporation, hereinafter designated as the "City", and _____, of the City of _____ County of _____ and State of Florida, hereinafter designated as the "Contractor".

[Or, if out of state:]

This **CONTRACT** made and entered into this ___ day of _____, 20___ by and between the City of Clearwater, Florida, a municipal corporation, hereinafter designated as the "City", and _____, a/an _____(State) Corporation authorized to do business in the State of Florida, of the City of _____ County of _____ and State of _____, hereinafter designated as the "Contractor".

WITNESSETH:

That the parties to this contract each in consideration of the undertakings, promises and agreements on the part of the other herein contained, do hereby undertake, promise and agree as follows:

The Contractor, and his or its successors, assigns, executors or administrators, in consideration of the sums of money as herein after set forth to be paid by the City and to the Contractor, shall and will at **their** own cost and expense perform all labor, furnish all materials, tools and equipment for the following:

PROJECT NAME: Cleveland St. Streetscape Phase III and Festival Core

PROJECT NO.: 16-0003-EN & 19-0026-EN

in the amount of $_____

In accordance with such proposal and technical supplemental specifications and such other special provisions and drawings, if any, which will be submitted by the City, together with any advertisement, instructions to bidders, general conditions, technical specifications, proposal and bond, which may be hereto attached, and any drawings if any, which may be herein referred to, are hereby made a part of this contract, and all of said work to be performed and completed by the contractor and its successors and assigns shall be fully completed in a good and workmanlike manner to the satisfaction of the City.

If the Contractor should fail to comply with any of the terms, conditions, provisions or stipulations as contained herein within the time specified for completion of the work to be performed by the Contractor, then the City, may at its option, avail itself of any or all remedies provided on its behalf and shall have the right to proceed to complete such work as Contractor is obligated to perform in accordance with the provisions as contained herein.

CONTRACT

(2)

THE CONTRACTOR AND HIS OR ITS SUCCESSORS AND ASSIGNS DOES HEREBY AGREE TO ASSUME THE DEFENSE OF ANY LEGAL ACTION WHICH MAY BE BROUGHT AGAINST THE CITY AS A RESULT OF THE CONTRACTOR'S ACTIVITIES ARISING OUT OF THIS CONTRACT AND FURTHERMORE, IN CONSIDERATION OF THE TERMS, STIPULATIONS AND CONDITIONS AS CONTAINED HEREIN, AGREES TO HOLD THE CITY FREE AND HARMLESS FROM ANY AND ALL CLAIMS FOR DAMAGES, COSTS OF SUITS, JUDGMENTS OR DECREES RESULTING FROM ANY CLAIMS MADE UNDER THIS CONTRACT AGAINST THE CITY OR THE CONTRACTOR OR THE CONTRACTOR'S SUB CONTRACTORS, AGENTS, SERVANTS OR EMPLOYEES RESULTING FROM ACTIVITIES BY THE AFOREMENTIONED CONTRACTOR, SUB CONTRACTOR, AGENT SERVANTS OR EMPLOYEES, TO THE LIMITS OF § 725.06(2).

In addition to the foregoing provisions, the Contractor agrees to conform to the following requirements:

In connection with the performance of work under this contract, the Contractor agrees not to discriminate against any employee or applicant for employment because of race, sex, religion, color, or national origin. The aforesaid provision shall include, but not be limited to, the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; lay off or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post hereafter in conspicuous places, available for employees or applicants for employment, notices to be provided by the contracting officer setting forth the provisions of the non-discrimination clause.

The Contractor further agrees to insert the foregoing provisions in all contracts hereunder, including contracts or agreements with labor unions and/or worker's representatives, except sub-contractors for standard commercial supplies or raw materials.

It is mutually agreed between the parties hereto that time is of the essence of this contract, and in the event that the work to be performed by the Contractor is not completed within the time stipulated herein, it is then further agreed that the City may deduct from such sums or compensation as may be due to the Contractor the sum of **$1,000.00 per day** for each day that the work to be performed by the Contractor remains incomplete beyond the time limit specified herein, which sum of **$1,000.00 per day** shall only and solely represent damages which the City has sustained by reason of the failure of the Contractor to complete the work within the time stipulated, it being further agreed that this sum is not to be construed as a penalty but is only to be construed as liquidated damages for failure of the Contractor to complete and perform all work within the time period as specified in this contract.

It is further mutually agreed between the City and the Contractor that if, any time after the execution of this contract and the public construction bond which is attached hereto for the faithful performance of the terms and conditions as contained herein by the Contractor, that the City shall at any time deem the surety or sureties upon such public construction bond to be unsatisfactory or if, for any reason, the said bond ceases to be adequate in amount to cover the performance of the work the Contractor shall, at his or its own expense, within ten (10) days after receipt of written notice from the City to do so, furnish an additional bond or bonds in such term and amounts and with such surety or sureties as shall be satisfactory to the City. If such an event occurs, no further payment shall be made to the Contractor under the terms and provisions of this contract until such new or additional security bond guaranteeing the faithful performance of the work under the terms hereof shall be completed and furnished to the City in a form satisfactory to it.

CONTRACT
(3)

In addition to all other contract requirements as provided by law, the contractor executing this agreement agrees to comply with public records law.

IF THE CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, THE CONTRACTORS DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS CONTRACT. CONTACT THE CUSTODIAN OF PUBLIC RECORDS AT 727-562-4092, Rosemarie.Call@myclearwater.com, 600 Cleveland St. Clearwater, FL 33756

The contractor's agreement to comply with public records law applies specifically to:

a) Keep and maintain public records required by the City of Clearwater (hereinafter "public agency") to perform the service being provided by the contractor hereunder.

b) Upon request from the public agency's custodian of public records, provide the public agency with a copy of the requested records or allow the records to be inspected or copied within a reasonable time at a cost that does not exceed the cost provided for in Chapter 119, Florida Statutes, as may be amended from time to time, or as otherwise provided by law.

c) Ensure that the public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by law for the duration of the contract term and following completion of the contract if the contractor does not transfer the records to the public agency.

d) Upon completion of the contract, transfer, at no cost, to the public agency all public records in possession of the contractor or keep and maintain public records required by the public agency to perform the service. If the contractor transfers all public records to the public agency upon completion of the contract, the contractor shall destroy any duplicate public records that are exempt or confidential and exempt from public records disclosure requirements. If the contractor keeps and maintains public records upon completion of the contract, the contractor shall meet all applicable requirements for retaining public records. All records stored electronically must be provided to the public agency, upon request from the public agency's custodian of public records, in a format that is compatible with the information technology systems of the public agency.

e) A request to inspect or copy public records relating to a public agency's contract for services must be made directly to the public agency. If the public agency does not possess the requested records, the public agency shall immediately notify the contractor of the request and the contractor must provide the records to the public agency or allow the records to be inspected or copied within a reasonable time.

f) The contractor hereby acknowledges and agrees that if the contractor does not comply with the public agency's request for records, the public agency shall enforce the contract provisions in accordance with the contract.

g) A contractor who fails to provide the public records to the public agency within a reasonable time may be subject to penalties under Section 119.10, Florida Statutes.

h) If a civil action is filed against a contractor to compel production of public records relating to a public agency's contract for services, the court shall assess and award against the contractor the reasonable costs of enforcement, including reasonable attorney fees, if:

1. The court determines that the contractor unlawfully refused to comply with the public records request within a reasonable time; and

CONTRACT
(4)

2. At least 8 business days before filing the action, the plaintiff provided written notice of the public records request, including a statement that the contractor has not complied with the request, to the public agency and to the contractor.

i) A notice complies with subparagraph (h)2. if it is sent to the public agency's custodian of public records and to the contractor at the contractor's address listed on its contract with the public agency or to the contractor's registered agent. Such notices must be sent by common carrier delivery service or by registered, Global Express Guaranteed, or certified mail, with postage or shipping paid by the sender and with evidence of delivery, which may be in an electronic format.

j) A contractor who complies with a public records request within 8 business days after the notice is sent is not liable for the reasonable costs of enforcement.

IN WITNESS WHEREOF, the parties to the agreement have hereunto set their hands and seals and have executed this Agreement, the day and year first above written.

CITY OF CLEARWATER
IN PINELLAS COUNTY, FLORIDA

By: _____ (SEAL)
William B. Horne, II
City Manager

Attest:

Countersigned:

_____
Rosemarie Call
City Clerk

By: _____
Frank Hibbard
Mayor

Approved as to form:

_____
Owen Kohler
Assistant City Attorney

Contractor must indicate whether:
_____ Corporation, _____ Partnership, _____ Company, or _____ Individual

_____
(Contractor)

By: _____ (SEAL)
Print Name: _____
Title: _____

The person signing shall, in his own handwriting, sign the Principal's name, his own name, and his title; where the person is signing for a Corporation, he must, by Affidavit, show his authority to bind the Corporation – **provide Affidavit**.

CONSENT OF SURETY TO FINAL PAYMENT

TO OWNER:	City of Clearwater	PROJECT NAME: Cleveland St. Streetscape Phase III and Festival Core
	Engineering	PROJECT NO.: 16-0003-EN & 19-0026-EN
	100 S. Myrtle Ave.	CONTRACT DATE: [_____]
	Clearwater, FL 33756	BOND NO.: [_____], recorded in O.R. Book [____], Page [____], of the Public Records of Pinellas County, Florida.

CONTRACTOR: [_____]

Pursuant to § 255.05(11), Florida Statutes, and in accordance with the provisions of the Contract between the Owner and the Contractor as indicated above, the:

[insert name of Surety]
[address]
[address] ,SURETY,

on bond of

[insert name of Contractor]
[address]
[address] ,CONTRACTOR,

hereby approves of the final payment to the Contractor, and agrees that final payment to the Contractor shall not relieve Surety of any of its obligations to

City of Clearwater
Engineering
100 S. Myrtle Ave.
Clearwater, FL 33756 ,OWNER,

as set forth in said Surety's bond.

IN WITNESS WHEREOF, the Surety has hereunto set its hand this ___ day of _____, _____

_____
(Surety)

_____
(Signature of authorized representative)

_____
(Printed name and title)

Attest:
(Seal):

PROPOSAL/BID BOND

(Not to be filled out if a certified check is submitted)

KNOWN ALL MEN BY THESE PRESENTS: That we, the undersigned, _____ _____ as Contractor, and _____ _____ as Surety, whose address is _____ _____, are held and firmly bound unto the City of Clearwater, Florida, in the sum of _____ Dollars ($_____) (being a minimum of 10% of Contractor's total bid amount) for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns.

The condition of the above obligation is such that if the attached Proposal of _____ _____ as Contractor, and _____ as Surety, for work specified as: _____ _____ all as stipulated in said Proposal, by doing all work incidental thereto, in accordance with the plans and specifications provided herefor, all within Pinellas County, is accepted and the contract awarded to the above named bidder, and the said bidder shall within ten days after notice of said award enter into a contract, in writing, and furnish the required Public Construction Bond with surety or sureties to be approved by the City Manager, this obligation shall be void, otherwise the same shall be in full force and virtue by law and the full amount of this Proposal/Bid Bond will be paid to the City as stipulated or liquidated damages.

Principal must indicate whether:
_____ Corporation, _____ Partnership, _____ Company, or _____ Individual

Signed this _____ day of _____, 20____.

_____
Contractor

_____
Principal

By: _____
Title

_____

_____
Surety

The person signing shall, in his own handwriting, sign the Principal's name, his own name, and his title; where the person is signing for a Corporation, he must, by Affidavit, show his authority to bind the Corporation – **provide Affidavit**.

AFFIDAVIT

(To be filled in and executed if the bidder is a corporation)

STATE OF FLORIDA)

COUNTY OF _____)

_____, being duly sworn, deposes and says that he/she is Secretary of _____
a corporation organized and existing under and by virtue of the laws of the State of Florida, and having its principal office at:

_____ _____ _____ _____
(Street & Number) (City) (County) (State)

Affiant further says that he is familiar with the records, minute books and by-laws of

_____
(Name of Corporation)

Affiant further says that _____ is _____
(Officer's Name) (Title)

of the corporation, is duly authorized to sign the Proposal for _____

or said corporation by virtue of _____
(state whether a provision of by laws or a Resolution of Board of Directors. If by Resolution give date of adoption).

_____

_____
Affiant

Sworn to before me this _____ day of _____, 20____.

_____
Notary Public

_____
Type/print/stamp name of Notary

_____
Title or rank, and Serial No., if any

NON-COLLUSION AFFIDAVIT

STATE OF FLORIDA)

COUNTY OF _____)

_____ being, first duly sworn, deposes and says that he is

_____ of _____,
the party making the foregoing Proposal or Bid; that such Bid is genuine and not collusive or sham: that said bidder is not financially interested in or otherwise affiliated in a business way with any other bidder on the same contract; that said bidder has not colluded, conspired, connived, or agreed, directly or indirectly, with any bidders or person, to put in a sham bid or that such other person shall refrain from bidding, and has not in any manner, directly or indirectly, sought by agreement or collusion, or communication or conference, with any person, to fix the bid price or affiant or any other bidder, or to fix any overhead, profit or cost element of said bid price, or that of any other bidder, or to secure any advantage against the City of Clearwater, Florida, or any person or persons interested in the proposed contract; and that all statements contained in said proposal or bid are true; and further, that such bidder has not directly or indirectly submitted this bid, or the contents thereof, or divulged information or data relative thereto to any association or to any member or agent thereof.

_____
Affiant

Sworn to and subscribed before me this _____ day of _____, 20____.

_____
Notary Public

PROPOSAL

(1)

TO THE CITY OF CLEARWATER, FLORIDA, for

Cleveland St. Streetscape Phase III and Festival Core (16-0003-EN & 19-0026-EN)

and doing such other work incidental thereto, all in accordance with the contract documents, marked

Cleveland St. Streetscape Phase III and Festival Core (16-0003-EN & 19-0026-EN)

Every bidder must take notice of the fact that even though his proposal be accepted and the documents signed by the bidder to whom an award is made and by those officials authorized to do so on behalf of the City of Clearwater, Florida, that no such award or signing shall be considered a binding contract without a certificate from the Finance Director that funds are available to cover the cost of the work to be done, or without the approval of the City Attorney as to the form and legality of the contract and all the pertinent documents relating thereto having been approved by said City Attorney; and such bidder is hereby charged with this notice.

The signer of the Proposal, as bidder, also declares that the only person, persons, company or parties interested in this Proposal, are named in this Proposal, that he has carefully examined the Advertisement, Instructions to Bidders, Contract Specifications, Plans, Supplemental Specifications, General Conditions, Special Provisions, and Public Construction Bond, that he or his representative has made such investigation as is necessary to determine the character and extent of the work and he proposes and agrees that if the Proposal be accepted, he will contract with the City of Clearwater, Florida, in the form of contract; hereto annexed, to provide the necessary labor, materials, machinery, equipment, tools or apparatus, do all the work required to complete the contract within the time mentioned in the General Conditions and according to the requirements of the City of Clearwater, Florida, as herein and hereinafter set forth, and furnish the required surety bonds for the following prices to wit:

If the foregoing Proposal shall be accepted by the City of Clearwater, Florida, and the undersigned shall fail to execute a satisfactory contract as stated in the Advertisement herein attached, then the City may, at its option determine that the undersigned has abandoned the contract, and thereupon this Proposal shall be null and void, and the certified check or bond accompanying this Proposal, shall be forfeited to become the property of the City of Clearwater, Florida, and the full amount of said check shall be retained by the City, or if the Proposal Bond be given, the full amount of such bond shall be paid to the City as stipulated or liquidated damages; otherwise, the bond or certified check accompanying this Proposal, or the amount of said check, shall be returned to the undersigned as specified herein.

PROPOSAL

(2)

Attached hereto is a bond or certified check on _____

_____ Bank, for the sum of _____

_____ ($_____)
(being a minimum of 10% of Contractor's total bid amount).

The full names and residences of all persons and parties interested in the foregoing bid are as follows:

(If corporation, give the names and addresses of the President and Secretary. If firm or partnership, the names and addresses of the members or partners. The Bidder shall list not only his name but also the name of any person with whom bidder has any type of agreement whereby such person's improvements, enrichment, employment or possible benefit, whether sub-contractor, materialman, agent, supplier, or employer is contingent upon the award of the contract to the bidder).

NAMES:	ADDRESSES:
_____	_____
_____	_____
_____	_____
_____	_____

Signature of Bidder: _____

The person signing shall, in his own handwriting, sign the Principal's name, his own name and his title. Where the person signing for a corporation is other than the President or Vice President, he must, by affidavit, show his authority, to bind the corporation.

Principal: _____

By: _____ Title: _____

Company Legal Name: _____

Doing Business As (if different than above): _____

Business Address of Bidder: _____

City and State: _____ Zip Code _____

Phone: _____ Email Address: _____

Dated at _____, this _____ day of _____, A.D., 20__.

CITY OF CLEARWATER
ADDENDUM SHEET

PROJECT: Cleveland St. Streetscape Phase III and Festival Core (16-0003-EN & 19-0026-EN)

Acknowledgment is hereby made of the following addenda received since issuance of Plans and Specifications.

Addendum No. _____ Date: _____

Addendum No. _____ Date: _____

Addendum No. _____ Date: _____

Addendum No. _____ Date: _____

Addendum No. _____ Date: _____

Addendum No. _____ Date: _____

Addendum No. _____ Date: _____

Addendum No. _____ Date: _____

Addendum No. _____ Date: _____

Addendum No. _____ Date: _____

Addendum No. _____ Date: _____

_____
(Name of Bidder)

_____
(Signature of Officer)

_____
(Title of Officer)

_____
(Date)

BIDDER'S PROPOSAL

PROJECT: Cleveland St. Streetscape Phase III and Festival Core (16-0003-EN & 19-0026-EN)

_____

CONTRACTOR: _____

BIDDER'S GRAND TOTAL: $_____ (Numbers)

BIDDER'S GRAND TOTAL: _____

_____

_____ (Words)

	BID ITEMS	UNIT	QTY	UNIT PRICE	AWARDED AMOUNT
ROADS AND ADMINISTRATION					
1000	**DEMOLITION & ADMINISTRATION**				
1001	MAINTENANCE OF TRAFFIC	LS	1		
1002	EROSION AND SEDIMENTATION CONTROLS	LS	1		
1003	DEMO CURB	SY	11827		
1004	MILL ASPHALT	SY	32765		
1005	DEMO SIDEWALKS	SY	4543		
1006	DEMO DRIVEWAYS	SY	6180		
1007	DEMO BUILDING FOUNDATION	SY	150		
1008	DEMO TREES	EA	114		
1009	DEMO LIGHTING	EA	50		
1010	DEMO FIRE HYDRANTS	EA	11		
	TOTAL DEMOLITION & ADMINISTRATION				
2000	**PAVING**				
2001	MAINTENANCE OF TRAFFIC	LS	1		
2002	EROSION AND SEDIMENTATION CONTROLS	LS	1		
2003	CUT	CY	28000		
2004	EMBANKMENT	CY	9150		
2005	CLW TYPE 1 CURB	LF	9653		
2006	CLW STRAIGHT CURB	LF	3200		
2007	CLW VALLEY GUTTER	LF	2284		
2008	TYPE 9.5 (TLB) SUPERPAVE ASPHALTIC CONCRETE (2")	TN	2655		
2009	8" AGGREGATE BASE (LBR 100)	SY	24129		

2010	TYPE B STABILIZATION	SY	27569		
2011	SIDEWALK	SY	9993		
2012	BIKE PATH	SY	4319		
2013	DRIVEWAY	SY	4597		
	TOTAL PAVING				
3000	**SIGNAGE AND PAVEMENT MARKINGS**				
3001	PATTERNED PAVEMENT, VEHICULAR AREAS, GREEN BIKE LANE	SY	1114		
3002	SINGLE POST SIGN, F&I GROUND MOUNT, 12-20 SF	AS	145		
3003	SINGLE POST SIGN, REMOVE	AS	210		
3004	PAINTED PAVEMENT MARKINGS, STANDARD,WHITE, SOLID, 6"	GM	0.33		
3005	PAINTED PAVEMENT MARKINGS, STANDARD,BLACK, SKIP, 6"	GM	1.14		
3006	THERMOPLASTIC, STANDARD, WHITE, SOLID, 12" FOR CROSSWALK AND ROUNDABOUT	LF	5400		
3007	THERMOPLASTIC, STANDARD, WHITE, SOLID, 24" FOR STOP LINE AND CROSSWALK	LF	1849		
3008	THERMOPLASTIC, STANDARD, WHITE, 2-4 DOTTED GUIDELINE, 6"	GM	0.08		
3009	THERMOPLASTIC, STANDARD, WHITE, 2-2 DOTTED EXTENSION LINE, 6"	GM	0.14		
3010	THERMOPLASTIC, STANDARD, WHITE, MESSAGE OR SYMBOL	EA	20		
3011	THERMOPLASTIC, STANDARD, WHITE, ARROW	EA	29		
3012	THERMOPLASTIC, STANDARD, WHITE, YIELD LINE	EA	2		
3013	THERMOPLASTIC, PREFORMED, WHITE, MESSAGE	EA	49		
3014	THERMOPLASTIC, PREFORMED, WHITE, ARROW	EA	49		
3015	THERMOPLASITIC, STANDARD,OTHER SURFACES, WHITE, SOLID, 6"	GM	0.23		
3016	THERMOPLASTIC, STANDARD, YELLOW, SOLID, 18" FOR DIAGONAL OR CHEVRON	LF	732		
3017	THERMOPLASTIC, STANDARD-OTHER SURFACES, WHITE, SKIP, 6",10-30 SKIP	GM	0.12		
3018	THERMOPLASTIC, STANDARD, OTHER SURFACES, YELLOW, SOLID, 6'	GM	2.45		
	TOTAL SIGNAGE AND PAVEMENT MARKINGS				
4000	**LANDSCAPE, IRRIGATION & HARDSCAPE**				

4001	TRASH RECEPTACLES	EA	7		
4002	BENCHES	EA	10		
4003	BIKE RACKS	EA	14		
4004	BOLLARDS	EA	78		
4005	BUS SHELTERS	EA	2		
4006	JAPANESE BLUEBERRY	EA	20		
4007	CRAPE MYRTLE	EA	20		
4008	MEDJOOL PALM	EA	23		
4009	LIVE OAK	EA	93		
4010	SABAL PALM	EA	96		
4011	FOXTAIL PALM	EA	36		
4012	PERENNIAL PEANUT	SF	8961		
4013	DWF. BOUGAIVILLEA 'HELEN JOHNSON'	EA	467		
4014	HORSETAIL	EA	1170		
4015	DWF YAUPON HOLLY	EA	50		
4016	PODOCARPUS 'PRINGLES'	EA	396		
4017	INDIAN HAWTHORN	EA	1969		
4018	DWF CONFEDERATE JASMINE	EA	3822		
4019	COONTIE	EA	400		
4020	BERMUDA 'LATITUDE 36'	SF	65000		
4021	MINI PINE BARK MULCH	CY	215		
4023	IRRIGATION	LS	1		
	TOTAL LANDSCAPE, IRRIGATION & HARDSCAPE				
5000	**ELECTRICAL**				
5001	LIGHTING (139 LIGHTS)	EA	139		
	TOTAL ELECTRICAL				
	SUB-TOTAL ROADS & ADMINISTRATION 1001-5001				
5002	**10% CONTINGENCY ROADS & ADMINISTRATION 1001-5001**	**LS**	**1**		
	TOTAL ROADS & ADMINISTRATION 1001-5002				
6000	**STORMWATER**				
6001	DEMO STORM PIPE	LF	6088		
6002	DEMO STORM STRUCTURES	EA	55		
6003	15" RCP	LF	1220		
6004	18" RCP	LF	1062		
6005	24" RCP	LF	3204		
6006	30" RCP	LF	252		
6007	36" RCP	LF	503		
6008	42" RCP	LF	560		

6009	INDEX NO. 425-020 - CURB INLET TYPE 4, <10'	EA	2		
6010	INDEX NO. 425-021 - CURB INLET TYPE 5, <10'	EA	42		
6011	INDEX NO. 425-021 - CURB INLET TYPE 6, <10'	EA	3		
6012	INDEX NO. 425-052 - TYPE C DBI , <10'	EA	1		
6013	INDEX NO. 425-052 - TYPE D DBI, <10'	EA	1		
6014	INDEX NO. 425-041 - GUTTER INLET - TYPE V, <10'	EA	15		
6015	INDEX NO. 425-001 - TYPE 8 MANHOLE, <10'	EA	11		
6016	INDEX NO. 425-001 - TYPE 8 MANHOLE, <10', J BOTTOM	EA	7		
6017	BAFFLE BOX	EA	2		
6018	15" PIPE CONNECTION INTO EXISTING STRUCTURES	EA	3		
6019	18" PIPE CONNECTION INTO EXISTING STRUCTURES	EA	1		
6020	24" PIPE CONNECTION INTO EXISTING STRUCTURES	EA	1		
6021	STRUCTURE MODIFICATION - TOP REPLACEMENT WITH RING AND COVER	EA	1		
6022	8" PVC CONTECH PIPE, TYPE A-2000	LF	11000		
6023	8" UNDER DRAIN CLEANOUT	EA	65		
6024	8" PVC OUTFALL PIPE (UNDERDRAINS)	LF	130		
6025	RAIN GARDEN	EA	11		
	SUB-TOTAL STORMWATER 6001-6025				
6026	**10% CONTINGENCY FOR STORMWATER ITEMS 6001-6025**	**LS**	**1**		
	TOTAL STORMWATER 6001-6026				
	UTILITIES				
7000	**WATER**				
7001	DEMO WATER	LF	10273		
7002	5/8" WATER SERVICE	LF	3751		
7003	1" WATER SERVICE	LF	1551		
7004	2" WATER SERVICE	LF	100		
7005	20" DIP WATER MAIN	LF	400		
7006	6" DIP WATER MAIN	LF	102		
7007	8" PVC WATER MAIN	LF	8100		
7008	6" PVC WATER MAIN	LF	500		
7009	4" PVC WATER MAIN	LF	100		
7010	LINE STOP 20"	EA	3		
7011	LINE STOP 8"	EA	1		
7012	LINE STOP 6"	EA	6		

7013	LINE STOP 4"	LF	2		
7014	8" GATE VALVE	EA	27		
7015	6" GATE VALVE	EA	23		
7016	4" GATE VALVE	EA	12		
7017	AIR RELEASE VALVE ASSEMBLY	EA	2		
7018	FITTINGS & APPURTENANCES	TN	5		
7019	RESTRAINTS, BELL AT TIE-IN	EA	230		
7020	FIRE HYDRANT ASSEMBLY	EA	15		
	SUBTOTAL WATER				
7021	**10% CONTINGENCY**	LS	1		
	TOTAL WATER				
8000	**RECLAIMED WATER**				
8001	4" PVC RECLAIM MAIN	LF	7300		
8002	1" RECLAIM SERVICE	LF	880		
8003	2" RECLAIM SERVICE	LF	880		
8004	4" GATE VALVE	EA	42		
8005	SERVICE BOX	EA	95		
8006	4" BLOWOFF ASSEMBLY	EA	15		
	SUBTOTAL RECLAIMED WATER				
8007	**10% CONTINGENCY**	LS	1		
	TOTAL RECLAIMED WATER				
9000	**SANITARY SEWER**				
9001	DEMO SEWER PIPE	LF	4184		
9002	DEMO SEWER STRUCTURES	EA	18		
9003	SANITARY SEWER MANHOLE	EA	20		
9004	SANITARY SEWER MANHOLE - CONNECT TO EX	EA	2		
9005	SANITARY SEWER PIPE -12" PVC	LF	40		
9006	SANITARY SEWER PIPE -10" PVC	LF	270		
9007	SANITARY SEWER PIPE - 8" PVC	LF	3700		
9008	SANITARY SEWER PIPE - LATERAL - 6" PVC	LF	2500		
9009	INSTALL CLEAN-OUT	EA	48		
	SUBTOTAL SANITARY SEWER				
9010	**10% CONTINGENCY**	LS	1		
	TOTAL SANITARY SEWER				
	SUB-TOTAL UTILITIES				
	TOTAL 10% CONTINGENCY				
	TOTAL UTILITIES				
10000	**GATEWAY FESTIVAL CORE**				
10001	CONCRETE SIDEWALK AND DRIVEWAYS, 4" THICK	SY	1		

10002	CONCRETE SIDEWALK AND DRIVEWAYS, 6" THICK	SY	1		
10003	CONCRETE HEADER CURB, 6"	LF	1		
10004	PIPE HANDRAIL - GUIDERAIL, ALUMINUM	LF	1		
10005	CONCRETE CLASS NS, CONCRETE STEPS	CY	1		
10006	REINFORCING STEEL - MISCELLANEOUS	LB	1		
10007	CONCRETE CLASS II, RETAINING WALL	CY	1		
10008	REINFORCING STEEL - RETAINING WALL	LB	1		
10009	LANDSCAPE PLANTERS	LS	1		
10010	SITE LIGHTING	LS	1		
10011	IRRIGATION	LS	1		
10012	SHADE STRUCTURE ALLOWANCE	LS	1	$ 300,000.00	
10013	SHADE STRUCTURE FOUNDATION	LS	1		
10014	MASONRY STORAGE STRUCTURE	LS	1		
	SUB-TOTAL GATEWAY FESTIVAL CORE				
10015	**10% CONTINGENCY GATEWAY FESTIVAL CORE**	**LS**	**1**		
	TOTAL GATEWAY FESTIVAL CORE				

SUBTOTAL	
TOTAL 10% CONTIGENCY	
TOTAL CONSTRUCTION COST	
GRAND TOTAL	

THE BIDDER'S GRAND TOTAL ABOVE IS HIS TOTAL BID BASED ON HIS UNIT PRICES AND LUMP SUM PRICES AND THE ESTIMATED QUANTITIES REQUIRED FOR EACH SECTION. THIS FIGURE IS FOR INFORMATION ONLY AT THE TIME OF OPENING BIDS. THE CITY WILL MAKE THE TABULATION FROM THE UNIT PRICES AND LUMP SUM PRICE BID. IF THERE IS AN ERROR IN THE TOTAL BY THE BIDDER, IT SHALL BE CHANGED AS ONLY THE UNIT PRICES AND LUMP SUM PRICE SHALL GOVERN.

THE CONTRACTOR SHALL PROVIDE COPIES OF A CURRENT CONTRACTOR LICENSE/REGISTRATION WITH THE STATE OF FLORIDA AND PINELLAS COUNTY IN THE BID RESPONSE.

SCRUTINIZED COMPANIES AND BUSINESS OPERATIONS WITH CUBA AND SYRIA CERTIFICATION FORM

PER SECTION III, ITEM 25, IF YOUR BID IS $1,000,000 OR MORE, THIS FORM MUST BE COMPLETED AND SUBMITTED WITH THE BID PROPOSAL. FAILURE TO SUBMIT THIS FORM AS REQUIRED, MAY DEEM YOUR SUBMITTAL NONRESPONSIVE.

The affiant, by virtue of the signature below, certifies that:

1. The vendor, company, individual, principal, subsidiary, affiliate, or owner is aware of the requirements of section 287.135, Florida Statutes, regarding companies on the Scrutinized Companies with Activities in Sudan List, the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, or engaging in business operations in Cuba and Syria; and
2. The vendor, company, individual, principal, subsidiary, affiliate, or owner is eligible to participate in this solicitation and is not listed on either the Scrutinized Companies with Activities in Sudan List, the Scrutinized Companies with Activities in the Iran Petroleum Sector List, or engaged in business operations in Cuba and Syria; and
3. Business Operations means, for purposes specifically related to Cuba or Syria, engaging in commerce in any form in Cuba or Syria, including, but not limited to, acquiring, developing, maintaining, owning, selling, possessing, leasing or operating equipment, facilities, personnel, products, services, personal property, real property, military equipment, or any other apparatus of business or commerce; and
4. If awarded the Contract (or Agreement), the vendor, company, individual, principal, subsidiary, affiliate, or owner will immediately notify the City of Clearwater in writing, no later than five (5) calendar days after any of its principals are placed on the Scrutinized Companies with Activities in Sudan List, the Scrutinized Companies with Activities in the Iran Petroleum Sector List, or engages in business operations in Cuba and Syria.

_____
Authorized Signature

_____
Printed Name

_____
Title

_____
Name of Entity/Corporation

STATE OF _____

COUNTY OF _____

The foregoing instrument was acknowledged before me on this _____ day of _____, 20____, by _____ (name of person whose signature is being notarized) as the _____ (title) of _____ (name of corporation/entity), personally known to me as described herein _____, or produced a _____ (type of identification) as identification, and who did/did not take an oath.

_____
Notary Public

_____
Printed Name

My Commission Expires: _____
NOTARY SEAL ABOVE

SCRUTINIZED COMPANIES THAT BOYCOTT ISRAEL LIST CERTIFICATION FORM

PER SECTION III, ITEM 25, THIS FORM MUST BE COMPLETED AND SUBMITTED WITH THE BID PROPOSAL. FAILURE TO SUBMIT THIS FORM AS REQUIRED, MAY DEEM YOUR SUBMITTAL NONRESPONSIVE.

The affiant, by virtue of the signature below, certifies that:

1. The vendor, company, individual, principal, subsidiary, affiliate, or owner is aware of the requirements of section 287.135, Florida Statutes, regarding companies on the Scrutinized Companies that Boycott Israel List, or engaged in a boycott of Israel; and
2. The vendor, company, individual, principal, subsidiary, affiliate, or owner is eligible to participate in this solicitation and is not listed on the Scrutinized Companies that Boycott Israel List, or engaged in a boycott of Israel; and
3. "Boycott Israel" or "boycott of Israel" means refusing to deal, terminating business activities, or taking other actions to limit commercial relations with Israel, or persons or entities doing business in Israel or in Israeli-controlled territories, in a discriminatory manner. A statement by a company that it is participating in a boycott of Israel, or that it has initiated a boycott in response to a request for a boycott of Israel or in compliance with, or in furtherance of, calls for a boycott of Israel, may be considered as evidence that a company is participating in a boycott of Israel; and
4. If awarded the Contract (or Agreement), the vendor, company, individual, principal, subsidiary, affiliate, or owner will immediately notify the City of Clearwater in writing, no later than five (5) calendar days after any of its principals are placed on the Scrutinized Companies that Boycott Israel List, or engaged in a boycott of Israel.

_____
Authorized Signature

_____
Printed Name

_____
Title

_____
Name of Entity/Corporation

STATE OF _____

COUNTY OF _____

The foregoing instrument was acknowledged before me on this _____ day of _____, 20____, by _____ (name of person whose signature is being notarized) as the _____ (title) of _____ (name of corporation/entity), personally known to me as described herein _____, or produced a _____ (type of identification) as identification, and who did/did not take an oath.

_____
Notary Public

_____
Printed Name

My Commission Expires: _____
NOTARY SEAL ABOVE