

ENGLEWOOD WATER DISTRICT

MANASOTA KEY WATER MAIN REPLACEMENT PROJECT



Technical Specifications

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TECHNICAL SPECIFICATIONS

TABLE OF CONTENTS

DIVISION 01 – GENERAL REQUIREMENTS

01 00 05	General Requirements
01 01 50	Control of Work
01 11 00	Summary of Work
01 12 00	Measurement and Payment
01 29 73	Schedule of Values
01 32 16	Construction Progress Schedule
01 32 21	Field Engineering and Surveying
01 32 33	Construction Photography
01 33 00	Submittal Procedures
01 40 00	Quality Requirements
01 51 00	Temporary Utilities
01 66 00	Product Storage and Handling Requirements
01 74 01	Cleaning and Waste Management
01 76 00	Protecting Installed Construction
01 78 39	Project Record Documents

DIVISION 02 – SITE WORK

02 22 00	Existing Utilities and Underground Structures
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DIVISION 31 – EARTHWORK

31 10 00	Site Clearing
31 23 10	Surface Restoration
31 23 19	Dewatering
31 23 33	Trenching and Backfilling
31 25 13	Erosion and Sedimentation Control

DIVISION 33 – UTILITIES

33 05 24	Directional Drilling
33 11 12	Disinfection
33 31 50	Piping and Valves

ENGINEERING REPORTS

Geotechnical Engineering Report (Tierra Inc., November 14, 2025)

SECTION 01 00 05
GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 DESCRIPTION OF REQUIREMENTS

- A. The Contractor performing the work covered by this contract shall be qualified by the Owner to perform the work shown and specified. The work covered by these specifications includes the furnishing of all labor, equipment, materials and performing all operations in connection with the installation of the water main replacement along Manasota Key Road, including all associated piping and appurtenances work, in compliance with the drawings, specifications and Contract Documents. The Contractor shall perform all operations and incidentals necessary to complete the work in a turnkey condition.

1.02 SUMMARY OF WORK

- A. Refer to Section 01 11 00.

1.03 UTILITY

- A. The Contractor shall coordinate with the Owner for operating existing valves and limiting any utility service interruptions during construction.

1.04 MATERIALS

- A. It is the Contractor's responsibility to inspect materials for damage or abnormalities. All materials shall be new. No used, remanufactured, damaged or rebuilt materials shall be used.

1.05 SEQUENCE OF WORK

- A. The Contractor shall comply with the following requirements:
 - 1. Schedule work as set forth in Section 01 32 16 – Construction Progress Schedule.
 - 2. Coordinate the construction schedule and operations with the Owner's Representative.
- B. Contractor shall perform and complete the work in the manner best calculated to promote rapid construction consistent with safety of life and property and to the satisfaction of the Engineer and Owner, and in strict accordance with the Contract Documents.

1.06 AS-BUILT DATA

- A. Provide as-built data in accordance with Project Record Document Requirements described in Section 01 78 39 and in accordance with this section.

- B. The Contractor shall maintain accurate records of the location, length, and elevation of all new and existing pipelines and appurtenances. Contractor shall maintain a set of drawings to be kept at the job site for this purpose. Promptly after completion of any portion of the work provided, Contractor shall deliver to the Engineer the surveyed as-built drawings with accurate notations recorded thereon as necessary to revise the drawings for record purposes.
- C. As-built data shall be submitted with each pay application; said pay application shall not be accepted until the as-built drawing is deemed up to date by the Engineer and the Owner. The Contractor shall be held responsible for the accuracy of such data and shall bear any costs incurred in finding utilities as a result of incorrect data furnished by the Contractor.

1.07 CONNECTIONS TO EXISTING MAINS

- A. Contractor shall notify the Owner and Engineer one week prior to connections and any potential operational impacts.
- B. Where connections are required between new work and existing utility mains, the connection shall be made in a thorough and first-class manner using proper fittings to suit the actual conditions.
- C. Englewood Water District personnel will operate all existing valves and controls necessary for shutting off and directing water flows during the Work.

1.08 UTILITY SYSTEM CODES

- A. All construction shall meet or exceed the requirements of the Englewood Water District Details and Construction Standards, the latest revisions, and these Specifications. In case there is a conflict between the Englewood Water District details and standards documents and the Specifications, the most stringent requirement shall be met.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 01 50
CONTROL OF WORK

PART 1 - GENERAL

1.01 WORK PROGRESS

- A. The Contractor shall furnish personnel and equipment which will be efficient, appropriate, and adequately sized to secure a satisfactory quality of work and a rate of progress which will ensure the completion of the work within the time stipulated in the Contract. If at any time such personnel appears to the Owner's Representative to be inefficient, inappropriate, or insufficient for securing the quality of work required for producing the rate of progress aforesaid, the Owner may order the Contractor to increase the efficiency, change the character, or increase the personnel and equipment and the Contractor shall conform to such order. Failure of the Owner's Representative to give such order shall in no way relieve the Contractor of any obligation to secure the quality of the work and rate of progress required.

1.02 WORK LOCATIONS

- A. Work shall be located substantially as indicated on the Plans, but the Owner and/or Owner's Representative reserves the right to make such modifications in locations as may be found desirable to avoid interference with existing structures or for other reasons.

1.03 OPEN EXCAVATIONS

- A. The Contractor shall take precautions to prevent injury due to open trenches. All trenches, excavated material, equipment, or other obstacles which could be dangerous shall be barricaded and well lighted at all times.

1.04 DISTRIBUTION SYSTEMS AND SERVICES

- A. The Contractor shall avoid interruptions to utility services and shall notify the Owner's Representative and the appropriate agency well in advance of any requirement for dewatering, isolating, or relocating a section of a utility, so that necessary arrangements may be made.

1.05 PROTECTION AND RELOCATION OF EXISTING STRUCTURES AND UTILITIES

- A. The Contractor shall assume full responsibility for the protection of all buildings, structures, and utilities, including poles, signs, services to building utilities, gas pipes, water pipes, hydrants, sewers, drains and electric and telephone cables and other similar facilities, whether or not they are shown on the Plans. The Contractor shall carefully support and protect all such structures and utilities from

injury of any kind. Any damage resulting from the Contractor's operation shall be repaired by the Contractor at their expense.

- B. The Contractor shall bear full responsibility for obtaining locations of all underground structures and utilities (including existing water services, drain lines and sewers). Services to customers shall be maintained and all costs or charges resulting from damage thereto shall be paid by the Contractor.
- C. Protection and temporary removal and replacement of existing utilities and structures as described in this Section shall be a part of the Work under the Contract and all costs in connection therewith shall be included in the unit prices established in the Bid.
- D. If, in the opinion of the Owner's Representative, permanent relocation of a utility owned by the Owner is required, the Owner may direct the Contractor, in writing, to perform the work. Work so ordered will be paid for at the Contract unit prices. If relocation of a privately-owned or franchise utility is required, the Contractor will notify the utility to perform the work as expeditiously as possible and include the Owner and Engineer in the correspondence for coordinating the relocation. The Contractor shall fully cooperate with the Owner and utility and shall have no claim for delay due to such relocation. The Contractor shall notify public utility companies in writing at least two (2) business days before excavating near their utilities.

1.06 CARE AND PROTECTION OF PROPERTY

- A. The Contractor shall be responsible for the preservation of all public and private property and shall use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work on the part of the Contractor, such property shall be restored by the Contractor, at their expense, to a condition equal or better to that existing before the damage was done, or they shall make good the damage in another manner acceptable to the Owner's Representative.
- B. Along the location of this work, all fences, walks, bushes, trees, shrubbery and other physical features shall be protected and restored in a thoroughly workmanlike manner unless otherwise shown on the drawings. Fences and other features removed by the Contractor shall be replaced in the location indicated by the Owner's Representative as soon as conditions permit. All grass areas beyond the limits of construction which have been damaged by the Contractor shall be regarded and sodded to equal or to better than original conditions.
- C. Trees close to the work which drawings do not specify to be removed, shall be boxed or otherwise protected against injury. The Contractor shall trim all branches that are liable to damage because of their operations, but in no case shall any tree be cut or removed without prior notification to the Owner's

Representative. All injuries to bark, trunk, limbs and roots of trees shall be repaired by dressing, cutting and painting according to approved methods, using only approved tools and materials.

- D. The protection, removal, and replacement of existing physical features along the line of work shall be a part of the Work under the Contract and all costs in connection therewith shall be included in the unit and/or lump sum prices established under the items in the Bid, unless otherwise shown or specified.

1.10 PROTECTION OF CONSTRUCTION AND EQUIPMENT

- A. All newly constructed work shall be carefully protected from injury in any way. No wheeling or walking or placing of heavy loads on it shall be allowed and all portions injured shall be replaced by the Contractor at their own expense.
- B. All structures shall be protected in a manner approved by the Owner's Representative. Should any surface or parts of the structures become heaved, cracked, or otherwise damaged, all such damaged portions of the work shall be completely repaired and made good by the Contractor, at their own expense and to the satisfaction of the Owner's Representative. If, in the final inspection of the work, any defects, faults, or omissions are found, the Contractor shall cause the same to be repaired or removed and replaced by proper materials and workmanship without extra compensation for the materials and labor required. The Contractor shall be fully responsible for the satisfactory maintenance and repair of the construction and other work undertaken herein, for at least the warranty period described in the Contract.
- C. The Contractor shall take all necessary precautions to prevent damage to any structure during and after construction and until such structure is accepted and taken over by the Owner.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 11 00
SUMMARY OF WORK

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, tools, equipment and services as indicated in accordance with provisions of Contract Documents.
- B. It is the intent of the Contract Documents to describe a functionally complete project.
- C. Furnish and install all supplementary or miscellaneous items, appurtenances, and devices incidental to or necessary for a sound, secure, complete, and functional installation.

1.02 WORK COVERED BY CONTRACT

- A. The Work generally includes, but not limited to the following construction, start-up and acceptance testing and handing over to Owner:
 - 1. Civil/site work including, but not limited to, clearing and grubbing, site-grading, seed/sod, and landscaping.
 - 2. Furnishing of all labor, material, superintendence, power, light, heat, fuel, water, tools, appliances, equipment, supplies, services and other means of construction necessary or proper for performing and completing the replacement of the water main.
 - 3. Connections to the existing water mains.
 - 4. Maintaining the Work area and site in a clean and acceptable manner.
 - 5. Maintaining existing facilities in service at all times except where specifically provided for otherwise herein.
 - 6. Protection of finished and unfinished Work and existing utilities.
 - 7. Repair and restoration of Work damaged during construction.
 - 8. Furnishing as necessary proper equipment and machinery, of a sufficient capacity, to facilitate the Work and to handle all emergencies normally encountered in Work of this character.
 - 9. Obtaining any and all other permits required for prosecution of the Work.

1.03 WORK SEQUENCE

- A. The Contractor shall organize and plan the construction activities to assure the safety and reliability of and to minimize the interruption to the water system and all other utilities.
- B. The proposed Work sequence shall be submitted to the Engineer in accordance with the Construction Progress Schedule requirements in Section 01 32 16.

1.04 CONTRACTOR-FURNISHED PRODUCTS

- A. Contractor shall furnish all products other than Owner-furnished products if Owner-furnished products are specifically designated.
- B. Components required to be supplied in quantity within a specification section shall all be the same and shall be interchangeable.

1.05 PERMITS AND LICENSES

- A. Contractor shall obtain, at their expense, all permits and licenses necessary for the construction of the Work, and to be in compliance with local, state and county jurisdictions including FDEP.

1.06 FENCES

- A. All fences affected by the Work shall be maintained by the Contractor until completion of the Work. Fences disturbed by the construction shall be restored by the Contractor to their original or better condition and to their original location.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 12 00
MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The following explanation of the Measurement and Payment for the Bid Form items is being provided for information and guidance. The omission of reference to any item shall not alter the intent of the Bid Form or relieve the Contractor of the necessity of furnishing such as a part of the Contract, at no additional cost to the Owner.

1.02 INCIDENTAL WORK

- A. The cost of incidental work described in the Plans and Contract Documents, for which there are no specific Contract Items, shall be considered as part of the general cost of doing the work and shall be included in the prices for the various Contract Items. No additional payment will be made therefore.
- B. The Contractor shall provide and maintain such modern tools, and equipment as may be necessary, to perform in a satisfactory and acceptable manner all the work required by this Contract. Only equipment of established reputation and proven efficiency shall be used.
- C. The Contractor shall be solely responsible for the adequacy of their workmanship, materials, and equipment.

1.03 MEASUREMENT

- A. The quantities set forth in the Bid Form are approximate and are given to establish a uniform basis for the comparison of bids. The Owner reserves the right to increase, decrease or eliminate the quantity of any class or portion of the Work during the progress of the construction.

1.04 PAYMENT

- A. Payment will be made on the basis of Work actually performed and for each item listed in the Bid Form shall be made at the Contract unit price or lump sum price per item of work on the basis of the work actually performed, completed, tested and accepted by the Owner. Such work includes but is not limited to furnishing of all necessary labor, equipment, tools and materials, appurtenances, equipment, transportation, clean up, restoration of disturbed areas, costs of insurance and bonding, and all other direct and indirect expenses to complete the construction, test to passing, and place the Work into operation. Cost of cleanup and surface restorations will be considered to be the percentage retained in accordance with the Contract Documents, and complete payment will not be made until all Work

has been accepted by the Owner and cleanup, restorations and as-builts are completed.

1.05 MEASUREMENT AND PAYMENT

A. Bid Item No. 1: Mobilization

1. Description – Bid item shall include mobilization costs associated with the Project and shall include mobilization, demolition, field staking, submittals, materials testing, fencing, Health and Safety Plan, Hurricane Preparedness Plan, identifying and securing a staging area, furnishing all labor, materials, tools, equipment, and incidentals required to mobilize and demobilize the Work, and other applicable administrative charges as outlined and in accordance with the Contract Documents and specified herein.
2. Measurement – Measurement of Item No. 1 will be by lump sum.
3. Payment – Amount for the project shall not exceed five percent (5%) of the subtotal bid price.

B. Bid Item No. 2: Performance and Payment Bond Premiums and Insurance

1. Description – Bid item shall include Performance and Payment Bond Premiums and insurance costs associated with the Project required for the Work in accordance with the Contract Documents and specified herein.
2. Measurement – Measurement of Item No. 2 will be by lump sum.
3. Payment – Amount for the project shall not exceed five percent (3%) of the subtotal bid price and shall be divided equally over the number of pay request anticipated from the Notice to Proceed. No additional payments shall be made due to time extensions, if applicable.

C. Bid Item No. 3: Pre-Construction Photography

1. Description – Bid item shall include photography and video costs associated with the Project and shall include photographer procurement, prepping, performing, processing, furnishing all labor, materials, tools, equipment, and incidentals required to photograph the project in accordance with the Contract Documents and specified herein.
2. Measurement – Measurement of Item No. 3 will be by lump sum.
3. Payment – Amount for the project will be made at the Contract lump sum price for the Contractor's cost for conducting an audio/video tape recording of pre-construction conditions. The Work includes coverage necessary to document existing conditions on public and private property. The Contractor may be required to restore private properties to conditions better than existing at no

additional cost to the Owner, if Contractor fails to sufficiently document existing conditions. The preconstruction video is only valid for the original substantial completion date.

- D. Bid Item No. 4: Flushing, Pressure Testing, Sampling Points and Disinfection
1. Description – Bid item shall include pipeline flushing, pressure testing, sampling, points, and disinfection associated with the Project and shall include furnishing all labor, materials, tools, equipment, and incidentals required for pigging and swabbing prior to the full-bore flush, flushing, pressure testing, sampling, disinfection and de-chlorination in accordance with local, County and state, FDOH and FDEP regulations, the Contract Documents and specified herein.
 2. Measurement – Measurement of Item No. 4 will be by lump sum.
 3. Payment – Amount for the project will be made at the Contract lump sum price for the Contractor's cost of the pipeline flushing, pressure testing and disinfection as outlined in the Contract Documents and specified herein.
- E. Bid Item No. 5: As-Built Survey
1. Description – Bid item shall include as-built survey costs associated with the Project and shall include furnishing all labor, materials, tools, equipment, and incidentals required to survey the Work in accordance with the Contract Documents and specified herein.
 2. Measurement – Measurement of Item No. 5 will be by lump sum.
 3. Payment – Amount for the project will be made at the Contract lump sum price for the Contractor's cost of the As-Built Survey.
- F. Bid Item No. 6: Maintenance of Traffic
1. Description – Bid item shall include Maintenance of Traffic (MOT) associated with the Project and shall include furnishing all labor, materials, tools, equipment, and incidentals required to maintain safe traffic in accordance with local, County and state laws, including Sarasota County DOT, FDOT, the Contract Documents and specified herein.
 2. Measurement – Measurement of Item No. 6 will be by lump sum.
 3. Payment – Amount for the project will be made at the Contract lump sum price for the Contractor's cost of the maintenance of traffic as needed for the Project.
- G. Bid Item No. 7: Site Work and Restoration
1. Description – Bid item shall include all site work and restoration needed for a complete project include clearing and grubbing, furnishing, installing and maintaining erosion control measures to safeguard the area from any

construction debris as required per local, County and State regulations, sidewalk, driveway and road removal and restoration to existing conditions, tree and site removal and protection, furnishing all labor, materials, tools, equipment, and incidentals for performing all operations required to furnish, install, maintain and repair, and to return the site to existing or better conditions.

2. Measurement – Measurement of Item No. 7 will be by lump sum.
3. Payment – Payment of the bid item will be made at the Contract lump sum price for the Contractor's cost for all site work including furnishing, installing and maintaining erosion control measures, clearing and grubbing, site work, removal and restoration including road, driveway, sidewalk, and grass of the Project.

H. Bid Item No. 8: Furnish and Install 8-inch HDPE via Horizontal Directional Drilling

1. Description – Bid item shall include furnishing and installing all labor, tools, equipment, and materials for complete in-place, tested, accepted and ready for operation 8-inch HDPE via Horizontal Directional Drilling (HDD) including all necessary pipes, flanges, fittings, bends, including 11.25 and 90 degrees bends, reducers, adapters, connections to existing and proposed water mains, labor, signs, dewatering, compaction, pipe bedding, backfilling, excavation and support, sheeting, thrust restraints, tracer wire and markers, identification tape, clamps, harnessing, demolition and removal of any existing water main, excavation of all material encountered including rock, removal or deposition of excess material, backfill, culverts, storm sewers, and other surface materials not specifically designated in the Bid, and clean-up, and for performing all operations required to furnish to the Owner the project, complete in place, as specified and as indicated on the Contract Documents.
2. Measurement – Measurement of Item No. 8 will be by lump sum.
3. Payment – Payment for furnishing and installing horizontal directional drills of 8-inch HDPE will be made at the Contract lump sum price for the Contractor's cost of the horizontal directional drilling as outlined in the Contract Documents and specified herein. The Drawings show a suggested path for the drills. The Contractor may deviate from these but will only be paid a lump sum price regardless of length. Any deviations will need to be reviewed and approved by the Owner and Engineer.

I. Bid Item No. 9: Furnish and Install 6-inch PVC via Open Cut

1. Description – Bid item shall include furnishing and installing all labor, tools, equipment and materials for complete in-place, tested, accepted and ready for operation 6-inch PVC Open Cut including all necessary pipes, fittings, flanges, bends, including 11.25 and 90 degrees bends, reducers, connections to existing and proposed water mains, labor, signs, dewatering, compaction, pipe

bedding, backfilling, excavation and support, sheeting, thrust restraints, tracer wire and markers, identification tape, demolition and removal of any existing water main, excavation of all material encountered including rock, removal or deposition of excess material, backfill, culverts, storm sewers, and other surface materials not specifically designated in the Bid, and clean-up and for performing all operations required to furnish to the Owner the project, complete in place, as specified and as indicated on the Contract Documents.

2. Measurement – Measurement of Item No. 9 will be by lineal foot.
3. Payment – Payment for furnishing and installing 6-inch PVC open cut pipeline will be made at the Contract unit price per lineal foot for the pipe, complete in place, as specified and as indicated on the Contract Documents.

J. Bid Item No. 10: Furnish and Install Water Main Connections

1. Description – Bid item shall include furnishing and installing all labor, tools, equipment, and materials for complete in-place, tested, accepted and ready for operation the water main connections including all necessary pipes, fittings, bends, tees, reducers and connections to existing and proposed water mains, signs, dewatering, maintaining and restoring service, compaction, pipe bedding, backfilling, excavation and support, sheeting, thrust restraints, demolition and removal of any existing water main, relocating the existing valve, restraints on existing and new pipe, excavation of all material encountered including rock, removal or deposition of excess material, backfill, culverts, storm sewers, and other surface materials not specifically designated in the Bid and clean-up, and for performing all operations required to furnish to the Owner the project, complete in place, as specified and as indicated on the Contract Documents.
2. Measurement – Measurement of Item No. 10 will be by Lump Sum.
3. Payment – Payment will be made at the Contract lump sum price for the Contractor's cost for complete in place and Owner accepted, connections of the new water mains to the existing water mains as specified in the Contract Documents.

K. Bid Item No. 11: Furnish and Install Gate Valve and Valve Box

1. Description – Bid item shall include furnishing and installing all necessary materials, labor, tools, equipment, fittings, and appurtenances including gate valve, valve stem, ID tabs, valve box, extensions, top, restrained joints and concrete pads. This item also includes the excavation, dewatering and installation of concrete valve support and material below the valve in

accordance with the detail shown on the Drawings.

2. Measurement – Measurement of Item No. 11 will be by Each.
3. Payment – Payment for furnishing and installing gate valve and valve box will be made at the Contract unit price per each valve acceptably installed, complete in place.

L. Bid Item No. 12: Furnish and Install Automatic Air Release

1. Description – Bid item shall include furnishing and installing all materials, labor, tools, equipment, fittings, and appurtenances for complete in place automatic air release as specified and shown in Drawings and Contract Documents. This item includes polyethylene tubing/piping, bends, brass saddle, brass corporation stop, adapters, brass pipe, ball valve, automatic air release, enclosure, guide post, gravel, valve pad, and tracer wire.
2. Measurement – Measurement of Item No. 12 will be by Each.
3. Payment – Payment of furnish and install automatic air release will be made at the Contract unit price per automatic air release acceptably installed, complete in place.

M. Bid Item No. 13: Furnish and Install Bollards

1. Description – Bid item includes furnishing and installing all materials, labor, tools, equipment, fittings, and appurtenances for complete in-place bollards and posts as specified and shown in Drawings. This item includes concrete post and pipe, encasement footer, painting bollard, reflective tape, concrete pad, expansion joint if set adjacent to concrete pavement and foundation.
2. Measurement – Measurement of Item No. 13 will be by Each.
3. Payment – Payment of furnish and install bollards will be made at the Contract unit price per bollard post acceptably installed, complete in place.

N. Bid item No. 14: Permitting Allowance

1. Description – Allowance for local government permits and fees.
2. Measurement – No measurement shall be made for this item.
3. Payment – For the allowance for permits and fees shall be made to the Contractor based on the actual incurred cost by the Contractor for the payment of local government permits and fees. Contractor shall submit with their payment application, receipts and a copy of the applicable permits proving the actual cost incurred from the local government. Payment shall be made within and according to the allowance provided in the Bid Form which shall constitute full compensation for all costs attributed to the payment of all applicable local government permits and fees.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 29 73
SCHEDULE OF VALUES

PART 1 - GENERAL

1.01 GENERAL DESCRIPTION

- A. The Schedule of Values is a detailed itemized list that establishes the value or cost of each detailed part of the Work. It shall be used as the basis for preparing progress payments and may be used as a basis for negotiations concerning additional work or credits which may arise during construction. Quantities and unit prices shall be included in the schedule when approved by or required by the Engineer.

1.02 SUBMITTALS

- A. Schedule of Values

1.03 THE SCHEDULE OF VALUES

- A. Schedule shall show breakdown of labor, materials, equipment and other costs used in preparation of the Bid. Costs shall be broken down into unit prices where feasible.
- B. Costs shall be in sufficient detail to indicate separate amounts for each Section of the Specifications and subsection therein. Amounts shall be included for each type of work specified, in a manner approved by the Engineer.
- C. Use Table of Contents of Specifications as basis for Schedule format and identify each item with the corresponding number and title in the Table of Contents. List sub-items of major products or systems as appropriate or when requested by Engineer.
- D. When requested by Engineer, support values with data that will substantiate their correctness.
- E. The sum of the individual values shown on the Schedule of Values must equal the total Contract Price.
- F. Each item shall include a directly proportional amount of the Contractor's overhead and profit.
- G. Schedule shall show the purchase and delivery costs for materials and equipment and anticipated date of payment needed prior to their installation.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 32 16
CONSTRUCTION PROGRESS SCHEDULE

PART 1 - GENERAL

1.01 SUMMARY

- A. This section includes specific requirements for the preparation, submittal, updating, and status reporting of the Construction Progress Schedule.
- B. Review of the Critical Path Method (CPM) Schedule:
 - 1. The Contractor is solely responsible for its means and methods and the CPM schedule represents in part its means and methods, the review of the CPM schedules (preliminary, baseline, updates, revisions, etc.) is for compliance with the requirements as defined in the contract documents.
 - 2. The review of the CPM schedule is not intended to be complete or exhaustive or check every activity and its relation to the work.
 - 3. The Engineer will provide comments on the CPM schedule compliance with those contract requirements and anomalies that might appear to the Engineer.
 - 4. If the Contractor fails to include contract requirements (e.g. specified cure times, commissioning periods) in the CPM schedule, or the Engineer fails to notify the Contractor of anomalies the Contractor is not relieved of the contract requirements.
 - 5. Acceptance of the CPM schedule does not imply that the Owner has approved or accepted the Contractor's means and methods or sequence for performing the work to construct the project.
 - 6. If the Contractor has questions or concerns about comments, the Contractor and Engineer shall meet to resolve those issues prior to issuance of future updates or revisions.

1.02 QUALITY ASSURANCE

- A. The person preparing, updating and revising the Construction Progress Schedule shall be experienced in the preparation of schedules of similar complexity.

1.03 DEFINITIONS

- A. The following definitions shall apply to this Section:
 - 1. EXECUTION OF THE CONTRACT: The date the contract is signed by the last party, either the Owner or the Contractor.
 - 2. PRELIMINARY SCHEDULE: A schedule showing detailed activity for the first 90 days of the Project, and a general work plan for construction activity from

the 91st day until the Contractual Completion Date.

3. **BASELINE SCHEDULE:** The initial detailed Progress Schedule prepared by the Contractor defining its plan for constructing the Project in accordance with the Contract Documents.
4. **SCHEDULE UPDATE:** The initially accepted Baseline Schedule, or subsequently approved Revised Baseline Schedules, updated each month to reflect actual start and finish dates of each schedule activity and the remaining duration of activities that began during the period.
5. **CURRENT SCHEDULE:** The current schedule is either the Baseline Schedule or Revised Baseline Schedule including and incorporating Schedule Updates.
6. **REVISED BASELINE SCHEDULE:** The initially accepted Baseline Schedule revised to reflect approved contract change orders and modifications.
7. **RECOVERY SCHEDULE:**
 - a. A schedule indicating the Contractor's plan for recovering lost time.
 - b. A recovery schedule will be requested when the Contractor is forecasting at least 10 working days or more delays in meeting a contract milestone or the contract completion date.
8. **SHORT INTERVAL SCHEDULE:**
 - a. Schedule prepared by the Contractor reflecting the work planned for the coming weeks.
 - b. This is also known as a Look-Ahead Schedule.
9. **RESOURCES:** Manpower, materials, permanent equipment, and construction equipment needed to construct the work.

1.04 SUBMITTALS

- A. **Project Schedule Preparation:**
 1. Within five (5) working days of Execution of the Contract, Contractor shall submit the name of the person responsible for the preparation, maintenance, updating and revision of all schedules.
- B. **Preliminary Schedule:**
 1. **Submittal and review:**
 - a. Submit within ten (10) days after Execution of the Contract or the effective date of the contract, whichever is earlier.
 2. **Submittal package:**

- a. Provide a detailed plan for the first ninety (90) days of the project and summary activities of the work to achieve the project milestones.
 - b. CPM time-scaled network diagram:
 - 1) A printed logic diagram and PDF that include the following information:
 - a) Unique activity number/identifier; numeric, alpha or combination of numeric/alpha.
 - b) Activity description.
 - c) Activity duration.
 - d) Early start and early finish for each activity.
 - e) Late start and late finish for each activity.
 - f) Total float (TF) for each activity.
 - g) Predecessor activities.
 - h) Successor activities.
 - i) Bar showing the early start and completion dates of each activity.
 - 2) The activities will be sorted by area, trades, and subcontractors as agreed on with the Engineer.
 - 3) Print the CPM time-scaled network diagram on minimum sheet size of 11" x 17".
- C. Baseline Schedule and Narrative Report:
1. Submittal and review:
 - a. Submit within thirty (30) days after Execution of the Contract or the effective date of the contract, whichever is earlier.
 - b. The Engineer shall review the baseline schedule and provide comments to the Contractor within twenty (20) working days after receipt of the schedule.
 - c. After receiving comments, the Contractor and Engineer shall meet to review the comments within five (5) working days.
 - d. After the meeting, the Contractor will modify the schedule as agreed and resubmit the baseline schedule within 5 working days.
 - e. After the Engineer confirms that the Contractor has made the changes as agreed, the schedule will become the baseline schedule.
 2. Submittal package:
 - a. CPM time-scaled network diagram:

- 1) A printed logic diagram and PDF that include the following information:
 - a) Unique activity number/identifier; numeric, alpha or combination of numeric/alpha.
 - b) Activity description.
 - c) Activity duration.
 - d) Early start and early finish for each activity.
 - e) Late start and late finish for each activity.
 - f) Total float (TF) for each activity.
 - g) Predecessor activities.
 - h) Successor activities.
 - i) Cost/budget to complete the work in the activity.
 - j) Resources needed to complete the activity.
 - k) Bar showing the early start and completion dates of each activity.
 - 2) The activities will be sorted by area, trades, and subcontractors as agreed on with the Engineer.
 - 3) Print the CPM time-scaled network diagram on minimum sheet size of 11" x 17".
 - 4) Provide electronic data in accordance with the Early Completion paragraph in the GENERAL REQUIREMENTS Article.
- b. Narrative report:
- 1) The Contractor shall provide a Narrative Report along with the CPM time-scaled network diagram that will include the following information:
 - a) Executive Summary explaining how the Contractor plans to execute its plan to construct the project.
 - b) Assumptions used to develop the schedule.
 - c) Constraints included in the schedule as defined by the Contract Documents.
 - d) The critical path and near critical path activities with an explanation of why those activities are included on those paths.
 - e) Number of planned working days per week including shifts per day.
 - f) Manpower plan including craft on site per day.
 - g) Production rates assumptions.

- h) Major equipment planned for the project and durations for their use.
 - i) Resource constraints.
 - j) Identification of unusual conditions or restrictions regarding labor, equipment or material.
 - k) Calendar(s) used in the contract and how the multiple calendars are used.
 - l) Holidays observed during construction.
- D. Schedule Updates Including:
- 1. Submittal and Review:
 - a. The Contractor shall provide a Schedule Update on the fourth day of each month after the Baseline Schedule is completed.
 - b. The Engineer shall provide comments to the Contractor on the Schedule Update.
 - c. The Contractor shall incorporate the Engineer comments into the next Schedule Update.
 - 2. CPM time-scaled network diagram as described for the Baseline Schedule:
 - a. Do not change the description of an activity number.
 - 1) Any activity added to the schedule shall have a new unique activity number and description.
 - 2) If activities are deleted, the deleted activity number(s) will not be used again.
 - 3. Narrative Schedule Report identifying the following:
 - a. Provide a narrative report with each Schedule Update detailing the work completed during the month, any changes to the schedule logic, any changes to activity durations, any changes to the critical path, and any changes to assumptions for constructing the Work, including assumed constraints included in the schedule as defined by the Contract Documents, permits, or the Contractor.
 - b. Indicate the reasons the Contractor made the changes to logic, durations, and the critical path.
- E. Revised Baseline Schedule:
- 1. Submittal and Review:
 - a. Provide a Revised Baseline Schedule to reflect approved Change Orders as requested by the Engineer.

- 1) Submit with ten (10) working days
 - b. Activities will be added, or the durations modified to reflect the work approved in change orders.
 - c. The Engineer will review and provide comments to the Contractor on the Revised Baseline Schedule within five (5) working days.
 - d. Incorporate the Engineer comments into the Revised Baseline Schedule.
 - e. After acceptance by the Engineer, the Revised Baseline Schedule, use for future Schedule Updates.
2. CPM time-scaled network diagram as described for the Baseline Schedule:
 - a. Do not change the description of an activity number.
 - 1) Any activity added to the schedule shall have a new activity number and description.
 - 2) If activities are deleted, the deleted activity number(s) will not be used again.
 3. Provide a narrative with an explanation of the changes in logic, duration of activities.
- F. Recovery Schedule:
1. When the activities on the critical path or the completion milestones appear to be beyond the contract time, the Engineer may request, and the Contractor shall provide a Recovery Schedule demonstrating how the Contractor will recover the lost time so that the Work will be completed within the Contract Time.
 2. Provide the Recovery schedule within ten (10) working days after requested by the Engineer and/or Owner.
 3. Activities will be added, or the durations modified, to reflect the changes to the work.
 4. The Engineer will review and provide comments to the Contractor on the Recovery Schedule within five (5) working days.
 5. Incorporate the Engineer comments into the Recovery Schedule.
 6. After acceptance by the Engineer, the Recovery Schedule use for future Schedule Updates.
 7. CPM time-scaled network diagram as described for the Baseline Schedule:
 - a. Do not change the description of an activity number.
 - 1) Any activity added to the schedule shall have a new activity number

and description.

- 2) If activities are deleted, the deleted activity number(s) will not be used again.

8. Provide a narrative with an explanation of the changes in logic and/or activity durations.

G. Short Interval Schedule:

1. Provide a four-week schedule each week during the Contract Time. This schedule can be reviewed at each progress meeting.
 - a. Provide an accurate representation of the work performed the previous week and work planned for the current week and subsequent three (3).
2. Provide in a tabular format with bars or other graphic representing work duration.
 - a. Reference activity ID numbers on the Baseline, Revised Baseline, or Updated Schedule, whichever is being currently used.
 - b. Note by color, highlight or underscore all activities on the critical path.
3. Identify inspection hold points including special inspections needed before the Contractor can move forward with the work.
4. Identify the day materials provided by the Owner or others needed on site.
5. Identify utility tie-ins and traffic changes including road and/or lane closures.

1.05 GENERAL REQUIREMENTS

A. Prepare and submit construction progress schedules as specified herein.

1. Develop and maintain Baseline, Updates and Recovery schedules using software as approved by Owner.
 - a. Scheduling Software Features:
 - 1) The following specific features are not allowed to be applied in the Baseline and Record Schedules:
 - a) Resource leveling.
 - b) Activity or event constraints, other than those specified by the Contract Documents.
 - 2) Durations shall have positive values.
 - b. Default progress data:
 - 1) Start and finish dates shall not be automatically updated.

- 2) Update with actual start and finish dates documented from field reports.
 - 3) Update work activities by actual Work progression, not cash flow driven.
 - 4) Updating of activity percent complete and remaining duration shall be independent functions, not one parameter calculated from the other.
 - 5) Out-of-sequence progress shall be accounted for through retained logic, not a default option of progress override.
2. Include the following information:
- a. Construction start dates (Award date, Notice(s) to Proceed date).
 - b. Procurement activities.
 - c. Preparation of key submittals for materials and equipment.
 - d. Engineers review and approval of key submittals.
 - e. Material and equipment fabrication lead times.
 - f. Material and equipment deliveries for Contractor, Owner and third parties.
 - g. Water curing of concrete after placement for all structures
 - h. Shutdowns.
 - i. Utility tie-ins.
 - j. Plant tie-ins.
 - k. Traffic changes and closers.
 - l. Inspections and hold points.
 - m. Startup of equipment.
 - n. Testing of equipment and systems.
 - o. Commissioning.
 - p. Contract milestones:
 - 1) Intermediate milestones.
 - 2) Substantial Completion Date.
 - 3) Physical Completion Date.
 - q. Costs for each activity.
 - r. Resources: Number of craft per day (not crews per day) for each activity and construction equipment planned for each activity.
3. Do not utilize any float suppression techniques or other software features that

effect the pure mathematical model calculating the critical path.

4. The following CPM schedule outputs will be rejected without further review:
 - a. Schedules indicating the start of the critical path at a date point or activity beyond the date of Notice to Proceed, or schedules indicating a discontinuous critical path from Notice to Proceed to Contract completion.
 - b. Schedules defining critical activities as those on a path or paths having some minimum value of float.
 - c. Schedules with multiple critical paths.
 - d. Schedules indicating a completion date beyond the contractual completion date.
- B. The number of activities shall be sufficient to assure adequate planning of the project, to permit monitoring and evaluation of progress, and to do an analysis of time impacts.
 1. Work activities shall not exceed durations of ten (10) days or two (2) weeks.
 - a. Procurement and fabrication activity durations may exceed 10 days or 2 weeks.
 2. Schedule activities shall include the following:
 - a. A clear and legible description.
 - b. At least one (1) predecessor and one (1) successor activity, except for project start and finish milestones.
- C. Early Completion Schedule:
 1. Contractor may show early completion time on any schedule provided that the requirements of the contract are met.
 2. Contractor may increase early completion time by improving production, reallocating resources to be more efficient, performing sequential activities concurrently or by completing activities earlier than planned.
 3. Any time between the Contractor's early completion and the Contract Time will be considered float.
- D. Plan working durations to incorporate the effects of normal weather impacts.
- E. Float:
 1. The project owns the float, therefore neither the Owner nor the Contractor has exclusive use of the float; the float can be used by either party.
 2. Once float is used, liability for delay of the project completion date rests with

the party actually causing delay to the project completion date.

1.06 TIME IMPACT ANALYSIS (TIA)

- A. The Contractor shall provide a TIA to support all requests for increases to the Contract Time.
- B. The Contractor shall use the Current Schedule to develop the TIA.
 - 1. The TIA must be attached to any change order proposal prior to approval of any change to time or cost when requesting additional time.
 - 2. Contractor shall submit a written narrative report to the Engineer with each request for adjustment to the Contract Time, or when Contractor or Engineer consider that an approved or anticipated change may impact the critical path or progress of the work.
 - a. Include a description of delaying factors and their impact with an explanation of corrective actions taken or proposed.
 - b. The TIA shall illustrate the impacts of each change or delay on the current scheduled completion date or internal milestone, as appropriate.
 - c. The analysis shall use the schedule that has a data date closest to and prior to the event or change.
 - d. The analysis shall identify the activities on the critical path prior to the event or change, the activities added or extended as a result of the event or change, and the impact of those changes on the critical path activities.
 - e. The analysis shall identify the impacts that the Contractor attributed to the change or Owner, those impacts that are the result of the Contractor's actions and those impacts that are considered concurrent.
 - f. If the impact schedule shows that incorporating the event modifies the critical path and scheduled completion date of the accepted CPM Schedule, the difference between scheduled completion dates of the two (2) schedules shall be equal to the adjustment of Contract Time.
- C. Contractor shall submit a TIA within fifteen (15) working days of receiving a written request for a TIA from the Engineer or after the event.
 - 1. Contractor shall allow the Engineer thirty (30) days after receipt to approve or reject the submitted TIA.
 - 2. All approved TIA schedule changes shall be shown on the next Schedule Update.
- D. Rejections of a TIA:
 - 1. If a TIA submitted by the Contractor is rejected by the Engineer, the Contractor

shall meet with the Engineer to discuss and resolve issues related to the TIA.

2. If agreement is not reached, the Contractor will be allowed ten (10) working days from the meeting with the Engineer to give notice.
3. The Engineer will withhold a portion of the progress payment if a TIA is requested by Engineer and not submitted by Contractor within fifteen (15) working days.
4. The payment will resume on the next estimate after the requested TIA is submitted and accepted by the Engineer.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 32 21
FIELD ENGINEERING AND SURVEYING

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall provide and pay for field surveying services required for the project and for As-built survey data. A survey within the limits of project work is required prior to commencement of construction.
- B. The Contractor shall furnish and set all necessary stakes to establish the lines and grades as shown on the Contract Drawings and layout each portion of the Work of the Contract.
- C. The Contractor shall provide topographic survey of the subject area as required to confirm desired/final grades.

1.02 QUALIFICATION OF SURVEYOR AND ENGINEER

- A. All construction staking shall be conducted by or under the supervision of a Florida Registered Professional Surveyor and Mapper (PSM). The Contractor shall be responsible for the layout of all such lines and grades, which will be subject to verification by the Engineer. Professional Surveyor and Mapper shall physically walk the site during major construction staking/survey at least once. PSM shall verify survey and provide signed/sealed survey, Professional Surveyor and Mapper/Professional Engineer shall provide signed/sealed record drawings.

1.03 SURVEY REFERENCE POINTS

- A. Existing basic horizontal and vertical control points for the Project are designated on the Contract Drawings.

1.04 PROJECT SURVEY REQUIREMENTS

- A. The Contractor shall establish temporary benchmarks as needed, referenced to data established by survey control points.

1.05 RECORDS

- A. The Contractor shall employ a Professional Engineer or Surveyor registered in the State of Florida to verify survey data and properly prepare record drawings per Section 01 78 39 – Project Record Documents.
- B. Prepare final survey illustrating locations, dimensions, angles, and elevations of all Work and the relationship to permanent benchmarks and property lines.
- C. All elevations shall be referenced to N.A.V.D. 88.
- D. Include certification, signed by surveyor, that the survey meets State of Florida

applicable standards of practice for As-Built/Record Surveys.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 32 33
CONSTRUCTION PHOTOGRAPHY

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. The Contractor shall employ a competent photographer to take professional grade pre- and post- construction photography and videography construction record photographs or perform video recording including furnishing all labor, materials, equipment, and incidentals necessary to obtain photographs and/or video recordings of all construction areas.
- B. Preconstruction record information shall consist of video recordings on flash drives, or portable hard drives.
- C. Construction progress information shall consist of digital photographs.

1.02 QUALIFICATIONS

- A. All photography shall be done by a competent camera operator who is fully experienced and qualified with the specified equipment.
- B. For the video recording, the audio portion should be done by a person qualified and knowledgeable in the specifics of the Contract, who shall speak with clarity and diction to be easily understood.

1.03 PROJECT PHOTOGRAPHS

- A. Provide a minimum of one digital photograph with each pay application.
- B. The Contractor shall pay all costs associated with the required photography and prints. Any parties requiring additional photography or prints shall pay the photographer directly.
- C. Each digital photograph shall have clearly identified in the file name with the name of the project, the orientation of view, and the date, and time of exposure.
- D. All project photographs shall be taken from locations to adequately illustrate conditions prior to construction, or conditions of construction and state of progress. The Contractor shall consult with the Owner at each period of photography for instructions concerning views required.

1.04 VIDEO RECORDINGS

- A. Video recording shall be done along all equipment access routes and within the project construction limits. Video recording shall include full recording of both sides of all access routes and within a ten (10) foot radius of project construction limits at the Jobsite. All video recording shall be in full color.

- B. A complete view, in sufficient detail, with audio description of the exact location shall be provided.
- C. The Plans shall be used as a reference for stationing in the audio portion of the recordings for easy location identification.
- D. Two complete sets of video recordings shall be delivered to the Owner for the permanent and exclusive use of the Owner prior to the start of any construction on the project.
- E. All video recordings shall contain the name of the project, the date and time of the video recording, the name and address of the photographer, and any other identifying information required.
- F. Construction shall not start until preconstruction video recordings are completed, submitted and accepted by the Owner. In addition, no progress payments shall be made until the preconstruction video recordings are accepted by the Owner.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Mechanics and administration of the submittal process for:
 - a. Shop Drawings.
 - b. Samples.
 - c. Informational submittals.
2. General content requirements for Shop Drawings.

1.02 DEFINITIONS

- A. Shop Drawings: drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.
- B. Product Data: illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.
- C. Samples: physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.
- D. Informational Submittals: Submittals other than Shop Drawings and samples required by the Contract Documents that do not require review and/or approval by the Owner or Engineer.
 1. Representative types of informational submittal items include but are not limited to:
 - a. Manufacturer's installation certification letters.
 - b. Warranties.
 - c. Service agreements.
 - d. Construction photographs.
 - e. Survey data.
 - f. Health and safety plans.
 - g. Work plans.
 - h. Delegated designs per performance specification requirements.

2. For-Information-Only submittals upon which the Engineer is not required to conduct review or take responsive action may be so identified in the Contract Documents.

1.03 SUBMITTAL SCHEDULE

A. Schedule of Shop Drawings:

1. Submit to Owner and Engineer within 10 days of Notice to Proceed.
2. Account for multiple transmittals under any specification section where partial submittals will be transmitted.

B. Shop Drawings: Submittal and approval prior to 30 percent completion of project.

C. Informational Submittals:

1. Reports and installation certifications submitted within seven (7) days of conducting testing, installation, or examination.
2. Submittals showing compliance with required qualifications submitted twenty (20) days prior to any work beginning using the subject qualifications.

1.04 PREPARATION OF SUBMITTALS

A. General:

1. All submittals and all pages of all copies of a submittal shall be completely legible.
2. Submittals which, in the Engineer's sole opinion, are illegible will be returned without review.
3. Minimize extraneous information for equipment and products not relevant to the submittal.
4. Contractors or vendors written comments on the submittal drawings shall be in green.

B. Shop Drawings, Product Data, and Samples:

1. Scope of any submittal and letter of transmittal shall be limited to one (1) Specification Section.
2. Do not submit under any Specification Section entitled (in part) "Basic Requirements" unless the product or material submitted is specified, in total, in a "Basic Requirements" Specification Section.
3. Numbering letter of transmittal:
 - a. Include as prefix the Specification Section number followed by a series number, "-xx", beginning with "01" and increasing sequentially with each additional transmittal for that Specification Section.
 - b. If more than one (1) submittal under any Specification Section, assign consecutive series numbers to subsequent transmittal letters.

4. Describing transmittal contents:
 - a. Provide listing of each component or item in submittal capable of receiving an independent review action.
 - b. Identify for each item:
 - 1) Manufacturer and Manufacturer's Drawing or data number.
 - 2) Contract Document tag number(s).
 - 3) Unique page numbers for each page of each separate item.
 - c. When submitting "or-equal" items that are not the products of named manufacturers include the words "or-equal" in the item description.
5. Contractor certification of review and approval:
 - a. Contractor shall provide a cover page with each submittal with certification from the Contractor indicating they have reviewed and approved the submittal contents. Cover page shall clearly identify the person who reviewed the submittal and the date it was reviewed.
 - b. Submittals containing multiple independent items shall be prepared with each item listed on the letter of transmittal or on an index sheet for all items listing the discrete page numbers for each page of each item, which shall be stamped with the Contractor's review and approval stamp.
 - 1) Each independent item shall have a cover sheet with the transmittal number and item number recorded.
 - a) Provide clear space of three square inches for Engineer stamping. Any comments from Engineer are to be differentiated by color.
 - 2) Individual pages or sheets of independent items shall be numbered in a manner that permits the entire contents of a particular item to be readily recognized and associated with Contractor's certification.
6. Resubmittals:
 - a. Number with original Specification Section and series number with a suffix letter starting with "A" on a (new) duplicate transmittal form.
 - b. Do not increase the scope of any prior transmittal.
 - c. Provide cover letter indicating how outstanding or rejected items from previous submittal was addressed and where the correction is found in the resubmittal.
 - d. Account for all components of prior transmittal.
 - 1) If items in prior transmittal were marked EXCEPTIONS NOTED or REVISE AND RESUBMIT, include in resubmittal specific details on how these items have been addressed.

- 2) Indicate "Outstanding-To Be Resubmitted at a Later Date" for any item marked REVISE AND RESUBMIT or REJECTED item not included in resubmittal.
 - a) Contractor shall obtain Engineer's prior approval to exclude items.
7. Contractor shall not use red color for marks on transmittals.
 - a. Duplicate all marks on all copies transmitted, and ensure marks are photocopy reproducible.
 - b. Engineer will use red marks or enclose marks in a cloud.
8. Transmittal contents:
 - a. Coordinate and identify Shop Drawing contents so that all items can be easily verified by the Engineer.
 - b. Provide submittal information or marks defining specific equipment or materials utilized on the Project.
 - 1) Generalized product information, not clearly defining specific equipment or materials to be provided, will be rejected.
 - c. Identify equipment or material project use, tag number, Drawing detail reference, weight, and other Project specific information.
 - d. Provide sufficient information together with technical cuts and technical data to allow an evaluation to be made to determine that the item submitted is in compliance with the Contract Documents.
 - e. Do not modify the manufacturer's documentation or data except as specified herein.
 - f. Submit items such as equipment brochures, cuts of fixtures, product data sheets or catalog sheets not exceeding 11" x 17" pages. Indicate exact item or model and all options proposed by arrow and leader.
 - g. When a Shop Drawing submittal is called for in any Specification Section, include as appropriate, scaled details, sizes, dimensions, performance characteristics, capacities, test data, anchoring details, installation instructions, storage and handling instructions, color charts, layout Drawings, rough-in diagrams, wiring diagrams, controls, weights and other pertinent data in addition to information specifically stipulated in the Specification Section.
 - 1) Arrange data and performance information in format similar to that provided in Contract Documents.
 - 2) Provide, at minimum, the detail specified in the Contract Documents.
 - h. If proposed equipment or materials deviate from the Contract Drawings or

Specifications in any way, clearly note the deviation and justify the said deviation in detail in a separate letter immediately following transmittal sheet. Any deviation from plans or specifications not depicted in the submittal or included but not clearly noted by the Contractor may not have been reviewed. Review by the Engineer shall not serve to relieve the Contractor of the contractual responsibility for any error or deviation from contract requirements.

9. Samples:

a. Identification:

- 1) Identify sample as to transmittal number, manufacturer, item, use, type, project designation, tag number, Specification Section or Drawing detail reference, color, range, texture, finish and other pertinent data.
- 2) If identifying information cannot be marked directly on sample without defacing or adversely altering samples, provide a durable tag with identifying information securely attached to the sample.

b. Include application specific brochures, and installation instructions.

c. Provide Contractor's review and approval certification stamp as indication of Contractor's checking and verification of dimensions and coordination with interrelated work.

d. Resubmit revised samples of rejected items.

C. Informational Submittals:

1. Prepare in the format and detail specified in the respective Specification Section requiring the informational submittal.

1.05 TRANSMITTAL OF SUBMITTALS

A. Electronic Transmission of Submittals:

1. Transmittals shall be made electronically.
2. Provide documents in Adobe Acrobat Portable Document Format (PDF), latest version.
3. Do not password protect or lock the PDF document.
4. Drawings or other graphics must be converted to PDF file format from the original drawing file format and made part of the PDF document.
 - a. Scanning of drawings is to be used only where actual file conversion is not possible and drawings must be scanned at a resolution of 300 dpi or greater.
 - b. Required signatures may be applied prior to scanning for transmittal.
5. Electronic drawings shall be formatted to be at full-scale (or half-scale when printed to 11"x17").

- a. Do not reduce drawings by more than 50% in size.
 - b. Reduced drawings shall be clearly marked "HALF-SIZE" and shall scale accurately at that size.
6. Rotate sheets that are normally viewed in landscape mode so that when the PDF file is opened the sheet is in the appropriate position for viewing.
7. File naming conventions:
- a. File names shall use a "ten dot three" convention (XXXXXX-YY-Z.PDF) where XXXXXX is the Specification Section number, YY is the Shop Drawing Root number and Z is an ID number used to designate the associated volume.

1.06 ENGINEER'S REVIEW ACTION

A. Shop Drawings and Samples:

1. Items within transmittals will be reviewed for overall design intent and will receive one (1) of the following actions:
 - a. NO EXCEPTIONS TAKEN
 - b. CORRECTIONS NOTED
 - c. REJECTED
 - d. VERIFY AND MAKE CORRECTIONS
 - e. FOR INFORMATION ONLY
2. Submittals received will be initially reviewed to ascertain inclusion of Contractor's approval stamp.
 - a. Submittals not stamped by the Contractor or stamped with a stamp containing language other than that specified herein will not be reviewed for technical content and will be returned rejected.
3. In relying on the representation on the Contractor's review and approval stamp, Owner and Engineer reserve the right to review and process poorly organized and poorly described submittals as follows:
 - a. Submittals transmitted with a description identifying a single item and found to contain multiple independent items:
 - 1) Review and approval will be limited to the single item described on the transmittal letter.
 - 2) Other items identified in the submittal will:
 - a) Not be logged as received by the Engineer.
 - b) Be removed from the submittal package and returned without review and comment to the Contractor for coordination, description

and stamping.

- c) Be submitted by the Contractor as a new series number, not as a resubmittal number.
 - d) Engineer, at Engineer's discretion, may revise the transmittal letter item list and descriptions, and conduct review.
- 3) Unless Contractor notifies Engineer in writing that the Engineer's revision of the transmittal letter item list and descriptions was in error, Contractor's review and approval stamp will be deemed to have applied to the entire contents of the submittal package.
4. Submittals returned with as NO EXCEPTIONS or CORRECTIONS NOTED are considered ready for fabrication and installation.
- a. If for any reason one of these submittals is resubmitted, it must be accompanied by a letter defining the changes that have been made and the reason for the resubmittal.
 - b. Previous versions of the submittal shall be destroyed or conspicuously mark "SUPERSEDED."
5. Submittals marked VERIFY AND MAKE CORRECTIONS or REJECTED will be individually analyzed giving consideration as follows:
- a. If a portion of the submittal was marked as such, that portion of the submittal will not be distributed (unless previously agreed to otherwise at the Preconstruction Conference).
 - 1) One (1) copy of the Drawings will be marked up and returned to the Contractor.
 - a) Contractor shall correct and resubmit items so marked.
 - 2) The portion of the submittal with items marked NO EXCEPTIONS or CORRECTIONS NOTED will be fully distributed.
 - c. If a portion of the items or system proposed are acceptable, however, the major part of the individual Drawings or documents are incomplete or require revision, the entire submittal may be given VERIFY AND MAKE CORRECTIONS or REJECT Action.
 - 1) This is at the sole discretion of the Engineer.
 - 2) In this case, some Drawings may contain relatively few or no comments or the statement, "Resubmit to maintain a complete package."
 - 3) Distribution to the Owner and manufacturer will not be made (unless previously agreed to by the Engineer).

6. Failure to include any specific information specified under the submittal paragraphs of the Specifications will result in the submittal being returned to the Contractor and marked as such.
7. Calculations required in individual Specification Sections will be received for information purposes only, as evidence calculations have been stamped by the professional as defined in the specifications and for limited purpose of checking conformance with given performance and design criteria. The Engineer is not responsible for checking the accuracy of the calculations and the calculations will be returned stamped FOR INFORMATION ONLY to acknowledge receipt.
8. Contractor shall furnish required submittals with sufficient information and accuracy to obtain required approval of an item with no more than three (3) submittals. Engineer will record Engineer's time for reviewing a subsequent submittal of a Shop Drawing, sample, or other item requiring approval, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges.
9. Transmittals of submittals which the Engineer considers as "Not Required" submittal information, which is supplemental to but not essential to prior submitted information, or items of information in a transmittal which have been reviewed and marked NO EXCEPTIONS TAKEN or CORRECTIONS NOTED in a prior submittal, will be returned with action FOR INFORMATION ONLY.
10. Samples may be retained for comparison purposes.
 - a. Contractor shall remove samples when directed.
 - b. Include in bid all costs of furnishing and removing samples.
11. Approved samples submitted or constructed, constitute criteria for judging completed work.
 - a. Finished work or items not equal to samples will be rejected.
12. Review time by the Engineer shall be no more than two weeks after receipt of documents, samples, and submittals.

1.07 RECORD KEEPING

- A. The Contractor shall maintain an accurate, up-to-date submittal log. This log should include the following items:
 - a. Submittal, Description and Number assigned.
 - b. Date submitted to Owner/Engineer.
 - c. Date returned from Owner/Engineer.

- d. Status of Submittal (No Exceptions Taken, Reviewed as Modified, Revise and Resubmit, Not Reviewed/Rejected).
- e. Date of Resubmittal and Return (as applicable).
- f. Date material released (for fabrication or delivery, as applicable).
- g. Projected date of fabrication (as applicable).
- h. Projected date of delivery to site.
- i. Projected date and required lead time so that product installation does not delay contact.
- j. Status of O&M manuals submitted (as applicable).

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 40 40
QUALITY REQUIREMENTS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Material and equipment incorporated into the Work:
1. Conform to applicable specifications and standards.
 2. Comply with size, make, type, and quality specified, or as specifically approved in writing by the Owner.
 3. Manufactured and Fabricated Products:
 - a. Design, fabricate and assemble in accordance with the best engineering and shop practices.
 - b. Manufacture like parts of duplicate units to standard sizes and gages, to be interchangeable.
 - c. Two or more items of the same kind shall be identical and manufactured by the same manufacturer.
 - d. Products shall be suitable for service conditions.
 - e. Equipment capacities, sizes, and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.
 4. Do not use material or equipment for any purpose other than that for which it is specified.
 5. All material and equipment incorporated into the project shall be new.

1.02 MANUFACTURER'S INSTRUCTIONS

- A. When Contract Documents require that installation of work shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in the installation, including two (2) copies to Owner. Maintain one (1) set of complete instructions at the job site during installation and until completion.
- B. Handle, install, connect, clean, condition, and adjust products in strict accordance with such instructions and in conformity with specified requirements. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with Owner prior to proceeding. Do not proceed with work without clear instructions.

1.03 TRANSPORTATION AND HANDLING

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

1. Deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.
 2. Immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and approved submittals and that products are properly protected and undamaged.
- B. Provide equipment and personnel to handle products by methods to prevent soiling or damage to products or packaging.

1.04 SUBSTITUTIONS AND PRODUCT OPTIONS

A. Contractor's Options:

1. For products specified only by reference standard, select any product meeting that standard.
2. For products specified by naming one or more products or manufacturers and "or equal", Contractor must submit a request for substitutions of any product or manufacturer not specifically named in a timely manner so as not to adversely affect the construction schedule.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 51 00
TEMPORARY UTILITIES

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. The Contractor shall be responsible for furnishing all requisite temporary utilities, i.e., power, water, sanitation, etc. The Contractor shall obtain and pay for all permits required as well as pay for all temporary usages. The Contractor shall remove all temporary facilities upon completion of work.

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

- A. Materials for temporary utilities may be "used". Materials for electrical utilities shall be adequate in capacity for the required usage, shall not create unsafe conditions and shall not violate requirements of applicable codes and standards.

2.02 TEMPORARY ELECTRICITY AND LIGHTING

- A. Arrange with the applicable utility company for temporary power supply. Provide service required for temporary power and lighting and pay all costs for permits, service and for power used.

2.03 TEMPORARY WATER

- A. The Contractor shall arrange with the Owner utilities to provide water for construction purposes. The Contractor shall coordinate meter, pay for all costs including installation, maintenance and removal, and service charges for water used, as applicable.
- B. The Contractor shall protect piping and fittings against freezing.

2.04 TEMPORARY SANITARY FACILITIES

- A. The Contractor shall provide sanitary facilities in compliance with all laws and regulations.
- B. The Contractor shall service, clean and maintain facilities and enclosures.

PART 3 - EXECUTION

3.01 GENERAL

- A. The Contractor shall maintain and operate systems to assure continuous service.
- B. The Contractor shall modify and extend systems as work progress requires.

3.02 REMOVAL

- A. The Contractor shall completely remove temporary materials and equipment when their use is no longer required.
- B. The Contractor shall clean and repair damage caused by temporary installations or use of temporary facilities.

END OF SECTION

SECTION 01 66 00

PRODUCT STORAGE AND HANDLING REQUIREMENTS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Provide secure storage products to be incorporated into the Work and maintenance until completion of Work.

1.02 STORAGE

- A. Store products immediately on delivery and protect until installed in the Work, in accordance with manufacturer's instructions, with seals and labels intact and legible.

- B. Exterior Storage

- 1. Provide substantial platform, blocking or skids to support fabricated products above ground to prevent soiling or staining.
 - a. Cover products, subject to discoloration or deterioration from exposure to the elements, with impervious sheet coverings. Provide adequate ventilation to avoid condensation.
 - b. Prevent mixing of refuse or chemically injurious materials or liquids.

- C. Arrange storage in manner to provide easy access for inspection.

1.03 MAINTENANCE OF STORAGE

- A. Maintain periodic system of inspection of stored products on scheduled basis to assure that:

- 1. State of storage facilities is adequate to provide required conditions.
- 2. Required environmental conditions are maintained on continuing basis.
- 3. Surfaces of products exposed to elements are not adversely affected. Any weathering of products, coatings and finishes is not acceptable under requirements of these Contract Documents.

- B. Mechanical and electrical equipment which requires servicing during long term storage shall have complete manufacturer's instructions for servicing accompanying each item, with notice of enclosed instructions shown on exterior of package.

- 1. Equipment shall not be shipped until approved by the Owner. The intent of this requirement is to reduce on-site storage time prior to installation and/or operation. Under no circumstances shall equipment be delivered to the site more than one month prior to installation without written authorization from the Owner.
- 2. All equipment having moving parts such as gears, electric motors, etc. and/or

instruments shall be stored in a temperature and humidity-controlled building approved by the Owner until such time as the equipment is to be installed.

3. All equipment shall be stored fully lubricated with oil, grease, etc. unless otherwise instructed by the manufacturer.
4. Moving parts shall be rotated a minimum of once weekly to ensure proper lubrication and to avoid metal-to-metal "welding". Upon installation of the equipment, the Contractor shall start the equipment, at least half load, once weekly for an adequate period of time to ensure that the equipment does not deteriorate from lack of use.
5. Lubricants shall be changed upon completion of installation and as frequently as required, thereafter during the period between installation and acceptance.
6. Prior to acceptance of the equipment, the Contractor shall have the manufacturer inspect the equipment and certify that its condition has not been detrimentally affected by the long storage period. Such certifications by the manufacturer shall be deemed to mean that the equipment is judged by the manufacturer to be in a condition equal to that of equipment that has been shipped, installed, tested, and accepted within a certain amount of time. As such, the manufacturer will guaranty the equipment equally in both instances. If such a certification is not given, the equipment shall be judged to be defective. It shall be removed and replaced at the Contractor's expense.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 74 01
CLEANING AND WASTE MANAGEMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes intermediate and final cleaning of Work not including special cleaning of closed systems specified elsewhere.

1.02 STORAGE AND HANDLING

- A. Store cleaning products and cleaning wastes in containers specifically designed for the materials being stored.

1.03 SCHEDULING

- A. Schedule cleaning operations so that dust and other contaminants disturbed by cleaning process will not fall on newly painted surfaces.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Cleaning Agents:
 - 1. Compatible with surface being cleaned.
 - 2. New and uncontaminated.
 - 3. For Manufactured Surfaces: Material recommended by manufacturer.

PART 3 - EXECUTION

3.01 CLEANING – GENERAL

- A. Prevent accumulation of wastes that create hazardous conditions.
- B. Conduct cleaning and disposal operations to comply with laws and safety orders of governing authorities.
- C. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains or sewers.
- D. Dispose of degradable debris at an approved solid waste disposal site.
- E. Dispose of non-degradable debris at an approved solid waste disposal site or in an alternate manner approved by Engineer and regulatory agencies.
- F. Handle materials in a controlled manner with as few handlings as possible.
- G. On completion of work, leave area in a clean, natural looking condition.

1. Remove all signs of temporary construction and activities incidental to construction of required permanent Work.

H. Do not burn on-site, unless approved and authorized by the Owner and local agencies.

3.02 EXTERIOR (SITE) CLEANING

A. Cleaning During Construction:

1. Construction debris:
 - a. Confine in strategically located container(s):
 - 1) Cover to prevent blowing by wind.
 - 2) Haul from site minimum once a week.
 - b. Remove from work area to container daily.
2. Vegetation: Keep weeds and other vegetation trimmed to 3 IN maximum height.
3. Soils, sand, and gravel deposited on paved areas and walks:
 - a. Remove as required to prevent muddy or dusty conditions.
 - b. Do not flush into storm sewer system.

B. Final Cleaning:

1. Remove trash and debris containers from site and re-seed areas disturbed by location of trash and debris containers.
2. Clean paved roadways.

3.03 FIELD QUALITY CONTROL

- A. Immediately prior to Demonstration Period, conduct an inspection with Engineer and Owner to verify condition of all work areas.

END OF SECTION

SECTION 01 76 00
PROTECTING INSTALLED CONSTRUCTION

PART 1 - GENERAL

1.01 Requirements Included

- A. Provide secure protection for products to be incorporated into the Work and maintenance and protection for products after installation and until completion of Work.

1.02 Protection After Installation

- A. Provide protection of installed products to prevent damage from subsequent operations. Remove when no longer needed, prior to completion of work.
- B. Control traffic to prevent damage to equipment and surfaces.
- C. Provide coverings to protect finished surfaces from damage.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 78 39
PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.01 Requirements Included

- A. Contractor shall maintain at the site for the Owner one (1) record copy of:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Owner's field orders or written instructions.
 - 6. Approved shop drawings, working drawings and samples.
 - 7. Field test records.
 - 8. Construction photography.

1.02 Maintenance of Documents and Samples

- A. Store documents and samples in Contractor's field office apart from documents used for construction.
 - 1. Provide files and racks for storage of documents.
 - 2. Provide locked cabinet or secure storage space for storage of samples.
- B. File documents and samples in accordance with CSI format.
- C. Maintain documents in a clean, dry, legible, condition and in good order. Do not use record documents for construction purposes.
- D. Make documents and samples available at all times for inspection by the Owner.

1.03 Marking Devices

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

1.04 Recording

- A. Label each document "PROJECT RECORD" in neat large, printed letters.
- B. Record information concurrently with construction progress.
- C. Do not conceal any work until required information is recorded.
- D. Drawings; legibly mark to record actual construction:

1. All underground piping with elevations and dimensions. Changes to piping location. Horizontal and vertical locations of underground utilities and appurtenances referenced to permanent surface improvements. Actual installed pipe material, class, etc. Locations of drainage ditches, swales, water lines and force mains shall be shown every 200 feet (measured along the centerline) or alternate lot lines, whichever is closer. Dimensions at these locations shall indicate distance from centerline of right-of-way to the facility.
2. Certification as to the system meeting the minimum cover requirements.
3. Field changes of all fittings, bends, thrust blocks/anchors, joints, structures, dimension and detail.
4. Changes made by Field Order or by Change Order.
5. Details not on original contract drawings.
6. Equipment and piping relocations.
7. Locations of all valves, fire hydrants, manholes, water and sewer services, water and force main fittings, underdrain cleanouts, catch basins, junction boxes and any other structures located in the right-of-way or easement, shall be located by elevation and by station and offset based on intersection P.I.'s and centerline of right-of-way. For facilities located on private roads, the dimensioning shall be from centerline of paving or another readily visible baseline.
8. Elevations shall be provided for all manhole rim and inverts; junction box rim and inverts; water valves, air release valves and assemblies and hydrants; catch basin rim and inverts; and baffle, weir and invert elevations in control structures. Elevations shall also be provided at the point of vertical intersection (PVI's) and at every other lot line or 200 feet, whichever is less, of drainage swales and ditches. Benchmarks and elevation datum shall be indicated.
9. Slopes for pipes and ditches shall be recalculated, based on actual field measured distances, elevations, pipe sizes, and type shown. Cross section of drainage ditches and swales shall be verified.
10. Centerline of roads shall be tied to right-of-way lines. Elevation of roadway centerline shall be given at PVI's and at all intersections.
11. Record drawings shall show bearings and distances for all right-of-way and easement lines, and property corners.
12. Sidewalks, fences and walls, if installed at the time of initial record drawing submittal, shall be located every 200 feet or alternate lot lines, whichever is closer. Dimensions shall include distance from the right-of-way line and the back of curb and lot line or easement line.
13. Sanitary sewer mainline wyes shall be located from the downstream manhole. These dimensions shall be provided by on-site inspections or televising of the

sewer following installation.

14. Elevations shall be provided on the top of operating nuts for all water and force main valves.
15. Structures: Record drawings show the following information:
 - a. All slab elevations (top, bottom, intermediate).
 - b. Top elevations of all beams.
 - c. All horizontal locations including at least two corners for structures.
 - d. For buildings shown ridge elevation and eave elevation.
16. Equipment: Record drawings shall show the following information:
 - a. Centerline elevations of all new pipes and equipment.
 - b. Elevation of suction bells or pump intakes.
 - c. Equipment top elevations.
 - d. Distance between pumps (centerline to centerline).
 - e. Horizontal control for at least one corner, or center.
 - f. All equipment base elevations.
 - g. All motor and pump nameplate data. (This can be provided in summary form on a separate sheet).
17. Exterior Electrical/Instrumentation Conduits: Record drawings shall show the following information:
 - a. All horizontal and vertical control of all new and existing buried conduit. For existing buried conduit, identify only the size and material of said conduit that is exposed during construction activities.
 - b. Conduit material and size for all new conduits (shall be shown on the conduit/cable schedule).
 - c. Number and sizes of wires in each new conduit (shall be shown on the conduit/cable schedule).
 - d. Grounding system.
 - e. All primary element and transmitter nameplate data (This can be provided in summary form on a separate sheet).
18. Allowable tolerance shall be ± 6.0 inches for horizontal dimensions. Vertical dimensions such as the difference in elevations between manhole inverts shall have an allowable tolerance of $\pm 1/8$ inch per 50 feet (or part thereof) of horizontal distance up to a maximum tolerance of ± 2 inch.

19. Properly prepared record drawings, together with three hard copies and one electronic copy, shall be certified by a design professional (Engineer and/or Surveyor registered in the State of Florida), employed by the Contractor, and submitted to the Owner.

E. Specifications and Addenda; Legibly mark each Section to record:

1. Manufacturer, trade name, catalog number and supplier of each product and item of equipment actually installed.
2. Changes made by field order or by change order.

1.05 Submittal

- A. Prior to substantial completion and prior to starting the bacteria testing of water lines, deliver signed and sealed Record Documents and Record Drawings to the Owner. These will be reviewed and verified by the Engineer. If there are any required changes or additions, these shall be completed, and the entire signed and sealed set resubmitted prior to final pay application.
- B. The Contractor shall employ a Professional Engineer or Surveyor registered in the State of Florida to verify survey data and properly prepare record drawings. Record drawings shall be certified by the professional(s) (Engineer or Surveyor licensed in Florida), submitted on signed and sealed paper drawings together with an AutoCAD version on a recordable Hard Disk Drive or USB or similar within 14 days of the completion of the work.
- C. The USB shall contain media in AutoCAD Version 2018 or later, or in any other CAD program compatible with AutoCAD in DWG or DXF form. All fonts, line types, shape files or other pertinent information used in the drawing and not normally included in AutoCAD shall be included on the media with a text file or attached noted as to its relevance and use.
- D. Accompany submittal with transmittal letter, containing:
 1. Date.
 2. Project title and number.
 3. Contractor's name and address.
 4. Title and number of each Record Document.
 5. Signature of Contractor or his authorized representative.

Note: The data required to properly prepare these record drawings shall be obtained at the site, at no cost to the Owner by the responsible design professional or his/her duly appointed representative. The appointed representative shall be a qualified employee of the responsible design professional or a qualified inspector retained by the responsible design professional on a project-by-project basis.

1.06 Minimum Record Drawing Standards for All Record Drawings Submitted To Owner

- A. Record drawings shall be submitted to at least the level of detail in the contract documents. It is anticipated that the original contract documents shall serve as at least a background for all record information. Original drawings in CAD format may be requested of the Owner.
- B. Drawings shall meet the criteria of paragraph 1.04 D above.
- C. Record Drawings will need to meet all Owner requirements and standards.

PART 2 – PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 02 22 00

EXISTING UTILITIES AND UNDERGROUND STRUCTURES

PART 1 - GENERAL

1.01 GENERAL

- A. The Plans depict the approximate location of the existing utilities. The locations of facilities (horizontal and vertical) were obtained from existing aerial and GIS data. Existing utilities should be confirmed in the field.

1.02 CONTRACTOR'S RESPONSIBILITIES

- A. Call Sunshine 811 and locate the cables, ducts, conduit, pipeline, and all infrastructure and features within project limits in advance of any construction activities.
- B. Notify Engineer of any substantial changes and/or conflicts that would require a deviation in the Plans. Late discovery of existing underground utilities does not constitute "required" deviations if earlier discovery and/or discovery prior to Contractor's activities could have prevented such deviations.
- C. Notify Owner immediately of damage done to existing utilities and repair and/or replace and/or restore to previous conditions to the satisfaction of the Owner at no additional expense to the Owner.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 31 10 00
SITE CLEARING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Removing surface debris.
2. Removing designated pavement, sidewalks, and other existing features.
3. Removing designated trees, shrubs, and other plant life.

1.02 SUBMITTALS

- A. Product Data: Submit data for herbicide. Indicate compliance with applicable codes for environmental protection.

1.03 QUALITY ASSURANCE

- A. Conform to applicable code for environmental requirements and disposal of debris.
- B. Perform Work in accordance with Sarasota County Department of Transportation and Florida Department of Transportation Standard Specifications for Road and Bridge Construction and as shown and specified herein.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Identify waste area and salvage area for placing removed materials.

3.02 PREPARATION

- A. Contractor shall contact Sunshine 811 for location of existing utilities at 811 or 1-800-432-4770 a minimum of 48 hours prior beginning Work.
1. Request underground utilities to be located and marked within and surrounding construction areas.

3.03 PROTECTION

- A. Locate, identify, and protect utilities indicated to remain, from damage.
- B. Protect trees, plant growth, and features designated to remain.
- C. Protect benchmarks, survey control points, and existing structures from damage or displacement.

3.04 CLEARING

- A. Remove trees and shrubs within the clearing limits shown. Remove stumps and main root ball.
- B. Clear undergrowth and deadwood, without disturbing subsoil.
- C. Apply herbicide to remaining stumps to inhibit growth.

3.05 REMOVAL

- A. Remove debris, rock, and extracted plant life from Site.
- B. Partially remove paving, curbs, sidewalks, and other existing features as indicated on Drawings. Neatly saw cut concrete edges at right angle to surface.
- C. Remove abandoned utilities as shown. Indicated removal termination point for underground utilities on Record Documents.
- D. Continuously clean-up and remove waste materials from site. Do not allow materials to accumulate on site.
- E. Do not burn or bury materials on site. Leave site in clean condition.

END OF SECTION

SECTION 31 23 10
SURFACE RESTORATION

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Restoring and Maintaining Pavements and pavement bases.
 - 2. Restoring and Maintaining curbing, sidewalks, driveways, and grass surfaces.

1.02 COORDINATION

- A. Notify the utility owners which may have utilities in the project area and coordinate with them to avoid service interruptions and/or safety hazards as listed on the Contract Drawings.

1.03 QUALITY ASSURANCE

- A. The quality of workmanship and materials used in the restoration shall produce a surface equal to or better than the condition before the Work began.
- B. Prior to restoration, the Contractor shall saw cut and remove all existing pavement within 2 feet of the edge of the excavation, or within such widths as may be ordered by the Engineer.
- C. Prior to restoration, the Contractor shall saw cut and remove all existing pavement within 2 feet of the edge of the excavation, or within such widths as may be ordered by the Engineer.
- D. Compaction of soil and base materials shall be tested using the AASHTO T 180 method.
- E. Surface restoration workmanship and materials shall conform to the applicable sections of the FDOT-SSRBC.
- F. All dirt areas disturbed shall be restored by hydroseeding, unless otherwise specified.

PART 2 - PRODUCTS

2.01 SHELL BASE

- A. Shell base shall be constructed on the prepared subgrade to not less than 98 percent of maximum density, in accordance with the requirements of FDOT-SSRBC Section 200.
- B. The minimum compacted thickness of shell base shall conform to the detail shown on the Plans.

2.02 LIMEROCK BASE

- A. Limerock base shall be constructed on the prepared subgrade to not less than 98 percent of maximum density, in accordance with the requirements of FDOT-SSRBC Section 911. The minimum compacted thickness of limerock base shall conform to the detail shown on the Contract Drawings.

2.03 CRUSHED (RECLAIMED) CONCRETE BASE

- A. Crushed (reclaimed) concrete base shall be constructed on the prepared subgrade to not less than 98 percent of maximum density, in accordance with the requirements of FDOT SSRBC Section 204. The minimum compacted thickness of crushed (reclaimed) concrete base shall conform to detail shown on the Contract Drawings.
- B. The minimum limerock bearing ratio (LBR) value shall be 150.

2.04 ASPHALTIC CONCRETE BASE

- A. Prime coat shall be applied to the prepared base in accordance with FDOT-SSRBC Section 300 prior to permanent asphaltic concrete pavement.
- B. Unless specified elsewhere, all permanent asphaltic concrete pavement replacement shall be constructed in accordance with the requirements of FDOT-SSRBC Sections 320, 330, 334, and 337. Surface types and compacted thickness shall conform to the detail shown on the Contract Drawings.

2.05 EXPANSION JOINT MATERIAL

- A. Expansion joint material for concrete pavement surfaces, including sidewalks and driveways, shall be the bituminous strip type, ½-inch thick, and shall conform to applicable requirements of FDOT SSRBC Section 932.

PART 3 - EXECUTION

3.01 CURB AND GUTTER

- A. All permanent restoration of street curb, or curb and gutter, shall be of the same type and thickness as the curb, or curb and gutter, which abuts.
- B. The grade of the restored curb, or curb and gutter, shall conform to the grade of the existing adjacent curb, or curb and gutter, so that positive drainage is maintained.

3.02 CONCRETE SIDEWALK

- A. The restoration and construction of concrete sidewalks shall conform to applicable requirements of FDOT-SSRBC Section 522 and the Contract Drawings and shall be constructed where shown on the Contract Drawings and directed by the Owner. Sidewalk expansion joints with bituminous filler shall be installed at a maximum of 50-foot intervals on center and struck joints shall be spaced equidistant with walk width (joints wider than 6 feet shall be spaced as directed by the Owner). Where new construction is to be tied into existing facilities, the old material is to be removed back to the nearest construction joint, or sawcut to a straight line as directed by the City or Engineer. The soil under sidewalks and driveways shall be compacted to 98 percent of the maximum density.

- B. New sidewalks shall be 4-inches thick. Concrete pour for walk construction shall be made only on dampened subgrade. A soft broom finish shall be given the walk surface as directed by the Engineer.
- C. Sidewalks crossing driveways shall be constructed according to the Specifications for concrete driveways.
- D. Curb ramps for physically handicapped shall be constructed at all locations where sidewalks cross the curb or where directed by the Engineer. Those existing sidewalks which are removed to accomplish associated work as a part of this Project shall be replaced with a curb ramp when the sidewalk crosses the curb. The cost of curb ramps shall be included in the appropriate proposal item for sidewalk restoration.
- E. Where sidewalks are replaced, the replacement shall be the full width of the walk and the minimum length shall be 60 inches. Restoration of adjacent lawn is incidental to sidewalk replacement and no separate payment will be made therefore.

3.03 DRIVEWAY AND PARKING LOT

- A. Except as otherwise specified, all permanent restoration of base and surface of driveways, parking aprons, and sidewalks shall match the materials, thicknesses, elevations, lines, and grades of the existing construction, all to the Engineer's satisfaction. Patching of Portland cement driveway areas will not be allowed between joints or dummy joints.
- B. For areas where streets are to be paved, or where more than 50 percent of the driveway apron is disturbed, concrete or brick driveways shall be replaced in kind. All other driveways, including shell and dirt, shall be restored with an asphalt concrete surface from the street to the property line or front of sidewalk, as directed by the Owner or Engineer.
- C. All base compaction under driveways shall be to a minimum density of 98 percent of the maximum density.

3.04 DRIVEWAY – ASPHALT

- A. Residential asphalt driveway restoration shall include 1-inch thick asphaltic concrete surface over 2-inches of compacted sand-asphalt hot mix base, or 5-inches of compacted limerock or shell base.
- B. Commercial asphalt driveway restoration shall be constructed of 1-inch thick asphaltic concrete surface over 8-inches of limerock base compacted in 2 lifts.

3.05 DRIVEWAY – CONCRETE

- A. The restoration and construction of concrete driveways shall conform to applicable requirements of FDOT-SSRBC Section 522 and the Contract Drawings and shall be constructed where shown on the Contract Drawings and directed by the Owner or Engineer.
- B. Residential concrete driveway restoration shall be 5-inches thick and shall include placing a single layer of 6-inch by 6-inch wire mesh (WWF 6 x 6 - W1.4 x W1.4).
- C. Commercial concrete driveways shall be 6-inches thick with a double layer of 6-inch by 6-inch wire mesh (WWF 6 x 6 - W1.4 x W1.4).

3.06 GRASS

A. Sodding and Hydroseeding

1. Sod and hydroseed shall be planted as soon as practical after paving, pipeline, or other work has been completed. Hydroseeding shall always be used over sodding.
2. All work and materials shall meet the applicable requirements FDOT-SSRBC Section 570 (Sodding).
3. Sodding shall be done as directed by the Engineer, using only material which, in the opinion of the Engineer, is healthy and free of weeds, and (unless specified otherwise by the Engineer) of the same variety predominating at time of removal. Sod may be St. Augustine, Bahia, or other varieties as selected by the Engineer.
4. Sod shall be planted within 72 hours of being cut. Only moist, green sod having a virile root system may be planted. Sod shall be cut into adjacent sod to provide a smooth surface, and "top dressed" where necessary. Sod shall be rolled or tamped after planting to provide a uniform and consistent grade.

B. Grass Maintenance

1. The Contractor shall properly water and otherwise maintain all seeded and sodded areas for a minimum of 60 consecutive calendar days after completion of sodding and seeding operations. After the 60 days, and upon receipt of written request from the Contractor, the Engineer will inspect the areas for acceptance by the Owner. Any area that is washed or eroded, fails to show a uniform stand of healthy, vigorous grassing, or does not appear to be otherwise developing satisfactorily, shall be re-seeded and maintained until suitable for acceptance by the Engineer.
2. In the event that the stand of grass is found to be contaminated by weeds or other undesirable growth, the Contractor will be required to effectively eliminate such undesirable growth at his own expense.

END OF SECTION

SECTION 31 23 19

DEWATERING

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Dewatering shall include all necessary control and disposal of groundwater, regardless of source, on a continual basis during construction.
- B. Dewatering shall include the lowering of the groundwater table to relieve any hydrostatic head that could cause a decrease in the stability of the excavated subgrade. It shall also include the intercepting of seepage which could otherwise emerge from the slope or sides of excavations which could cause a decrease in the stability of the excavated subgrade or the slopes or sides of the excavations.

1.02 ADDITIONAL PROVISIONS

- A. Provide, operate, and maintain any dewatering system of sufficient size and capacity required to lower and control groundwater levels and groundwater hydrostatic pressure during the construction of the Work as required by this Section and the Contract Documents. The Contractor shall assume full responsibility and expense for the adequacy of the dewatering system with no additional time for performance.
- B. Design system to prevent differential hydrostatic head which would result in floating out soil particles in a manner termed as a “quick” or “boiling” condition. System shall not be dependent solely upon sumps and/or pumping water from within the excavation where differential head would result in a quick condition, which would continue to worsen the integrity of the excavation’s stability.
- C. The development, drilling, operation, and abandonment of all wells used in the dewatering system shall comply with regulations of the Florida Department of Environmental Protection and the Southwest Florida Water Management District. If dewatering equipment needed exceeds any of the following, the Contractor shall be required to permit the dewatering system with the SWFWMD:
 - 1. A 6-inch dewatering pump volute.
 - 2. A total of 100,000 GPD for 24 hours (1 day) dewatering.
 - 3. A 1,000,000 GPD pump capacity.
- D. Remove and dispose of water resulting from activities described in this Section. Provide siltation settling basins for all discharges from dewatering systems. Submit plan of settling basins and discharge facilities for review by the Engineer prior to dewatering system installation.
- E. Remove dewatering systems and equipment when no longer required.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 EXECUTION

- A. The dewatering system shall be capable of developing an excavated subgrade relieved of any hydrostatic pressure that could cause a decrease in the stability of the excavated subgrade and which will provide the necessary groundwater control for the proper performance required for completion of the Work.
- B. Maintain the groundwater level to a minimum of 2-feet below excavations. Provide piezometers if directed by the Engineer to document the groundwater level is being maintained.
- C. The dewatering system shall not cause damage to newly constructed or existing properties, buildings, utilities, and other work due to the loss of support from incompletely drained soils or from removal of soil particles resulting from the dewatering system operation.
- D. Dewatering facilities shall be located where they will not cause interference with work performed by others.
- E. If the dewatering system utilized by the Contractor causes or threatens to cause damage to new or existing facilities, the dewatering system shall be modified at no additional cost to the Owner. The Contractor shall be responsible for and shall repair all damage caused by the dewatering system operation at no additional cost to the Owner and at no additional time for performance.
- F. Dispose of subsurface water collected in a manner which conforms to all applicable local and state ordinances, statutes, and laws.
- G. Maintain continual and complete effectiveness of the dewatering system operation to provide a firm, stable, excavated subgrade at all times as required for proper performance of the Work. Interruptions due to power outages, or any other reason will not be permitted. System maintenance shall include but not be limited to 24-hour supervision by personnel skilled in the operation, maintenance, and replacement of system components, and any other work required to maintain excavation in dewatered condition.
- H. Provide standby equipment on site, installed, wired, and available for immediate operation if required to maintain dewatering on a continuous basis in the event any part of the system becomes inadequate or fails. If dewatering requirements are not satisfied due to inadequacy or failure of dewatering system, perform such work as may be required to restore damaged structures and foundation soils at no additional cost to Owner.

- I. Provide dewatering necessary to maintain the groundwater table below the level of backfill as it is being placed.
- J. Open pumping with sumps and ditches shall be allowed, provided it does not result in boils, loss of fines, softening of the ground, or instability of slopes.
- K. Install wells and/or wellpoints, if required, with suitable screens and filters, so that continuous pumping of fines does not occur. During normal pumping, and upon development of well(s), levels of fine sand or silt in the discharge water shall not exceed 5 ppm. Install sand tester on discharge of each pump during testing to verify that levels are not exceeded.
- L. Control grading around excavations to prevent surface water from flowing into excavation areas.
- M. Remove subgrade materials rendered unsuitable by excessive wetting and replace with approved backfill material at no additional cost to the Owner.

3.02 JOB CONDITIONS

- A. Erosion Control: Provide adequate protection from erosion from any of the dewatering operations utilized during the course of the construction. Any damage, disruption, or interference to newly constructed work or existing properties, buildings, structures, utilities and/or other work resulting directly or indirectly from dewatering operations conducted under this Contract shall be remedied by the Contractor, at no cost to the Owner.
- B. Treatment of Dewatering Operations Discharges: Provide such additional treatment devices as may be required to meet the provisions of the Contract. This may include the construction of sumps and/or settling basins, stone riprap, silt fences, or other requirements. The treatment devices shall be later removed and/or filled in with acceptable backfill material and restored to original conditions once they are no longer needed, at no additional cost to the Owner.
- C. Noise Control: All Work under this Section shall be executed in accordance with all Noise Ordinances of Sarasota County.

END OF SECTION

SECTION 31 23 33
TRENCHING AND BACKFILLING

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. The scope of work includes, but is not limited to, all piping installation and necessary appurtenances and minor structures.
- B. Furnish and place all sheeting, bracing and supports and shall remove from the excavation all materials which the Engineer may deem unsuitable for backfilling. The bottom of the excavation shall be firm and dry and in all respects. If conditions warrant, deposit gravel for pipe bedding, or gravel refill for excavation below grade, directly on the bottom of the trench immediately after excavation has reached the proper depth and before the bottom of the trench has become softened or disturbed by any cause whatever. The length of open trench shall be related closely to the rate of pipe laying.
- C. Wherever the requirement for 98 percent compaction is referred to herein it shall mean "at least 98 percent of maximum density as determined by ASTM D1557, Method D".
- D. Prior to the start of work submit the proposed method of backfilling and compaction to the Engineer for review.

1.02 JOB CONDITIONS

- A. The Contractor shall examine the site and review the available test borings or undertake his own soil borings prior to submitting his bid, taking into consideration all conditions that may affect his work. The Owner will not assume responsibility for variations of sub-soil quality or conditions at locations other than places shown and at the time the investigation was made. Boring log data and soil samples are available for examination after signing a release at the office of the Owner.
- B. Existing Utilities: Locate existing underground utilities in the areas of work. If utilities are to remain in place, provide adequate means of protection during earthwork operations.
 - 1. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, notify the Owner of such piping or utility immediately for directions.
 - 2. Cooperate with the Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
- C. Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights. Operate warning lights as recommended by authorities having jurisdiction.

1. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

1.03 SUBMITTALS

- A. Submit, in accordance with Section 01 33 00 – Submittal Procedures, complete product data for materials specified in this Section.
- B. For each material obtained from other than onsite sources, the Contractor shall notify the Engineer of the source of the material.
- C. Furnish product data for all imported fill material to include:
 1. Material Source: Submit name of imported material suppliers.
 2. Supplier's Certificate: Certify that products meet or exceed specified requirements.

1.04 REFERENCED STANDARDS

- A. American Association of State Highway and Transportation Officials:
 1. AASHTO M288 - Geotextiles.
 2. AASHTO M145 - Classification of Soils and Soil Aggregate Mixtures
 3. AASHTO T180 - Moisture-Density Relations of Soils Using a 10-lb. Rammer and 18-inch Drop
- B. ASTM International:
 1. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristic of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
 2. ASTM D2487 - Classification of Soils for Engineering Purposes
 3. ASTM D 4355 / D 4355M - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus.
 4. ASTM D 4533/ D 4533M - Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
 5. ASTM D 4632/ D 4632M - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
 6. ASTM D 6241 - Standard Test Method for Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe.
 7. ASTM D 4751 - Standard Test Methods for Determining Apparent Opening Size of a Geotextile.
- C. Florida "State Safety Act" (CS/SB 2626).
- D. Occupational Safety and Health Administration (OSHA):

1. 29 CFR Part 1926 Subpart P.
 2. Part 1926 Subpart P – Excavations
- E. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 DEFINITIONS

- A. Bedding – Area from bottom of trench to centerline of pipe
- B. Backfill – Material above the top of pipe to the topsoil, paving sub-grade, or foundation level.

PART 2 - PRODUCTS

2.01 GENERAL

- A. It is intended that previously excavated materials conforming to the following requirements be utilized wherever possible.

2.02 MATERIALS

A. Base, Fill, and Backfill:

1. Satisfactory soil materials are defined as those complying with American Association of State Highway and Transportation Officials (AASHTO) M 145, soil classification Groups A 1, A 24, A 25, and A 3.
2. Unsatisfactory soil materials are those defined in AASHTO M 145 soil classification Groups A 26, A 27, A 4, A 5, A 6, and A 7 along with peat and other highly organic soils.

B. Structural Fill:

1. Well graded soil material consisting of coarse aggregate to medium to fine grain sized sand, free of organic, deleterious and/or compressible material.
 - a. Shall not contain rock or stones exceeding 3-1/2 inches in diameter, hardpan, cobbles, or other similar materials.

C. Select Common Fill:

1. Soil material containing no more than 15 percent by weight finer than No. 200 mesh sieve.
 - a. Shall be free from organic matter, muck, marl, rock exceeding 3-1/2 inches in diameter, broken concrete, masonry, rubble, or other similar materials.
2. Material falling within the above specification, encountered during the excavation, may be stored in segregated stockpiles for reuse. All material which, in the opinion of the Engineer or the Owner, is not suitable for reuse shall be spoiled as specified

herein for disposal of unsuitable materials.

D. Bedding Rock:

1. Bedding rock shall be FDOT No. 57, gradation washed and graded lime rock or shell.

PART 3 - EXECUTION

3.01 GENERAL

- A. .
- B. The Contractor shall protect his work at all times by flagging, marking, lighting, and barricading. It shall also be the Contractor's responsibility to preserve and protect all above and underground structures, pipelines, conduits, cables, drains or utilities which are existing at the time he encounters them. Failure of the Contract Drawings to show the existence of these obstructions shall not relieve the Contractor from this responsibility. The cost of repair of any damage which occurs to these obstructions during or as a result of construction shall be borne by the Contractor without additional cost to the Owner.
- C. Precondition surveys and vibration monitoring are required for those areas where residential structures are within 100 feet of the proposed construction.
- D. Provide barriers, warning lights and other protective devices at all excavations.
- E. Protect benchmarks, property corners, and other survey monuments from damage or displacement. If marker needs to be removed it shall be referenced by licensed land surveyor and replaced, as necessary.

3.02 TRENCH EXCAVATION

- A. Pavement shall be cut with a saw, wheel, or pneumatic chisel along straight lines before excavating.
- B. Strip and stockpile topsoil from grassed areas crossed by trenches. At the Contractor's option, topsoil may be otherwise disposed of and replaced, when required, with approved topsoil of equal quality.
- C. Where necessary to place excavated material adjacent to buildings, erect barriers to keep earth at least 4-feet from such buildings. Earth deposited on lawns shall be promptly and carefully removed to preserve the turf. All trees, shrubs, and landscaping shall be protected. Boring and jacking shall be used, if necessary, except where the Owner's written permission is granted to remove trees and shrubs.
- D. While excavating and backfilling is in progress, traffic shall be maintained, and all utilities and other property protected as provided in the General Conditions and General Requirements. Sidewalks, roads, streets, and pavements shall not be blocked

or obstructed by excavated materials, except as authorized by the Engineer, in which case adequate temporary provisions must be made for satisfactory temporary passage of pedestrians, and vehicles. Minimize inconvenience to public travel or to tenants occupying adjoining property.

3.03 PIPE INTERFERENCES AND ENCASEMENT

- A. The Contractor shall abide by the following schedule of criteria concerning interferences with other utilities. In no case shall there be less than 0.3 feet between any two pipelines or between pipelines and structures. Concrete encasement shall be provided in accordance with the typical detail as shown in the Contract Drawings or provided for review to Engineer.

3.04 BEDDING

- A. Where select common bedding material is used for pipe support as shown in the Contract Drawings, the trench bottom or bedding should be prepared in accordance with this Section and the top six-inches shall be compacted using mechanical equipment to a minimum of ninety-eight (98) percent of the maximum dry density as determined by ASTM D1557, Method D.
- B. Where rock or shell is used for pipe support, gravity sewer pipe shall have rock or shell bedding to six-inches over top of pipe, and four-inches to six-inches below the invert. Pressure pipe shall have rock or shell bedding to springline of pipe, and four-inches to six-inches below the invert depending on the diameter as shown in the Contract Drawings. Rock or shell bedding shall be placed in maximum lift thicknesses of four-inches to six-inches with each lift compacted using mechanical equipment.
- C. Rock or shell bedding may be used under certain circumstances as a drain for ground water control, subject to the approval of the Engineer. The Contractor shall take all precautions necessary to maintain the shell or rock bedding in a compacted state and to prevent washing, erosion, or loosening of this bed.

3.05 TEST PITS

- A. Excavation of test pits may be required for the purpose of locating underground utilities or structures as an aid in establishing the precise location of new work.
- B. Test pits shall be backfilled as soon as the desired information has been obtained. The backfilled surface shall be maintained in a satisfactory condition for travel until resurfaced as specified.

3.06 BACKFILLING

- A. Backfilling over pipes shall begin as soon as practicable after the pipe has been laid, jointed, and inspected and the trench filled with suitable bedding material.
- B. Backfilling over ducts shall begin not less than three (3) days after placing concrete encasement.

- C. All backfilling shall be performed expeditiously and as detailed in the Contract Drawings.
- D. Any space remaining between the pipe and sides of the trench shall be packed full by hand shovel with selected earth, free from stones having a diameter greater than two inches (2") and thoroughly compacted with a tamper as fast as placed, up to a level of one foot (1') above the top of the pipe. The material shall be compacted to a minimum of 98 percent of the maximum dry density as determined by ASTM D1557, Method D in layers not to exceed four inches (4") up to the centerline of the pipe from the trench bottom and in layers not to exceed six inches (6") from the pipe centerline to twelve inches (12") above the pipe.
- E. The filling shall be carried up evenly on both sides with at least one person tamping for each person shoveling material into the trench.
- F. The remainder of the trench above the compacted backfill, as just described above, shall be filled and thoroughly compacted with select common fill with mechanical equipment. Compact select common fill in six-inch (6") layers to a minimum of ninety-eight (98) percent of the maximum dry density determined by ASTM D1557, Method D.
- G. Where the pipes are laid in streets, the remainder of the trench up to a depth of twelve-inch (12") below the bottom of the specified permanent paving shall be backfilled with common fill material in layers not to exceed one foot (1') and thoroughly compacted. The subbase layer for paving shall be of bank-run gravel thoroughly compacted in six-inch (6") layers.
- H. In locations where pipes pass through building walls, the Contractor shall take the following precautions to consolidate the refill up to an elevation of at least one foot (1') above the bottom of the pipes:
 - 1. Place structural fill in such areas for a distance of not less than three feet (3') either side of the center line of the pipe in level layers not exceeding six inches (6") in depth.
 - 2. Wet each layer to the extent requested and thoroughly compact each layer with a power tamper.
- I. To prevent longitudinal movement of the pipe, dumping backfill material into the trench and then spreading will not be permitted until selected material or screened gravel has been placed and compacted to a level one foot (1') over the pipe.
- J. Backfill around structures shall be granular fill material as specified and as shown on the Drawings. All backfill shall be spread and compacted as specified, especially under and over pipes connected to the structures. Take necessary precautions not to cause settlement or damage to adjacent slabs, walls, structures, or foundations.

- K. Bituminous paving shall not be placed in backfilling unless specifically permitted, in which case it shall be broken up as directed.
- L. All road surfaces shall be swept and hose-cleaned immediately after backfilling. Dust control measures shall be employed at all times.

3.07 COMPACTION

- A. Unless otherwise indicated, the type of equipment and number of passes required to obtain the specified degree of compaction shall be determined at the site, subject to the approval of the Engineer.
- B. Provide mechanical compaction for cohesive material and vibratory compaction for granular materials, unless otherwise approved by the Engineer. Vibratory compaction is not allowed within 100 feet of existing structures. In these areas, compaction shall be accomplished by static means only. If compaction difficulties arise, the Engineer shall be consulted to review and possibly modify compaction procedures.
- C. Non-cohesive soils shall be compacted with vibrating roller or equivalent; cohesive soils shall be compacted with sheepsfoot roller, pneumatic tamping, or approved equivalent, unless otherwise indicated. If rolling is employed, it shall be by use of a suitable roller or tractor, being careful to compact the fill throughout the full width of the trench.
- D. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
- E. Compaction by puddling or water jetting shall not be permitted.
- F. Compaction in confined areas shall be by use of hand or pneumatic ramming with tools weighing at least twenty pounds (20 lbs). The material shall be spread and compacted in layers not exceeding six-inch (6") thick, uncompacted loose measure thickness.
- G. The Contractor shall coordinate and pay for density tests to determine compaction of backfill spaced as required by the agencies having jurisdiction, or at a minimum of two (2) in every 300 feet of trench cut per lift and shall include a test at the spring line of the pipe. Perform no less than one (1) test per 2,500 square feet per lift, or fraction thereof, of backfill around or under structures and building areas. Perform one (1) test per lift per each change in type of fill. Perform one (1) test per 1000 square feet of pavement subgrade, minimum of two (2) tests. All tests shall be signed and sealed by a Florida Licensed Engineer.
- H. Minimum Density Requirements (ASTM D1557 or AASHTO T180)
 - 1. Compact fill under and within the influence area of roadways, structures, slabs, foundations to 98 percent
 - 2. Compact pond and road embankment fill to 95 percent

3. Compact landscape areas to 85 percent
4. Compact fill in all other areas to 92 percent

3.08 MINOR STRUCTURAL EXCAVATION AND BACKFILLING

- A. Minor structures are defined as manholes, junction boxes, inlets, valve vaults, and meter vaults. Do not excavate for any structure until that structure is scheduled for construction. Excavate only to the depth and dimensions necessary for the construction.
- B. The bottom of all excavations shall be undisturbed earth unless otherwise indicated and shall be approved by the Engineer before any subsequent work is started. Over excavate a minimum of two (2) feet where excavations occur within unsuitable soils and replace over excavated material with suitable soils.
- C. Excavations carried below depths indicated on the Drawings without the previous approval of the Engineer shall be filled with 2500 psi concrete or flowable fill at the Owner's discretion to the correct level at the expense of the Contractor.
- D. Maintain excavations in good order. If the bearing capacity of the foundation soils is reduced because the excavation is allowed to remain open prior to commencing work, the weathered soil shall be removed and replaced with 2500 psi concrete or flowable fill at the Owner's discretion at the expense of the Contractor.
- E. Do not backfill until new concrete has properly cured, coatings have been approved, and any required tests have been accepted.
- F. Fill within the influence area of roadways, structures, foundations, or slabs, shall be placed in layers of eight-inch (8") loose depth. In all other areas, place fill in layers of twelve-inch (12") loose depth.
- G. Exercise care during backfilling operations to avoid any puncture, break or other damage to waterproofing systems, if any. Backfill adjacent to waterproofing in the presence of the Engineer.
- H. Where backfilling is required on both sides of structures, backfill and compact simultaneously on opposite sides in even layers. Other backfilling sequences shall be as specifically noted.

3.09 GRADING

- A. Grading shall be returned to pre-construction existing grades or performed at such places as indicated in the Contract Drawings, to the lines, grades, and elevations shown or as approved by the Owner and shall be made in such a manner that the requirements for formation of embankments can be followed. All unacceptable material encountered, of whatever nature within the limits indicated, shall be removed and disposed of as requested. During the process of excavation, the grade shall be maintained in such condition that it will be well drained at all times. Temporary drains

and drainage ditches shall be installed to intercept or divert surface water which may affect the prosecution or condition of the Work.

- B. If at the time of excavation, it is not possible to place any material in its proper section of the permanent structure, it shall be stockpiled in approved areas for later use. No extras will be considered for the stockpiling or double handling of excavated material.
- C. The right is reserved to make minute adjustments or revisions in lines or grades if found necessary as the work progresses, due to discrepancies in the Contract Drawings or in order to obtain satisfactory construction.
- D. Stones or rock fragments larger than 1-1/2 inches in their greatest dimensions will not be permitted in the top one foot (1') of the subgrade line of all dikes, fills, or embankments.
- E. All fill slopes shall be uniformly dressed to the slope, cross section, and alignment shown in the Contract Drawings, or as approved in writing by the Engineer.
- F. In cuts, all loose or protruding rocks on the back slopes shall be jarred loose or otherwise removed to line or finished grade of slope. All cut and fill slopes shall be uniformly dressed to the slope, cross section, and alignment shown in the Contract Drawings or as approved in writing by the Engineer.
- G. No grading is to be done in areas where there are existing pipelines that may be uncovered or damaged until such lines which must be maintained are relocated, or where lines are to be abandoned, all required valves are closed and drains plugged at manholes.
- H. The Contractor shall replace all pavement cut or otherwise damaged during the progress of the Work as specified elsewhere herein.

3.10 RESTORING TRENCH SURFACE

- A. Where the trench occurs adjacent to paved streets, in shoulders, sidewalks, or in cross-country areas, thoroughly consolidate the backfill and maintain the surface as the work progresses. If settlement takes place, immediately deposit additional fill to restore the level of the ground.
- B. In, and adjacent to streets, the twelve-inch (12") of trench backfill below the specified initial pavement shall consist of compacted bank-run gravel. Should the Contractor wish to use material excavated from the trench as gravel subbase for pavement replacement, the Contractor, at his/her own expense, have samples of the material tested by an independent testing laboratory at intervals not to exceed 500-ft, in order to establish its compliance with the specifications. Only material which has been tested and approved by the Engineer shall be allowed to be incorporated into the work.

- C. The surface of any driveway or any other area which is disturbed by the trench excavation and which is not a part of the paved road shall be restored to a condition at least equal to that existing before work began.
- D. In sections where the pipeline passes through grassed areas, the Contractor, shall at his own expense, remove and replace the sod, or loam and seed the surface to the satisfaction of the Engineer.

3.11 DISPOSAL OF UNSUITABLE AND SURPLUS MATERIAL

- A. Excavated material shall be stacked without excessive surcharge on the trench bank or obstructing free access to hydrants and gate valves. Inconvenience to traffic and abutters shall be avoided as much as possible. Excavated material shall be segregated for use in backfilling as specified below.
- B. All surplus and/or unsuitable excavated material shall be disposed of in the following manner:
 - 1. Transport from Owner's property and legally dispose of. Any permit required for the hauling and disposing of this material beyond Owner's property shall be obtained prior to commencing hauling operations.
- C. Suitable excavated material may be used for fill if it meets the Technical Specifications for select common fill and is approved by the Engineer. Excavated material so approved may be neatly stockpiled at the site where designated by the Owner provided there is an area available where it will not interfere with the operation of the facility nor inconvenience traffic or adjoining property owners.

END OF SECTION

SECTION 31 25 13
EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The work specified in this Section consists of the design, provision, maintenance, and removal of temporary erosion and sedimentation controls as necessary.
- B. Temporary erosion controls include, but are not limited to, grassing, mulching, netting, watering, and the reseeded of on-site surfaces and spoil and borrow area surfaces, interceptor ditches at ends of berms and other such work at those locations which will ensure that erosion during construction will be either eliminated or maintained within acceptable limits as established by the Owner.
- C. Temporary sedimentation controls include, but are not limited to, silt dams, traps, barriers, entrance and exit of stormwater structures larger than 8-inch diameter pipes or 12 inch wide swales, and appurtenances at the foot of sloped surfaces which shall ensure that sedimentation pollution will be either eliminated or maintained within acceptable limits as established by the Owner.
- D. The Contractor is responsible for providing effective temporary erosion and sediment control measures during construction or until final controls become effective.

1.02 REFERENCE DOCUMENTS

- A. Florida Building Code, latest edition.
- B. FDEP/COE Dredge and Fill Regulations and/or Permit, as applicable.
- C. SWFWMD Permit Regulations and/or Permit, as applicable.
- D. Florida Stormwater, Erosion and Sedimentation Control Inspector's Manual, latest edition. FDOT Specifications and Details, as applicable.

PART 2 - PRODUCTS

2.01 EROSION CONTROL

- A. Netting - fabricated of material acceptable to the Owner.
- B. Seed and sod.

2.02 SEDIMENTATION CONTROL

- A. Bales - clean, seed free cereal hay type.
- B. Netting - fabricated of material acceptable to the Owner.
- C. Filter stone - crushed stone conforming to FDOT specifications.

- D. Concrete block - hollow, non-load-bearing type.
- E. Concrete - exterior grade not less than one inch thick.

PART 3 - EXECUTION

3.01 EROSION CONTROL

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

3.02 SEDIMENTATION CONTROL

- A. The Contractor shall install and maintain silt dams, traps, barriers, and appurtenances as shown on the approved descriptions and working drawings. Deteriorated hay bales and dislodged filter stone shall be replaced by the Contractor at their expense.

3.03 PERFORMANCE

- A. The Contractor, at their own expense, shall immediately take whatever steps are necessary to correct any deficiencies of the temporary erosion and sediment control measures employed if they fail to produce results or do not comply with the requirements of the State of Florida or any other federal, governmental, or regulatory agency.

END OF SECTION

SECTION 33 05 24

DIRECTIONAL DRILLING

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide all necessary tools, materials and equipment to successfully complete the installation of directionally, drilled piping as specified herein and shown on the drawings. The Contractor shall be responsible for the final constructed product, and for furnishing the qualified labor and superintendence necessary for this method of construction.
- B. Furnish all items necessary to perform the horizontal directional drilling operation and construct the pipe to the lines and grade shown on the drawings.
- C. Boring must use techniques of creating or directing a borehole along a predetermined path to a specified target location. This must involve use of mechanical and hydraulic deviation equipment to change the boring course and must use instrumentation to monitor the location and orientation of the boring head assembly along a predetermined course.
- D. Drilling must be accomplished with fluid-assist mechanical cutting. Boring fluids shall be a mixture of bentonite and water or polymers and additives. Bentonite sealants and water will be used to lubricate and seal the mini-tunnel. It is mandatory that minimum pressures and flow rates be used during drilling operation as not to fracture the sub-grade material around and or above the bore.
- E. The mobile drilling system shall utilize small diameter fluid jets to fracture and mechanical cutters to cut and excavate the soil as the head advances forward.
- F. Steering shall be accomplished by the installation of an offset section of drill stem that causes the cutterhead to turn eccentrically about its centerline when it is rotating. When steering adjustments are required, the cutterhead offset section is rotated toward the desired direction of travel and the drill stem is advanced forward without rotation.
- G. The mobile drilling system must be capable of being launched from the surface at an inclined angle and drilling a 2-inch to 3-inch diameter pilot hole. The pilot hole will then be enlarged with reamers as required.

1.02 REFERENCE STANDARDS

- A. Florida Department of Transportation (FDOT) Design Standards Specification Section 555, Directional Bore.
- B. Englewood Water District Details and Construction Standards.
- C. American Association of State Highway and Transportation Officials (AASHTO).

- D. Occupational Safety and Health Administration (OSHA).

1.03 DEFINITIONS

- A. Contractor's Construction Drawings shall be defined as drawings by which the Contractor proposes to construct, operate, build, etc., the referenced item. The submission of these drawings shall be required for the sole purpose of providing the sufficient details to verify that the Contractor's work in progress is in accordance with the intent of the design.

1.04 SUBMITTALS

- A. The Engineer will base the review of submitted details and data on the requirements of the completed work, safety of the work in regards to the public, potential for damage to public or private utilities and other existing structures and facilities, and the potential for unnecessary delay in the execution of the work. Such review shall not be construed to relieve the Contractor in any way of his responsibilities under the contract. Contractor shall not commence work on any items requiring Contractor's construction drawings or other submittals until the drawings and submittals are reviewed and accepted by the Engineer.
- B. The Contractor shall:
1. Submit for review complete construction drawings and/or complete written description identifying details of the proposed method of construction and the sequence of operations to be performed during construction, as required by the method of tunnel excavation approved. The drawings and descriptions shall be sufficiently detailed to demonstrate to the Engineer whether the proposed materials and procedures will meet the requirements of this specification. Contractor shall submit arrangement drawings and technical specifications of the machine and trailing equipment (including any modifications), three-year experience record with this type of machine and a copy of the manufacturer's operation manual for the machine.
 2. Contractor's construction drawings shall be submitted on the following items.
 - a. Complete details of the equipment, methods and procedures to be used, including but not limited to primary lining installation, timing of installation in relation to the excavation plan and sequence, bulkheads, etc.
 - b. Grouting techniques, including equipment, pumping procedures, pressure grout types, mixtures and plug systems.
 - c. Method of controlling line and grade of excavation.
 - d. Details of muck removal, including equipment type, number, and disposal location.

- e. Proposed contingency plans for critical phases and areas of directional drilling.
 - f. Disposal of Spoils and Drilling Fluid Plan – Provide a plan for disposal of waste materials resulting from the pipeline construction, including drilling fluids, cuttings, waste oil, fuel, discharge water, etc. Identify the disposal site(s) and submit a letter indicating willingness and legal authority to accept the described and anticipated waste product.
 - g. Pullback Calculations – Make sure the drill rig is capable of pulling the sized reamer and pipe.
 - (1) Submit calculations for pullback loads for the conditions and operating practices anticipated.
 - (2) Consider buckling and combination loads in addition to tensile pullback loads.
 - (3) Identify parameters used and state assumptions made in calculations.
 - (4) Provide calculations that are signed and sealed by a licensed Professional Engineer in the State of Florida.
- C. Quality Control Methods. At least 10 days prior to the start of directional drilling, Contractor shall submit a description of his quality control methods he proposes to use in his operations to the Engineer. The submittal shall describe:
- 1. Procedures for controlling and checking line and grade.
 - 2. Field forms for establishing and checking line and grade.
- D. Safety. Procedures including, but not limited to, monitoring for gases encountered shall be submitted.
- E. Hazardous chemical list as well as all MSDS and technical data sheets.

1.05 DESIGN CRITERIA

- A. Compatibility of Methods.
 - 1. The methods of excavation, lining, and groundwater control shall be compatible.

1.06 JOB CONDITIONS

- A. Safety Requirements
 - 1. Perform work in a manner to maximize safety and reduce exposure of men and equipment to hazardous and potentially hazardous conditions, in accordance with applicable safety standards.

2. Whenever there is an emergency or stoppage of work which is likely to endanger the excavation or adjacent structures, operate a full work force for 24 hours a day, including weekends and holidays, without intermission until the emergency or hazardous conditions no longer jeopardize the stability and safety of the work.
- B. Air Quality.
1. Conduct directional drilling operations by methods and with equipment, which will positively control dust, fumes, vapors, gases or other atmospheric impurities in accordance with applicable safety requirements.

1.07 PERMITS

- A. Obtain any and all other permits required for prosecution of the work.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Refer to Section 33 31 50 for HDPE pipe material.

PART 3 - EXECUTION

3.01 GENERAL

- A. The Contractor shall be responsible for his means and methods of directional drilling construction and shall ensure the safety of the work, the Contractor's employees, the public, and adjacent property, whether public or private.
- B. Anticipate that portions of the drilled excavation will be below the groundwater table.
- C. Comply with all local, state and federal laws, rules and regulations at all times to prevent pollution of the air, ground and water.

3.02 EQUIPMENT

- A. Diesel, electrical, or air-powered equipment will be acceptable, subject to applicable federal and state regulations.
- B. Any method or equipment that the Contractor can demonstrate will produce the specified results will be considered.
- C. Employ equipment that will be capable of handling the various anticipated ground conditions. In addition, the equipment shall:
1. Be capable of minimizing loss of ground ahead of and around the machine and providing satisfactory support of the excavated face at all times.

2. Provide a system to indicate whether the amount of earth material removed is equivalent to that displaced by the advance of the machine such that the advance rate may be controlled accordingly.

D. Provide adequate secondary containment for any and all portable storage tanks.

3.03 DIRECTIONAL DRILLING DATA

A. Daily logs of construction events and observations shall be submitted on at least the following:

1. Location and elevation of significant soil strata boundaries and brief soil descriptions.
2. Jacking pressures and torsional forces, if applicable.

3.04 CONTROL OF THE TUNNEL LINE AND GRADE

A. Construction Control.

1. Establish and be fully responsible for the accuracy of his own control for the construction of the entire project, including structures, tunnel line and grade.
2. Establish control points sufficiently far from the tunnel operation not to be affected by construction operations.
3. Maintain daily records of alignment and grade and shall submit three copies of these records to the Engineer. However, the Contractor remains fully responsible for the accuracy of his work and the correction of it, as required.
4. Check control for the bore alignment against an above ground undisturbed reference at least once each hour and once for each 50 feet of tunnel constructed, or more often as needed or directed by the Engineer.

3.05 DISPOSAL OF EXCESS MATERIAL

- A. Where such effort is necessary, cost for groundwater control during the course of the tunnel work shall be included in the unit contract price for the work.
- B. Dewatering required during the course of the project to lower water table, to remove standing water, surface drainage seepage, or to protect ongoing work against rising waters or floods shall be considered incidental to the work being performed.

END OF SECTION

SECTION 33 11 12
DISINFECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Disinfection of all pipelines, conduits and equipment which are to store, handle or carry potable water. Furnish all labor, water, chemicals and equipment, including taps, corporation stops, backflow preventers, temporary pumps and other items necessary to perform the Work, except as otherwise specified.

1.02 REFERENCES

- A. Codes and standards referred to in this Section are:
 - 1. AWWA C651 - Disinfecting Water Mains
 - 2. AWWA C652 - Disinfection of Water-Storage Facilities

1.03 QUALITY ASSURANCE

- A. Disinfection Standards: Disinfect in accordance with AWWA C651 for water mains and AWWA C652 for water storage facilities and equipment.
- B. Chlorinated Water Disposal: Dispose of old highly chlorinated water in accordance with applicable regulations.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 WATER MAIN DISINFECTION

- A. Following acceptable flushing and pressure testing, disinfect all sections of the water distribution system and receive approval thereof from the appropriate agencies, prior to placing in service. Advance notice of 24 hours shall be provided to the Owner before disinfecting procedures start. The disinfection shall be accomplished in accordance with the applicable provisions of AWWA Standard C651, "Disinfecting Water Main" and all appropriate approval agencies.
- B. The disinfecting agent shall be free chlorine in aqueous solution with sustained concentration for 12 hours or more of not less than 50 parts per million. Chlorine may be derived from Chlorine gas, or 70% (high test) calcium hypochlorite (HTH or Perchloron, or equal). Administration may be by any of the several methods

described in AWWA Standard C651 as proposed by the Contractor and approved by the Engineer. Proposals as to method must be made prior to commencement of the disinfection process.

- C. Following contact with chlorine solution, the system shall be thoroughly flushed out. Samples shall then be taken using sterile containers obtained from Owner. Samples shall be taken by the Contractor and delivered by him to the Owner or approved laboratory for analysis.
- D. If samples do not demonstrate satisfactory results, the disinfection procedure shall be repeated until two (2) series of satisfactory samples are obtained, the period between such series of samples to be a minimum of 24 hours.

END OF SECTION

SECTION 33 31 50
PIPING AND VALVES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Furnish, install, and test all piping, fittings, valves, and appurtenances as shown on the drawings and specified herein required for a complete, operating piping system. The Work shall also include such connections, reconnections, relocations, temporary services, abandonments, and all other provisions in regard to existing water service operations and modifications required to perform the Work.

1.02 SUBMITTALS

- A. Product Data: Provide data on pipe fittings, valves, and accessories.
- B. Manufacturer's Certificate: Certify that pipe, fittings, and valves meet or exceed respective ANSI and AWWA standards.

1.03 PROJECT RECORD DOCUMENTS

- A. Accurately record actual horizontal and vertical locations of piping mains, valves, connections, and invert elevations.
- B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.04 QUALITY ASSURANCE

- A. Fabricated piping shall meet all ASME code requirements as specified herein.
- B. Materials in Contact with Potable Water:
 - a. Certified according to NSF 61 and NSF 372.
 - b. Certified lead free in accordance with the Safe Drinking Water Act.
- C. All pipe, valves, fire hydrants, and fittings shall be clearly marked with the name or trademark of the manufacturer, the batch number, the location of the plant, date of manufacture, strength designation and pressure rating.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store materials according to manufacturer instructions.
- B. Block individual and stockpiled pipe lengths to prevent moving.
- C. Do not place pipe or pipe materials on private property or in areas obstructing pedestrian or vehicle traffic.

- D. Store PE and PVC materials out of sunlight.
- E. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
- F. Deliver and store valves in shipping containers with labeling in place.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Although they may not be specifically shown on the drawings or called for elsewhere in the Technical Provisions, the Contractor shall include the cost of all fittings, piping supports, and miscellaneous appurtenances needed to provide a secure, workable pipe and valve system.
- B. Refer to the Englewood Water District Construction Standards for the Approved Products List.

2.02 PIPE

A. PVC PIPE

1. All PVC pipe shall meet AWWA C-900 Standards. PVC pipe 4-inch in diameter and larger shall be class 150, DR 18 pipe or better conforming to AWWA C900.
2. Fittings used in conjunction with the C900 PVC pipe shall be ductile iron coated with fusion bonded epoxy, or PVC push-joint pressure rated fittings (SDR-35 min) as detailed on pipe schedule, mechanical joint, complying with AWWA C111.
3. PVC for potable water shall be blue in color.
4. PVC shall be NSF 61 approved and bear the NSF logo.

B. HIGH DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS

1. Materials used for the manufacture of polyethylene pipe and fittings shall PE 4710, conforming to ASTM D3350 with the cell classification of 445574C/E and is listed with the Plastic Pipe Institute's (PPI) TR-4. The manufacturer shall certify that the materials used to manufacture pipe and fittings meet these requirements. Resin shall be PE 4710.
2. Polyethylene pipe for potable water shall be DR-9.
3. Polyethylene pipe outside diameter shall conform to Iron Pipe Sizes (IPS).
4. Polyethylene pipe shall be manufactured and tested in accordance with AWWA C906 and shall be so marked.
5. Polyethylene fittings and custom fabrications shall be molded or fabricated by the approved pipe manufacturer. Butt fusion outlets shall be made to the same outside diameter, wall thickness and tolerances as the mating pipe. All fittings and custom

fabrications shall be pressure rated for the same internal pressure rating as the mating pipe. Reduced pressure-rated (de-rated) fabricated fittings are prohibited.

6. Molded fittings shall be manufactured and tested in accordance with ASTM D3261 and shall be so marked. Molded fittings shall be tested in accordance with AWWA C906.
7. The manufacturer must certify that samples of the manufacturer's production pipe have been tested, in accordance with ASTM D-2837, and validated in accordance with the latest revisions of PPI TR-3 2023.
8. HDPE pipe shall be NSF 61 approved and bear the NSF logo.

2.03 Valves

A. Gate Valves

1. Resilient seated gate valves shall be non-rising stem (NRS) type, conforming to the latest revision of AWWA Standard C-515. The gate valves shall be mechanical joint type, fully enclosed, and suitable for buried service complete with a ductile iron 2-inch operating nut that is independent of the stem and wedge. The body shall be of ductile iron and fully encapsulated inside and outside with a fusion bonded epoxy coating conforming to the latest revision of AWWA Standard C-550. The wedge shall be ductile iron and completely encapsulated with a resilient EPDM elastomer permanently bonded to the wedge and have a rubber-tearing bond that meets ASTM D429. The stem shall be stainless steel and have an integral thrust collar with a Delrin thrust bearing above and below the collar. The gate valve shall have two O-rings set in machined grooves in the seal plate. The stem seal plate shall have an O-ring gasket to seal against the bonnet secured with bolts and nuts. The body, bonnet, and seal plate shall have a factory-applied thermoplastic epoxy coating on all interior and exterior surfaces. All internal parts shall be accessible for repair or maintenance without removing the body from the line. Valve shall be Series 2500-1 epoxy coated gate valve with stainless steel stem manufactured by American Flow Control or approved equal.
2. Valves utilized for corrosive service shall be manufactured of materials compatible with the fluid. All materials shall be submitted for review by the Engineer.
3. Gate valves shall be NSF 61 approved and bear the NSF logo.

2.04 Piping, Fittings & Miscellaneous Materials

A. Pipe Couplings

1. Couplings shall be EPDM gasketed, sleeve-type, with diameter to fit existing pipe. Coupling shall include a steel middle ring, follower rings, wedge-section gaskets and truck head type steel bolts. Couplings shall be manufactured by Dresser, or equal.

2. All couplings shall be NSF 61 approved for potable water use.

B. Thrust Restraint

1. All bends, tees, crosses, reducers and dead ends shall be restrained through an approved means of mechanical joint restraint. All branch valves shall be restrained with MEGALUG or approved equal or anchor tees. Any line terminated as a construction phase that is a known future extension shall have a lug valve placed at the end and restrained with MEGALUG or approved equal. Thrust restraints shall be placed in accordance with the detail shown in the construction plans.

C. Locator for Pipe

1. On all pipe construction 10 gauge, THHN insulated, solid copper wire shall be laid and secured on top of pipe. Wire shall be continuous from valve box to valve box, wrapped two (2) times around each joint of pipe and extended inside each valve box to enable location devices to be attached without digging up the valve box.
2. Service wire shall be laid in the trench with all services, connected to the main wire and wrapped around the service piping or tubing. Wire for potable water mains shall be blue in color.
3. All wire connections shall be made with Dry-Splice wire connectors, Imperial Snip-Snap fittings filled with waterproof silicone sealant or approved equal. All splices shall be inspected and tested before burial.
4. On all bends 22.5-degrees or larger, capped or plugged ends, repair points, tees and crosses, any change in pipe material, and any change in direction provide 3M EMS 4-inch ball marker 1403-XR or approved equal.

D. Corporation Stops

1. Units shall be brass, equipped with connections compatible with the connecting service pipe-type; must have pack joint type connections for polyethylene tubing with locking collars and stainless steel inserts. Corporation stops to be by Ford, or equal.
2. Units shall be NSF approved for potable water use and shall have a minimum pressure rating of 200 psi.

E. Valve Boxes

1. All valve boxes shall be cast iron construction with 5-inch shafts manufactured by Star. Valve box lids shall have a 1-inch-deep skirt and shall have the appropriate words (e.g. "WATER" for potable water) where appropriate, cast in the top. Valve operating nuts shall be brought to within 30-inch of the surface using valve extension rods if required. Valve boxes to be Star VBT, or equal.

F. Tapping Saddles

1. Tapping Saddles shall be double strap saddles for ductile iron. If pipe is PVC, use stainless steel wide band. Saddles shall have a heavy-duty gasket. Saddles to be by Ford 202B, AY McDonald 3826, Smith Blair 325, or equal.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Contractor shall contact Sunshine 811 for location of existing utilities at 811 a minimum of 48 hours prior beginning Work.
- B. The Contractor shall field verify vertical and horizontal locations of all underground facilities in advance of construction to verify that no conflicts exist with the proposed pipe alignment and depth.
 1. Should a conflict be discovered, the Contractor shall contact the Engineer immediately and provide all pertinent information for preparation of a remedial design.
- C. Verify that existing utility water main size, location, and invert are as indicated on Drawings.

3.02 PREPARATION

- A. Where applicable, ream pipe and tube ends and remove burrs.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare pipe connections to equipment with flanges or unions.

3.03 BEDDING

- A. Excavate trench and install pipe bedding as specified in Section 31 23 33 – Trenching and Backfilling.

3.04 SURFACE CONDITIONS

- A. Inspection
 1. Prior to all Work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this work may properly commence.
 2. Verify that all equipment may be installed in accordance with all pertinent codes and regulations, the original design, shop drawings, and the reference standards.
- B. Discrepancies
 1. In the event of discrepancy, immediately notify the Engineer.

2. Do not proceed with installation in area of discrepancy until all such discrepancies have been fully resolved.

3.05 Pipe Installation - General

- A. Take all precautions necessary to ensure that pipe, valves, fittings, and other accessories are not damaged in unloading, handling, and installation. Examine each piece of material just prior to installation to determine that no damage has occurred. Remove any damaged material from the site and replace with undamaged material.
- B. Horizontal Directional Drill Installations shall be in accordance with Specification Section 33 05 24 –Directional Drilling.
- C. Exercise care to keep foreign material and dirt from entering pipe during storage handling and installation. Close ends of in-place at the end of any work period to preclude the entry of animals and foreign material.
- D. All pipes shall be laid in a dry trench.
- E. Use only those tools specifically intended for cutting the size and material and type pipe involved. Make cut to prevent damage to pipe or lining and to leave a smooth end at right angles to the axis of the pipe.

3.06 Valves and Valve Boxes

- A. Install valves with operator stems in the vertical plane through the pipe axis and out of the plane of flow. Locate valves as shown on Drawings. Thoroughly clean before installation. Check valves for satisfactory operation.
- B. Equip all underground valves without gearing or operator switch valve boxes. Set box in alignment with valve stem centered on valve nut. Set the valve box to prevent transmitting shock or stress to the valve. Set the box cover flush with the finished ground surface or pavement.

3.07 Thrust Restraint

- A. Provide reaction anchors of concrete blocking, metal harness, retainer gland type or restrained joint type at all changes in direction of pressure pipelines and as shown on drawings.
- B. Concrete reaction anchors shall bear against undisturbed earth and shall be of the size and shape necessary to resist service conditions of the pipe.
- C. Use metal harness restraints as shown on drawings.
- D. Where retainer glands are used, extreme care shall be taken so that each set screw is tightened as recommended by the manufacturer before the pipe is backfilled and tested. Retainer glands shall not be used on non-metallic pipe, or on any pipe 10-inch or smaller.

3.08 Hydrostatic Testing

A. General:

1. Hydrostatic tests shall be conducted on all newly laid pressure pipes, joints, and valves including all service lines to the curb stops. Air testing of pressure pipe shall not be permitted under any circumstance. The Contractor shall furnish all necessary equipment and materials, make all taps, and furnish all closure pieces in the pipe as required.
2. The Contractor's testing plan shall be submitted to the Owner and Engineer for review and approval prior to testing.
3. Hydrostatic testing shall be performed at a minimum pressure of 150 psi pressure or 1.5 times the working pressure (whichever is greater) for a period of not less than two (2) hours.
4. The Contractor shall supply a pump to apply the specified pressure to the test system. The pump suction shall be in a barrel/drum or similar device, or metered with a calibrated meter, so that the amount of water required to maintain the test pressure may be measured accurately.
5. The maximum length of pipe to be tested at one time is 2,600 linear feet. If more than 2,600 linear feet of pipe is tested during a single hydrostatic test, then the allowable leakage shall not exceed that which would be allowed for 2,600 linear feet of jointed ductile iron pipe.
6. No leakage shall be permitted for jointless pipe (i.e., fusion welded HDPE or FPVC pipe). If jointless pipe is included within a section being tested, then the length of jointless pipe shall not be considered when calculating the allowable leakage.

B. Pre-Test Procedures:

1. The Contractor shall perform a hydrostatic pre-test to provide reasonable assurance of acceptance prior to performance of the witnessed test. Upon accomplishing a successful pretest, the Contractor shall schedule testing to be conducted in the presence of persons required to witness the test.
2. Testing for acceptance shall be conducted in the presence of representatives of the Engineer of Record, the Owner, and the Contractor. All persons required to be present for testing shall be notified by the Contractor a minimum of two (2) business days prior to commencement of the test. Should any of the persons required to be present not be able to attend, the test shall be rescheduled.
3. Piping and appurtenance to be tested shall be within sections between valves, unless alternate methods have received prior approval. Testing shall not proceed until restraining devices are installed and all trenches have been completely backfilled in accordance with the Contract Documents. All piping shall be

thoroughly cleaned and flushed prior to testing to clear the lines of all foreign matter. While the piping is being filled with water, care shall be exercised to permit the escape of air from extremities of the test section, with additional release cocks provided if required.

4. The Contractor shall ensure that all equipment such as pumps, gauges, blow-offs, and valves are in good working order.
5. The Contractor shall ensure that all valves within a section to be tested are fully open. At the request of the Owner or the Engineer of Record, the Contractor shall operate each valve to demonstrate that they are open.
6. One day prior to the hydrostatic test, slowly fill the pipe with water and allow it to stand for 24 hours.

C. Hydrostatic Testing for Acceptance:

1. The procedure for conducting the test shall be that each section of pipe to be tested shall be slowly filled with water and the specified test pressure shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Owner and the Engineer of Record. Prior to applying the specified test pressure, all air shall be expelled from the pipe. To accomplish this, the Contractor shall make taps and install appropriate valves to ensure all air is bled from the test section.
2. If during the 2-hour test period the test pressure drops by 5 psi from the starting pressure, additional water shall be pumped into the test section to return the pressure to the starting pressure. The amount of water required to return the pressure to the starting pressure shall be recorded.
3. At the end of the 2-hour test period, additional water shall be pumped into the test section to return the pressure to the starting pressure. The amount of water required to return the pressure to the starting pressure shall be recorded.
4. Leakage shall be defined as the quantity of water added to hold the specified test pressure for the duration of the test period. No pipe installation will be accepted if the leakage is greater than the number of gallons per hour as determined by the following formula:

$$L = \frac{S \times D \times \sqrt{P}}{148,000}$$

L = allowable leakage (makeup water), in gallons per hour.

S = length of pipe tested, in feet.

D = nominal pipe diameter, in inches.

P = average test pressure, in psi (gauge).

5. If defective pipes, fittings, valves, or hydrants are discovered in consequence of this pressure test, all such items shall be removed and replaced by the Contractor with sound material and the test repeated until satisfactory results are obtained.

D. Connections to Existing Piping Systems

1. Approximate locations for existing piping systems are shown in the Plans. Prior to making connections into existing piping systems, the Contractor shall:
2. Field verify location, size, piping material, and piping system of the existing pipe.
3. Obtain all required fittings, which may include saddles, ductile iron sleeves or fittings, flanges, or others as shown in the Plans.
4. Unless otherwise approved, new piping systems shall be completely assembled and successfully tested prior to making connections into existing pipe systems.

3.09 Field Quality Control

- A. Compaction testing shall be performed in accordance with Section 31 23 33 – Trenching and Backfilling.
- B. If tests indicate Work does not meet specified requirements, remove work, replace, and retest at no cost to Owner.
- C. Frequency of Tests: Minimum of one test per pipe branch.

END OF SECTION

TIERRA

November 14, 2025

Kimley-Horn and Associates, Inc.
1514 Broadway Street, Suite 301
Fort Myers, FL 33901

Attn: Ms. Heather M. Ripley, P.E.

**RE: Report of Geotechnical Engineering Services
Manasota Key Water Main Design
Sarasota County, Florida
Kimley-Horn Project No.: 148896009
Tierra Project No.: 6511-25-250**

Ms. Ripley:

Tierra, Inc. (Tierra) has completed geotechnical engineering services for the above-referenced project. The results of our limited study are presented herein.

The project consists of providing geotechnical services to support the design of the replacement of the existing water main along a portion of Manasota Key Road in Sarasota County, Florida. We understand that a portion of the existing water main with a length of approximately ¼-mile was washed out during storm events in 2024 and will require reconstruction. Horizontal Directional Drilling (HDD) is associated with design and construction for the project.

REVIEW OF PUBLISHED DATA

USDA Soil Survey

Based on a review of the Sarasota County Soil Survey published by the USDA, it appears that there are two (2) primary soil-mapping units noted in the area of proposed improvements. The following paragraphs and table provide a brief description of the soil unit as presented in the Soil Survey.

Beaches (Map Unit 2): This map unit occurs as nearly level to sloping, narrow strips of tide- and surf-washed sandy material and shell fragments along the Gulf of Mexico shoreline. The unit commonly is a mixture of moderately alkaline sand and fine shell fragments. About half of the beach area may be flooded daily during high tides, and all the beaches can be flooded by storm tides. Depth to the water table varies greatly, commonly ranging from at or above natural grades to 6 feet, depending on the distance from the shore, elevation, and tidal condition.

Canaveral Fine Sand, 0 to 5 Percent Slopes (Map Unit 6): The Canaveral component makes up 85 percent of the map unit. Slopes are 0 to 5 percent. This component is on ridges on marine terraces on coastal plains. The parent material consists of sandy marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is very high. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not flooded nor is it ponded. The seasonal zone of water saturation is at 30 inches during June, July, August, September, October, and November. Organic matter content in the surface horizon is about 1 percent.

Summary of USDA Soil Survey							
Sarasota, Florida							
USDA Map Symbol and Soil Name	Depth (in)	Soil Classification		Permeability (in/hr)	pH	Seasonal High Water Table	
		USCS	AASHTO			Depth (feet)	Months
(2) Beaches	The USDA Soil Survey does not contain information for the Beaches Component.						
(6) Canaveral	0-5	SP-SM, SM	A-2-4, A-3	20.0 - 40.0	6.6-8.4	1.5-3.5	Jun-Nov
	5-17	SP-SM, SM	A-3, A-2-4	20.0 - 40.0	6.6-8.4		
	17-49	SP-SM	A-3, A-2-4	20.0 - 40.0	7.4-8.4		
	49-80	SP-SM	A-3, A-2-4	20.0 - 40.0	7.4-8.4		

It should be noted that information contained in the USDA Soil Survey may not be reflective of actual soil and groundwater conditions, particularly if development in the project vicinity has modified soil conditions or surface/subsurface drainage.

USGS Quadrangle Map

Based on a review of the USGS Quadrangle Map titled “Englewood NW, Florida” it appears that the natural elevations of the proposed improvements range up to +5 feet National Geodetic Vertical Datum of 1929 (NGVD 29).

Potentiometric Surface Elevation

Based on a review of the “Upper Floridan Aquifer Potentiometric Surface” map published by the USGS, the potentiometric surface elevation of the Upper Floridan Aquifer in the vicinity of the proposed improvements ranges up to +20 feet, NGVD 29. The natural ground elevation at the project site ranges up to +5 feet, NGVD 29. Artesian flow conditions were not encountered during the field exploration.

SUBSURFACE EXPLORATION

To support the design of the HDD operation, Tierra performed five (5) Standard Penetration Test (SPT) borings to depths ranging from approximately 15 to 45 feet below existing grades. Prior to commencing our subsurface exploration, a boring location plan was developed based on the requested locations provided by Kimley-Horn.

The borings were located in the field by a representative of Tierra using Garmin eTrex® hand-held, non-survey grade Global Positioning System (GPS) equipment with a manufacturer’s reported accuracy of ±10 feet. The approximate boring locations are shown on the attached **Boring Location Plan**. Utility clearances were coordinated by Tierra via Sunshine State One Call as required prior to performing the soil borings. If the boring locations are critical to design at this stage, Tierra recommends the borings be surveyed by the project surveyor.

The SPT borings were performed with a drill rig using Bentonite Mud drilling procedures. The soil sampling was performed in general accordance with American Society for Testing and Materials (ASTM) Test Designation D-1586. Within the SPT borings performed, the initial 4 feet were manually advanced by a hand auger to verify utility clearance. SPT resistance N values were then taken continuously to a depth of 10 feet and at intervals of 5 feet thereafter to the boring termination

depths. Representative portions of the soil samples were sealed in glass jars, labeled and transferred to our laboratory for classification and analysis.

SUBSURFACE CONDITIONS

The soil types encountered during this exploration have been assigned stratum numbers. The stratum numbers and soil types associated with the project are provided in the table below. Detailed results of each boring are presented on the **Soil Profiles** sheet in the **Appendix**.

Stratum Number	Soil Description	USCS Symbol
1	Light Gray to Gray to Light Brown to Brown Sand to Sand with Silt	SP/SP-SM
2	Gray to Brown to Green Clay to Silt	CL/CH/ML/MH
3	Sandy Calcareous Clay to Weathered Limestone	--- ⁽¹⁾
⁽¹⁾ USCS does not include nomenclature for Limestone		

A geotechnical engineer bases soil stratification on a visual review of the recovered samples, laboratory testing and interpretation of the field boring logs. The boring stratification lines represent the approximate boundaries between soil types of significantly different engineering properties; however, the actual transition may be gradual. In some cases, small variations in properties not considered pertinent to our engineering evaluation may have been abbreviated or omitted for clarity. The boring profiles represent the condition at the particular boring location and variations did occur among the borings.

GROUNDWATER INFORMATION

The groundwater table was measured at depths ranging from approximately 4 to 7½ feet below the existing ground surface. The encountered groundwater levels are presented adjacent to the soil profiles on the attached **Soil Profiles** sheet.

Groundwater conditions will vary with environmental variations and seasonal conditions, such as the frequency and magnitude of rainfall patterns, tidal conditions, as well as man-made influences (i.e. existing swales, drainage drainages, underdrains and areas of covered soils, such as paved parking lots). It should be noted that groundwater levels tend to fluctuate during periods of prolonged drought and extended rainfall and may be affected by man-made influences. In addition, a seasonal effect will also occur in which higher groundwater levels are normally recorded in rainy seasons.

TEST DESIGNATION

The following list summarizes the laboratory tests performed by Tierra and the respective test methods utilized.

- Fines Content Analyses - The fines content tests were conducted in general accordance with the FDOT test designation FM 1-T011 (AASHTO test designation T-088).

- Atterberg Limits - The liquid limit and the plastic limit tests ("Atterberg Limits") were conducted in general accordance with the AASHTO test designations T-089 and T-090, respectively (ASTM test designation D-4318).
- Natural Moisture Content - The moisture content tests were conducted in general accordance with the AASHTO test designation T-265 (ASTM test designation D-2216).

The results of the laboratory testing are presented on the attached **Soil Profiles** sheets in the **Attachments**.

EVALUATION AND RECOMMENDATIONS

The soils encountered within the borings performed for the project appear to be suitable for the anticipated HDD operation based on the limited geotechnical exploration performed.

Weathered limestone was encountered within SPT boring B-3 at depths ranging from approximately 35 to the boring termination depth of 45 feet below existing grades. This material is rock. If the horizontal directional drilling operations extend into this stratum, the Contractor should anticipate that drilling and reaming through and within this material may be difficult and may require non-conventional construction techniques and specialized equipment. In addition, limestone is porous and will be difficult to de-water and losses of drilling fluid circulation may occur within this material. The depth and consistency of this material may vary.

Loose to medium dense sandy soils with shell fragments were encountered within some of the borings. Due to the loose sand with shell encountered and typically high permeability rates for sand with shell soil mixtures and the variable limestone stratum, the Contractor should anticipate higher than normal circulation losses of drilling fluid during the HDD operation in these areas.

The groundwater table was measured at depths ranging from approximately 4 to 7½ feet below existing grades. The groundwater levels presented in this report are the levels that were measured at the time of our field activities and fluctuation should be anticipated. We recommend that the Contractor determine the actual groundwater levels at the time of the construction to determine groundwater impact on construction procedures. Care should be given to open excavations and site grading to minimize ponding of surface water.

Temporary side slopes and excavations should comply with the Occupational Safety and Health Administration's (OSHA) trench safety standards, 29 C.F.R., s. 1926.650, Subpart P, all subsequent revisions or updates of OSHA's referenced standard adopted by the Department of Labor and Employment Security and Florida's Trench Safety Act, Section 553.62, Florida Statutes. Excavated materials should not be stockpiled at the top of the slope within a horizontal distance equal to the excavation depth.

Protection of Existing Structures

FDOT Standard Specification 108, or similar County requirements, should be followed for protection of existing structures as relating to construction operations. Additional measures including vibration monitoring and identifying specific structures for settlement monitoring and inspection that may be outside of Specification 108 may be warranted depending on the Contractor's means and methods.

REPORT LIMITATIONS

The information and recommendations contained in this report are our opinions based on the site conditions and project information described herein and further assume that the conditions observed in the exploratory borings are representative of the subsurface conditions throughout the site, i.e., the subsurface conditions elsewhere on the site are the same as those disclosed by the borings. If, during construction, subsurface conditions different from those encountered in the exploratory borings are observed or appear to be present beneath excavations, we should be advised at once so that we can review these conditions and reconsider our recommendations where necessary.

If there is a substantial lapse in time between the submittal of this report and the start of work at the site, or if conditions or project layout are changed due to natural causes or construction operations at or adjacent to the site, we recommend that this report be reviewed to determine the applicability of conclusions and recommendations considering the changed conditions and time lapse.

This report was prepared for the exclusive use of Kimley-Horn, Inc. and their client for evaluating the design of the project as it relates to the geotechnical aspects discussed herein. It should be made available to prospective contractors for information on factual data only and not as a warranty of subsurface conditions included in this report. Unanticipated soil conditions may require that additional expense be made to attain a properly constructed project. Therefore, some contingency fund is recommended to accommodate such potential extra costs.

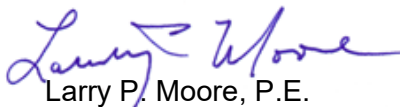
Should there be any questions regarding the report, please do not hesitate to contact our office at (813) 989-1354. Tierra would be pleased to continue providing geotechnical services throughout the implementation of the project. We look forward to working with you and your organization on this and future projects.

Respectfully Submitted,

TIERRA, INC.



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Attachments: Boring Location Plan
Soil Profiles



AERIAL FROM 2023 (BEFORE STORM EVENTS)

BORING LOCATION PLAN



LEGEND

 APPROXIMATE LOCATION OF SPT BORING

DRAWN BY:
SW

APPROVED BY:
LPM

ENGINEER OF RECORD:
LAWRENCE P. MOORE, P.E.

FLORIDA LICENSE NO.:
47673

DATE:
NOV 2025

CHECKED BY:
TB



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SCALE:
NOTED

PROJECT NUMBER:
6511-25-250

GEOTECHNICAL ENGINEERING SERVICES
MANASOTA KEY WATER MAIN
SARASOTA COUNTY, FLORIDA

SHEET 1

SOIL PROFILES

LEGEND

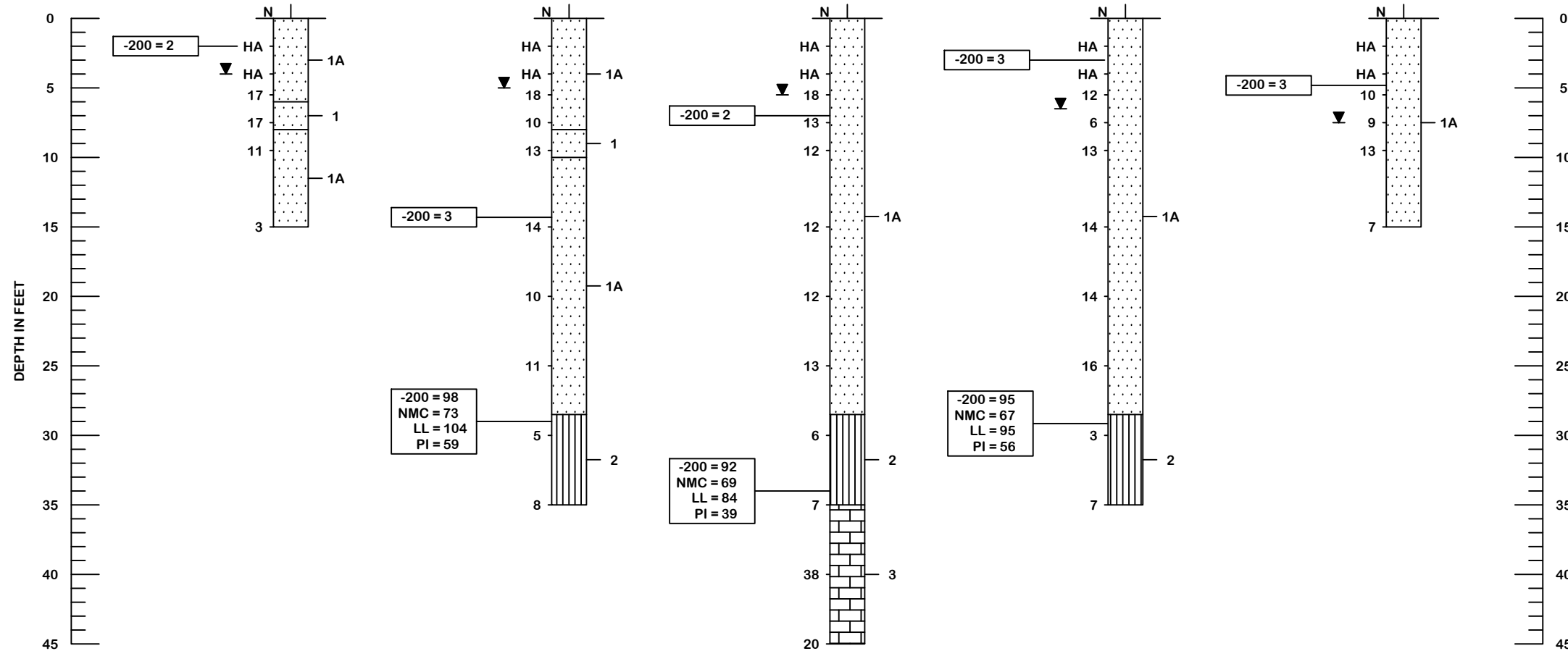
BOR # B-1
EASTING 529714
NORTHING 957671
DATE 10/23/2025

BOR # B-2
EASTING 529854
NORTHING 957357
DATE 10/23/2025

BOR # B-3
EASTING 530084
NORTHING 956956
DATE 10/24/2025

BOR # B-4
EASTING 530330
NORTHING 956557
DATE 10/24/2025

BOR # B-5
EASTING 530582
NORTHING 956192
DATE 10/24/2025



- 1 LIGHT GRAY TO GRAY TO LIGHT BROWN TO BROWN SAND TO SAND WITH SILT (SP/SP-SM)
- 2 GRAY TO BROWN TO GREEN CLAY TO SILT (CL/CH/ML/MH)
- 3 SANDY CALCAREOUS CLAY TO WEATHERED LIMESTONE
- A - OCCASIONALLY WITH SHELL FRAGMENTS
- GROUNDWATER LEVEL ENCOUNTERED DURING INVESTIGATION
- N SPT N-VALUE IN BLOWS/FOOT FOR 12 INCHES OF PENETRATION (UNLESS OTHERWISE NOTED)
- SP UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2488) GROUP SYMBOL AS DETERMINED BY VISUAL REVIEW AND LABORATORY TESTING ON SELECTED SAMPLES FOR CONFIRMATION OF VISUAL REVIEW
- HA HAND AUGERED TO VERIFY UTILITY CLEARANCES
- 200 PERCENT PASSING #200 SIEVE
- NMC NATURAL MOISTURE CONTENT (%)
- LL LIQUID LIMIT (%)
- PI PLASTICITY INDEX (%)
- EASTING EASTING COORDINATE REFERENCED TO THE FLORIDA STATE PLANE COORDINATE SYSTEM, FLORIDA WEST ZONE, N.A.D. 83 DETERMINED USING HAND-HELD GARMIN ETREX GPS EQUIPMENT WITH A REPORTED ACCURACY OF ± 10 FEET.
- NORTHING NORTHING COORDINATE REFERENCED TO THE FLORIDA STATE PLANE COORDINATE SYSTEM, FLORIDA WEST ZONE, N.A.D. 83 DETERMINED USING HAND-HELD GARMIN ETREX GPS EQUIPMENT WITH A REPORTED ACCURACY OF ± 10 FEET.
- NOTE: WEATHERED LIMESTONE WAS ENCOUNTERED WITHIN THE BORINGS PERFORMED. EXCAVATIONS INTO AND/OR THROUGH THESE MATERIALS WILL BE DIFFICULT AND WILL REQUIRE NON-CONVENTIONAL CONSTRUCTION TECHNIQUES AND SPECIALIZED EQUIPMENT. VARIATIONS IN THE DEPTH AND STRENGTH OF THIS MATERIAL SHOULD BE ANTICIPATED.

ENVIRONMENTAL CLASSIFICATION

SUBSTRUCTURE CONCRETE EXTREMELY AGGRESSIVE
SUBSTRUCTURE STEEL EXTREMELY AGGRESSIVE

AUTOMATIC HAMMER	
GRANULAR MATERIALS- RELATIVE DENSITY	SPT (BLOWS/FT.)
VERY LOOSE	LESS THAN 3
LOOSE	3 TO 8
MEDIUM	8 TO 24
DENSE	24 TO 40
VERY DENSE	GREATER THAN 40
SILTS AND CLAYS CONSISTENCY	SPT (BLOWS/FT.)
VERY SOFT	LESS THAN 1
SOFT	1 TO 3
FIRM	3 TO 6
STIFF	6 TO 12
VERY STIFF	12 TO 24
HARD	GREATER THAN 24

DRAWN BY:
SW

CHECKED BY:
TB

APPROVED BY:
LPM

DATE:
NOV 2025

ENGINEER OF RECORD:
LAWRENCE P. MOORE, P.E.
FLORIDA LICENSE NO.:
47673



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GEOTECHNICAL ENGINEERING SERVICES
MANASOTA KEY WATER MAIN
SARASOTA COUNTY, FLORIDA

SHEET 2