SECTION 01620 STORAGE AND PROTECTION

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

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

1.02 STORAGE

A. Store products immediately on delivery and protect until installed in the Work, in accord 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.

A. 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 Engineer. 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 Engineer.
2. All equipment having moving parts such as gears, electric motors, etc. and/or instruments shall be stored in a temperature and humidity controlled building approved by the Engineer until such time as the equipment is to be installed.
3. All equipment shall be stored fully lubricated with oil, grease, etc. unless otherwise instructed by the manufacturer.
4. Moving parts shall be rotated a minimum of once weekly to insure proper lubrication and to avoid metal-to-metal "welding". Upon installation of the equipment, the Contractor shall start the equipment, at least half load, once weekly for an adequate period of time to insure 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 in a minimum time period. 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.

1.04 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 01700 CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

Comply with requirements stated in Conditions of the Contract and in Specifications for administrative procedures in closing out the work.

1.02 SUBSTANTIAL COMPLETION

A. The Contractor shall submit the following items when the Contractor considers the work to be substantially complete:

1. A written notice that the work, or designated portion thereof, is substantially complete.
2. A list of items to be completed or corrected.

B. Within a reasonable time after receipt of such notice, the Engineer and Owner shall make an inspection to determine the status of completion.

C. Project record documents and operations and maintenance manuals must be submitted before the project shall be considered substantially complete.

D. If the Engineer determines that the work is not substantially complete:

1. The Engineer shall notify the Contractor in writing, stating the reasons.
2. The Contractor shall remedy the deficiencies in the work and send a second written notice of substantial completion to the Engineer.
3. The Engineer shall reinspect the work.

E. When the Engineer finds that the work is substantially complete:

1. He shall prepare and deliver to the Owner a tentative Certificate of Substantial Completion (Manatee County Project Management Form PMD-8) with a tentative list of the items to be completed or corrected before final payment.
2. The Engineer shall consider any objections made by the Owner as provided in Conditions of the Contract. When the Engineer considers the work substantially complete, he will execute and deliver to the Owner and the Contractor a definite Certificate of Substantial Completion (Manatee County Project Management Form PMD-8) with a revised tentative list of items to be completed or corrected.

1.03 FINAL INSPECTION

A. When the Contractor considered the work to be complete, he shall submit written certification stating that:

1. The Contract Documents have been reviewed.
2. The work has been inspected for compliance with Contract Documents.
3. The work has been completed in accordance with Contract Documents.
4. The equipment and systems have been tested in the presence of the Owner's representative and are operational.
5. The work is completed and ready for final inspection.

B. The Engineer shall make an inspection to verify the status of completion after receipt of such certification.

C. If the Engineer determines that the work is incomplete or defective:

1. The Engineer shall promptly notify the Contractor in writing, listing the incomplete or defective work.
2. The Contractor shall take immediate steps to remedy the stated deficiencies and send a second written certification to Engineer that the work is complete.
3. The Engineer shall reinspect the work.

D. Upon finding the work to be acceptable under the Contract Documents, the Engineer shall request the Contractor to make closeout submittals.

E. For each additional inspection beyond a total of three (3) inspections for substantial and final completion due to the incompleteness of the work, the Contractor shall reimburse the Owner for the Engineer's fees.

1.04 CONTRACTOR'S CLOSEOUT SUBMITTALS TO ENGINEER

A. Project Record Documents (prior to substantial completion).

B. Operation and maintenance manuals (prior to substantial completion).

C. Warranties and Bonds.

E. Evidence of Payment and Release of Liens: In accordance with requirements of General and Supplementary Conditions.

F. Certification letter from Florida Department of Transportation and Manatee County Department of Transportation, as applicable.

G. Certificate of Insurance for Products and Completed Operations.

H. Final Reconciliation, Warranty Period Declaration, and Contractor's Affidavit (Manatee County Project Management Form PMD-9).

1.05 FINAL ADJUSTMENT OF ACCOUNTS

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

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

1. The original Contract Sum.
2. Additions and deductions resulting from:
   a. Previous Change Orders
   b. Unit Prices
   c. Penalties and Bonuses
   d. Deductions for Liquidated Damages
   e. Other Adjustments
3. Total Contract Sum, as adjusted.
4. Previous payments.
5. Sum remaining due.

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

1.06 FINAL APPLICATION FOR PAYMENT

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

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01710 CLEANING

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

Execute cleaning during progress of the work and at completion of the work, as required by the General Conditions.

1.02 DISPOSAL REQUIREMENTS

Conduct cleaning and disposal operations to comply with all Federal, State and Local codes, ordinances, regulations and anti-pollution laws.

PART 2 PRODUCTS

2.01 MATERIALS

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

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

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

PART 3 EXECUTION

3.01 DURING CONSTRUCTION

A. Execute periodic cleaning to keep the work, the site and adjacent properties free from accumulation of waste materials, rubbish and wind-blown debris, resulting from construction operations.

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

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

3.02 DUST CONTROL

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

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

3.03 FINAL CLEANING

A. Employ skilled workmen for final cleaning.

B. Broom clean exterior paved surfaces; rake clean other surfaces of the grounds.

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

END OF SECTION

SECTION 01720 PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Contractor shall maintain at the site for the Owner one record copy of:

1. Drawings.
2. Specifications.
3. Addenda.
4. Change Orders and other modifications to the Contract.
5. Engineer's field orders or written instructions.
6. Approved shop drawings, working drawings and samples.
7. Field test records.
8. Construction photographs.

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 Engineer.

1.03 MARKING DEVICES

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

1.04 RECORDING

A. Label each document "PROJECT RECORD" 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. Field changes of dimension and detail.
3. Changes made by Field Order or by Change Order.
4. Details not on original contract drawings.
5. Equipment and piping relocations.
6. 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.
7. Elevations shall be provided for all manhole rim and inverts; junction box rim and inverts; catch basin rim and inverts; and baffle, weir and invert elevations in control structures. Elevations shall also be provided at the PVI's and at every other lot line or 200 feet, whichever is less, of drainage swales and ditches. Bench marks and elevation datum shall be indicated.
8. 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.
9. 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.
10. Record drawings shall show bearings and distances for all right-of-way and easement lines, and property corners.
11. 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.
12. Sanitary sewer mainline wyes shall be located from the downstream manhole. These dimensions shall be provided by on-site inspections or televiewing of the sewer following installation.
13. Elevations shall be provided on the top of operating nuts for all water and force main valves.
14. 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 ± 1/8 inch per 50 feet (or part thereof) of horizontal distance up to a maximum tolerance of ± 2 inch.
15. Properly prepared record drawings on mylar, together with two copies, 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/Engineer.

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.

F. Shop Drawings (after final review and approval):

1. Five sets of record drawings for each process equipment, piping, electrical system and instrumentation system.

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 Engineer. These will be reviewed and verified by the inspector. 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), as stipulated by the Land Development Ordinance and submitted on signed and dated mylar drawings together with a recordable compact disk (CD).

C. The CD shall contain media in AutoCad Version 12 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 County 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.

PART 2 STANDARDS

2.01 MINIMUM RECORD DRAWING STANDARDS FOR ALL RECORD DRAWINGS SUBMITTED TO MANATEE COUNTY

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 Engineer.

B. Drawings shall meet the criteria of paragraph 1.04 D above.

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01730 OPERATING AND MAINTENANCE DATA

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

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

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

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

C. Provide three (3) sets of operating and maintenance manuals for each piece of equipment provided within this Contract.

1.02 FORM OF SUBMITTALS

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

B. Format:

1. Size: 8-1/2 inch x 11 inch
2. Paper: 20 pound minimum, white, for typed pages
3. Text: Manufacturer's printed data or neatly typewritten
4. Drawings:
   a. Provide reinforced punched binder tab, bind in with text.
   b. Fold larger drawings to size of text pages.
5. Provide fly-leaf for each separate product or each piece of operating equipment.
   a. Provide typed description of product and major component parts of equipment.
   b. Provide indexed tabs.
6. Cover: Identify each volume with typed or printed title "OPERATING AND MAINTENANCE INSTRUCTIONS". List:
   a. Title of Project.
   b. Identity of separate structures as applicable.
   c. Identity of general subject matter covered in the manual.

C. Binders:

1. Commercial quality three-ring binders with durable and cleanable plastic covers.
2. Maximum ring size: 1 inch.
3. When multiple binders are used, correlate the data into related consistent groupings.

1.03 MANUAL FOR EQUIPMENT AND SYSTEMS

A. Submit three copies of complete manual in final form.

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

1. Description of unit and component parts.
   a. Function, normal operating characteristics and limiting conditions.
   b. Performance curves, engineering data and tests.

c. Complete nomenclature and commercial number of replaceable parts.

2. Operating Procedures:
   a. Start-up, break-in, routine and normal operating instructions.
   b. Regulation, control, stopping, shut-down and emergency instructions.
   c. Summer and winter operating instructions.
   d. Special operating instructions.
3. Maintenance Procedures:
   a. Routine operations.
   b. Guide to "trouble-shooting".
   c. Disassembly, repair and reassembly.
   d. Alignment, adjusting and checking.
4. Servicing and lubricating schedule.
   a. List of lubricants required.
5. Manufacturer's printed operating and maintenance instructions.
6. Description of sequence of operation by control manufacturer.
7. Original manufacturer's parts list, illustrations, assembly drawings and diagrams required for maintenance.
   a. List of predicted parts subject to wear.
   b. Items recommended to be stocked as spare parts.
8. As installed control diagrams by controls manufacturer.
9. Each contractor's coordination drawings.
   a. As installed color coded piping diagrams.
10. Charts of valve tag numbers, with location and function of each valve.
11. List of original manufacturer's spare parts, manufacturer's current prices and recommended quantities to be maintained in storage.
12. Other data as required under pertinent sections of specifications.

C. Content, for each electric and electronic system, as appropriate:

1. Description of system and component parts.
   a. Function, normal operating characteristics and limiting conditions.
   b. Performance curves, engineering data and tests.
   c. Complete nomenclature and commercial number of replaceable parts.
2. Circuit directories of panelboards.
   a. Electrical service.
   b. Controls.
   c. Communications.
3. As-installed color coded wiring diagrams.
4. Operating procedures:
   a. Routine and normal operating instructions.
   b. Sequences required.
   c. Special operating instructions.
5. Maintenance procedures:
   a. Routine operations.
   b. Guide to "trouble-shooting".
   c. Disassembly, repair and reassembly.
   d. Adjustment and checking.
6. Manufacturer's printed operating and maintenance instructions.
7. List of original manufacture's spare parts, manufacturer's current prices and recommended quantities to be maintained in storage.
8. Prepare and include additional data when the need for such data becomes apparent during instruction of Owner's personnel.

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

E. Additional requirements for operating and maintenance data: Respective sections of Specifications.

1.04 SUBMITTAL SCHEDULE

A. Submit one copy of completed data in final form fifteen days prior to substantial completion.

1. Copy will be returned after substantial completion, with comments (if any).

B. Submit two copies of approved data in final form. Final acceptance will not be provided until the completed manual is received and approved.

1.05 INSTRUCTION OF OWNER'S PERSONNEL

A. Prior to final inspection or acceptance, fully instruct Owner's designated operating and maintenance personnel in operation, adjustment and maintenance of products, equipment and systems.

B. Operating and maintenance manual shall constitute the basis of instruction.

1. Review contents of manual with personnel in full detail to explain all aspects of operations and maintenance.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01740 WARRANTIES AND BONDS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Compile specified warranties and bonds.

B. Compile specified service and maintenance contracts.

C. Co-execute submittals when so specified.

D. Review submittals to verify compliance with Contract Documents.

E. Submit to Engineer for review and transmittal to Owner.

1.02 SUBMITTAL REQUIREMENTS

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

B. Number of original signed copies required: Two each.

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

1. Product or work item.
2. Firm, with name of principal, address and telephone number.
3. Scope.
4. Date of beginning of warranty, bond or service and maintenance contract.
5. Duration of warranty, bond or service maintenance contract.
6. Provide information for Owner's personnel:
   a. Proper procedure in case of failure.
   b. Instances which might affect the validity of warranty or bond.
7. Contractor, name of responsible principal, address and telephone number.

1.03 FORM OF SUBMITTALS

A. Prepare in duplicate packets.

B. Format:

1. Size 8-1/2 inch x 11 inch punched sheets for standard 3-ring binder. Fold larger sheets to fit into binders.
2. Cover: Identify each packet with typed or printed title "WARRANTIES AND BONDS". List:
   a. Title of Project.
   b. Name of Contractor.

C. Binders: Commercial quality, three-ring, with durable and cleanable plastic covers.

1.04 TIME OF SUBMITTALS

A. Make submittals within ten days after date of substantial completion and prior to final request for payment.

B. For items of work, where acceptance is delayed materially beyond date of substantial completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

1.05 SUBMITTALS REQUIRED

A. Submit warranties, bonds, service and maintenance contracts as specified in respective sections of Specifications.

B. Approval by the Owner of all documents required under this section is a pre-requisite to requesting a final inspection and final payment

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

DIVISION 2 SITE WORK

SECTION 02064 MODIFICATIONS TO EXISTING STRUCTURES, PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SCOPE OF WORK

Furnish all labor, materials, equipment and incidentals required to modify, alter and/or convert existing structures as shown or specified and as required for the installation of piping, mechanical equipment and appurtenances. Existing piping and equipment shall be removed and dismantled as necessary for the performance of facility alterations in accordance with the requirements herein specified.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

A. The Contractor shall cut, repair, reuse, excavate, demolish or otherwise remove parts of the existing structures or appurtenances, as indicated on the Contract Drawings, herein specified, or necessary to permit completion of the work under this Contract. The Contractor shall dispose of surplus materials resulting from the above work in an approved manner. The work shall include all necessary cutting and bending of reinforcing steel, structural steel, or miscellaneous metal work found embedded in the existing structures.

B. The Contractor shall dismantle and remove all existing equipment, piping, and other appurtenances required for the completion of the work. Where called for or required, the contractor shall cut existing pipelines for the purpose of making connections thereto. Anchor bolts for equipment and structural steel removed shall be cut off one inch below the concrete surface. Surface shall be finished as specified in the Contract Documents.

C. At the time that a new connection is made to an existing pipeline, additional new piping, extending to and including a new valve, shall be installed. Pipe anchorage, if required, is part of the installation shall also be installed as directed by the Engineer.

D. No existing structure, equipment, or appurtenance shall be shifted, cut, removed, or otherwise altered except with the express approval of and to the extent approved by the Engineer.

E. When removing materials or portions of existing utility pipelines and/or structures or when making openings in walls and partitions, the Contractor shall take all precautions and use all necessary barriers and other protective devices so as not to damage the structures beyond the limits necessary for the new work, and not to damage the structures or contents by falling or flying debris. Unless otherwise permitted, line drilling will be required in cutting existing concrete.

F. Materials and equipment removed in the course of making alterations and additions shall remain the property of the Owner, except that items not salvageable, as determined by the Engineer and the Owner, shall become the property of the Contractor to be disposed of by him

off the work site at his own place of disposal. Operating equipment shall be thoroughly cleaned, lubricated, and greased for protection during prolonged storage.

G. All alterations to existing utility pipes and structures shall be done at such time and in such manner as to comply with the approved time schedule. So far as possible before any part of the work is started, all tools, equipment, and materials shall be assembled and made ready so that the work can be completed without delay.

H. All workmanship and new materials involved in constructing the alterations shall conform to the General Specifications for the classes of work insofar as such specifications are applicable.

I. All cutting of existing concrete or other material to provide suitable bonding to new work shall be done in a manner to meet the requirements of the respective section of these Specifications covering the new work. When not covered, the work shall be carried on in the manner and to the extent directed by the Resident Project Representative.

J. Surfaces of seals visible in the completed work shall be made to match as nearly as possible the adjacent surfaces.

K. Non-shrink grout shall be used for setting wall castings, sleeves, leveling pump bases, doweling anchors into existing concrete and elsewhere as shown.

L. Where necessary or required for the purpose of making connections, the Contractor shall cut existing pipelines in a manner to provide an approved joint. Where required, he shall use flanges, or provide Dresser Couplings, all as required.

M. The Contractor shall provide flumes, hoses, piping and other related items to divert or provide suitable plugs, bulkheads, or other means to hold back the flow of water or other liquids, all as required in the performance of the work under this Contract.

N. Care shall be taken not to damage any part of existing buildings or foundations or outside structures.

3.02 CONNECTING TO EXISTING PIPING AND EQUIPMENT

The Contractor shall verify exact location, material, alignment, joint, etc. of existing piping and equipment prior to making the connections called out in the Drawings. The verifications shall be performed with adequate time to correct any potential alignment or other problems prior to the actual time of connection. A Manatee County representative must be present for all tie-ins for a visual inspection.

3.03 REMOVAL AND ABANDONMENT OF ASBESTOS CEMENT PIPE AND APPURTENANCES

A. All work associated with the removal or abandonment of existing asbestos cement pipe and appurtenances shall be performed by a licensed asbestos abatement contractor or subcontractor registered in the State of Florida.

B. The asbestos abatement contractor or subcontractor shall contact the appropriate regulatory agencies prior to removal or abandonment of any asbestos material and shall obtain all required permits and licenses and issue all required notices. The Contractor shall be responsible for all fees associated with permits, licenses and notices to the governing

regulatory agencies.

C. All work associated with removal or abandonment of asbestos cement pipe and appurtenances shall be performed in accordance with the standards listed below and all other applicable local, State, or Federal standards.

1. Florida Administrative Code, Chapter 17-251, "Asbestos".
2. National Emission Standards Hazardous Air Pollution (NESHAP), 40 CFR, Part 61, Subpart M, latest revision.
3. Occupational Safety and Health Act, 29 CFR
4. The Environmental Protection Agency (EPA) Asbestos Abatement Worker Protection Rule.
5. Florida Statute 455.300.

3.04 ASBESTOS CEMENT PIPE REMOVAL

A. All asbestos cement pipe sections shown on the Drawings to be removed, and all related valves, fittings and appurtenances shall be removed in their entirety and disposed of by the Contractor in accordance with this Section. After removal of the facilities, all trenches shall be backfilled in accordance with the Contract Documents. The cost of disposing of the removed materials shall be borne by the Contractor.

B. The Contractor shall make necessary provisions for the Engineer's representative to monitor all removal operations.

C. The cutting of existing asbestos-cement (A/C, aka "Transite") pipe shall be by hand saw only activities by a licensed asbestos abatement contractor. No machine cutting shall be allowed. Removal of all portions of pipe shall be double bagged prior to shipment. Longer sections of pipe removed may be shipped without double bagging. An asbestos manifest form must accompany each and every shipment of such pipe or pipe material waste to the Manatee County Lena Road Landfill. Prior to each shipment, a minimum of 24 hours notice to the Landfill field office (Phone #748-5543) is required.

3.05 IN-PLACE GROUTING OF EXISTING PIPE

A. Where water and wastewater utility pipes are to be abandoned in place, they shall be filled with a sand/cement grout as specified herein. When such pipes are constructed with asbestos cement materials, the abandonment activities shall be performed by a licensed asbestos abatement contractor as specified in these Specifications.

B. Grout shall be injected within the pipe sections indicated on the Drawings. The ends of these sections shall be capped and/or plugged. The grouting program shall consist of pumping sand-cement grout with suitable chemical additives at pressures necessary to fill the pipe sections shown on the Drawings to prevent the potential for future collapse.

C. The pump used for grouting should be a continuous flow, positive displacement model with a pugmill type mixing vat having a minimum shaft speed of 60 rpm and incorporated as an integral part of the equipment. Alternate equipment may be used subject to the approval of the Engineer. The rate of pumping shall not exceed six (6) cubic feet per minute. The pumping pressures shall be in the range of 100 to 150 psi.

D. The Contractor shall provide standpipes and/or additional means of visual inspection as required by the Engineer to determine if adequate grout material has filled the entire pipe

section(s). The Contractor shall make necessary provisions for the Engineer's representative to monitor all grouting operations.

E. All pipe to be abandoned shall be capped or plugged with a fitting or material that will prevent soil or other material from entering the pipe. All caps and plugs shall be subject to approval by the Engineer.

END OF SECTION

SECTION 02100 SITE PREPARATION

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section covers clearing, grubbing and stripping of the project site and/or along the pipeline route.

B. The Contractor shall clear and grub all of the area within the limits of construction or as required, which includes, but is not limited to utility easements. The width of the area to be cleared shall be reviewed by the Engineer prior to the beginning of any clearing.

C. The Contractor's attention is directed to any Soil Erosion and Sediment Control Ordinances in force in Manatee County. The Contractor shall comply with all applicable sections of these ordinances.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 CLEARING

The surface of the ground, for the area to be cleared and grubbed shall be completely cleared of all timber, brush, stumps, roots, grass, weeds, rubbish and all other objectionable obstructions resting on or protruding through the surface of the ground. However, trees shall be preserved as hereinafter specified unless otherwise designated by the Engineer. Clearing operations shall be conducted so as to prevent damage to existing structures and installations and to those under construction, so as to provide for the safety of employees and others. Soil erosion control devices such as hay bales and silt fences shall be installed to satisfy all Federal, State and County requirements.

3.02 GRUBBING

Grubbing shall consist of the complete removal of all stumps, roots larger than 1-1/2 inches in diameter, matted roots, brush, timber, logs and any other organic or metallic debris not suitable for foundation purposes, resting on, under or protruding through the surface of the ground to a depth of 18 inches below the subgrade. All depressions excavated below the original ground surface for or by the removal of such objects, shall be refilled with suitable materials and compacted to a density conforming to the surrounding ground surface.

3.03 STRIPPING

In areas so designated, topsoil shall be stockpiled. Topsoil so stockpiled shall be protected until it is placed as specified. The Owner shall have the option to receive all excess topsoil materials. The Contractor shall pay all equipment and labor cost to deliver excess top soil material to a remote site chosen by the Owner within a five mile radius of the construction site. Should Owner not choose to receive any or all excess topsoil materials, the Contractor shall dispose of said material at no additional cost to Owner.

3.04 DISPOSAL OF CLEARED AND GRUBBED MATERIAL

The Contractor shall dispose of all material and debris from the clearing and grubbing

operation by hauling such material and debris off site. The cost of disposal (including hauling) of cleared and grubbed material and debris shall be considered a subsidiary obligation of the Contractor; the cost of which shall be included in the prices bid for the various classes of work.

3.05 PRESERVATION OF TREES

Those trees which are not designated for removal by the Engineer shall be carefully protected from damage. The Contractor shall erect such barricades, guards and enclosures as may be considered necessary by him for the protection of the trees during all construction operation.

3.06 PRESERVATION OF DEVELOPED PRIVATE PROPERTY

A. The Contractor shall exercise extreme care to avoid unnecessary disturbance of developed private property adjacent to proposed project site. Trees, shrubbery, gardens, lawns and other landscaping, which are not designated by the Engineer to be removed, shall be replaced and replanted to restore the construction easement to the condition existing prior to construction.

B. All soil preservation procedures and replanting operations shall be under the supervision of a nursery representative experienced in such operations.

C. Improvements to the land such as fences, walls, outbuildings and other structures which of necessity must be removed, shall be replaced with equal quality materials and workmanship.

D. The Contractor shall clean up the construction site across developed private property directly after construction is completed upon approval of the Engineer.

3.07 PRESERVATION OF PUBLIC PROPERTY

The appropriate paragraphs of these Specifications shall apply to the preservation and restoration of public lands, parks, rights-of-way, easements and all other damaged areas. This includes, but is not limited to the trimming of trees damaged by contractor's equipment.

END OF SECTION

SECTION 02220 EXCAVATION, BACKFILL, FILL AND GRADING FOR STRUCTURES

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Structural excavation shall consist of the removal of material for the construction of foundations for structures and other excavation designated on the drawings or in these specifications.

B. Structural excavation and backfill shall consist of furnishing material, if necessary and placing and compacting backfill material around structures to the lines and grades designated on the drawings, as specified or directed by the Engineer.

C. Structural excavation and backfill shall include the furnishing of all materials, equipment and other facilities which may be necessary to perform the excavations, place and compact the backfill, install sheeting and bracing, and carry out any necessary dewatering. It shall also include the wasting or disposal of surplus excavated material in a manner and in locations approved by the Engineer.

D. The Contractor is responsible for the protection of every tree which is scheduled to remain in the project area. This includes trees which may or may not be shown on the plans. Every tree shall be adequately protected in place at no additional cost to the County. This includes, but is not limited to, protecting the root systems and adjusting grades as necessary for tree/root protection.

1.02 QUALITY ASSURANCE

A. Testing Agency:

1. In place soil compaction tests shall be performed by a qualified testing laboratory.
2. Compaction tests shall be taken every 500 feet, except in the road crossings or road shoulders. Tests are to be taken according to current FDOT Standards.

B. Reference Standards:

1. American Society for Testing and Materials (ASTM):
   a. ASTM D1557, Moisture-Density Relations of Soils Using 10-lb. (4.5-kg) Rammer and 18-in. (457-mm) Drop.

1.03 JOB CONDITIONS

A. The Contractor shall provide, operate and maintain all necessary pumps, discharge lines, well points, etc., in sufficient number and capacity to keep all excavation, bases, pits, etc., free from seepage, standing or running water at all times throughout the period of construction.

B. The Contractor shall assume all responsibility for the security of the excavation required, employing bracing, lining or other accepted means necessary to accomplish same.

C. Excavated areas shall be cleared of all debris, water, slush, muck, clay and soft or loose earth and shall be conditioned to the entire satisfaction of the Engineer.

D. All excavated material unsuitable for use or which will not be used shall be disposed of in a manner consistent with State and County regulation.

E. All unsuitable organic materials, roots, logs, etc., found during excavation shall be removed by the Contractor and the trench shall be refilled with suitable material.

PART 2 PRODUCTS

2.01 MATERIAL FOR CONTROLLED FILL

A. Composition: Only approved material free from organic matter and lumps of clay, shall be used for backfill. Excavated earth free from debris or organic material may be used for backfilling foundations or fill.

B. Crushed stone and shell shall meet or exceed current FDOT Standards.

2.02 UNSUITABLE MATERIAL

Unsuitable material shall be defined as highly organic soil per ASTM D2487 Group PT. This includes, but is not limited to, such items as topsoil, roots, vegetable matter, trash, debris, and clays that cannot be dried sufficiently to obtain specified compaction.

PART 3 EXECUTION

3.01 INSPECTION

A. The Contractor shall verify that work preceding the affected work of this Section has been satisfactorily completed.

B. Conditions adversely affecting the work of this Section shall be corrected to the satisfaction of the Engineer.

3.02 REMOVAL OF UNSUITABLE MATERIALS

A. The Contractor shall remove unsuitable material from within the limits of the Work.

B. Materials meeting requirements for controlled fill shall be stockpiled as necessary and in such a manner satisfactory to the Engineer.

C. All material excavated shall be placed so as to minimize interference with public travel and to permit proper access for inspection of the work.

3.03 EXCAVATION

A. When concrete or shell subbase footing is to rest on an excavated surface, care shall be taken not to disturb the natural soil. Final removal and replacement of the foundation material and subbase compaction to grade shall not be made until just before the concrete or masonry is placed.

B. When any structural excavation is completed, the Contractor shall notify the Engineer who will make an inspection of the excavation. No concrete or masonry shall be placed until the excavation has been approved by the Engineer.

C. The elevations of the footing bottom and the base slab as shown on the Drawings, shall be considered as approximate and the Engineer may order in writing, such changes in dimensions or elevations of the footings and slab base as necessary to secure satisfactory foundations.

D. All excavation shall be made within an area bounded by lines five feet outside and parallel to the exterior walls of the structure to allow for correct forming, shoring and inspection of foundation work. Pouring of concrete against earth side walls shall not be permitted.

E. If the ground is excavated below the grade called for by the Drawings or becomes unstable due to the Contractor's carelessness or operations, the ground shall be excavated to undisturbed native soil before continuing concreting operations.

D. If in the opinion of the Engineer, the material at or below the normal grade of the bottom of the trench is unsuitable for pipe or structure foundation, it shall be removed to the depth directed by the Engineer and if so directed, replaced by crushed stone or washed shell.

3.04 STRUCTURAL BACKFILL

A. Structural backfill shall not be placed until the footings or other portions of the structure or facility have been inspected by the Engineer and approved for backfilling.

B. A minimum of 1-1/2" layer of lean concrete shall be placed as a working mat for the concrete base slabs and footings if required by the engineer.

C. Fill shall be placed in uniform layers not more than 12" thick and compacted to a minimum of 98 percent of the maximum density determined by ASTM D1557, Method A or C, or as directed by the Engineer. The Contractor shall securely tamp the backfill with pneumatic rammer around all wall foundations. The method of compaction shall be satisfactory to the Engineer.

D. Compaction of structural backfill by ponding and jetting may be permitted when, as determined by the Engineer: the backfill material is of such character that it will be self-draining when compacted; foundation materials will not soften or be otherwise damaged by the applied water; no damage from hydrostatic pressure will result to the structure. Ponding and jetting within two feet below finished subgrade shall not be permitted in roadway areas. At the discretion of the Engineer, ponding and jetting may be permitted with compaction layers not to exceed four feet.

E. Surplus material not used on-site shall be removed and disposed of off-site by the Contractor. In no case shall surplus material be deposited on adjacent lands. Fill used for grading shall be placed in layers not to exceed 12 inches in thickness and shall be compacted to a density equal or greater to that of the surrounding natural ground.

3.05 BACKFILLING AROUND STRUCTURES

A. Common fill and structural fill are specified for use as backfill against the exterior walls of the structures. Fill shall be placed in layers having a maximum thickness of eight (8) inches in loose state and shall be compacted sufficiently to prevent settlement. If compaction is by rolling or ramming, material shall be wetted down as required. Where material can be suitably compacted by jetting or puddling, the Contractor may use one of these methods. No boulders shall be allowed to roll down the slopes and hit the walls.

B. Backfilling shall be carried up evenly on all walls of an individual structure simultaneously. A variation of two (2) feet in elevation will be the maximum allowable. No backfill shall be allowed against walls until the walls and their supporting slabs, if applicable, have attained sufficient strength. Backfilling shall be subjected to approval by the Engineer.

C. 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 above the bottom of the pipes:

1. Place structural fill in such areas for a distance of not less than three feet either side of the center line of the pipe in level layers not exceeding 6-inches in depth.
2. Wet each layer to the extent directed and thoroughly compact each layer with a power tamper to the satisfaction of the Engineer.
3. Structural fill shall be of the quality specified under Part 2 of this Section.

D. The surface of filled areas shall be graded to smooth true lines, strictly conforming to grades indicated on the grading plan. No soft spots or uncompacted areas shall be allowed in the work.

E. Temporary bracing shall be provided as required during construction of all structures to protect partially completed structures against all construction loads, hydraulic pressure and earth pressure. The bracing shall be capable of resisting all loads applied to the walls as a result of backfilling.

3.06 FIELD QUALITY CONTROL

E. The density of soil in place shall be a minimum of 95 percent in accordance with ASTM test 1557-70T, Method A or C.

END OF SECTION

SECTION 02221 TRENCHING, BEDDING AND BACKFILL FOR PIPE

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, equipment and incidentals necessary to perform all excavation, backfill, fill, grading, trench protection or other related work required to complete the piping work shown on the Drawings and specified herein. The work shall include, but not be limited to: vaults; duct conduit; pipe; roadways and paving; backfilling; required fill or borrow operations; grading; disposal of surplus and unsuitable materials; and all related work such as sheeting, bracing and dewatering.

B. Prior to commencing work, the Contractor shall examine the site and review test borings if available, or undertake his own subsurface investigations and take into consideration all conditions that may affect his work.

C. The Contractor is responsible for the protection of every tree which is scheduled to remain in the project area. This includes trees which may or may not be shown on the plans. Every tree shall be adequately protected in place at no additional cost to the County. This includes, but is not limited to protecting the root systems and adjusting grades as necessary for tree/root protection.

1.02 PROTECTION

A. Sheeting and Bracing in Excavations:

1. In connection with construction of underground structures, the Contractor shall properly construct and maintain cofferdams. These shall consist of: sheeting and bracing as required to support the sides of excavations, to prevent any movement which could in any way diminish the width of the excavation below that necessary for proper construction and to protect adjacent structures, existing yard pipe and/or foundation material from disturbance, undermining, or other damage. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed, they shall be immediately filled and rammed.
2. Trench sheeting for pipes: no sheeting is to be withdrawn if driven below, mid-diameter of any pipe and no wood sheeting shall be cut off at a level lower than one foot above the top of any pipe unless otherwise directed by the Engineer. During the progress of the work, the Engineer may direct the Contractor in writing to leave additional wood sheeting in place. If steel sheeting is used for trench sheeting, removal shall be as specified above, unless written approval is given for an alternate method of removal.
3. All sheeting and bracing not left in place shall be carefully removed in such a manner as not to endanger the construction or other structures, utilities, existing piping, or property. Unless otherwise approved or indicated on the Drawings or in the Specification, all sheeting and bracing shall be removed after completion of the piping or structure, care being taken not to disturb or otherwise injure the pipeline or finished masonry. All voids left or caused by withdrawal of sheeting shall be immediately refilled with sand by ramming with tools specifically made for that purpose, by watering, or as may otherwise be directed.
4. The Contractor shall construct, to the extent he deems it desirable for his method of operation, the cofferdams and sheeting outside the neat lines of the pipeline trench or foundation unless otherwise indicated on the Drawings or directed by the

Owner/Engineer. Sheeting shall be plumb and securely braced and tied in position. Sheeting, bracing and cofferdams shall be adequate to withstand all pressures to which the pipeline or structure will be subjected. Pumping, bracing and other work within the cofferdam shall be done in a manner to avoid disturbing any construction of the pipeline or the enclosed masonry. Any movement or bulging which may occur shall be corrected by the Contractor at his own expense so as to provide the necessary clearances and dimensions.

5. Drawings of the cofferdams and design computations shall be submitted to the Engineer and approved prior to any construction. However, approval of these drawings shall not relieve the Contractor of the responsibility for the cofferdams. The drawings and computations shall be prepared and stamped by a Registered Professional Engineer in the State of Florida and shall be in sufficient detail to disclose the method of operation for each of the various stages of construction, if required, for the completion of the pipeline and substructures.

B. Dewatering, Drainage and Flotation

1. The Contractor shall construct and place all pipelines, concrete work, structural fill, bedding rock and limerock base course, in-the-dry. In addition, the Contractor shall make the final 24" of excavation for this work in-the-dry and not until the water level is a minimum of 6" below proposed bottom of excavation.
2. The Contractor shall, at all times during construction, provide and maintain proper equipment and facilities to remove promptly and dispose of properly all water entering excavation and keep such excavations dry so as to obtain a satisfactory undisturbed subgrade foundation condition until the fill, structure, or pipes to be built thereon have been completed to such extent that they will not be floated or otherwise damaged by allowing water levels to return to natural elevations.
3. Dewatering shall at all times be conducted in such a manner as to preserve the natural undisturbed bearing capacity of the subgrade soils at proposed bottom of excavation.
4. Wellpoints may be required for dewatering the soil prior to final excavation for deeper in-ground structures or piping and for maintaining the lowered groundwater level until construction has been completed to avoid the structure, pipeline, or fill from becoming floated or otherwise damaged. Wellpoints shall be surrounded by suitable filter sand and no fines shall be removed by pumping. Pumping from wellpoints shall be continuous and standby pumps shall be provided.
5. The Contractor shall furnish all materials and equipment to perform all work required to install and maintain the proposed drainage systems for handling groundwater and surface water encountered during construction of structures, pipelines and compacted fills.
6. Where required, the Contractor shall provide a minimum of two operating groundwater observation wells at each structure to determine the water level during construction of the pipeline or structure. Locations of the observation wells shall be at structures and along pipelines as approved by the Engineer prior to their installation. The observation wells shall be extended to 6 inches above finished grade, capped with screw-on caps protected by 24" x 24" wide concrete base and left in place at the completion of this Project.
7. Prior to excavation, the Contractor shall submit his proposed method of dewatering and maintaining dry conditions to the Engineer for approval. Such approval shall not relieve the Contractor of the responsibility for the satisfactory performance of the system. The Contractor shall be responsible for correcting any disturbance of natural bearing soils for damage to pipeline or structures caused by an inadequate dewatering system or by interruption of the continuous operation of the system as specified.

8. As part of his request for approval of a dewatering system, the Contractor shall demonstrate the adequacy of the proposed system and wellpoint filter sand by means of a test installation. Discharge water shall be clear, with no visible soil particles in a one quart sample. Discharge water shall not flow directly into wetlands or Waters of the State as defined by FDEP and SWFWMD.
9. During backfilling and construction, water levels shall be measured in observation wells located as directed by the Engineer.
10. Continuous pumping will be required as long as water levels are required to be below natural levels.

PART 2 PRODUCTS

2.01 MATERIALS

A. General

1. Materials for use as fill and backfill shall be described below. For each material, the Contractor shall notify the Engineer of the source of the material and shall furnish the Engineer, for approval, a representative sample weighing approximately 50 pounds, at least ten calendar days prior to the date of anticipated use of such material.
2. Additional materials shall be furnished as required from off-site sources and hauled to the site.

B. Structural Fill

1. Structural fill in trenches shall be used below spread footing foundations, slab-on-grade floors and other structures as backfill within three feet of the below grade portions of structures.
2. Structural fill material shall be a minimum of 60 percent clean sand, free of organic, deleterious and/or compressible material. Minimum acceptable density shall be 98 percent of the maximum density as determined by AASHTO T-180. Rock in excess of 2-1/2" in diameter shall not be used in the fill material. If the moisture content is improper for attaining the specified density, either water shall be added or material shall be permitted to dry until the proper moisture content for compaction is reached.

C. Common Fill

1. Common fill material shall be free from organic matter, muck or marl and rock exceeding 2-1/2" in diameter. Common fill shall not contain broken concrete, masonry, rubble or other similar materials. Existing soil may be used to adjust grades over the site with the exception of the construction area.
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, is not suitable for reuse shall be spoiled as specified herein for disposal of unsuitable materials by the Contractor.

D. Crushed Stone

1. Crushed stone may be used for pipe bedding, manhole bases, as a drainage layer below structures with underdrains and at other locations indicated on the Drawings.
2. Crushed stone shall be size No. 57 with gradation as noted in Table 1 of Section 901 of Florida Department of Transportation, Construction of Roads and Bridges.

PART 3 EXECUTION

3.01 TRENCH EXCAVATION AND BACKFILLING

A. Excavation for all trenches required for the installation of pipes and electrical ducts shall be made to the depths indicated on the Drawings and in such manner and to such widths as will give suitable room for laying the pipe or installing the ducts within the trenches.

B. Rock shall be removed to a minimum 6" clearance around the bottom and sides of all the pipe or ducts being laid.

C. Where pipes or ducts are to be laid in limerock bedding or encased in concrete, the trench may be excavated by machinery to or just below the designated subgrade provided that the material remaining in the bottom of the trench is no more than slightly disturbed.

D. Where the pipes or ducts are to be laid directly on the trench bottom, the lower part of the trenches shall not be excavated to grade by machinery. The last of the material being excavated manually, shall be done in such a manner that will give a flat bottom true to grade so that pipe or duct can be evenly supported on undisturbed material. Bell holes shall be made as required.

E. Backfilling over pipes shall begin as soon as practicable after the pipe has been laid, jointed and inspected and the trench filled with suitable compacted material to the mid-diameter of the pipe.

F. Backfilling over ducts shall begin not less than three days after placing concrete encasement.

G. All backfilling shall be prosecuted expeditiously and as detailed on the Drawings.

H. 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 2" and thoroughly compacted with a tamper as fast as placed, up to a level of one foot above the top of the pipe.

I. The filling shall be carried up evenly on both sides with at least one man tamping for each man shoveling material into the trench.

J. The remainder of the trench above the compacted backfill, as just described above, shall be filled and thoroughly compacted by rolling, ramming, or puddling, as the Engineer may direct, sufficiently to prevent subsequent settling.

END OF SECTION

SECTION 02223 EXCAVATION BELOW GRADE AND CRUSHED STONE OR SHELL REFILL

PART 1 GENERAL

1.01 SCOPE OF WORK

A. If in the opinion of the Engineer, the material at or below the normal grade of the bottom of the trench is unsuitable for pipe or structure foundation, it shall be removed to the depth directed by the Engineer and replaced by crushed stone or washed shell.

PART 2 PRODUCTS (NOT USED)

PART 3 MATERIALS

3.01 EXCAVATION AND DRAINAGE

A. Whatever the nature of unstable material encountered or the groundwater conditions, trench stabilization shall be complete and effective.

B. Should the Contractor excavate below the grade shown on the Contract drawings because of negligence or for his own convenience; due to failure in properly dewatering the trench; disturbs the subgrade before dewatering is sufficiently complete; he shall be directed by the Engineer to excavate below grade. The work of excavating below grade and furnishing and placing the approved refill material shall be performed at the Contractor's expense.

3.02 REFILL

A. Should the material at the level of trench bottom consist of fine sand, sand and silt or soft earth, the subgrade material shall be removed as directed by the Engineer and the excavation shall be refilled with crushed stone or washed shell.

END OF SECTION

SECTION 02260 FINISH GRADING

PART 1 GENERAL

1.01 WORK INCLUDED

A. The Contractor shall finish grade sub-soil.

B. The Contractor shall cut out areas to receive stabilizing base course materials for paving and sidewalks.

C. The Contractor shall place, finish grade and compact top soil.

1.02 PROTECTION

The Contractor shall prevent damage to existing fencing, trees, landscaping, natural features, bench marks, pavement and utility lines. Damage shall be corrected at no cost to the Owner.

PART 2 PRODUCTS

A. Topsoil: Shall be friable loam free from subsoil, roots, grass, excessive amount of weeds or other organics, stones, and foreign matter; acidity range (pH) of 5.5 to 7.5; containing a minimum of 4 percent and a maximum of 25 percent organic matter. The Contractor may use topsoil stockpiles on site if they conform to these requirements.

PART 3 EXECUTION

3.01 SUB-SOIL PREPARATION

A. The Contractor shall rough grade sub-soil systematically to allow for a maximum amount of natural settlement and compaction. Uneven areas and low spots shall be eliminated. Debris, roots, branches or other organics, stones, and sub-soil shall be removed by the Contractor and disposed of in a manner consistent with the latest Manatee County Standards as well as any affected regulatory agency. Should contaminated soil be found, the Contractor shall notify the Engineer.

B. The Contractor shall cut out areas to sub-grade elevation to stabilize base material for paving and sidewalks.

C. The Contractor shall bring sub-soil to required profiles and contour graces gradually; and blend slopes into level areas.

D. The Contractor shall slope the structure grade a minimum of two (2) inches in ten (10) feet unless indicated otherwise on the Drawings.

E. The Contractor shall cultivate sub-grade to a depth of 3 inches where the topsoil is to be placed. He shall repeat cultivation in areas where equipment use has compacted sub-soil.

F. The Contractor shall not make grade changes which causes water to flow onto adjacent lands.

3.02 PLACING TOPSOIL

A. The Contractor shall place topsoil in areas where seeding, sodding and planting is to be

performed. He shall place from the following minimum depths, up to finished grade elevations:

1. 6 inches for seeded areas
2. 4-1/2 inches for sodded areas
3. 24 inches for shrub beds
4. 18 inches for flower beds

B. The Contractor shall use topsoil in a dry state as determined by the Engineer. He shall place the material during dry weather.

C. The Contractor shall use fine grade topsoil eliminating rough and low areas to ensure positive drainage. He shall maintain levels, profiles and contours of the sub-grades.

D. The Contractor shall remove stone, roots, grass, weeds, debris, and other organics or foreign material while spreading the material.

E. The Contractor shall manually spread topsoil around trees, plants and structures to prevent damage which may be caused by grading equipment.

F. The Contractor shall lightly compact and place the topsoil.

3.03 SURPLUS MATERIAL

A. The Contractor shall remove surplus sub-soil and topsoil from site at his expense.

B. The Contractor shall leave stockpile areas and entire job site clean and raked, ready for landscaping operations.

END OF SECTION

SECTION 02276 TEMPORARY 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 reseeding 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/Engineer.

C. Temporary sedimentation controls include, but are not limited to: silt dams, traps, barriers, 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/Engineer.

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.

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.

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 Florida Dept of Transportation 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 his expense.

3.03 PERFORMANCE

A. The Contractor, at his 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 02325 ROAD AND RAILROAD CROSSINGS

PART 1 GENERAL

1.01 SCOPE OF WORK

The Contractor shall furnish all labor, equipment, materials and incidentals required to install road or railroad crossings as shown on the Drawings and as specified herein.

1.02 OPERATIONS ON MANATEE COUNTY OR STATE OF FLORIDA PROPERTY

A. All work affecting Manatee County, Florida Department of Transportation, any other governmental agency's right-of-way or facilities, or railroad right-of-way shall be carried out to the full satisfaction of the applicable Department's authorized representative. The Contractor shall be responsible to meet any and all requirements of the Department of Transportation, railroad, or other agency pertaining to the specific project and shall conduct all his work accordingly.

B. Prior to the start of the jacking operation, a detailed jacking plan shall be submitted to the Engineer for review and approval. No work shall be permitted until the submittals are accepted. A Bore Path Report shall be submitted with in three (3) days of completion of the bore.

C. Prior to construction, a minimum of three working days written notice prior to start of the actual work shall be given to the Engineer and to the Florida Department of Transportation or other applicable agency.

D. The Contractor shall install, maintain and leave in place any sheeting, underpinning, cribbing and other related items (other than that required for the jacking pits) to support any structures or facility on the right-of-way owned by either Manatee County, Florida Dept. of Transportation or other governmental agency or railroad entity. The Contractor, at his expense, may be directed by the Department of Transportation, other applicable agency, or the Owner/Engineer, to leave sheeting in place.

E. The Contractor shall perform all necessary soil test borings to determine actual soil conditions and shall utilize the results of said borings to determine the procedures required for each jack and bore operation, including, but not limited to, the presence of rock and necessary dewatering requirements.

F. No wires, equipment, or other appurtenances shall be permitted to be placed across or pass across State property without the express written permission of the Department of Transportation's authorized representative.

G. All equipment used by the Contractor on State property may be inspected by the State and shall not be used if it is deemed unsatisfactory by an authorized State representative. State highways shall be kept free of obstructions at all times.

H. No blasting shall be permitted under or adjacent to any State highways.

I. The Contractor shall be responsible for all damages arising from his negligence or failure to comply with any State or Manatee County regulations or requirements or deviations from the Contract Documents.

J. All State highway crossings shall be performed and completed in a manner fully satisfactory to the Department of Transportation and Manatee County.

K. Traffic control requirements and procedures are detailed in Section 01570 of this specification.

1.03 SHOP DRAWINGS

The Contractor shall furnish working drawings showing all fabrication and construction details for the jacked crossings.

1.04 SUBMITTALS

A. Contractor shall submit a Jacking Plan that includes the following:

1. Site layout plan for entry and exit pit locations, drawn to scale, depicting the position of all required equipment, access points, existing facilities to remain in place, existing traffic lanes to be maintained in operation, office trailers and storage sites.
2. Qualification information on jack/bore contractor.
3. Manufacturer's information on equipment to be used.
4. Methods and materials for retaining walls for jacking and receiving pits.

B. Bore Report that details final alignment, dimensions, and record documentation.

PART 2 PRODUCTS

2.01 MATERIALS

Sleeve, carrier pipe, skids, insulation, bulkheads, etc. shall be per contract plans.

PART 3 EXECUTION

3.01 JACKING SLEEVE

A. The Contractor shall provide all labor, material, equipment and appurtenances required for jacking the sleeves beneath the roadway or railroad tracks. The steel sleeve shall be welded steel pipe and jacked in one continuous operation at the locations shown on the drawings. Once the operation starts, jacking shall not be discontinued. Proper alignment and elevation of the sleeves shall be consistently maintained throughout the jacking operation.

B. The Contractor shall shore the jacking pits with sheeting or such other materials as required. Sheeting shall be driven to a sufficient depth below the invert of the steel sleeve to resist any pressure developed by the soil outside the jacking pit. Sheeting shall terminate not less than 3-feet, 6-inches above existing grade.

C. The sections of steel sleeve shall be field welded in accordance with the applicable portions of AWWA C-206 for field welded water pipe joints. Steel sleeve shall receive one coat of Tnemec 46H-413 Hi-Build Tnemec-tar applied in accordance with manufacturer's recommendation.

D. At the completion of the jacking operations, the Contractor shall be required to leave all sheeting in place. The top of the sheeting shall be cut off 36-inches below finished grade.

E. The Contractor shall be responsible for preventing voids outside the steel sleeves. Should

they occur, the Contractor may be directed to fill them with grout in a method approved by the Engineer. The Contractor shall exercise care in the sleeve removal to prevent voids.

F. The Contractor shall be responsible for furnishing, installing and removing the thrust block or restraint which was employed in driving the sleeve forward. No additional payment for the jacking restraint shall be made other than the unit price for this item. The entire jacking operation shall be discussed and accepted by the Engineer prior to commencing jack and bore operation. After completion, the backup structures shall be removed in part or whole to permit construction of the pipeline in the sleeve.

3.02 INSTALLING PIPE IN SLEEVE

A. The Contractor shall install the pipe in full conformity with the Contract Documents. The pipe shall be installed to the lines and grades required within the sleeve and placed to the approval of the Engineer. The pipe shall be braced to the side and the top of the sleeve to prevent flotation or motion.

B. A bulkhead shall be placed at the ends of the sleeve to keep the surrounding soil and material from migrating into the voids in the sleeve..

3.03 TESTING

The pipe shall be tested as provided in the Contract Document.

END OF SECTION

SECTION 02355 LUMBER LEFT IN PLACE

PART 1 GENERAL

1.01 SCOPE OF WORK

The Contractor shall furnish and install shoring and sheeting as necessary to provide adequate safety.

PART 2 PRODUCTS

2.01 MATERIALS

Wood for shoring and sheeting shall be green, rough cut hardwood planking.

PART 3 EXECUTION

3.01 INSTALLATION

A. The Contractor shall furnish, install and maintain sheeting and bracing required to support the sides of excavations, to prevent any movement which could in any way diminish the width of the excavation below which is necessary for proper construction and to protect adjacent structures from undermining or other damage. If the Engineer determines that insufficient or improper supports have been provided, he may order additional supports to be installed at the expense of the Contractor. Compliance with such orders shall not relieve or release the Contractor from his responsibility for the sufficiency of such supports. Care shall be taken to prevent voids outside of the sheeting. Should voids form, they shall be immediately filled and rammed.

B. The Contractor shall embed and leave in place all sheeting, bracing and other related items as shown on the Contract Drawings. The Owner/Engineer may direct that sheeting and bracing timber be cut off at a specified elevation. No additional payment or compensation shall be made for this work.

C. Sheeting and bracing not left in place shall be removed carefully in such manner as not to endanger other structures, utilities, property, or proposed construction.

D. The Owner/Engineer may order sheeting and bracing to be left in place; however, this shall not relieve the Contractor from liability for damages to persons or property due to negligence or the failure on the part of the Contractor to leave in place sufficient sheeting and bracing to prevent any caving or moving of the ground.

E. The Contractor shall receive no payment other than that included in the pipe bid item price for any timber used for sheeting bracing, or other related items.

END OF SECTION

SECTION 02485 SEEDING AND SODDING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials and equipment necessary to satisfactorily return all construction areas to their original conditions or better.

B. Work shall include furnishing and placing seed or sod, fertilizing, planting, watering and maintenance until acceptance by Engineer/Owner.

1.02 RELATED WORK NOT INCLUDED

Excavation, filling and grading required to establish elevation shown on the Drawings are included under other sections of these Specifications.

1.03 QUALITY ASSURANCE

A. It is the intent of this Specification that the Contractor is obliged to deliver a satisfactory stand of grass as specified. If necessary, the Contractor shall repeat any or all of the work, including grading, fertilizing, watering and seeding or sodding at no additional cost to the Owner until a satisfactory stand is obtained. For purposes of grassing, a satisfactory stand of grass is herein defined as a full lawn cover over areas to be sodded or seeded, with grass free of weeds, alive and growing, leaving no bare spots larger than 3/4 square yard within a radius of 8 feet.

B. All previously grassed areas where pipelines are laid shall be sodded. All sodding and grassing shall be installed in accordance with these Specifications or as directed by the Engineer.

PART 2 PRODUCTS

2.01 MATERIALS

A. Fertilizer: The fertilizer shall be of the slow-release type meeting the following minimum requirements: 12 percent nitrogen, 8 percent phosphorus, 8 percent potassium; 40 percent other available materials derived from organic sources. At least 50 percent of the phosphoric acid shall be from normal super phosphate or an equivalent source which will provide a minimum of two units of sulfur. The amount of sulfur shall be indicated on the quantitive analysis card attached to each bag or other container. Fertilizer shall be uniform in composition, dry and free flowing delivered to sites in original unopened containers bearing manufacturer's statement or guarantee.

B. Seeding/Grassing: The Contractor shall grass all unpaved areas disturbed during construction which do not require sod. All grassing shall be completed in conformance with FDOT Specifications, Sections 570 and 981. The grassed areas shall be mulched and fertilized in accordance with FDOT Specifications, except that no additional payment will be made for mulching, fertilizing and/or watering.

C. Sodding: Sod shall be provided as required on the construction drawings or at locations as directed by the Engineer in accordance with Florida Department of Transportation, Specifications Section 575 and 981. The Contractor shall furnish bahia grass sod or match existing sod. Placement and watering requirements shall be in accordance with FDOT

Specifications Section 575, except that no additional payment will be made for placement and/or watering. This cost shall be included in the Contract price bid for sodding.

D. Topsoil: Topsoil stockpiled during excavation may be used as necessary. If additional topsoil is required to replace topsoil removed during construction, it shall be obtained off site at no additional cost to the Owner. Topsoil shall be fertile, natural surface soil, capable of producing all trees, plants and grassing specified herein.

E. Water: It is the Contractor's responsibility to supply all water to the site, as required during seeding and sodding operations and through the maintenance period and until the work is accepted. The Contractor shall make whatever arrangements that may be necessary to ensure an adequate supply of water to meet the needs for his work. He shall also furnish all necessary hose, equipment, attachments and accessories for the adequate irrigation of lawns and planted areas as may be required. Water shall be suitable for irrigation and free from ingredients harmful to plant life.

PART 3 EXECUTION

3.01 INSTALLATION

A. When the trench backfill has stabilized sufficiently, the Contractor shall commence work on lawns and grassed areas, including fine grading as necessary and as directed by the Engineer.

B. Finish Grading: Areas to be seeded or sodded shall be finish graded, raked, and debris removed. Soft spots and uneven grades shall be eliminated. The Engineer shall approve the finish grade of all areas to be seeded or sodded prior to seed or sod application.

C. Protection: Seeded and sodded areas shall be protected against traffic or other use by placing warning signs or erecting barricades as necessary. Any areas damaged prior to acceptance by the Owner shall be repaired by the Contractor as directed by the Engineer.

3.02 CLEANUP

Soil or similar materials spilled onto paved areas shall be removed promptly, keeping those areas as clean as possible at all times. Upon completion of seeding and sodding operations, all excess soil, stones and debris remaining shall be removed from the construction areas.

3.03 LANDSCAPE MAINTENANCE

A. Any existing landscape items damaged or altered during construction by the Contractor shall be restored or replaced as directed by the Engineer.

B. Maintain landscape work for a period of 90 days immediately following complete installation of work or until Owner accepts project. Watering, weeding, cultivating, restoration of grade, mowing and trimming, protection from insects and diseases, fertilizing and similar operations as needed to ensure normal growth and good health for live plant material shall be included at no additional cost to the Owner.

3.04 REPAIRS TO LAWN AREAS DISTURBED BY CONTRACTOR'S OPERATORS

Lawn areas planted under this Contract and all lawn areas damaged by the Contractor's operation shall be repaired at once by proper soil preparation, fertilizing and sodding, in accordance with these Specifications.

END OF SECTION

SECTION 02575 PAVEMENT REPAIR AND RESTORATION

PART 1 GENERAL

1.01 SCOPE OF WORK

The Contractor shall furnish all labor, materials, equipment, obtain County or State right-of-way permits and incidentals required and remove and replace pavements over trenches excavated for installation of water or sewer lines and appurtenances as shown on the Contract Drawings.

1.02 GENERAL

A. The Contractor shall take before and after photographs.

B. The Contractor shall repair in a manner satisfactory to the County or State, all damage done to existing structures, pavement, driveways, paved areas, curbs and gutters, sidewalks, shrubbery, grass, trees, utility poles, utility pipe lines, conduits, drains, catch basin, flagstones, or stabilized areas or driveways and including all obstructions not specifically named herein, which results from this Project.

C. The Contractor shall keep the surface of the backfilled area of excavation in a safe traffic bearing condition and firm and level with the remaining pavement until the pavement is restored in the manner specified herein. All surface irregularities that are dangerous or obstructive to traffic are to be removed. The repair shall conform to applicable requirements of Manatee County Transportation Department requirements for pavement repair and as described herein, including all base, subbase and asphalt replacement.

D. All materials and workmanship shall meet or exceed the County requirements and as called for in the Contract Documents and nothing herein shall be construed as to relieve the Contractor from this responsibility.

E. All street, road and highway repair shall be made in accordance with the FDOT and County details indicated on the Drawings and in accordance with the applicable requirements and approval of affected County and State agencies.

PART 2 PRODUCTS

2.01 PAVEMENT SECTION

A. Asphaltic concrete shall consist of asphalt cement, coarse aggregate, fine aggregate and mineral filler conforming to FDOT Type S-III Asphalt. Pavement replacement thickness shall match that removed but in no case shall be less than 1-1/2" compacted thickness. All asphalt concrete pavement shall be furnished, installed and tested in accordance with FDOT Specifications for Road and Bridge Construction.

B. Asphalt or crushed concrete or approved equal base material shall be furnished and installed under all pavement sections restored under this Contract. Asphalt base shall have a minimum 6" compacted thickness, meet requirements for FDOT ABC III (Minimum Marshall Stability of 1000) and be furnished, installed and tested in accordance with the requirements of the FDOT Standards. Crushed concrete base shall be 10" minimum compacted thickness. Crushed concrete aggregate material shall have a minimum LBR of 140 compacted to 99% T-180

AASHTO density. Asphalt base and crushed concrete base are acceptable. Other bases shall be submitted for approval.

C. Prime and tack will be required and applied in accordance with Section 300 - FDOT Specifications: Prime and Tack Coat for Base Courses.

PART 3 EXECUTION

3.01 CUTTING PAVEMENT

A. The Contractor shall saw cut in straight lines and remove pavement as necessary to install the new pipelines and appurtenances and for making connections to existing pipelines.

B. Prior to pavement removal, the Contractor shall mark the pavement for cuts nearly paralleling pipe lines and existing street lines. Asphalt pavement shall be cut along the markings with a rotary saw or other suitable tool. Concrete pavement shall be scored to a depth of approximately two (2) inches below the surface of the concrete along the marked cuts. Scoring shall be done by use of a rotary saw, after which the pavement may be broken below the scoring with a jackhammer or other suitable equipment.

C. The Contractor shall not machine pull the pavement until it is completely broken and separated along the marked cuts.

D. The pavement adjacent to pipe line trenches shall neither be disturbed or damaged. If the adjacent pavement is disturbed or damaged, irrespective of cause, the Contractor shall remove and replace the pavement. In addition, the base and sub-base shall be restored in accordance with these Specifications, Florida Dept. of Transportation Standard Specifications and as directed by the Engineer.

3.02 PAVEMENT REPAIR AND REPLACEMENT

A. The Contractor shall repair, to meet or exceed original surface material, all existing concrete or asphaltic pavement, driveways, or sidewalks cut or damaged by construction under this Contract. He shall match the original grade unless otherwise specified or shown on the Drawings. Materials and construction procedures for base course and pavement repair shall conform to those of the Florida Dept. of Transportation.

B. The Contractor's repair shall include the preparation of the subbase and base, place and maintain the roadway surface, any special requirements whether specifically called for or implied and all work necessary for a satisfactory completion of this work. Stabilized roads and drives shall be finished to match the existing grade. Dirt roads and drives shall have the required depth of backfill material as shown on the Contract Drawings.

C. The width of all asphaltic concrete repairs shall extend the full width and length of the excavation or to the limits of any damaged section. The edge of the pavement to be left in place shall be cut to a true edge with a saw or other approved method so as to provide a clean edge to abut the repair. The line of the repair shall be reasonably uniform with no unnecessary irregularities.

3.03 MISCELLANEOUS RESTORATION

Sidewalks or driveways cut or damaged by construction shall be restored in full sections or blocks to a minimum thickness of four inches. Concrete curb or curb and gutter shall be

restored to the existing height and cross section in full sections or lengths between joints. RCP pipe shall be repaired or installed in accordance with manufacturer's specifications. Grassed yards, shoulders and parkways shall be restored to match the existing sections with grass sod of a type matching the existing grass.

3.04 SPECIAL REQUIREMENTS

The restoration of all surfaces, as described herein, disturbed by the installation of pipelines shall be completed as soon as is reasonable and practical. The complete and final restoration of both paved and shell stabilized roads within a reasonable time frame is of paramount importance. To this end, the Contractor shall, as part of his work schedule, complete the restoration of any area of road within five weeks after removing the original surface. Successful leak testing shall be performed prior to restoring any area of road. All restoration and replacement or repairs are the responsibility of the Contractor.

3.05 CLEANUP

After all repair and restoration or paving has been completed, all excess asphalt, dirt and other debris shall be removed from the roadways. All existing storm sewers and inlets shall be checked and cleaned of any construction debris.

3.06 MAINTENANCE OR REPAIR

All wearing surfaces shall be maintained by the Contractor in good order suitable for traffic prior to completion and acceptance of the work.

END OF SECTION

SECTION 02615 DUCTILE IRON PIPE AND FITTINGS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, equipment and incidentals required to install ductile iron pipe and restrained joint ductile iron pipe and cast iron or ductile iron restrained joint fittings, complete, as shown on the Drawings and specified in these Standards.

B. Fittings are noted on the drawings for the Contractor's convenience and do not relieve him from laying and jointing different or additional items where required.

C. The Contractor shall furnish all labor, materials, equipment and incidentals required to install push-on joint or restrained joint ductile iron pipe, complete as shown on the Drawings and Specifications.

D. Newly installed pipe shall be kept clean and free of all foreign matter. All DI pipe installed underground shall be poly wrapped unless noted otherwise on the plans.

1.02 SUBMITTALS

A. The Contractor shall submit to the Engineer, within ten days after receipt of Notice to Proceed, a list of materials to be furnished, the names of the suppliers and the appropriate shop drawings for all ductile iron pipe and fittings.

B. The Contractor shall submit the pipe manufacturer's certification of compliance with the applicable sections of the Specifications.

PART 2 PRODUCTS

2.01 MATERIALS

A. Ductile iron pipe shall conform to ANSI/AWWA C150/A21.50 and ANSI/AWWA C151/A21.51. Thickness of pipe shall be Class 50 or pressure Class 350. All pipe not buried shall be Class 53. All ductile iron pipe shall be clearly marked on the outside of the barrel to readily identify it from cast iron.

B. Unrestrained joint pipe shall be supplied in lengths not to exceed 21 feet. Unless otherwise called for in the Contract Documents, unrestrained joint pipe shall be either the rubber-ring type push-on joint or standard mechanical joint pipe as manufactured by the American Cast Iron Pipe Company, U.S. Pipe and Foundry Company, or approved equal.

C. All fittings shall be pressure rated for 350 psi and meet the requirement of AWWA C110 or AWWA C153. Rubber gaskets shall conform to ANSI A21.11 for mechanical and push-on type joints for diameters up to 14" diameter. Gaskets for 16" diameter and larger pipe shall be EPDM (Ethylene-Propylene Dine Monomer) such as the "Fastite Gasket" of American Ductile Iron Pipe Co., or approved equal.

D. Water Mains: All ductile iron pipe and fittings shall have a standard thickness cement lining on the inside in accordance with AWWA/ANSI C104/A21.4 and a coal tar enamel coating on the outside. The coal tar enamel shall be in accordance with ANSI A21.4. All interior linings shall be EPA/NSF approved.

E. Force Main Fittings: All ductile iron fittings shall have a factory applied fusion bonded epoxy or epoxy and polyethylene lining on the inside in accordance with manufacturer's specifications and a coal tar enamel coating on the outside. The coal tar enamel shall be in accordance with ANSI A21.4. The interior lining is to be based on manufacturer's recommendation for long-term exposure to raw sewage. It shall have a minimum ten year warranty covering failure of the lining and bond failure between liner and pipe.

F. Restrained joints shall be provided at all horizontal and vertical bends and fittings, at casings under roads and railroads and at other locations shown on the Contract Drawings. Restrained joint pipe fittings shall be designed and rated for the following pressures: 350 psi for pipe sizes up to and including 24" diameter; 250 psi for pipe sizes 30" diameter and above.

2.02 IDENTIFICATION

A. Each length of pipe and each fitting shall be marked with the name of the manufacturer, size and class and shall be clearly identified as ductile iron pipe. All gaskets shall be marked with the name of the manufacturer, size and proper insertion direction.

B. Pipe shall be poly wrapped blue for potable water mains, purple for reclaimed water mains and green for sewage force mains. All potable water pipe shall be NSF certified and copies of lab certification shall be submitted to the Engineer.

END OF SECTION

SECTION 02616 DISINFECTING POTABLE WATER PIPE LINES

PART 1 GENERAL

1.01 SCOPE OF WORK

The Contractor shall furnish all labor, materials, equipment and incidentals required to clean and disinfect portable water pipe lines. This work is required to place all types of pipe into service as potable water lines.

1.02 CLEANING WATER MAINS

At the conclusion of the work, the Contractor shall thoroughly clean all of the new pipes to remove all dirt, stones, pieces of wood or other material which may have entered during the construction period per Section 02618.

1.03 DISINFECTING POTABLE WATER PIPE LINES

A. All record drawing requirements must be submitted to the Owner/Engineer prior to starting the bacteriological testing of the water lines.

B. Prior to being placed in service, all potable water pipe lines shall be chlorinated in accordance with AWWA 651, "Standard Procedure for Disinfecting Water Main". The procedure shall meet Health Department requirements. The location of the chlorination and sampling points shall be determined by the Engineer. Taps for chlorination and sampling shall be uncovered and backfilled by the Contractor as required.

C. The general procedure for chlorination shall be to flush all dirty or discolored water from the lines, then introduce chlorine in approved dosages through a tap at one end while water is being withdrawn at the other end of the line. The chlorine solution shall remain in the pipe line for 24 hours.

Water for flushing, filling and disinfecting the new lines must be obtained without contaminating existing pipe lines. Water obtained from existing pipe lines for this purpose shall pass through an approved air gap or backflow prevention device.

D. Following the chlorination period, all treated water shall be flushed from the lines at their extremities and replaced with water from the distribution system. Bacteriological sampling and analysis of the replacement water shall then be made by an approved laboratory or the Health Department in full accordance with the AWWA Manual C651. The line shall not be placed in service until the requirements of the State and County Public Health Department are met. Results of the bacteriological tests together with certified record drawings must be submitted to the Health Department (FDEP) within 30 days of the tests.

E. Special disinfecting procedures when approved by the County, may be used where the method outlined above is not practical.

END OF SECTION

SECTION 02617 INSTALLATION AND TESTING OF PRESSURE PIPE

PART 1 GENERAL

1.01 INSTALLING PIPE AND FITTINGS

A. The Contractor shall install all pipe in accordance with the recommendations of the pipe manufacturer and as specified herein.

B. The Contractor shall take care in handling, storage and installation of pipe and fittings to prevent injury to the pipe or coatings. All pipe and fittings shall be examined before installation and pipe which is deemed to be defective by the Owner/Engineer shall not be installed.

C. The Contractor shall thoroughly clean and keep thoroughly clean, all pipe and fittings prior to during and after installation.

D. The Contractor shall lay the pipe to the lines and grades shown on the Contract Drawings with bedding and backfill as shown on the Drawings or called out in the Contract Documents. Blocking under the pipe shall not be permitted except through casing sleeves.

E. The Contractor shall keep the open ends of all pipe closed with a tightly fitting plug when installation is not in progress or the potential exists for dirt or debris to enter the pipe.

F. The pipe or accessories shall not be dropped into the trench under any circumstances.

G. The Contractor shall construct all water mains pursuant to the provisions of "Recommended Standards for Water Works", Part 8, incorporated by reference in Rule 17-555.330(3), F.A.C.

1.02 PROCEDURE FOR TESTING WATER LINES, FORCE MAINS AND RECLAIMED WATER LINES

A. A 48-hour notice is needed prior to testing. A letter stating the reasons testing should be scheduled ahead of other jobs must accompany all emergency testing requests.

B. Engineer and Contractor must be present for all testing, except for testing tapping valves and sleeves.

C. All pressure pipe lines shall remain undisturbed for 24 hours to develop complete strength at all joints. All pipe lines shall be subjected to a hydrostatic pressure test for two (2) hours at full working pressure, but not less than 180 psi for water/reclaimed (150 psi for force main). Maximum length of pipe to be tested at one time is 2,600 feet. If line is longer than 2,600 feet and cannot be sectioned in 2,600 feet (max.) lengths, the allowable leakage will be figured at 2,600 feet.

D. Allowable leakage shall be determined by AWWA C600 table for hydrostatic tests. Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe, or any valved section thereof; to maintain the test pressure after the air in the pipe line has been expelled and the pipe has been filled with water.

E. All digging on the job site in the right-of-way must be completed before any testing of water or sewer. Any digging or boring across water or sewer lines after they have been tested may result in a retest of the lines at the County's request.

F. If any revisions or changes are made after initial testing, lines will be re-tested at the County's request.

G. Disconnect water supply during test.

H. All force mains will be tested from the valves in the valve vault at the lift station to the point of connection whether it be against a valve on another force main or into a manhole.

I. All services to be aboveground during test. The services should be the correct length so they will be one (1) foot inside right-of-way line.

J. All fire hydrant gate valves to be open during test.

K. All visible leaks are to be repaired, regardless of the amount of leakage.

L. Check gauge pressure periodically during test. If test pressure drops to 175 psi for water/reclaimed lines or to 145 psi for force mains during test, the line must be repumped back to 180 psi for water/reclaimed (150 psi force mains) and the amount of leakage measured. The test will continue on with the remaining time left. At the end of the test, the line must be repumped again back to 180 psi (150 psi for force main) and the amount of leakage measured and added to any previous leakage determined earlier in the test.

M. After the line passes the test, the pressure will be blown off from the opposite end of line from the gauge location. Fire hydrants, services and end-of-line blow offs will be opened to demonstrate they were on line during the test.

N. At end of test, the test gauge must return to zero. The pressure gauge must read 0 psi to a maximum of 300 psi in 5 psi increments.

O. The section of line being tested must be identified on the charge sheet. The length and size of pipe, the exact area being tested and the valves being tested against, must be identified. Use Station numbers if available.

P. A punch list must be made at the end of all tests.

Q. A copy of the charge sheet will be given to the Engineer and the Contractor at the end of the test.

1.03 INSPECTION/TESTING PROCEDURE COVERING BORED PIPE LINES OR CASING AND CONDUITS INSTALLED ACROSS PREVIOUSLY TESTED AND/OR COUNTY ACCEPTED WATER AND SEWER PIPE WITHIN DEVELOPMENT PROJECTS UNDER ACTIVE CONSTRUCTION

A. Prior to testing water and sewer lines, every effort will be made to install sleeves for underground utilities that will cross these water and sewer lines or services.

B. Where it has not been possible to pre-install sleeves prior to testing and bores or conduits are required, it is the responsibility of the utility company and/or their Contractor performing the work to provide Manatee County Utility Operations Department or the Engineer of Record with accurate horizontal and vertical as-built information of the sleeves, bores and conduits installed by said utility company. This applies to all bores and conduits crossing water and sewer lines.

C. Procedures to be followed for installation of conduits, pipe lines and bores that will cross, or be closer than 5'-0" horizontally and 18 inches vertically to, previously tested water and sewer lines that are still under the ownership of the developer/contractor.

1. Notify the owner and obtain the best as-built information available. Allow sufficient time for the owner to field locate the existing pipe lines.
2. Submit drawings of proposed location to the Owner and Manatee County Utility Operations Dept. Utility Locations Section for review.
3. Obtain a County Right-of-Way Use Permit if the work area is within a dedicated area of right-of-way.
4. Perform installation in the presence of a County representative. Call (941) 792-8811, ext. 5061 or ext. 5069 with at least two (2) working days notice.
5. Submit two (2) copies of as-built information to the Owner to incorporate into the record drawings to be submitted to the County.
6. Failure to follow steps 2) thru 5) will result in additional charges for retesting the previously tested water and sewer lines.

D. Procedures to be followed for installation of conduits, pipe lines and bores crossing or closer than 5'-0" horizontally and 18 inches vertically to previously tested water and sewer lines that have been previously accepted by Manatee County:

1. Obtain record drawing information from the County.
2. If roadway has been dedicated to Manatee County, obtain Right-of-Way Use Permit and copy the Project Management Department Locations Section with proposed location drawing.
3. Follow procedures in "Sunshine State One-Call", paying special attention to the requirements of Section VII.

E. Should water or sewer lines be damaged during the bore pipe line or casing installation, the cost of any repairs and retesting will be paid for by the utility company that installed the bore. The actual clearance between a bored casing crossing a water or sewer pipe should not be less than 18 inches.

END OF SECTION

SECTION 02618 PIPELINE CLEANING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, equipment and incidentals required to clean all new lines 4" and larger, and existing pipelines as specified in this specification and as indicated on the Drawings.

B. This work shall include the furnishing and installation of all pig launching and retrieval devices and the appropriate pigs for the cleaning procedure, and all necessary excavations, shutdowns, fittings and valves required.

1.02 RELATED WORK

A. The contractor is responsible for all necessary supply water.

B. The contractor is responsible for all necessary bypass pumping.

C. The contractor is responsible for the proper disposal of any materials removed from the pipe lines as a result of the cleaning procedure.

1.03 SUBMITTALS

A. The Contractor shall submit prior to construction, a cleaning plan, Shop Drawings, and layout diagram for approval to the Engineer.

B. The Contractor shall submit to the Engineer a list of materials to be furnished, and the names of suppliers.

1.04 QUALIFICATIONS

A. The Contractor performing this work shall be fully qualified, experienced and equipped to complete this work expeditiously and in a satisfactory manner.

B. The Contractor shall also be capable of providing crews as needed to complete this work without undue delay.

C. The Owner reserves the right to approve or disapprove the Contractor, based on the submitted qualifications.

PART 2 PRODUCTS

2.01 GENERAL

A. The contractor shall be responsible for furnishing pigs in sufficient numbers and sizes, of appropriate densities, coatings and configurations to properly clean the piping systems.

B. All pigs used for the cleaning of sewer or reclaimed water lines shall not be used in the cleaning of potable water lines.

2.02 MATERIALS

A. The pig launching and retrieval equipment shall be of the latest design and construction and shall include the means to maintain constant monitoring of the in-line flows and pressures of the system being cleaned and the constant location of the cleaning pigs in the system. Launching and retrieval systems shall be fabricated, designed and manufactured according to ANSI standards and capable of withstanding working pressures of 150 psi. Launching and receiving devices shall be sized one diameter larger than the system to which it will be attached with a minimum length of 2.5 times the diameter.

B. The contractor shall have available for immediate use an electronic pig detector for use in the system being cleaned to provide a means of tracking the passage of the pig in the system to locate areas of potential or suspected blockage and other disparities in the system.

C. The pig shall be constructed of elastomer polyurethane with an open cell construction and a density equal to or suitable for use in the piping system being cleaned. Pig configuration shall consist of a parabolic nose with a concave base and coated with a resilient surface material that will maintain a peripheral seal and will effectively clean the piping system without over abrading the interior pipe wall. Pig characteristics shall include the ability to navigate through 90 degree bends, 180 degree turns, bi-directional fittings, full port valves, reduce its cross sectional area and return to its original design configuration and be propelled by hydraulic pressure.

PART 3 EXECUTION

3.01 PIPELINE CLEANING

A. The cleaning of the pipe line shall be done by the controlled and pressurized passage of a polyurethane pig of varying dimensions, coatings and densities as determined by the Engineer through the piping system.

B. A series of pigs shall be entered into the system at a point as near to the beginning as is logistically and mechanically feasible.

C. A launching assembly shall be used as the entrance point for the pig. This assembly shall allow for the following:

1. The entering of pigs into the system by providing the means to induce flow from an external source, independent of the flows and pressures immediately available from the system, on the back of the pig to develop sufficient pressure to force the pig through the system.
2. A means to control and regulate the flow.
3. A means to monitor the flows and pressures.
4. A means to connect and disconnect from the system without any disruption to the operation of the system.

D. The pig shall be removed or discharged from the system at a point as near to the end as is logistically and mechanically feasible.

E. The contractor shall be responsible for the retrieval of the pig at the discharge point. This may include setting a trap that will not disrupt normal flow and operations but will capture the pig and any debris. A retrieval assembly may also be used but said assembly shall be able to connect and disconnect from the system without any disruption to the operation of

the system.

F. Alternative launching and retrieval methods shall be done with the prior approval of the Engineer.

G. Any pig that cannot progress through the piping system shall be located by the contractor and removed by excavation of the pipe in order to remove the blockage. All pipe repairs shall be the responsibility of the contractor and shall be performed with as little disruption to the system as possible.

H. Any increase in pressure that cannot be accounted for, i.e. fittings or valves or additional cleaning runs, shall be investigated, per the Engineers' approval, by locating the pig at the beginning of the increased pressure and excavating to determine the cause of the pressure increase. All pipe repairs shall be the responsibility of the contractor and shall be performed with as little disruption to the system as possible.

I. Final flushing of the cleansed lines shall be performed after the last successful run of the pig as determined by the Engineer. The contractor shall be responsible for all applicable flushing and disinfection requirements for potable water lines.

3.02 ACCEPTANCE

A. The contractor shall maintain and provide a report at the end of the cleaning procedure containing the following:

1. The pressures in the pipe during the pigging procedure.
2. Any inline problems encountered during the procedure including all excavations with detailed locations, reason for the excavation and any corrective measures taken to the pipeline.
3. A record of the pigs used, their sizes, styles and other pertinent information regarding what materials were used during the cleaning.
4. An analysis of the condition of the pipeline before and after the cleaning procedure.

END OF SECTION

SECTION 02619 HORIZONTAL DIRECTIONAL DRILLING

PART 1 GENERAL

1.01 SCOPE

The Contractor shall furnish all labor, materials, equipment and incidentals required to install all pipe, fittings and appurtenances as shown on the Drawings and specified in the Contract Documents by Horizontal Directional Drilling (HDD).

1.02 GENERAL

A. All existing structures, water and sewer lines, storm drains, utilities, driveways, sidewalks, signs, mail boxes, fences, trees, landscaping, and any other improvement or facility in the construction area that the Contractor disturbs for his own construction purposes shall be replaced to original condition at no additional cost to the County.

B. For "Navigable Waters of the U.S." reference 33 of the Code of Federal Regulations, Part 329.

C. For "Waters of the U.S." reference 33 of the Code of Federal Regulations, Part 323.

D. For "Waters of the State" reference Section 62-301 of the Florida Administrative Code.

1.03 TESTING

A. In place soil compaction tests shall be performed by a qualified testing laboratory.

B. Compaction tests shall be taken at every excavation, except in the road crossings or road shoulders; tests are to be taken according to current FDOT Standards.

C. All pipe shall be tested in accordance with the appropriate material specifications.

D. Reference Standards: American Society for Testing and Materials (ASTM), D1557, Moisture-Density Relations of Soils Using 10-lb. Rammer and 18-in. Drop.

E. The density of soil in place shall be a minimum of 95 percent in accordance with ASTM test 1557-70T, Method A or C.

1.04 QUALIFICATIONS

A. Pipe Manufacture: All pipe and fittings shall be furnished by a single manufacturer who is fully experienced, reputable and qualified in the manufacture of the items to be furnished.

B. Drilling Supervisor: The Contractor shall provide a competent boring specialist who shall remain on the project site during the entirety of the directional boring operation. This includes, but is not limited to, drilling fluid preparation, seaming, boring and pulling. The boring specialist shall have a minimum of five years experience in supervising directional bores of similar nature, diameter, materials and lengths.

C. Pipe Fusion: All boring and fusing equipment shall be certified for operation. The Contractor responsible for thermal butt fusing pipe and fittings shall have manufacturer certification for performing such work or a minimum of five years experience performing this type of work. If no

certification is available, written documentation of the required work experience shall be submitted for approval.

D. Drilling Fluid Specialist: The personnel responsible for supervising the supply, mixing, monitoring fluid quality, pumping and re-circulation system proposed for the drilling fluid shall have a written certification issued by the Drilling Fluid manufacturer for performing such work or a minimum of five years experience performing this type of work. If no certification is available, written documentation of the required work experience for the proposed personnel shall be submitted for review and approval.

1.05 SUBMITTALS

A. Detailed description including specifications and catalog cuts for:

1. Shop drawings and catalog data for all HDD equipment.
2. The pipe manufacturer's maximum degree of radial bending allowed for the pipe when full and when empty and pullback force recommended setting.
3. Steering and tracking devices including specific tracer wire.
4. Drilling fluids; the drilling fluid submittal shall include the ratio of mixture to water, including any additives, based on the Contractor's field observations prior to construction, knowledge and experience with drilling in similar conditions, and any soil data provided in the Contract Documents, which shall be verified by the fluid specialist.
5. Shop drawings for the breakaway swivel, including the method of setting the swivels' break point and set point to be used.
6. Pipe assembly procedure, details of support devices, and staging area layout including methods to avoid interference with local streets, driveways, and sidewalks.
7. Details of pipe fusion procedures and copies of the fusion technician qualification certification or documentation.
8. Drilling fluid technician qualification certification or documentation

B. If the Contractor proposes any changes to the pull-back distance or profile shown on the drawings, he may be required to submit a complete design for the proposed pipe including an analysis for pull-back forces, external loads including full hydrostatic pressure if empty, external forces due to borehole collapse, ovalization during pull-back, thermal stress while exposed to Sun-light, shortening after release of pull-back force, and tensile stress during pull-back.

C. Bore Plan: For all contiguous piping installations over 300 feet in length or any installations for piping larger than 4" in diameter, the Contractor shall submit a Bore Plan that includes the following:

1. Contact information and experience for the drilling fluid specialist.
2. The number of passes the bore will include to get the product pipe installed.
3. The pilot bore and all reaming bore sizes including the final pullback with the product pipe.
4. Drilling rod length in feet.
5. The pilot bore, pre-ream bores (if any) and pullback production rate in minutes per (drilling) rod to maintain adequate mud flow.
6. Details of the entry and exit pit locations along with entry and exit angles for the bore, drawn to scale, depicting the position of all required equipment, access points, existing facilities to remain in place, existing traffic lanes to be maintained in operation, office trailers and storage sites.

8. The method of fusing or joining pipe of adjacent bores to ensure that the joint is on grade with the installed pipe.

D. Furnish a Bore Path Report to the Engineer within seven days of the completion of each bore path. Data collected by the County Representative does not relieve the Contractor from the responsibility of recording his own data. Include the following in the report:

1. Location of project, project name and number
2. Name of person collecting data, including title, position and company name
3. Investigation site location (Contract plans station number or reference to a permanent structure within the project right-of-way)
4. Driller's Log & identification of the detection method used
5. Elevations and offset dimensions of installed pipe as referenced to the drawings
6. Data log of pullback force during product pipe installation
7. All failed bores. Include length of pipe left in place and explanation of failed installation.

PART 2 PRODUCTS

2.01 MATERIALS

A. Incidental materials that may or may not be used to install the product depending on field requirements are not paid for separately and will be included in the cost of the installed product.

B. Drilling Fluids shall use a mixture of bentonite clay or other approved stabilizing agent mixed with potable water with a pH of 8.5 to 10.0 to create the drilling fluid for lubrication and soil stabilization. Vary the fluid viscosity to best fit the soil conditions encountered. Contractor shall have appropriate additives for drilling fluid available for different soil conditions that may be encountered. Do not use any other chemicals or polymer surfactants in the drilling fluid without written consent from the Engineer. Certify to the Engineer in writing that any chemicals to be added are environmentally safe and not harmful or corrosive to the product pipe.

C. For drilling operations that will be below waters of the State of Florida, only bentonite free drilling fluids shall be used. Acceptable products are BioMax, manufactured by M-I Swaco, Inc., P.O. Box 2216, Laurel, Mississippi 39440, Phone: (800) 731-7331 or Bio-Bore, manufactured by Baroid Drilling Fluids, Inc., P.O. Box 1675, Houston, Texas 77251, Phone: (731) 987-5900 or approved equal.

D. Identify the source of water for mixing the drilling fluid. Approvals and permits are required for obtaining water from such sources as streams, rivers, ponds or fire hydrants. Any water source used other than potable water may require a pH test.

E. The tracer wire to be used for all directional drills shall be a solid, 10 gauge, high strength, copper clad steel wire with a polyethylene jacket of appropriate color manufactured by Copperhead Industries or Manatee County approved equal.

F. Breakaway connectors shall be supplied by DCD Design & Manufacturing, Condux International, Inc. or approved equal.

PART 3 EXECUTION

3.01 SITE CONDITIONS

A. Carry out excavation for entry, exit, recovery pits, slurry sump pits, or any other excavation as specified in the Contract documents. Sump pits are required to contain drilling fluids if vacuum devices are not operated throughout the drilling operation, unless approved by the Engineer.

B. Within 48 hours of completing installation of the boring product, clean the work site of all excess slurry or spoils. Take responsibility for the removal and final disposition of excess slurry or spoils. Ensure that the work site is restored to pre-construction conditions or as identified on the plans.

C. Exposure of product pipe to sunlight shall be limited to 14 consecutive days unless approved by the Engineer.

C. The pipe shall be supported at intervals along its length with rollers or Teflon pads to minimize frictional forces when being pulled, and to hold the pipe above the ground. Surface cuts or scratches greater than or equal to the maximum defect depth in 3.08 E are not acceptable.

3.02 DAMAGE RESTORATION & REMEDIATION

A. The Contractor shall take responsibility for restoration for any damage caused by heaving, settlement, separation of pavement, escaping drilling fluid (frac-out), or the directional drilling operation, at no cost to the County.

B. When required by the Engineer, provide detailed plans which show how damage to any roadway facility will be remedied. These details will become part of the Record Drawings Package. Remediation Plans must follow the same guidelines for development and presentation of the Record Drawings. When remediation plans are required, they must be approved by the Engineer before any work proceeds.

C. For HDD operations that will be below waters of the State of Florida, the contractor shall be responsible for any damage caused by the drilling operation, including, but not limited to, fracturing of the channel bottom. Any State or Federal required environmental cleanup due to the release of drilling fluids into State waters shall be at the Contractor's expense. The Contractor may at his own expense increase the depth of his drilling operations upon the approval from the Engineer.

3.03 QUALIFICATIONS FOR REJECTION OF DIRECTIONAL BORE

A. The Engineer may reject any portion of the work that is deemed to be non-responsive to the Contract requirements or not in conformance with approved plans and submittals, and for other factors including the following:

1. Failed Bore: When there is any indication that the installed product has sustained damage, stop all work, notify the County and investigate damage. The County may require a pressure and / or mandrel test at no additional cost to the County and shall have a County representative present during the test. Perform all testing within 24 hours unless otherwise approved by the Engineer. Furnish a copy of the test results and all bore logs to the Engineer for review and approval. The Engineer is allowed up to 5 working days to approve or determine if the product installation is not in compliance with the specifications.
2. Obstructions: If an obstruction is encountered during boring which prevents completion of the installation in accordance with the design location and specification, the pipe may be taken out of service and left in place at the discretion of the Engineer.
3. Pull-back Failure: If the installed breakaway device should fail during pull back.

4. Loss of Drilling Fluids: If the drilling fluid is "lost" during the pull back of the product and can not be regained within the required timeframe of the manufacturer or if more than a reasonable amount of fluid is used to fill an unknown void and flow can not be regained. No pipe shall be pulled without visible flow of drilling fluid.
5. Test Failure: If the pipe shall fail a hydraulic pressure test as specified by the County.
6. Damaged Pipe: If at any time when the product is pulled back and any exposed areas have a greater than allowable "gouging" or visible marring of the pipe per the table in 3.08 E.
7. Alignment Tolerance Exceeded: If the vertical and horizontal limits are not within tolerances.
8. Defective Material: Any other defect in material or workmanship which would affect the quality, performance, or installation life of the installed pipeline.

B. Remediation: All rejected bores shall be at the Contractors expense to correct and provide a satisfactory installed product. The Contractor shall submit to the Engineer a revised installation plan and procedure for approval before resuming work. The Engineer may require non-compliant installations to be filled with excavatable flowable fill or to be completely removed at no additional cost to the County.

3.04 PRODUCT LOCATING AND TRACKING

A. The County recognizes walkover, wire line, and wire line with surface grid verification, or any other system as approved by the Engineer, as the accepted methods of tracking directional bores. Use a locating and tracking system capable of ensuring that the proposed installation is installed as intended. The locating and tracking system must provide information on:

1. Clock and pitch information
2. Depth
3. Transmitter temperature
4. Battery status
5. Position (x,y)
6. Azimuth, where direct overhead readings (walkover) are not possible (i.e. sub aqueous)

B. Ensure proper calibration of all equipment before commencing directional drilling operation.

C. Prepare the Driller's Log. Take and record alignment readings or plot points such that elevations on top of and offset dimensions from the center of the product to a permanent fixed feature are provided. Such permanent fixed feature must have prior approval of the Engineer. Provide elevations and dimensions at all bore alignment corrections (vertical and horizontal) with a minimum distance between points of 10 feet. Provide a sufficient number of elevations and offset distances to accurately plot the vertical and horizontal alignment of the installed product.

D. Installation Location Tolerances: The location of the initial bored hole shall be deemed acceptable by the Engineer if the deviations of the bore from the design alignment or approved adjustments do not exceed the following tolerances:

1. Profile:
   a. 2.0 feet within a length of 100 feet
   b. No reverse curvature within 200 feet
   c. Total deviation not to exceed 5 feet
2. Alignment:

a. 3.0 feet within a length of 200 feet
b. No reverse curvature
c. Total deviation not to exceed 7.0 feet

3.05 PRODUCT BORE HOLE DIAMETER

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

Maximum Pilot or Back-Reamer Bit Diameter When Rotated 360 Degrees	
Nominal Inside Pipe Diameter Inches	Bit Diameter Inches
2	4
3	6
4	8
6	10
8	12
10	16
12 and greater	Maximum Product OD plus 6

3.06 EQUIPMENT REQUIREMENTS

A. The HDD equipment selected by the Contractor shall be capable of drilling, steering, tracking, reaming and installing the pipeline through all the subsurface conditions that may be present at the site.

B. Match equipment to the size of pipe being installed. Obtain the Engineer's approval for installations differing from the above chart. Ensure that the drill rod can meet the bend radius required for the proposed installation.

C. All HDD equipment shall have a data logger to record pull back force during all pipe installations.

D. All HDD equipment that has the capability to exceed the maximum recommended pulling force shall have a breakaway swivel properly attached to the product pipe that will release if the pullback force exceeds the pipe manufacturers recommended pulling force.

3.07 THRUST / PULLBACK REQUIREMENTS

The Contractor shall provide as part of the required working drawings submittal complete data regarding the operational and maximum thrust or pulling forces to be used for the initial drill head and back-reamer installations, and the final pull-back of the pipe. Gages or other measurement tools shall be used to monitor the forces being used.

3.08 INSTALLATION PROCESS

A. Ensure adequate removal of soil cuttings and stability of the bore hole by monitoring the drilling fluids such as the pumping rate, pressures, viscosity and density during the pilot bore, back reaming and pipe installation. Relief holes can be used as necessary to relieve excess pressure down hole. Obtain the Engineer's approval of the location and all conditions

necessary to construct relief holes to ensure the proper disposition of drilling fluids is maintained and unnecessary inconvenience is minimized to other facility users.

B. The Contractor shall determine the pull-back rate in order to allow the removal of soil cuttings without building excess down-hole pressure and to avoid local heaving, or spills. Contain excess drilling fluids at entry and exit points until they are recycled and separated from excavated materials, or removed from the site or vacuumed during drilling operations. Ensure that entry and exit pits and storage tanks are of sufficient size to contain the expected return of drilling fluids and soil cuttings. The bored hole shall always be maintained full of drilling fluids for support of surfaces, and the fluid re-circulation equipment shall operate continuously until the pipe installation is completed and accepted by the Engineer.

C. Ensure that all drilling fluids are disposed of or recycled in a manner acceptable to the appropriate local, state, or federal regulatory agencies. When drilling in suspected contaminated ground, test the drilling fluid for contamination and appropriately dispose of it. Remove any excess material upon completion of the bore. If in the drilling process it becomes evident that the soil is contaminated, contact the Engineer immediately. Do not continue drilling without the Engineer's approval.

D. The timing of all boring processes is critical. Install a product into a bore hole within the same day that the pre-bore is completed to ensure necessary support exists. Once pullback operations have commenced, the operation shall continue without interruption until the pipe is completely pulled into the borehole.

D. E. All prepared pipe that is being used for installation shall be adequately supported off the ground along the entire length to avoid damaging of the material during pullback due to ground surface conditions. Surface cuts or scratches greater than or equal to the maximum defect depth are not acceptable.

Pipe Size In.	Max. Defect Depth In.
4	1/16
6	1/11
8	5/32
10	3/16
12	1/4
> 12	Per Pipe Manufacturer's Recommendations

F. The drilling fluid specialist shall remain on the project site during the entirety of the directional boring operation to ensure proper mixture and production of drilling fluids needed for the bore.

G. Upon successful completion of the pilot hole, the borehole shall be reamed to a minimum of 25 percent greater than the outside diameter of the pipe being installed.

H. For bores with more than two radii of curvature (entrance and exit), the borehole should be reamed up to 50 percent larger than the outside diameter of the carrier pipe. Prereaming may be necessary dependent on size of material to be pulled.

I. Additional passes for prereaming may be required for larger pipe. Incremental increases shall be used as needed until appropriate bore hole size has been achieved.

J. Prereaming must be accomplished with no product attached to the reamer head on all bore pipe 6" and larger. The bore product maybe pulled back on final pass of prereaming upon prior

approval from the Engineer.

K. After reaming the borehole to the required diameter, the pipe shall be pulled through the hole. In front of the pipe shall be a breakaway swivel and barrel reamer to compact the borehole walls.

L. The Contractor shall not attempt to ream at a rate greater than the drilling equipment and drilling fluid system are designed to safely handle.

M. Install all piping such that their location can be readily determined by electronic designation after installation. For non-conductive installations, externally attach two (2) tracer wires; see Section 2.01 - Materials, Part I. above, to the product pipe. Connect any break in the conductor line before construction with an electrical clamp, or solder, and coat the connection with a rubber or plastic insulator to maintain the integrity of the connection from corrosion. Clamp connections must be made of brass or copper and of the butt end type with wires secured by compression. Soldered connections must be made by tight spiral winding of each wire around the other with a finished length minimum of 3 inches overlap. Tracking conductors must extend 2 feet beyond bore termini. Test conductors for continuity. Each conductor that passes must be identified as such by removing the last 6 inches of the sheath. No deductions are allowed for failed tracking conductors. Upon completion of the directional bore, the Contractor shall demonstrate to the County that the wire is continuous and unbroken through the entire run of the pipe by providing full signal conductivity (including splices) when energizing for the entire run in the presence of the County Representative. If the wire is broken, the Contractor shall repair or replace it at no additional cost to the County.

END OF SECTION

SECTION 02620 POLYETHYLENE (PE) PRESSURE PIPE

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, equipment and incidentals required to install polyethylene pressure pipe, fittings and appurtenances as shown on the Drawings and specified in the Contract Documents and these Standards.

B. Newly installed pipe shall be kept clean and free of all foreign matter & gouges.

C. All pipe shall be correctly color coded / identified.

1.02 QUALIFICATIONS

All polyethylene pipe, fittings and appurtenances shall be furnished by a single manufacturer who is fully experienced, reputable and qualified in the manufacture of the items to be furnished.

1.03 SUBMITTALS

A. The Contractor shall submit to the Engineer, within ten days after receipt of Notice to Proceed, a list of materials to be furnished, the names of the suppliers and the appropriate shop drawings for all polyethylene pipe and fittings.

B. The Contractor shall submit the pipe manufacturer's certification of compliance with the applicable sections of the Specifications.

C. The Contractor shall submit shop drawings showing installation method and the proposed method and specialized equipment to be used.

PART 2 PRODUCTS

2.01 POLYETHYLENE PRESSURE PIPE

A. Polyethylene pipe 4" diameter and larger shall be high-density PE 3408 polyethylene resin per ASTM D 3350, Cell Classification 345464C, Class 160, DR 11, CPChem DriscoPlex 4000, 4300 or 4500 or an approved equal, meeting the requirements of AWWA C906. All pipe materials used in potable water systems shall comply with NSF Standard 61. Outside diameters of water, reclaimed water and pressure sewer HDPE pipes shall be ductile iron size (DIPS).

B. Polyethylene pipe and tubing 3" diameter and smaller shall be pressure Class 200, DR 9 "Driscopipe 5100", Endo Pure by Endot, or equal, meeting the requirements of AWWA C901 (latest revision) and the following ASTM requirements:

Material Designation PPI/ASTM PE 3408
Material Classification ASTM D-1248 III C5 P34
Cell Classification ASTM D-3350

2.02 JOINTS

A. Where PE pipe is joined to PE pipe, it shall be by thermal butt fusion. Thermal fusion shall be accomplished in accordance with the written instructions of the pipe manufacturer and fusion equipment supplier. The installer of the thermal butt fused PE pipe shall have received training in heat fusion pipe joining methods and shall have had experience in performing this type of work.

B. Where thermal butt fusion cannot be used, or when specifically called for on the plans, electro-fused couplings may be used. Fusion shall be in accordance with the written instructions of the fitting manufacturer.

C. Flanged joints, mechanical joints, tapping saddles, and molded fittings shall be in accordance with AWWA C901, C906 or C909, ASTM D3350 and D3140, as applicable. Fusion and mechanical connections are allowed, chemical (solvents, epoxies, etc.) are not allowed.

2.03 DETECTION

A. Direct buried HDPE pipe shall have 3" detectable metallic tape of the proper color placed directly above the pipe and 12" below finished grade or 6" detectable tape between 12" and 24" below finished grade.

B. Direct buried or horizontal directional drilled HDPE pipe shall also have a tracer wire installed along the pipe alignment. The tracer wire to be used shall be a solid, 10 gauge, high strength, copper clad steel wire with a polyethylene jacket of appropriate color manufactured by Copperhead Industries or Manatee County approved equal.

2.04 IDENTIFICATION

A. Pipe shall bear identification markings in accordance with AWWA C906.

B. Pipe shall be color coded blue for water, purple (Pantone 522 C) for reclaimed water or green for pressure sewer using a solid pipe color or embedded colored stripes. Where stripes are used, there shall be a minimum of three stripes equally spaced.

PART 3 EXECUTION

3.01 INSTALLING POLYETHYLENE PRESSURE PIPE AND FITTINGS

All polyethylene pressure pipe shall be installed by direct bury, directional bore, or a method approved by the Owner/Engineer prior to construction. If directional bore is used, or if directed by the Owner/Engineer, the entire area of construction shall be surrounded by silt barriers during construction.

3.02 INSPECTION AND TESTING

All pipelines shall remain undisturbed for 24 hours to develop complete strength at all joints. All pipelines shall be subjected to a hydrostatic pressure and leak test per section 02617.

END OF SECTION

SECTION 02640 VALVES AND APPURTENANCES

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, equipment and incidentals required and install complete and ready for operation all valves and appurtenances as shown on the Drawings and as specified herein.

B. All valves and appurtenances shall be of the size shown on the Drawings and, to the extent possible, all equipment of the same type on the Project shall be from one manufacturer.

C. All valves and appurtenances shall have the name of the manufacturer and the working pressure for which they are designed cast in raised letters upon some appropriate part of the body.

D. All valves shall have a factory applied, fusion bonded epoxy coating on interior and exterior unless noted otherwise in the plans or this specification.

E. The equipment shall include, but not be limited to, the following:

1. Gate valves (Sec. 2.01)
2. Pressure Sustaining and Check Valves (Sec. 2.02)
3. Ball Valves for PVC Pipe (Sec. 2.03)
4. Butterfly Valves (Sec. 2.04)
5. Plug Valves (Sec. 2.05)
6. Valve Actuators (Sec. 2.06)
7. Air Release Valves (Sec. 2.07)
8. Valves Boxes (Sec. 2.08)
9. Corporation Cocks (Sec. 2.09)
10. Flange Adapter Couplings (Sec. 2.10)
11. Flexible Couplings (Sec. 2.11)
12. Hose Bibs (Sec. 2.12)
13. Slow Closing Air and Vacuum Valves (Sec. 2.13)
14. Surge Anticipator Valve (Sec. 2.14)
15. Check Valves (Sec. 2.15)
16. Hydrants (Sec. 2.16)
17. Restraining Clamps (Sec. 2.17)
18. Tapping Sleeves and Tapping Valves (Sec. 2.18)
19. Single Acting Altitude Valves (Sec. 2.19)

1.02 DESCRIPTION OF SYSTEMS

All of the equipment and materials specified herein are intended to be standard for use in controlling the flow of potable water, reclaim water, wastewater, etc., depending on the applications.

1.03 QUALIFICATIONS

All of the types of valves and appurtenances shall be products of well established reputable firms who are fully experienced and qualified in the manufacture of the particular equipment to

be furnished. The equipment shall be designed, constructed and installed in accordance with the best practices and methods and shall comply with these Specifications as applicable. Valves shall be as covered under mechanical devices in Section 8 of ANSI/NSF Standard 61.

1.04 SUBMITTALS

A. Submit to the Engineer within 30 days after execution of the contract a list of materials to be furnished, the names of the suppliers and the date of delivery of materials to the site.

B. Complete shop drawings of all valves and appurtenances shall be submitted to the Engineer for approval in accordance with the Specifications.

1.05 TOOLS

Special tools, if required for normal operation and maintenance shall be supplied with the equipment.

PART 2 PRODUCTS

2.01 GATE VALVES

A. All buried valves shall have cast or ductile iron three (3) piece valve bodies.

B. Where indicated on the drawings or necessary due to locations, size, or inaccessibility, chain wheel operators shall be furnished with the valves. Such operators shall be designed with adequate strength for the valves with which they are supplied and provide for easy operation of the valve. Chains for valve operators shall be galvanized.

C. Where required, gate valves shall be provided with a box cast in a concrete slab and a box cover. Length of box shall include slab thickness. Box cover opening shall be for valve stem and nut. Valve wrenches and extension stems shall be provided by the manufacturer to actuate the valves. The floor box and cover shall be equal to those manufactured by Rodney Hunt Machine Company, Orange, Massachusetts, Clow, DeZurik or approved equal.

D. Gate valves with 3"-20" diameters shall be resilient seated, manufactured to meet or exceed the requirements of AWWA C509 or C515 and UL/FM of latest revision and in accordance with the following specifications. Valves shall have an unobstructed waterway equal to or greater than the full nominal diameter of the valve.

E. Wrench nut shall be provided for operating the valve.

F. Valves shall be suitable for an operating pressure of 200 psi and shall be tested in accordance with AWWA C509 or C515.

G. All bonnet bolts, nuts and studs shall be stainless steel.

2.02 PRESSURE SUSTAINING AND CHECK VALVE

A. Pressure sustaining and check valve shall be pilot operated diaphragm actuated valve with cast iron body, bronze trim, and 125-pound flanged ends. The valve shall be hydraulically operated, diaphragm type globe valve. The main valve shall have a single removable seat and a resilient disc, of rectangular cross section, surrounded on three and a half sides. The stainless steel stem shall be fully guided at both ends by a bearing in the valve cover, and an

integral bearing in the valve seat. It shall be sleeved at both ends with delrin. No external packing glands are permitted and there shall be no pistons operating the main valve or any controls. The valve shall be equipped with isolation cocks to service the pilot system while permitting flow if necessary. Main valve and all pilot controls shall be manufactured in the United States of America. Valve shall be single chamber type, with seat cut to 5 degrees taper.

B. Valve shall maintain a minimum (adjustable) upstream pressure to a preset (adjustable) maximum. The pilot system shall consist of two direct acting, adjustable, spring loaded diaphragm valves.

C. Valve shall be cast iron (ASTM A48) with main valve trim of brass (QQB-B-626) and bronze (ASTM B61). The pilot control valves shall be cast brass (ASTM B62) with 303 stainless steel trim. All ferrous surfaces inside and outside shall have a 2-part epoxy coating. Valve shall be similar in all respects to CLA-VAL Company, Model 692G-01ABKG, as manufactured by CLA-VAL Company, Winter Park, Florida, or similar pressure sustaining and check valve as manufactured by Golden Alderson; or approved equal.

2.03 BALL VALVES FOR PVC PIPE

A. Ball valves for PVC pipe shall be of PVC Type 1 with union, socket, threaded or flanged ends as required. Ball valves shall be full port, full flow, all plastic construction, 150 psi rated with teflon seat seals and T-handles. PVC ball valves shall be as manufactured by Celanese Piping Systems, Inc., Wallace and Tiernan, Inc., Plastiline, Inc., or approved equal.

B. All valves shall be mounted in such a position that valve position indicators are plainly visible when standing on the floor.

2.04 BUTTERFLY VALVES

A. Butterfly valves shall conform to the AWWA Standard Specifications for Rubber Seated Butterfly Valves, Designated C-504, except as hereinafter specified. Valves, except as specified hereinafter, shall be Class 250B and equal to those manufactured by Henry Pratt Company, DeZurik, Mueller Lineseal, or approved equal. Ductile iron conforming to ASTM A536, Grade 65-45-12 shall be provided for all Class 250 valves. All valves shall be leak tested at 500 psi.

B. The face-to-face dimensions of flanged end valves shall be in accordance with Table 1 of above mentioned AWWA Specification for short-body valve. Adequate two-way thrust bearings shall be provided. Flange drilling shall be in accordance with ANSI B16.1.

C. Valve seats shall be an EPDM elastomer. Valve seats 24 inches and larger shall be field adjustable and replaceable without dismounting operator disc or shaft and without removing the valve from the line. All retaining segments and adjusting devices shall be of corrosion resistant material with stainless Nylock screws and be capable of the 1/8-inch adjustment. Valves 20 inches and smaller shall have bonded or mechanically restrained seats as outlined in AWWA C 504. Where the EPDM seat is mounted on the valve body, the mating edge of the valve disc shall be 18-8 stainless steel or Nickel-Chrome, 80-20%. Where the EPDM seat is mounted on the valve disc, the valve body shall be fitted with an 18-8 stainless steel seat offset from the shaft, mechanically restrained and covering 360 degrees of the peripheral opening or seating surface.

D. The valve body shall be constructed of ductile iron or close grain cast iron per ASTM A126,

Class B with integrally cast hubs for shaft bearing housings of the through boss-type. Butterfly valves of the "wafer" or "spool" type will not be accepted.

E. The valve shaft shall be turned, ground, and polished constructed of 18-8, ASTM A-276, Type 304 stainless steel and designed for both torsional and shearing stresses when the valve is operated under its greatest dynamic or seating torque. Shaft shall be of either a one piece unit extending full size through the valve disc and valve bearing or it may be of a stub shaft design. Shaft bearings shall be teflon or nylon, self-lubricated type.

F. All valves shall be subject to hydrostatic and leakage tests at the point of manufacture. The hydrostatic test for Class 250 valves shall be performed with an internal hydrostatic pressure equal to 500 psi applied to the inside of the valve body of each valve for a period of five minutes. During the hydrostatic test, there shall be no leakage through the metal, the end joints or the valve shaft seal. The leakage test for the Class 250 valves shall be performed at a differential pressure of 230 psi and against both sides of the valve. No adjustment of the valve disc shall be necessary after pressure test for normal operation of valve. The Class 250 valves shall be tested in conformance with AWWA C-504.

G. In general, the butterfly valve operators shall conform to the requirements of Section 3.8 of the AWWA Standard Specifications for Rubber Seated Butterfly Valves, Designation C504, insofar as applicable, and as herein specified.

H. Gearing for the operators shall be totally enclosed in a gear case in accordance with paragraph 3.8.3 of the above mentioned AWWA Standard Specification.

I. Operators shall be capable of seating and unseating the disc against the full design pressure of velocity, as specified for each class, into a dry system downstream and shall transmit a minimum torque to the valve. Operators shall be rigidly attached to the valve body.

J. The manufacturer shall certify that the required tests on the various materials and on the completed valves have been satisfactory and that the valves conform with all requirements of this Specification and the AWWA standard.

K. Where indicated on the Drawings, extension stems, floor stands, couplings, stem guides, and floor boxes as required shall be furnished and installed.

2.05 PLUG VALVES

A. All plug valves shall be eccentric plug valves capable of sustaining 150 psi in either direction without leaking.

Exception: Single direction plug valves may be used if it is clearly demonstrated they will never be required to resist pressure in both directions either in service or during pipe line testing.

B. Plug valves shall be tested in accordance with current AWWA Standard C-504-80 Section 5. Each valve shall be performance tested in accordance with paragraph 5.2 and shall be given a leakage test and hydrostatic test as described in paragraphs 5.3 and 5.4. The manufacturer shall furnish certified copies of reports covering proof of design testing as described in Section 5.5.

C. Plug valves shall be of the non-lubricated eccentric type with resilient faced plugs and shall be furnished with end connections as shown on the Plans. Flanged valves shall be faced and

drilled to the ANSI 150 lb. standard. Mechanical joint ends shall be to the AWWA Standard C111-72. Bell ends shall be to the AWWA Standard C100-55 Class B. Screwed ends shall be to the NPT standard.

D. Plug valve bodies shall be of ASTM A126 Class B Semi-steel, 31,000 psi tensile strength minimum in compliance with AWWA Standard C507-73, Section 5.1 and AWWA Standard C504-70 Section 6.4. Port areas for valves 20-inches and smaller shall be 80 percent of full pipe area. Valves 24 inch and larger shall have a minimum port area between 80 and 100 percent of full nominal pipe area. All exposed nuts, bolts, springs, washers, etc. shall be zinc or cadmium plated. Resilient plug facings shall be of Hycar or Neoprene.

E. Plug valves shall be furnished with permanently lubricated stainless steel or oil-impregnated bronze upper and lower plug stem bushings. These bearings shall comply with current AWWA Standards.

2.06 VALVE ACTUATORS

A. General

1. All valve actuators shall conform to Section 3.8 of the AWWA Standard Specification and shall be either manual or motor operated.
2. Actuators shall be capable of seating and unseating the disc against the full design pressure and velocity, as specified for each class, into a dry system downstream, and shall transmit a minimum torque to the valve. Actuators shall be rigidly attached to the valve body.
3. Butterfly valve actuators shall conform to the requirements of Section 3.8 of the AWWA Standard specifications for Rubber Seated Butterfly Valves, Designated C504, insofar as applicable and as herein specified.

B. Manual Actuators

1. Manual actuators shall have permanently lubricated, totally enclosed gearing with handwheel and gear ratio sized on the basis of actual line pressure and velocities. Actuators shall be equipped with handwheel, position indicator, and mechanical stop-limiting locking devices to prevent over travel of the disc in the open and closed positions. They shall turn counter-clockwise to open valves. Manual actuators shall be of the traveling nut, self-locking type and shall be designed to hold the valve in any intermediate position between fully open and fully closed without creeping or fluttering. Actuators shall be fully enclosed and designed to produce the specified torque with a maximum pull of 80 pounds on the handwheel or chainwheel. Actuator components shall withstand an input of 450 foot pounds for 30" and smaller and 300 foot pounds for larger than 30" size valves at extreme actuator positions without damage. Valves located above grade shall have handwheel and position indicator, and valves located below grade shall be equipped with a two inch (2") square AWWA operating nut located at ground level and cast iron extension type valve box. Valve actuators shall conform to AWWA C504, latest revision.

C. Motor Actuators (Modulating)

1. The motor actuated valve controller shall include the motor, actuator unit gearing, limit switch gearing, limit switches, position transmitter which shall transmit a 4-20 mA DC signal, control power transformer, electronic controller which will position the valve based on a remote 4-20 milliamp signal, torque switches, bored and key-wayed drive

sleeve for non-rising stem valves, declutch lever and auxiliary handwheel as a self-contained unit.

2. The motor shall be specifically designed for valve actuator service using 480 volt, 60 Hertz, three phase power as shown, on the electrical drawings. The motor shall be sized to provide an output torque and shall be the totally enclosed, non-ventilated type. The power gearing shall consist of helical gears fabricated from heat treated alloy steel forming the first stage of reduction. The second reduction stage shall be a single stage worm gear. The worm shall be of alloy steel with carburized threads hardened and ground for high efficiency. The worm gear shall be of high tensile strength bronze with hobbed teeth. All power gearing shall be grease lubricated. Ball or roller bearings shall be used throughout. Preference will be given to units having a minimum number of gears and moving parts. Spur gear reduction shall be provided as required.
3. Limit switches and gearing shall be an integral part of the valve control. The limit switch gearing shall be made of bronze and shall be grease lubricated, intermittent type and totally enclosed to prevent dirt and foreign matter from entering the gear train. Limit switches shall be of the adjustable type capable of being adjusted to trip at any point between fully opened valve and fully closed valve.
4. The speed of the actuator shall be the responsibility of the system supplier with regard to hydraulic requirements and response compatibility with other components within the control loop. Each valve controller shall be provided with a minimum of two rotor type gear limit switches, one for opening and one for closing. The rotor type gear limit switch shall have two normally open and two normally closed contacts per rotor. Gear limit switches must be geared to the driving mechanism and in step at all times whether in motor or manual operation. Provision shall be made for two additional rotors as described above, each to have two normally open and two normally closed contacts. Each valve controller shall be equipped with a double torque switch. The torque switch shall be adjustable and will be responsive to load encountered in either direction of travel. It shall operate during the complete cycle without auxiliary relays or devices to protect the valve, should excessive load be met by obstructions in either direction of travel. The torque switch shall be provided with double-pole contacts.
5. A permanently mounted handwheel shall be provided for manual operation. The handwheel shall not rotate during electric operations, but must be responsive to manual operation at all times except when being electrically operated. The motor shall not rotate during hand operation nor shall a fused motor prevent manual operation. When in manual operating position, the unit will remain in this position until motor is energized at which time the valve operator will automatically return to electric operation and shall remain in motor position until handwheel operation is desired. This movement from motor operation to handwheel operation shall be accomplished by a positive declutching lever which will disengage the motor and motor gearing mechanically, but not electrically. Hand operation must be reasonably fast. It shall be impossible to place the unit in manual operation when the motor is running. The gear limit switches and torque switches shall be housed in a single easily accessible compartment integral with the power compartment of the valve control. All wiring shall be accessible through this compartment. Stepping motor drives will not be acceptable.
6. The motor with its control module must be capable of continuously modulating over its entire range without interruption by heat protection devices. The system, including the operator and control module must be able to function, without override protection of any kind, down to zero dead zone.
7. All units shall have strip heaters in both the motor and limit switch compartments.
8. The actuator shall be equipped with open-stop-close push buttons, an auto-manual selector switch, and indicating lights, all mounted on the actuator or on a separate locally mounted power control station.
9. The electronics for the electric operator shall be protected against temporary

submergence.

10. Actuators shall be Limitorque L120 with Modutronic Control System containing a position transmitter with a 4-20MA output signal or equal.

D. Motor Actuators (Open-Close)

1. The electronic motor-driven valve actuator shall include the motor, actuator gearing, limit switch gearing, limit switches, torque switches, fully machined drive sleeve, declutch lever, and auxiliary handwheel as a self-contained unit.
2. The motor shall be specifically designed for valve actuator service and shall be of high torque totally enclosed, nonventilated construction, with motor leads brought into the limit switch compartment without having external piping or conduit box.
   (a) The motor shall be of sufficient size to open or close the valve against maximum differential pressure when voltage to motor terminals is 10% above or below nominal voltage.
   (b) The motor shall be prelubricated and all bearings shall be of the anti-friction type.
3. The power gearing shall consist of helical gears fabricated from heat treated steel and worm gearing. The worm shall be carburized and hardened alloy steel with the threads ground after heat treating. The worm gear shall be of alloy bronze accurately cut with a hobbing machine. All power gearing shall be grease lubricated. Ball or roller bearings shall be used throughout.
4. Limit switches and gearing shall be an integral part of the valve actuator. The switches shall be of the adjustable rotor type capable of being adjusted to trip at any point between fully opened valve and fully closed valve. Each valve controller shall be provided with a minimum of two rotor type gear limit switches, one for opening and one for closing (influent valves require additional contacts to allow stopping at an intermediate position). The rotor type gear limit switch shall have two normally open and two normally closed contacts per toro. Additional switches shall be provided if shown on the control and/or instrumentation diagrams. Limit switches shall be geared to the driving mechanism and in step at all times whether in motor or manual operation. Each valve actuator shall be equipped with a double torque switch. The torque switch shall be adjustable and will be responsive to load encountered in either direction of travel. It shall operate during the complete cycle without auxiliary relays or devices to protect the valve should excessive load be met by obstructions in either direction of travel. Travel and thrusts shall be independent of wear in valve disc or seat rings.
5. A permanently mounted handwheel shall be provided for manual operation. The handwheel shall not rotate during electric operation except when being electrically operated. The motor shall not rotate during hand operation, nor shall a fused motor prevent manual operation. When in manual operating position, the unit will remain in this position until motor is energized at which time the valve actuator will automatically return to electric operation and shall remain in motor position until handwheel operation is desired. Movement from motor operation to handwheel operation shall be accomplished by a positive declutching lever which will disengage the motor and motor gearing mechanically, but not electrically. Hand operation must be reasonably fast. It shall be impossible to place the unit in manual operation when the motor is running.
6. Valve actuators shall be equipped with an integral reversing controller and three phase overload relays, Open-Stop-Close push buttons, local-remote-manual selector switch, control circuit transformer, three-phase thermal overload relays and two pilot lights in a NEMA 4X enclosure. In addition to the above, a close coupled air circuit breaker or disconnect switch shall be mounted and wired to the valve input power terminals for

the purpose of disconnecting all underground phase conductors.

7. The valve actuator shall be capable of being controlled locally or remotely via a selector switch integral with the actuator. In addition, an auxiliary dry contact shall be provided for remote position feedback.
8. Valve A.C. motors shall be designed for operation on a 480 volt, 3-phase service. Valve control circuit shall operate from a fuse protected 120 volt power supply.
9. Motor operators shall be as manufactured by Limitorque Corporation, Type L120 or approved equal.

2.07 AIR RELEASE VALVES

The air release valves for use in water or force mains shall be installed as shown on the Drawings. The valves shall have a cast iron body cover and baffle, stainless steel float, bronze water diffuser, Buna-N or Viton seat, and stainless steel trim. The fittings shall be threaded. The air release valves shall be Model 200A or 400A as manufactured by APCO Valve and Primer Corporation, Schaumburg, Illinois; or approved equal.

2.08 VALVE BOXES

A. Buried valves shall have cast-iron three piece valve boxes or HDPE adjustable valve boxes. Cast iron valve boxes shall be provided with suitable heavy bonnets and shall extend to such elevation at or slightly above the finished grade surface as directed by the Engineer. The barrel shall be two-piece, screw type, having a 5-1/4 inch shaft. The upper section shall have a flange at the bottom with sufficient bearing area to prevent settling and shall be complete with cast iron covers. Covers shall have WATER, SEWER, or RECLAIM, as applicable, cast into the top.

B. All valves shall have actuating nuts extended to within four (4) feet of the top of the valve box. All valve extensions will have a centering guide plate two (2) inches maximum below the actuating nut. The valve extension shall be fastened to the existing nut with a set screw. Valve boxes shall be provided with a concrete base and a valve nameplate engraved with lettering 1/8-inch deep as shown on the Drawings.

C. HDPE adjustable valve boxes shall be one complete assembled unit composed of the valve box and extension stem. All moving parts of the extension stem shall be enclosed in a housing to prevent contact with the soil. Valve box assembly shall be adjustable to accommodate variable trench depths.

D. The entire assembly shall be made of heavy wall high density polyethylene. All exterior components shall be joined with stainless steel screws. The valve box top section shall be adaptable to fit inside a valve box upper section.

E. The stem assembly shall be of a telescoping design that allows for variable adjustment length. The stem material shall be of plated steel square tubing. The stem assembly shall have a built-in device that keeps the stem assembly from disengaging at its fully extended length. The extension stem must be torque tested to 1000 foot pounds. Covers shall have WATER, SEWER or RECLAIMED clearly and permanently impressed into the top surface.

2.09 CORPORATION COCKS

Corporation cocks for connections to cast-iron, ductile iron or steel piping shall be all brass or bronze suitable for 180 psi operating pressure and similar to Mueller Co. H-10046 or approved equal by Clow Corp., and shall be of sizes required and/or noted on the Drawings.

2.10 FLANGE ADAPTER COUPLINGS

Flange adapter couplings shall be of the size and pressure rating required for each installation and shall be suitable for use on either cast iron or ductile iron pipe. They shall be similar or approved equal to Dresser Company, Style 128. All couplings shall have a sufficient number of factory installed anchor studs to meet or exceed a minimum test pressure rating of 230 psi minimum.

2.11 FLEXIBLE COUPLINGS

Flexible couplings shall be either the split type or the sleeve type as shown on the Drawings.

1. Split type coupling shall be used with all interior piping and with exterior pipings noted on the Drawings. The couplings shall be mechanical type for radius groove piping. The couplings shall mechanically engage and lock grooved pipe ends in a positive couple and allow for angular deflection and contracting and expansion.
2. Couplings shall consist of malleable iron, ASTM Specification A47, Grade 32510 housing clamps in two or more parts, a single chlorinated butyl composition sealing gasket with a "C" shaped cross-section and internal sealing lips projecting diagonally inward, and two or more oval track head type bolts with hexagonal heavy nuts conforming to ASTM Specification A 183 and A194 to assemble the housing clamps. Bolts and nuts shall be hot dipped galvanized after fabrication.
3. Victualic type couplings and fittings may be used in lieu of flanged joints. Pipes shall be radius grooved as specified for use with the Victaulic couplings. Flanged adapter connections at fittings, valves, and equipment shall be Victaulic Vic Flange Style 741, equal by Gustin-Bacon Group, Division of Certain-Teed Products, Kansas City, Kansas, or approved equal.
4. Sleeve type couplings shall be used with all buried piping. The couplings shall be of steel and shall be Dresser Style 38 or 40, as shown on the Drawings, or equal. The coupling shall be provided with hot dipped galvanized steel bolts and nuts unless indicated otherwise.
5. All couplings shall be furnished with the pipe stop removed.
6. Couplings shall be provided with gaskets of a composition suitable for exposure to the liquid within the pipe.
7. If the Contractor decides to use victaulic couplings in lieu of flanged joints, he shall be responsible for supplying supports for the joints.

2.12 HOSE BIBS

Hose bibs shall be 3/4" or 1" brass, polished chromium plated brass, with vacuum breaker as noted on the drawings.

2.13 SLOW CLOSING AIR AND VACUUM VALVES

A. The Contractor shall furnish and install slow closing air and vacuum valves as shown on the Drawings which shall have two (2) independent valves bolted together. The air and vacuum valve shall have all stainless steel float, guided on both ends with stainless shafts. The air and vacuum valve seat shall be Buna-N to insure drop tight closure. The Buna-N seat shall be fastened to the cover stainless shoulder screws in a manner to prevent distortion of the seat. The float shall be guided at both ends with stainless steel bushings.

B. The valve cover shall have a male lip designed to fit into the body register for accurate

alignment of the float into the Buna-N seat. The valve cover shall have 250-pound class flanged outlet connection.

C. The surge check valve shall be bolted to the inlet of the air and vacuum valve and consist of a body, seat, disc, and compression spring. A surge check unit shall operate on the interphase between the kinetic energy and relative velocity flows of air and water, so that after air passes through, and water rushes into the surge check, the disc starts to close, reducing the rate of flow of water into the air valve by means of throttling orifices in the disc to prevent water hammer in the air valves. The surge check orifices must be adjustable type for regulation in the field to suit operating conditions. Valve shall be rated for 250-pound class working pressure.

D. The complete slow closing air and vacuum valve with air release valve shall have been flow tested in the field, substantiated with test data to show reduction of surge pressure in the valve. Flow test data shall be submitted with initial shop drawings for approval.

E. Valve exterior to be painted Red Oxide, Phenolic TT-P86, Primer or approved equal for high resistance to corrosion.

F. All materials of construction shall be certified in writing to conform to ASTM specifications as follows:

Air Valve Cover, Body, and Surge Check Body	Cast Iron	ASTM A48, Class 30
Float	Stainless Steel	ASTM A240
Surge Check Seat and Disc	Stainless Steel	ASTM A582
Air Valve Seat	Buna-N	
Spring	Stainless Steel	T302

2.14 SURGE ANTICIPATOR VALVES

A. Surge anticipator valves shall be furnished for the pumping systems as shown on the Drawings. The valve shall be hydraulically operated, pilot controlled, and diaphragm or piston actuated. The main valve shall be cast iron conforming to ASTM A48 with bronze trim conforming to ASTM B61 and flanged ends conforming to ANSI B161.1. The main valve shall be globe type with a single removable seat and a resilient disc.

B. The diaphragm actuated valve shall have a stainless steel stem guided at both ends by a bearing in the valve cover and an integral bearing surface in the seat. No external packing glands shall be permitted. The valve shall be fully serviceable without removing it from the line. The pilot system shall be of noncorrosive construction and provided with isolation cocks.

C. The piston actuated valve shall operate on the differential piston principle. The valve piston shall be guided on its outside diameter. The valve shall be able to operate in any position and shall be fully serviceable without removing it from the line. The pilot system shall be provided with isolation cocks, and be of noncorrosive materials of construction.

D. The valve shall be designed specifically to minimize the effects of water hammer, resulting from power failure at the pumping station, or from normal stopping and starting of pumping operators. The valve shall open hydraulically on a down surge, or low pressure wave created when the pump stops, remain open during the low pressure cycle in order to be open when the high pressure wave returns. The high pressure pilot shall be adjustable over a 20 to 200 psi range and the low pressure pilot shall be adjustable over a 15 to 75 psi range. The valve shall be the 250 Class.

2.15 CHECK VALVES

A. Check valves for cast iron and ductile iron pipe lines shall be swing type and shall meet the material requirements of AWWA Specification C508. The valves shall be iron body, bronze mounted, single disc, 175 psi working water pressure and nonshock. Valves shall be as manufactured by Mueller, Clow, American, Kennedy, M&H, or approved equal. Valves 8" and larger shall be air cushioned to reduce valve slam.

B. When there is no flow through the line, the disc shall hang lightly against its seat in practically a vertical position. When open, the disc shall swing clear of the waterway.

C. Check valves shall have bronze seat and body rings, extended bronze hinge pins and bronze nuts on the bolts of bolted covers.

D. Valves shall be so constructed that disc and body seat may easily be removed and replaced without removing the valve from the line. Valves shall be fitted with an extended hinge arm with outside lever and weight. Weights provided and approved by the Engineer shall be installed.

2.16 HYDRANTS

Hydrants shall be AVK Series 27 DRX Barrel (nostalgic style with stainless steel bolts) Kennedy Type K-81, American Darling B-84-B or Mueller Super Centurian A423, or approved equal and shall conform to the "Standard Specification for Fire Hydrants for Ordinary Water Works Service", AWWA C502, and UL/FM certified, and shall in addition meet the specific requirements and exceptions which follow:

1. Hydrants shall be according to manufacturer's standard pattern and of standard size, and shall have one 4-1/2" steamer nozzle and two 2-1/2" hose nozzles.
2. Hydrant inlet connections shall have mechanical joints for 6" ductile-iron pipe.
3. Hydrant valve opening shall have an area at least equal to that area of a 5-1/4" minimum diameter circle and be obstructed only by the valve rod. Each hydrant shall be able to deliver 500 gallons minimum through its two 2-1/2" hose nozzles when opened together with a loss of not more than 2 psi in the hydrants.
4. Each hydrant shall be designed for installation in a trench that will provide 5-ft. cover.
5. Hydrants shall be hydrostatically tested as specified in AWWA C502.
6. Hydrants shall be rated at 200 psi.
7. All nozzle threads shall be American National Standard.
8. Each nozzle cap shall be provided with a Buna N rubber washer.
9. Hydrants shall be so arranged that the direction of outlets may be turned 90 degrees without interference with the drip mechanism and without the mechanism obstructing the discharge from any outlet.
10. Hydrants must be capable of being extended without removing any operating parts.
11. Hydrants shall have bronze-to-bronze seatings as per AWWA C502-85.

12. Hydrant main valve closure shall be of the compression type opening against the pressure and closing with the pressure. The resilient seat material shall meet the requirements of AWWA C-509 and shall preferably be EPDM Elastomer.
13. Internal and below ground iron parts (bonnet, nozzle section and base) shall have a fusion bonded epoxy coating per AWWA C550. Aboveground external hydrant parts (cap, bonnet and nozzle section) shall be either epoxy coated together with a UV resistant polyester coating or have two shop coats of paint per AWWA C502. The lower stand pipe or barrel shall be protected with asphaltic coatings per AWWA C502.
14. Exterior nuts, bolts and washer shall be stainless steel. Bronze nuts may be used below grade.
15. All internal operating parts shall be removable without requiring excavation.

2.17 RESTRAINING CLAMPS

Restraining clamp assemblies as detailed in the drawings for use at hydrant connections to water mains, or at fittings where shown on the Drawings, shall be as manufactured by American Cast Iron Pipe, Star Pipe Products, U.S. Pipe; or approved equal.

2.18 TAPPING SLEEVES AND GATE VALVES

A. Tapping valves shall meet the requirement of AWWA C500. The valves shall be flanged, shall be mechanical joint outlet with nonrising stem, designed for vertical burial and shall open left or counterclockwise. Stuffing boxes shall be the "O-ring" type. Operating nut shall be AWWA Standard 2" square for valves 2" and up. The valves shall be provided with an overload seat to permit the use of full size cutters. Gaskets shall cover the entire area of flange surfaces and shall be supplied with EPDM wedges up to 30" diameter.

B. Tapping sleeves and saddles shall seal to the pipe by the use of a confined "O" ring gasket, and shall be able to withstand a pressure test of 180 psi for one hour with no leakage in accordance with AWWA C110, latest edition. A stainless steel 3/4" NPT test plug shall be provided for pressure testing. All bolts joining the two halves shall be stainless steel and shall be included with the sleeve or saddle. Sleeves and saddles shall be protected from corrosion by being fusion applied epoxy coated, or be made of 18-8 Type 304 stainless steel. Saddle straps shall be 18-8 Type 304 stainless steel.

2.19 SINGLE ACTING ALTITUDE VALVES

A. Function

1. The altitude control valve shall be of the single acting type, closing off tightly when the water reaches the maximum predetermined level in the tank to prevent overflow; and opening to permit replenishing of the tank supply when the water level drops approximately 6" to 12" below the maximum level.
2. A hand operated valve in the power water line to the top of the piston shall permit adjustment of the speed of valve closing. The tank water level control shall be by means of a diaphragm operated, spring loaded, three way pilot which directs power water to or from the top of the main valve piston. The three way pilot shall be of bronze construction. The diaphragm surface exposed to the tank head shall be not less than 57 sq. inches. It shall be possible to adjust the spring above the diaphragm for water level control approximately 20% above or below the factory setting.

B. Description

1. The main valve shall operate on the differential piston principle such that the area on the underside of the piston is no less than the pipe area on the upper surface of the piston is of a greater area than the underside of the piston.
2. The valve piston shall be guided on its outside diameter by long stroke stationary Vee ports which shall be downstream of the seating surface to minimize the consequences of throttling. Throttling shall be done by the valve Vee ports and not the valve seating surfaces.
3. The valve shall be capable of operating in any position and shall incorporate only one flanged cover at the valve top from which all internal parts shall be accessible. There shall be no stems, stem guides, or spokes within the waterway. There shall be no springs to assist the valve operation.

C. Construction

1. The valve body shall be of cast iron ASTM A-126 with flanges conforming to the latest ANSI Standards. The valve shall be extra heavy construction throughout. The valve interior trim shall be bronze B-62 as well as the main valve operation.
2. The valve seals shall be easily renewable while no diaphragm shall be permitted within the main valve body.
3. All controls and piping shall be of non-corrosive construction.
4. A visual valve position indicator shall be provided for observing the valve piston position at any time.

D. Figure Number

The valves shall be the 20" Globe type (Fig. 3200-D) as manufactured by GA Industries of Mars, Pennsylvania, or approved equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. All valves and appurtenances shall be installed in the location shown, true to alignment and rigidly supported. Any damage occurring to the above items before they are installed shall be repaired to the satisfaction of the Engineer.

B. After installation, all valves and appurtenances shall be tested at least two hours at the working pressure corresponding to the class of pipe, unless a different test pressure is specified. If any joint proves to be defective, it shall be repaired to the satisfaction of the Engineer.

C. Install all floor boxes, brackets, extension rods, guides, the various types of operators and appurtenances as shown on the Drawings that are in masonry floors or walls, and install concrete inserts for hangers and supports as soon as forms are erected and before concrete is poured. Before setting these items, the Contractor shall check all plans and figures which have a direct bearing on their location and he shall be responsible for the proper location of these valves and appurtenances during the construction of the structures.

D. Pipe for use with flexible couplings shall have plain ends as specified in the respective pipe sections.

E. Flanged joints shall be made with high strength, low alloy Corten bolts, nuts and washers. Mechanical joints shall be made with mild corrosion resistant alloy steel bolts and nuts. All

exposed bolts shall be painted the same color as the pipe. All buried bolts and nuts shall be heavily coated with two (2) coats of bituminous paint comparable to Inertol No. 66 Special Heavy.

F. Prior to assembly of split couplings, the grooves as well as other parts shall be thoroughly cleaned. The ends of the pipes and outside of the gaskets shall be moderately coated with petroleum jelly, cup grease, soft soap or graphite paste, and the gasket shall be slipped over one pipe end. After the other pipe has been brought to the correct position, the gasket shall be centered properly over the pipe ends with the lips against the pipes. The housing sections then shall be placed. After the bolts have been inserted, the nuts shall be tightened until the housing sections are firmly in contact, metal-to-metal, without excessive bolt tension.

G. Prior to the installation of sleeve-type couplings, the pipe ends shall be cleaned thoroughly for a distance of 8". Soapy water may be used as a gasket lubricant. A follower and gasket, in that order, shall be slipped over each pipe to a distance of about 6" from the end.

H. Valve boxes with concrete bases shall be installed as shown on the Drawings. Mechanical joints shall be made in the standard manner. Valve stems shall be vertical in all cases. Place cast iron box over each stem with base bearing on compacted fill and the top flush with final grade. Boxes shall have sufficient bracing to maintain alignment during backfilling. Knobs on cover shall be parallel to pipe. Remove any sand or undesirable fill from valve box.

3.02 HYDRANTS

A. Hydrants shall be set at the locations designated by the Engineer and/or as shown on the Drawings and shall be bedded on a firm foundation. A drainage pit on crushed stone as shown on the Drawings shall be filled with gravel or crushed stone and satisfactorily compacted. During backfilling, additional gravel or crushed stone shall be brought up around and 6" over the drain port. Each hydrant shall be set in true vertical alignment and shall be properly braced. Concrete thrust blocks shall be placed between the back of the hydrant inlet and undisturbed soil at the end of the trench. Minimum bearing area shall be as shown on the plans. Felt paper shall be placed around the hydrant elbow prior to placing concrete. CARE MUST BE TAKEN TO INSURE THAT CONCRETE DOES NOT PLUG THE DRAIN PORTS. Concrete used for backing shall be as specified herein.

B. When installations are made under pressure, the flow of water through the existing main shall be maintained at all times. The diameter of the tap shall be a minimum of 2" less than the inside diameter of the branch line.

C. The entire operation shall be conducted by workmen thoroughly experienced in the installation of tapping sleeves and valves, and under the supervision of qualified personnel furnished by the manufacturer. The tapping machine shall be furnished by the Contractor if tap is larger than 12" in diameter.

D. The Contractor shall determine the locations of the existing main to be tapped to confirm the fact that the proposed position for the tapping sleeve will be satisfactory and no interference will be encountered such as the occurrence of existing utilities or of a joint or fitting at the location proposed for the connection. No tap will be made closer than 30" from a pipe joint.

E. Tapping valves shall be set in vertical position and be supplied with a 2" square operating nut for valves 2" and larger. The valve shall be provided with an oversized seat to permit the use of full sized cutters.

F. Tapping sleeves and valves with boxes shall be set vertically or horizontally as indicated on the Drawings and shall be squarely centered on the main to be tapped. Adequate support shall be provided under the sleeve and valve during the tapping operation. Sleeves shall be no closer than 30" from water main joints. Thrust blocks shall be provided behind all tapping sleeves. Proper tamping of supporting earth around and under the valve and sleeve is mandatory. After completing the tap, the valve shall be flushed to ensure that the valve seat is clean.

3.03 SHOP PAINTING

Ferrous surfaces of valves and appurtenances shall receive a coating of rust-inhibitive primer. All pipe connection openings shall be capped to prevent the entry of foreign matter prior to installation.

3.04 FIELD PAINTING

All metal valves and appurtenances specified herein and exposed to view shall be painted.

3.05 INSPECTION AND TESTING

Completed pipe shall be subjected to hydrostatic pressure test for two hours at 180 psi. All leaks shall be repaired and lines retested as approved by the Engineer. Prior to testing, the pipelines shall be supported in an approved manner to prevent movement during tests.

END OF SECTION

SECTION 02999 MISCELLANEOUS WORK AND CLEANUP

PART 1 GENERAL

1.01 SCOPE OF WORK

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

B. The work of this Section may include, but is not limited to the following:

1. Restoration of roads, sidewalks, driveways, curbing and gutters, fences, guardrails, lawns, shrubbery and any other existing items damaged or destroyed.
2. Crossing utilities.
3. Relocation of existing water, reclaim water, or sewer lines less than four inches diameter, water and sanitary sewer services, low pressure gas lines, telephone lines, electric lines, cable TV lines as shown on the Contract Drawings.
4. Restoring easements (servitudes) and rights-of-way.
5. Clean up.
6. Incidental work (project photographs, testing, shop drawings, traffic control, record drawings, etc.).
7. Excavation and Embankment - As defined in the Florida Department of Transportation Standard Specifications for Road and Bridge Construction (1991 Edition or latest revision).
8. Stormwater and erosion control devices.

1.02 SUBMITTAL OF LUMP SUM BREAKDOWN

Contractor shall submit to the Owner/Engineer, a breakdown of the lump sum bid for Miscellaneous Work and Cleanup Item in the Proposal within 10 days after date of Notice to Proceed.

1.03 WORK SPECIFIED UNDER OTHER SECTIONS

All work shall be completed in a workmanlike manner by competent workmen in full compliance with all applicable sections of the Contract Documents.

PART 2 PRODUCTS

2.01 MATERIALS

Materials required for this Section shall equal or exceed materials that are to be restored. The Contractor may remove and replace or reuse existing materials with the exception of paving.

PART 3 EXECUTION

3.01 RESTORING OF SIDEWALKS, ROADS, CURBING, FENCES AND GUARDRAILS

A. The Contractor shall protect existing sidewalks & curbing. If necessary, sidewalks & curbing shall be removed from joint to joint and replaced after backfilling. Curbing damaged during construction because of the Contractor's negligence or convenience, shall be replaced with

sidewalks & curbing of equal quality and dimension at no cost to the Owner.

B. At the locations necessary for the Contractor to remove, store and replace existing fences and guardrails during construction, the sections removed shall be only at the direction of the Engineer. If any section of fence is damaged due to the Contractor's negligence, it shall be replaced at no cost to the Owner with fencing equal to or better than that damaged and the work shall be satisfactory to the Engineer.

C. Guardrails in the vicinity of the work shall be protected from damage by the Contractor. Damaged guardrails shall be replaced in a condition equal to those existing

D. Road crossings shall be restored in accordance with the Contract Documents and current FDOT Standards. Compensation for road restoration shall be included under the Road Restoration Bid Item if specified or under Miscellaneous Cleanup if it is not specified.

3.02 CROSSING UTILITIES

This item shall include any extra work required in crossing culverts, water courses, drains, water mains and other utilities, including all sheeting and bracing, extra excavation and backfill, or any other work required or implied for the proposed crossing, whether or not shown on the Drawings.

3.03 RELOCATIONS OF EXISTING GAS LINES, TELEPHONE LINES, ELECTRIC LINES AND CABLE TV LINES

The Contractor shall notify the proper utility involved when relocation of these utility lines is required. The Contractor shall coordinate all relocation work by the utility so that construction shall not be hindered.

3.04 RESTORING THE EASEMENTS AND RIGHTS-OF-WAY

The Contractor shall be responsible for all damage to private property due to his operations. He shall protect from injury all walls, fences, cultivated shrubbery, pavement, underground facilities, including water, sewer and reclaimed water lines and services, or other utilities which may be encountered along the easement. If removal and replacement is required, it shall be done in a workmanlike manner, at his expense, so that the replacement are equivalent to that which existed prior to construction.

3.05 STORMWATER AND EROSION CONTROL DEVICES

The Contractor shall be responsible for, provide, and install all stormwater and erosion control devices necessary to insure satisfactory compliance with the Florida Department of Environmental Protection Stormwater, Erosion, and Sedimentation Control Inspector's Manual.

END OF SECTION

DIVISION 3 CONCRETE

SECTION 03200 CONCRETE REINFORCEMENT

PART 1 GENERAL

1.01 WORK INCLUDED

A. Reinforcing steel bars and welded steel wire fabric for cast-in-place concrete, complete with tie wire.

B. Support chairs, bolsters, bar supports and spacers, for reinforcing.

1.02 QUALITY ASSURANCE

Perform concrete reinforcing work in accordance with ACI 318 unless specified otherwise in this Section.

1.03 REFERENCES

A. ACI 318 - Building Code Requirements for Reinforced Concrete.

B. ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.

C. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.

D. CRSI 63 - Recommended practice for placing reinforcing bars.

E. CRSI 65 - Recommended practice for placing bar supports, specifications and nomenclature.

F. ACI 315 - American Concrete Institute - Manual of Standard Practice.

1.04 SHOP DRAWINGS

A. Submit shop drawings in accordance with Contract Documents.

B. Indicate bar sizes, spacings, locations and quantities of reinforcing steel and wire fabric, bending and cutting schedules and supporting and spacing devices.

C. Manufacturer's Literature: Manufacturer's specifications and installation instructions for splice devices.

PART 2 PRODUCTS

2.01 REINFORCING

A. Reinforcing steel: Grade 60, Minimum Yield Strength 60,000 psi, deformed billet steel bars, ASTM A615; plain finish.

B. Welded steel wire fabric: Deformed wire, ASTM A497; smooth wire ASTM A185 in flat sheets; plain finish.

2.02 ACCESSORY MATERIALS

A. Tie wire: Minimum 16 gauge annealed type, or patented system accepted by Engineer.

B. Chairs, bolsters, bar supports, spacers: Sized and shaped for strength and support of reinforcing during construction conditions.

C. Special chairs, bolsters, bar supports, spacers (where adjacent to architectural concrete surfaces): Stainless steel type sized and shaped as required.

2.03 FABRICATION

A. Fabricate concrete reinforcing in accordance with ACI 315.

B. Locate reinforcing splices, not indicated on Drawings, at points of minimum stress. Location of splices shall be reviewed by Engineer.

C. Where indicated, weld reinforcing bars in accordance with AWS D12.1.

PART 3 EXECUTION

3.01 PLACEMENT

A. Reinforcing shall be supported and secured against displacement. Do not deviate from true alignment.

B. Before placing concrete, ensure reinforcing is clean, free of loose scale, dirt, or other foreign coatings which would reduce bond to concrete.

3.02 QUALITY ASSURANCE

A. Acceptable Manufacturers: Regularly engaged in manufacture of steel bar and welded wire fabric reinforcing.

B. Installer Qualifications: Three years experience in installation of steel bar and welded wire fabric reinforcing.

C. Allowable Tolerances:

1. Fabrication:
   a. Sheared length: +l in.
   b. Depth of truss bars: +0, -1/2 in.
   c. Stirrups, ties and spirals: $\pm$1/4 in.
   d. All other bends: $\pm$1 in.
2. Placement:
   a. Concrete cover to form surfaces: $\pm$1/4 in.
   b. Minimum spacing between bars: 1 in.
   c. Top bars in slabs and beams:
      (1) Members 8 in. deep or less: $\pm$1/4 in.
      (2) Members more than 8 in.: $\pm$1/2 in.
   d. Crosswise of members: Spaced evenly within 2 in. of stated separation.
   e. Lengthwise of members: Plus or minus 2 in.
3. Maximum bar movement to avoid interference with other reinforcing steel, conduits, or

embedded items: 1 bar diameter.

3.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver reinforcement to project site in bundles marked with metal tags indicating bar size and length.

B. Handle and store materials to prevent contamination.

3.05 INSTALLATION

A. Placement:

1. Bar Supports: CRSI 65.
2. Reinforcing Bars: CRSI 63.

B. Steel Adjustment:

1. Move within allowable tolerances to avoid interference with other reinforcing steel, conduits, or embedded items.
2. Do not move bars beyond allowable tolerances without concurrence of Engineer.
3. Do not heat, bend, or cut bars without concurrence of Engineer.

C. Splices:

1. Lap splices: Tie securely with wire to prevent displacement of splices during placement of concrete.
2. Splice devices: Install in accordance with manufacturer's written instructions.
3. Do not splice bars without concurrency of Engineer, except at locations shown on Drawings.

D. Wire Fabric:

1. Install in longest practicable length.
2. Lap adjoining pieces one full mesh minimum, and lay splices with 16 gauge wire.
3. Do not make end laps midway between supporting beams, or directly over beams of continuous structures.
4. Offset end laps in adjacent widths to prevent continuous laps.

E. Cleaning: Remove dirt, grease, oil, loose mill scale, excessive rust, and foreign matter that will reduce bond with concrete.

F. Protection During Concreting: Keep reinforcing steel in proper position during concrete placement.

END OF SECTION

SECTION 03300 CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 WORK INCLUDED

Poured-in-place concrete slabs, thrust blocks, pile caps and pipe support cradles.

1.02 QUALITY ASSURANCE

Perform cast-in-place concrete work in accordance with ACI 318, unless specified otherwise in this Section.

1.03 TESTING LABORATORY SERVICES

A. Inspection and testing will be performed by the testing laboratory currently under contract to Manatee County in accordance with the Contract Documents.

B. Provide free access to work and cooperate with appointed firm.

C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of work.

D. Tests of cement and aggregates may be performed to ensure conformance with requirements stated herein.

E. Three concrete test cylinders will be taken for every 100 cu. yds. or part thereof of each class of concrete placed each day. Smaller pours shall have cylinders taken as directed by the Engineer.

F. One slump test will be taken for each set of test cylinders taken.

1.04 REFERENCES

A. ASTM C33 - Concrete Aggregates

B. ASTM C150 - Portland Cement

C. ACI 318 - Building Code Requirements for Reinforced Concrete

D. ASTM C260 - Air Entraining Admixtures for Concrete

E. ASTM C94 - Ready-Mixed Concrete

F. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete

G. ACI 305 - Recommended Practice for Hot Weather Concreting

PART 2 PRODUCTS

2.01 CONCRETE MATERIALS

A. Cement: Moderate-Type II, High early strength-Type III, Portland type, ASTM C150.

B. Fine and Coarse Aggregates: ASTM C33.

C. Water: Clean and free from injurious amounts of oil, alkali, organic matter, or other deleterious material.

2.02 ADMIXTURES

A. Air Entrainment: ASTM C260.

B. Chemical: ASTM C494 Type A - water reducing admixture.

2.03 ACCEPTABLE MANUFACTURERS

Acceptable Products:

1. Pozzolith
2. WRDA

2.04 ACCESSORIES

Non-shrink grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2400 psi in 2 days and 7000 psi in 28 days.

2.05 CONCRETE MIXES

A. Mix concrete in accordance with ASTM C94.

B. Provide concrete of following strength:

1. Required concrete strengths as determined by 28 day cylinders shall be as shown on the Drawings, but shall not be less than 3000 psi.
2. Select proportions for normal weight concrete in accordance with ACI 301 3.8 Method 1, Method 2, or Method 3. Add air entraining agent to concrete to entrain air as indicated in ACI 301 Table 3.4.1.
3. All mixes shall be in accordance with FDOT Specifications.

C. Use set-retarding admixtures during hot weather only when accepted by Engineer.

D. Add air entraining agent to concrete mix for concrete work exposed to exterior.

2.06 FORMS

A. Forms shall be used for all concrete masonry, including footings. Form shall be so constructed and placed that the resulting concrete will be of the shape, lines, dimensions, appearance and to the elevations indicated on the Drawings.

B. Forms shall be made of wood, metal, or other approved material. Wood forms shall be constructed of sound lumber or plywood of suitable dimensions, free from knotholes and loose knots; where used for expose surfaces, boards shall be dressed and matched. Plywood shall be sanded smooth and fitted with tight joints between panels. Metal forms shall be of an approved type for the class of work involved and of the thickness and design required for rigid

construction.

C. Edges of all form panels in contact with concrete shall be flush within 1/32-inch and forms for plane surfaces shall be such that the concrete will be plane within 1/16-inch in four feet. Forms shall be tight to prevent the passage of mortar and water and grout.

D. Forms for walls shall have removable panels at the bottom for cleaning, inspection and scrubbing-in of bonding paste. Forms for walls of considerable height shall be arranged with tremies and hoppers for placing concrete in a manner that will prevent segregation and accumulation of hardened concrete on the forms or reinforcement above the fresh concrete.

E. Molding or bevels shall be placed to produce a 3/4-inch chamfer on all exposed projecting corners, unless otherwise shown on the Drawings. Similar chamfer strips shall be provided at horizontal and vertical extremities of all wall placements to produce "clean" separation between successive placements as called for on the Plans.

F. Forms shall be sufficiently rigid to withstand vibration, to prevent displacement or sagging between supports and constructed so the concrete will not be damaged by their removal. The Contractor shall be entirely responsible for their adequacy.

G. Forms, including new pre-oiled forms, shall be oiled before reinforcement is placed, with an approved nonstaining oil or liquid form coating having a non-paraffin base.

H. Before form material is re-used, all surfaces in contact with concrete shall be thoroughly cleaned, all damaged places repaired, all projecting nails withdrawn, all protrusions smoothed and in the case of wood forms pre-oiled.

I. Form ties encased in concrete shall be designed so that after removal of the projecting part, no metal shall be within 1-inch of the face of the concrete. That part of the tie to be removed shall be at least 1/2-inch diameter or be provided with a wood or metal cone at least 1/2-inch in diameter and 1-inch long. Form ties in concrete exposed to view shall be the cone-washer type equal to the Richmond "Tyscru". Throughbolts or common wire shall not be used for form ties.

PART 3 EXECUTION

3.01 PLACING CONCRETE

A. Place concrete in accordance with ACI 304.

B. Notify Engineer minimum 24 hours prior to commencement of concreting operations.

C. Verify anchors, seats, plates and other items to be cast into concrete are placed, held securely and will not cause hardship in placing concrete. Rectify same and proceed with work.

D. Maintain records of poured concrete items. Record date, location of pour, quantity, air temperature and test samples taken.

E. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints are not disturbed during concrete placement.

F. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent. Apply bonding agent in accordance with manufacturer's recommendations.

G. Pour concrete continuously between predetermined construction and control joints. Do not break or interrupt successive pours such that cold joints occur.

H. In locations where new concrete is dowelled to existing work, drill holes in existing concrete, insert steel dowels and pack solidly with non-shrink grout.

I. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Engineer upon discovery.

J. Conform to ACI 305 when concreting during hot weather.

3.02 SCREEDING

Screed surfaces level, maintaining flatness within a maximum deviation of 1/8" in 10 feet.

3.03 PATCHING

Allow Engineer to inspect concrete surfaces immediately upon removal of forms. Patch imperfections as directed. All patching procedures shall be submitted to and approved by the Engineer prior to use.

3.04 DEFECTIVE CONCRETE

A. Modify or replace concrete not conforming to required lines, details and elevations.

B. Repair or replace concrete not properly placed resulting in excessive honeycomb and other defects. Do not patch, fill, touch-up, repair, or replace exposed architectural concrete except upon express direction of Engineer for each individual area.

3.05 CONCRETE FINISHING

Provide concrete surfaces to be left exposed, columns, beams and joists with smooth rubbed finish.

3.06 CURING AND PROTECTION

Beginning immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures and mechanical injury. Maintain concrete with minimal moisture loss at relatively constant temperature for a period of 7 days or until concrete strengths reaches 75% of the 28 day design strength.

Protection against moisture loss may be obtained with spray on curing compounds or plastic sheets. Protection against heat or cold may be obtained with insulated curing blankets or forms.

3.07 CONCRETE DRIVEWAY RESTORATION

Concrete driveways shall be restored with 6 inches of 3,000 psi concrete with W2.5 X W2.5, 6X6 wire mesh. Place ½ inch expansion joint between back of curb and new concrete. Area beneath restoration shall be mechanically tamped prior to placing concrete.

3.08 CONCRETE SIDEWALK RESTORATION

Concrete sidewalks across driveways shall be restored with 6 inches of 3,000 psi concrete with W2.5 X W2.5, 6X6 wire mesh. Place ½ inch expansion joint between back of curb and new concrete. Area beneath restoration shall be mechanically tamped prior to placing concrete.

Concrete sidewalks outside of driveways shall be restored with 4 inches of 3,000 psi concrete per FDOT Design Standards, Sections 522 & 310

END OF SECTION

SECTION 03350 CONCRETE FINISHES

PART 1 GENERAL

1.01 SCOPE OF WORK

Furnish all labor, materials, equipment and incidentals required to finish cast-in-place concrete surfaces as specified herein.

1.02 SUBMITTALS

Submit to the Engineer as provided in the Contract Documents, the proposed chemical hardener manufacturer's surface preparation and application procedures.

1.03 SCHEDULE OF FINISHES

A. Concrete for the Project shall be finished in the various specified manners either to remain as natural concrete or to receive an additional applied finish or material under another Section.

B. The base concrete for the following conditions shall be finished as noted and as further specified herein:

1. Exterior, exposed concrete slabs and stairs - broomed finish.
2. Interior, exposed concrete slabs - steel trowel finish.
3. Concrete on which process liquids flow or in contact with sludge - steel trowel finish.
4. Concrete where not exposed in the finished work and not scheduled to receive an additional applied finish or material - off-form finish.
5. Provide concrete surfaces to be left exposed such as walls, columns, beams and joists with smooth rubbed finish.

1.04 RESPONSIBILITY FOR CHANGING FINISHES

A. The surface finishes specified for concrete to receive additional applied finishes or materials are the finishes required for the proper application of the actual products specified under other Sections. Where different products are approved for use, it shall be the Contractor's responsibility to determine if changes in finishes are required and to provide the proper finishes to receive these products.

B. Changes in finishes made to accommodate product different from those specified shall be performed at no additional cost to the Owner. Submit the proposed new finishes and their construction methods to the Engineer for approval.

PART 2 PRODUCTS

2.01 MATERIALS

A. Portland cement and component materials required for finishing the concrete surfaces shall be as specified in the Contract Documents.

B. Hardener shall be Lapidolith as manufactured by Sonneborn Building Products or approved equal. Hardener shall be used on all floors, stair treads and platforms.

PART 3 EXECUTION

3.01 FORMED SURFACES

A. Forms shall not be stripped before the concrete has attained a strength of at least 50 percent of the ultimate design strength. This is equivalent to approximately five "100 day-degrees" of moist curing.

B. Care shall be exercised to prevent damaging edges or obliterating the lines of chamfers, rustications, or corners when removing the forms or doing any work adjacent thereto.

C. Clean all exposed concrete surfaces and adjoining work stained by leakage of concrete, to the satisfaction of the Engineer.

D. Off-form finish. Fins and other projections shall be removed as approved. Tie cone holes and other minor defects shall be filled with non-shrink grout specified under the Contract Documents.

3.02 FLOORS AND SLABS

A. Floors and slabs shall be screeded to the established grades and shall be level with a tolerance of 1/8-inch when checked with a 10 foot straight edge, except where drains occur, in which case floors shall be pitched to drains as indicated. Failure to meet either of above shall be cause for removal, grinding, or other correction as approved by the Engineer.

B. Following screeding as specified above, power steel trowel as follows:

1. Immediately after final screeding, a dry cement/sand shake in the proportion of 2-sacks of portland cement to 350-pounds of coarse natural concrete sand shall be sprinkled evenly over the surface at the rate of approximately 500 pounds per 1,000 square feet of floor. Neat, dry cement shall not be sprinkled on the surface. This shake shall be thoroughly floated into the surface with an approved disc type power compacting machine weighing at least 200 pounds if a 20-inch disc is used or 300 pounds if a 24-inch disc is used (such as a "Kelly Float" as manufactured by the Weisner-Rapp Corporation of Buffalo, New York). A mechanical blade-type float or trowel is not acceptable for this work.

   NOTE: This operation (application of the cement/sand shake) may be eliminated at the discretion of the Engineer if the base slab concrete exhibits adequate fattiness and homogeneity.

2. In lieu of power steel troweling, small areas as defined by the Engineer shall be compacted by hand steel troweling with the dry cement/sand shake as ordered.

3. The floor or slab shall be compacted to a smooth surface and the floating operation continued until sufficient mortar is brought to the surface to fill all voids. The surfaces shall be tested with a straight edge to detect high and low spots which shall be eliminated.

4. Compaction shall be continued only until thorough densification is achieved and a small amount of mortar is brought to the surface. Excessive floating shall be avoided.

C. After Paragraph 3.02 A and B procedures are accomplished, floors and slabs for particular

conditions shall be completed as scheduled in one of the following finishes:

1. Wood float finish. Hand wood float, maintaining the surface tolerance to provide a grained, nonslip finish as approved.
2. Broomed finish. Hand wood float maintaining the surface tolerance and then broom with a stiff bristle broom in the direction of drainage to provide a nonslip finish as approved.
3. Steel trowel finish. Hand steel trowel to a perfectly smooth, hard even finish free from high or low spots or other defects as approved.

D. Floors, stair treads and platforms shall be given a floor hardener. Application shall be according to manufacturer's instructions.

3.03 APPROVAL OF FINISHES

A. All concrete surfaces will be inspected during the finishing process by the Engineer.

B. Surfaces which, in the opinion of the Engineer, are unsatisfactory shall be refinished or reworked until approved by the Engineer.

END OF SECTION

SECTION 03410 PRECAST CONCRETE STRUCTURES

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all materials, labor and equipment and construct valve vaults, meter vaults, concrete pipe and accessory items, consisting of precast sections as shown on the Drawings and as specified herein.

B. The forms, dimensions, concrete and construction methods shall be approved by the Engineer in advance of construction.

C. These Specifications are intended to give a general description of what is required, but do not purport to cover all of the structural design details which will vary in accordance with the requirements of the plans. It is, however, intended to cover the furnishing, shop testing, delivery and complete installation of all precast structures whether specifically mentioned in these Specifications or not.

D. The supplier of the precast items shall coordinate his work with that of the Contractor to insure that the units will be delivered and installed in the excavation provided by the Contractor, in accordance with the Contractor's construction schedule.

E. The Contractor will ensure coordination of the precast structures fabrication with the supplier to achieve the proper structural top slab openings, spacings and related dimensions for the selected equipment frames and covers. The top slabs, frames, covers, and subsurface structures outside of roadways shall be capable of live load of 300 pounds per square foot unless noted othewise.

F. All interior surfaces of valve vaults and meter vaults shall be painted with two coats of coal tar epoxy paint dry film thickness of 8 mils each coat, as approved by the Engineer.

1.02 SUBMITTALS

A. Submit to the Engineer in accordance with the Contract Documents, shop drawings showing details of construction, reinforcing, and joints.

B. Shop Drawings

1. Content
   a. Dimensions and finishes.
   b. Estimated camber.
   c. Reinforcing and connection details.
   d. Lifting and erection inserts.
   e. Other items cast into members.
2. Show location of unit by same identification mark placed on member.
3. Include design calculations.

C. Manufacturer's Literature: Manufacturer's recommended installation instructions.

D. Manufacturer's certificates of material conformance with Specifications.

E. Test Reports: Reports of tests on concrete. A minimum of three compression test cylinders will be required for each pour.

1.03 INSPECTION

A. The quality of all materials, the process of manufacture and the finished sections shall be subject to inspection and approval by the Engineer, or other representatives of the Owner. Such inspection may be made at the place of manufacture, or at the site after delivery, or at both places and the sections shall be subject to rejection at any time due to failure to meet any of the Specification requirements; even though sample sections may have been accepted as satisfactory at the place of manufacture. Sections rejected after delivery to the project site shall be marked for identification and shall be removed from the project site at once. All sections which have been damaged after delivery will be rejected and if already installed, shall be acceptably repaired, if permitted, or removed and replaced entirely at the Contractor's expense.

B. At the time of inspection, the sections will be carefully examined for compliance with the applicable ASTM designation and these Specifications and with the approved manufacturer's drawings.

1. All sections shall be inspected for general appearance, dimension, "scratch-strength", blisters, cracks, roughness, soundness, etc. The surface shall be dense and close-textured.
2. All sections shall meet the manufacturing tolerance requirements of ASTM C-478 or the following casting tolerances, whichever are more severe:

   Wall Thickness $\pm$ 3/8"
   Inside Diameter $\pm$ 3/8"
   Outside Diameter $\pm$ 1/2"
   Height or Length $\pm$ 3/8"

C. Imperfections may be repaired, subject to the approval of the Engineer, after demonstration by the manufacturer that strong and permanent repairs result. Repairs shall be carefully inspected before final approval. Cement mortar used for repairs shall have a minimum compressive strength of 4,000 psi at the end of 7 days and 5,000 psi at the end of 28 days, when tested in 3-inch by 6-inch cylinders stored in the standard manner. Epoxy mortar may be utilized for repairs subject to the approval of the Engineer.

PART 2 PRODUCTS

2.01 PRECAST CONCRETE SECTIONS

A. Joints between precast concrete sections shall be set by plastic shims and filled with non-metallic non-shrink grout as specified in the Contract Documents and shown on the Drawings.

B. The top slab sections shall be fitted with water tight hatches as specified in the Construction Drawings. The frames and covers will be sized for the openings shown on the Contract Drawings.

C. The various precast sections shall have the inside dimensions and minimum thickness of concrete as indicated on the Drawings. All precast and cast-in-place concrete members shall conform to the Building Code Requirements for Reinforced Concrete ACI 318 and applicable ASTM Standards.

D. Fillets shall be provided and installed in the wet wells as shown on the Drawings. They shall be

constructed using concrete fill and shall conform to the Contract Documents.

E. Precast structures shall be constructed to the dimensions as shown on the Drawings and as specified in these Specifications. Flow channels, inverts, and benches in manholes shall be precast, not constructed after installation. Provide a true curve of the largest radius possible for changes in direction of sewer and entering branch or branches.

F. Type II cement shall be used, typically at a compressive strength of 4,000 psi, except as otherwise approved.

G. The date of manufacture and the name or trademark of the manufacturer shall be clearly marked on the inside of each precast section.

H. Sections shall be cured by an approved method and shall not be shipped until at least seven (7) days after having been fabricated.

I. Each precast section manufactured in accordance with the Drawings shall be clearly marked to indicate the intended installation location. The Contractor shall be responsible for the installation of the correct precast sections in their designated locations.

J. Wet wells, and manholes receiving flow from lift stations shall be precast with a cast in place PVC protective liner.

1. The prefabricated wetwell or manhole liner shall be a non-load bearing component installed and adequately anchored inside a new precast concrete wetwell or manhole riser during the concrete casting process at the concrete precaster's manufacturing facility. The liner must be fully supported during the casting process.
2. The liners shall be resistant to the chemical environment normally found in the gravity wastewater transmission systems to which they will be exposed.
3. The liner shall have a warranty against defect in material and workmanship for a period of three years.
4. After assembly and installation, in the field, all internal seams are to be sealed by bonding or welding per the manufacturer's standard method and details.
5. Any repairs or other modifications to the liner, such as patching or sealing PVC sleeves used for pipe penetrations of the structure, shall sealed by bonding or welding per the PVC liner manufacturer's standard methods and details.

PART 3 EXECUTION

3.01 INSTALLATION

A. The Contractor shall be responsible for handling ground water to provide firm, dry subgrade for the structure, shall prevent water rising on new poured-in-place concrete or grouted joint sections within 24 hours after placing and shall guard against flotation or other damage resulting from ground water or flooding.

B. A minimum of an 8-inch shell base compacted layer of washed shell or crushed stone shall be placed as a foundation for the wet well base slabs and valve and/or meter vault pits.

B. Backfill materials around the wet well and above the pipe bedding shall be select material as specified in the Contract Documents.

D. Precast bases, conforming to all requirements of ASTM C478 and above listed requirements for

precast sections, may be used.

E. The structure shall not be set into the excavation until the installation procedure and excavation have been approved by the Engineer.

F. The base may be cast-in-place concrete placed on a thoroughly compacted crushed rock subbase. The tops of the cast-in-place bases shall be shaped to mate with the precast barrel section and shall be adjusted in grade so that the top slab section is at the approximately correct elevation.

G. Precast concrete structure sections shall be set so as to be vertical and with sections in true alignment with a 1/4-inch maximum tolerance to be allowed. The outside and inside joint shall be filled with a non-shrink grout and finished flush with the adjoining surfaces. Allow joints to set for 24 hours before backfilling. Backfilling shall be done in a careful manner, bringing the fill up evenly on all sides. The Contractor shall install the precast sections in a manner that will result in a watertight joint. Leaking joints are not acceptable.

H. Holes in the concrete sections required for handling or other purposes shall be plugged with a non-shrink grout or by grout in combination with concrete plugs.

I. Where holes must be cut in the precast sections to accommodate pipes, cutting shall be done prior to setting them in place to prevent any subsequent jarring which may loosen the mortar joints.

J. Frames and hatches specified and furnished shall be cast in the cover slab prior to setting. Normal installation shall include 6" to 12" of concrete grade rings between the top of the cone section and the cover plate ring slab.

ASTM A48-74, or most recent revision, Specification for Gray Iron Castings, Class 30 or Grade 60-45-10 Ductile Iron meeting the requirements of ASTM A536-72, or most recent revision, Specification for Ductile Iron Castings. Cast in a true symmetrical pattern of tough, dense and even grained iron, free from warping, scales, lumps, blisters, sandholes, or any defects of any kind. Provide indented pattern lids with lettering as shown on the Drawings. Machine or grind frames and lids at touching surfaces to provide firm seats and prevent rocking. Remove and replace any set not matching perfectly. All frames and covers shall be designed to withstand an HS20-44 wheel loading as defined by AASHTO specifications.

K. Manhole inserts: Watertight manhole inserts shall be required for all sanitary sewer manholes installed. Inserts shall be as manufactured by FRW Industries, Conroe, Texas, or approved equal. Inserts shall be complete with a self-cleaning relief valve. Relief valves shall operate on a pressure differential of 1/2 psi. Neoprene gaskets shall be installed under the insert lip to insure a leakproof seal.

L. Penetrations and connections into precast or existing structures shall be accomplished by rotary core boring.

M. Cast in place liners shall be repaired, fitted around penetrations, sealed at joints, etc. in accordance with the manufacturer's recommendations for that liner. As a general rule, repairs, sleeves and patches shall be welded in place, glues and sealants shall nt be used unless approved by the manufacturer.

3.04 TESTING

A. After constructed to its finished height and before being backfilled, each manhole shall be tested for water tightness.

1. Plug pipe lines and perform vacuum test. Observing all recommended safety measures induce a backpressure of 5.0 p.s.i. equivalent to 10" Hg (mercury). The manhole assembly is considered satisfactory if the vacuum loss is less than 1" Hg for the length of time listed in the following table:

Time of Test in Seconds			
Depth Feet	Manhole Diameter in Feet		
	4	5	6
4	10	13	16
8	20	26	32
12	30	39	48
16	40	52	64
20	50	65	80
24	60	78	96
T	5	6.5	8

Note: Add "T" seconds for each additional 2'- of depth.

B. Failure to pass this test requires the Contractor to correct the problems and retest. The Contractor will replace leaking gaskets and/or concrete sections and retest the completed manhole. No manhole will be accepted without successfully passing this test.

END OF SECTION

DIVISION 5 METALS

SECTION 05500 MISCELLANEOUS METAL

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, equipment and incidentals required and install covers, grates, frames and other miscellaneous metals as shown on the Drawings and specified herein. The miscellaneous metal items include but are not limited to the following:

1. All metal frames, ladders, stairs, stair rails, floor opening frames including gratings and supports.
2. Prefabricated access hatches and frames.
3. Anchors and anchor bolts except those specified to be furnished with all equipment.
4. Railings, posts and supports both interior and exterior.
5. Cast iron frames, covers, grates, drain leaders and drains.
6. Bridge crane track supports.
7. Stair nosings, steel plates, overhead steel door frames, angle frames, plates and channels.
8. Exterior H.V.A.C. hoods.
9. Pump guide rail system.

1.02 COORDINATION

A. The work in this Section shall be completely coordinated with the work of other Sections. Verify at the site both the dimensions and work of other trades adjoining items of work in this Section before fabrication and installation of items herein specified.

B. Furnish to the pertinent trades all items included under this Section that are to be built into the work of other Sections.

1.03 SHOP DRAWINGS AND SAMPLES

A. Detail drawings, as provided for in the Contract Documents, showing sizes of members, method of assembly, anchorage, and connection to other members shall be submitted to the Engineer for approval before fabrication.

B. Samples shall be submitted at the request of the Engineer for concurrent review with Shop Drawings.

1.04 FIELD MEASUREMENTS

A. Field measurements shall be taken at the site to verify or supplement indicated dimensions and to insure proper fitting of all items.

1.05 REFERENCED SPECIFICATIONS

A. Unless otherwise specified, materials shall conform to the following:

Structural Steel	ASTM A36
Welded & Seamless Steel Pipe	ASTM A53
Gray Iron Castings	ASTM A48, Class 30
Galvanizing, general	ASTM A123
Galvanizing, hardware	ASTM A153
Galvanizing, assemblies	ASTM A386
Aluminum (Extruded Shapes)	6061-T6 (Alum. alloy)
Aluminum (Extruded Pipe)	6061-T6 (Alum. alloy)
Aluminum Bar Structural	6061-T6 (Alum. alloy)
Bolts and Nuts	ASTM, A307
Stainless Steel Bolts, Fasteners	AISI, Type 316
Stainless Steel Plate and Sheet, Wire	AISI, Type 316
Welding Rods for Steel	AWS Spec. for Arc Welding

PART 2 PRODUCTS

2.01 ANCHORS, BOLTS AND FASTENING DEVICES

A. Anchors, bolts, etc., shall be furnished as necessary for installation of the work of this Section.

B. Compound masonry anchors shall be of the type shown or required and shall be equal to Star Slug in compounded masonry anchors manufactured by Star Expansion Industries, equal by Phillips Drill Co., Rawlplug, or equal. Anchors shall be minimum "two unit" type.

C. The bolts used to attach the various members to the anchors shall be the sizes shown or required. Stainless steel shall be attached to concrete or masonry by means of stainless steel machine bolts and iron or steel shall be attached with steel machine bolts unless otherwise specifically noted.

D. For structural purposes, unless otherwise noted, expansion bolts shall be Wej-it "Ankr-Tite", Phillips Drill Co. "Wedge Anchors", or Hilti "Kwik-Bolt". When length of bolt is not called for on the Drawings, the length of bolt provided shall be sufficient to place the wedge portion of the bolt a minimum of 1-inch behind the reinforcing steel within the concrete. Material shall be as noted on the Drawings. If not listed, all materials shall be stainless steel.

2.02 ALUMINUM ITEMS

A. Aluminum gratings shall be of serrated I-Bar Aluminum Alloy 6061-T6, fabricated to the depths and thicknesses shown on the Drawings and shall be Reliance Steel Products Company, I-Lok Type 7/8 R4 Aluminum Grating; IKG Industries, "Galok" Aluminum I-Bar Grating Type S194-I, or equal. All openings 2 inches and greater in diameter shall be banded with a bar of the same depth and thickness as the main bearing bars of the grating, or furnished with continuous cross bridges. Each cut bar shall be welded to the band if banding is utilized. The ends of all grating sections shall be likewise banded. Clamps and bolts used for attaching grating to supporting members shall be stainless steel. All grating shall be clamped unless noted otherwise. Clamps shall be as recommended by the manufacturer.

B. Stair treads shall be as specified above for grating and shall have abrasive nonslip nosing.

C. Aluminum nosing at concrete stairs shall be an extrusion of 4-inch minimum width with abrasive filled and shall be Wooster Products, Inc., Alumogrit Treads, Type 116; equal by Barry Pattern and Foundry Co.; Andco; or equal. Embedded anchors shall be furnished with a minimum of three anchors per tread.

D. Aluminum ladders shall be fabricated to the dimensions and details and installed as shown on the Drawings. Treads to be of cast aluminum by Dixie Metals, Inc. of Fort Lauderdale, Florida or equal.

E. Aluminum Handrails, Mechanically Fastened Type:

1. All aluminum mechanically fastened type pipe handrails and guardrails shall be clear anodized aluminum finish and installed as specified herein and indicated on the Drawings. Handrails shall be made of nominal 1-1/2 inches inside diameter pipe (Schedule 40) fabricated or seamless 6063-T6 alloy. The supplier of the handrail system shall supply all necessary fittings, rackets, transition, corner and connector pieces, toeboards, protective gaskets, etc., for a complete job at the locations, indicated on the Drawings. All mounting hardware including bolts, studs, nuts, etc., shall be stainless steel Type 316. Bends shall be smooth and accurate to the details shown. Railings shall be the "Rigid Rail System" as manufactured by Reynolds Aluminum of Reynolds Metal Company as Reynolds II pipe railing system or the "Connectorail System" as manufactured by Julius Blum & Co., Inc., Carlstadt, New Jersey. The handrail systems shall comply with all OSHA and D Section 1208.2 of the Standard Building Code.

2. Spacing of posts where posts are required shall be as noted on shop drawings, but in all cases, shall be uniform and shall not exceed the requirements of OSHA and Section 1208.2 of the Standard Building Code. Shorter spacing may be used where required to maintain the maximum spacing. The fabricator of the aluminum handrail and guardrail system shall be responsible for the design and preparation of shop drawings and design calculations (signed and sealed by Florida Registered Engineer) to meet OSHA requirements and Section 1208.2 of Standard Building Code.

3. All railings shall be erected in line and plumb. Field splicing and expansion compensation shall be accomplished using internal splice sleeves. Make provisions for removable railing sections as detailed and where shown on the Drawings.

4. Where handrail or guardrail posts are set in concrete as per the manufacturer's requirements the posts shall be set into aluminum sheeves cast in the concrete and firmly cemented with 1651 epoxy resin by E-Bond Epoxies, Oakland Park, Florida, Moulded Reinforced Plastics, Inc., Fort Lauderdale, Florida or equal. Collars shall be placed on the posts and fastened in place, as shown and as detailed on approved shop drawings.

5. Where handrail is supported from structural members, it shall be done by the use of approved sockets, flanges, brackets, or other approved means which will

provide neat and substantial support for the pipe railing.

6. All railing shall be properly protected by paper, or by an approved coating or by both against scratching, splashes or mortar, paint, or other defacements during transportation and erection and until adjacent work by other trades has been completed.

F. Toeboards: Contractor shall furnish and install aluminum toeboards conforming to latest OSHA requirements on all railings and other locations where indicated on the Drawings.

1. Toeboards shall consist of an extruded 6063-T6 aluminum shape bolted by means of a pipe clamp to the railing posts without requiring any drilling or welding of the toeboard to the railing posts as manufactured by Reynolds Aluminum, Julies Blum & Company, Thompson Fabricating Company or equal. Toeboards shall have pitched top and tear drop bottom to prevent accumulation of dirt, or other material.
2. All fastening hardware shall be Type 316 stainless steel.

G. Kickplates, if required, shall be fabricated and installed as shown on the Drawings.

H. Aluminum safety gate shall be fabricated of extruded aluminum.

I. Prefabricated checkerplate aluminum floor hatches shall be Type "JD", or "KD" as manufactured by Bilco Co., Babcock-Davis Associates, Inc.; Type "AM" Inland-Ryerson Construction Products Co., Milcor Division; or equal, sized as shown. Hatches with either dimension over 3 feet-6 inches shall be double leaf type. Hatches shall be designed for a live load of 300 pounds per square foot. Hatches shall be watertight.

J. Ship ladders shall be of all aluminum construction as detailed. Treads shall have abrasive nosing as manufactured by Reliance Steel Products Co., IKG Industries, or equal.

K. Checkplate aluminum cover plates shall be fabricated to the details shown and installed at the locations shown.

L. Structural aluminum angle and channel door frames shall be provided as shown on the Drawings and shall be anodized. Frames shall be fabricated with not less than three anchors on each jamb.

M. Miscellaneous aluminum shapes and plates shall be fabricated as shown. Angle frames for hatches, beams, grates, etc., shall be furnished complete with welded strap anchors attached. Furnish all miscellaneous aluminum shown, but not otherwise detailed. Structural shapes and extruded items shall conform to the detail dimensions on the Plans within the tolerances published by the American Aluminum Association.

2.03 STEEL ITEMS

A. Sleeves shall be steel or cast iron pipe in walls and floors with end joints as shown on the Drawings. All pipe sleeves shall have center anchor around circumference as shown.

B. Miscellaneous steel pipe for sleeves and lifting attachments and other uses as required shall be Schedule 40 pipe fabricated according to the details as shown on the Drawings.

C. Miscellaneous steel shall be fabricated and installed in accordance with the Drawings and shall include: beams, angles, support brackets, closure angles in roof at edge of T-beams; base plates to support ends of T-beams; door frames; splice plates, anchor bolts; lintels and any other miscellaneous steel called for on the Drawings and not otherwise specified.

2.04 CAST IRON ITEMS

A. Outside pipe clean-out frames and covers shall be heavy duty, R-6013-R-6099 series as manufactured by Neenah Foundry Co., or equal. All outside pipe clean-outs shall be 6-inch diameter.

B. Frames and covers for valve vaults and manholes shall be of a good quality, strong, tough even grained cast iron except as otherwise specified below. Castings shall be as manufactured by the U. S. Foundry, Neenah Foundry, Mechanics Iron Foundry, or equal. Covers to have letters "WATER", "SEWER" or "DRAIN", as applicable, embossed on top.

PART 3 EXECUTION

3.01 FABRICATION

A. All miscellaneous metal work shall be formed true to detail, with clean, straight, sharply defined profiles and smooth surfaces of uniform color and texture and free from defects impairing strength or durability.

B. Connections and accessories shall be of sufficient strength to safely withstand stresses and strains to which they will be subjected. Steel accessories and connection to steel or cast iron shall be steel, unless otherwise specified. Threaded connections shall be made so that the threads are concealed by fitting.

C. Welded joints shall be rigid and continuously welded or spot welded as specified or shown. The face of welds shall be dressed flush and smooth. Exposed joints shall be close fitting and jointed where least conspicuous.

D. Welding of parts shall be in accordance with the Standard Code of Arc and Gas Welding in Building Construction of the AWS and shall only be done where shown, specified, or permitted by the Engineer. All welding shall be done only by welders certified as to their ability to perform welding in accordance with the requirements of the AWS Code. Component parts of built-up members to be welded shall be adequately supported and clamped or held by other adequate means to hold the parts in proper relation for welding.

E. Welding of aluminum work shall be on the unexposed side as much as possible in order to prevent pitting or discoloration.

F. All aluminum finish exposed surfaces, except as specified below, shall have manufacturer's standard mill finish. Aluminum handrails shall be given an anodic oxide treatment in accordance with the Aluminum Association Specification AA-C22-

A41. A coating of methacrylate lacquer shall be applied to all aluminum shipment from the factory.

G. Castings shall be of good quality, strong, tough, even-grained, smooth, free from scale, lumps, blisters, sand holes, and defects of any kind which render them unfit for the service for which they are intended. Castings shall be thoroughly cleaned and will be subjected to a hammer inspection in the field by the Engineer. All finished surfaces shown on the Drawings and/or specified shall be machined to a true plane surface and shall be true and seat at all points without rocking. Allowances shall be made in the patterns so that the thickness specified or shown shall not be reduced in obtaining finished surfaces. Castings will not be acceptable if the actual weight is less than 95 percent of the theoretical weight computed from the dimensions shown. The Contractor shall provide facilities for weighing castings in the presence of the Engineer showing true weights, certified by the supplier.

H. All steel finish work shall be thoroughly cleaned, in accordance with the Contract Documents, of all loose mill scale, rust, and foreign matter before shipment and shall be given one shop coat of primer compatible with finish coats specified in Painting Section after fabrication but before shipping. Paint shall be applied to dry surfaces and shall be thoroughly and evenly spread and well worked into joints and other open spaces. Abrasions in the field shall be touched up with primer immediately after erection. Final painting is specified in the Contract Documents.

I. Galvanizing, where required, shall be the hot-dip zinc process after fabrication. Following all manufacturing operations, all items to be galvanized shall be thoroughly cleaned, pickled, fluxed, and completely immersed in a bath of molten zinc. The resulting coating shall be adherent and shall be the normal coating to be obtained by immersing the items in a bath of molten zinc and allowing them to remain in the bath until their temperature becomes the same as the bath. Coating shall be not less than 2 oz. per sq. ft. of surface.

3.01 INSTALLATION

A. Install all furnished items imbedded in concrete or other masonry. Items to be attached to concrete or masonry after such work is completed shall be installed in accordance with the details shown. Fastening to wood plugs in masonry will not be permitted. All dimensions shall be verified at the site before fabrication is started.

B. All steel surfaces to come in contact with exposed concrete or masonry shall receive a protective coating of an approved heavy bitumastic troweling mastic applied in accordance with the manufacturer's instructions prior to installation.

C. Where aluminum is embedded in concrete, apply a heavy coat of approved bitumastic troweling mastic in accordance with the manufacturer's instructions prior to installation.

D. Where aluminum contacts masonry or concrete, provide a 1/32-inch neophrene gasket between the aluminum and the concrete or masonry.

E. Where aluminum contacts a dissimilar metal, apply a heavy brush coat of zinc-chromate primer and provide a 1/32-inch neoprene gasket between the aluminum and the dissimilar metal.

F. Where aluminum contacts wood, apply two coats of aluminum metal and masonry

paint to the wood.

END OF SECTION

SECTION 05550 AIR RELEASE ENCLOSURE

PART 1 GENERAL

1.01 SCOPE OF WORK

The Contractor shall furnish all labor, materials, equipment and incidentals required to install the above ground air release enclosure as listed in the specifications and as shown on the Drawings.

1.02 RELATED WORK

The contractor shall be responsible for any related work necessary for the proper installation of enclosure. This shall include, but is not limited to, any required bypass pumping, any required earthwork and any required concrete work.

1.03 SUBMITTALS

A. Submit to the Engineer shop drawings and schedules of all enclosure systems and appurtenances required. Submit design data and specification data sheets listing all parameters used in the enclosure system design.

B. Submit to the Engineer the name of the enclosure supplier and a list of materials to be furnished.

1.04 REFERENCE STANDARDS

A. American Water Works Association (AWWA).

B. American Society for Testing and Materials (ASTM).

C. Where reference is made to the above standard, the revision in effect at the time of bid opening shall apply.

1.05 QUALITY ASSURANCE

The enclosure manufacturer shall be a company specializing in the manufacture of such enclosures with at least five(5) years of successful field experience and being lab certified as meeting A.S.S.E 1060 requirements.

1.06 DELIVERY, STORAGE AND HANDLING

A. Care shall be taken in shipping, handling and placing to avoid damaging. Any material damaged in shipment shall be replaced as directed by the Engineer.

B. Any material showing deterioration, or which has been exposed to any other adverse storage condition that may have caused damage, even though no such damage can be seen, shall be marked as rejected and removed at once from the work.

PART 2 PRODUCTS

2.01 GENERAL

All enclosures shall comply with the standard detail for shape and size and shall include a 24"W x 24"H access door with a hasp for a padlock. The enclosure shall be securely attached to a concrete base with anchor brackets installed on the interior of the enclosure, through the flange base of the enclosure itself or through a stainless steel anchor hinge.

2.02 ALUMINUM ENCLOSURE

A. The roof, walls and access panels shall be constructed of mill finish aluminum, ASTM B209, solid sheet construction, with a wall thickness of one eighth inch.

B. All structural members shall be aluminum. No wood or "particle board" shall be allowed in assembly.

C. Multi-sectional enclosures shall fit together with overlapping "tongue and groove" joints and be secured internally with mechanical fasteners.

D. All assembly fasteners shall be stainless steel or aluminum.

2.03 STAINLESS STEEL ENCLOSURE

A. The roof, walls and access panels shall be constructed stainless steel, type 316, solid sheet construction, with a wall thickness of one eighth inch.

B. All structural members shall be stainless steel. No wood or "particle board" shall be allowed in assembly.

C. Multi-sectional enclosures shall fit together with overlapping "tongue and groove" joints and be secured internally with mechanical fasteners.

C. All assembly fasteners shall be stainless steel.

FIBERGLASS ENCLOSURE

A. Enclosure shall be a 1 piece molded fiberglass enclosure with a base flange for mounting to the concrete slab and a full recessed door opening with a lip. Enclosure shall be by Allied Molded Products, or approved equal. Color shall be as directed by the Engineer.

B. Full length piano style hinge, door latch, padlock hasp and all bolts and other hardware shall be of stainless steel.

PART 3 EXECUTION

3.01 INSTALLATION

A. Enclosure shall be assembled and mounted on the concrete pad according to the manufacturer's instructions and the contract drawings.

B. Enclosure shall be installed plumb, level and square.

END OF SECTION

APPENDICES

ENVIRONMENTAL SITE ASSESSMENT

16-Inch Water Line Installation
Port Manatee
North Dock Street
Palmetto, Manatee County, Florida

GLE Project No.: 09310-00089

Prepared for:

Mr. Paul Schamell
Project Manager
Manatee County Project Management Department
1112 Manatee Avenue West
Bradenton, Florida 34205

April 30, 2009

Prepared by:

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Environmental Site Assessment

Conducted at:

16-Inch Water Line Installation
Port Manatee
North Dock Street
Palmetto, Manatee County, Florida

GLE Project No.: 09310-00089

Prepared for:

Mr. Paul Schamell
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April 30, 2009

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TABLE OF CONTENTS

1.0 INTRODUCTION

Based on information obtained from the representatives of the Manatee County Project Management Division (MCPMD), a 16-inch water line is to be installed in the easement location of existing waterlines located along North Dock Street (NDS) along the Transmontaigne, Inc., (TMI) facility on Port Manatee. It is GLE's understanding that the soil and groundwater located within the existing water line easement may be impacted with petroleum associated with releases documented at the TMI facility along NDS. GLE was contracted to determine the potential soil and groundwater impacts along NDS and the TMI facility to the intersection of NDS and Eastern Avenue. In addition, the scope of services includes recommendations for the appropriate management/handling of the impacted soil and groundwater as determined applicable, prior to the scheduling of the proposed excavation activities for the installation of the new waterline. On January 5, 2009, GLE received authorization (WA#, IFAS# W0900079) to proceed with the initial assessment, as proposed. **Figure F-1 depicts the site location area.**

Based on the findings of the initial assessment activities conducted along North Dock Street and the Transmontaigne, Inc., (TMI) facility on Port Manatee, GLE Environmental Site Assessment (ESA) Draft Report dated February 20, 2009, additional soil analysis and groundwater assessment activities was determined necessary. A Change Order (CO) for the initial work authorization, to complete the additional assessment activities as proposed was submitted for review. As per the verbal authorization from Mr. Paul Schamell, MCPMD, the CO activities were initiated on March 25, 2009. In addition, on April 2, 2009, GLE received authorization to proceed with the Change Order provided (CO #1 to W0900079), and the additional assessment activities, as proposed.

GLE presents the findings of these investigations, as referenced below:

2.0 INVESTIGATIVE METHODOLIES

2.1 Soil Investigative Methodologies

Prior to initiating the proposed field investigation activities at Port Manatee, on January 19 and 20, 2009, GLE personnel completed the enrollment process and registration for badges necessary to obtain access to the Port Manatee facility. In addition, GLE staff contacted the appropriate Access Control Center at Port Manatee with regard to the tentative schedule to conduct the field investigations as proposed. Furthermore, GLE contacted Sunshine State One-Call for a utility clearance/mark out specifically along NDS and TMI.

On January 20, 2009, GLE met with Mr. James Moore of CH2MHill and Mr. Paul Schamell the Project Manager for the MCPMD, to discuss the investigative approach to complete the field soil/groundwater activities and the tentative schedule to obtain

laboratory data for the preparation of a 'Draft" report. As discussed, the field investigation activities were initiated along the existing waterline starting at the eastern fence line (measured from the southeast corner) of the TMI facility. The soil boring investigations extended to the west at fifteen feet increments along NDS and the TMI facility. The initial field investigations conducted were terminated at the western fence line of the TMI facility, at the intersection of Eastern Avenue and NDS.

GLE coordinated the soil field investigation activities on January 21, 22, 23, 26 and 27, 2009. On January 21, GLE referenced the starting point measuring from the southeast corner of the TMI fence line. The distance between the existing fence line to the north side of NDS was measured to be forty-five feet (to the south). In addition, based on the utility clearance mark out, the existing waterlines are located passing from east to west, approximately ten feet to the north of the north side of NDS. It should be noted that a sanitary sewer force main line was identified and exists (passing from east to west) approximately twenty-five feet to the north of the north side of NDS and approximately twenty feet to the south of the fence line associated with the TMI facility. Based on the utility locations, soil borings were advanced between thirty-three and thirty-five feet south of the fence line associated with the TMI facility, which is approximately ten feet north of north side of NDS and within five feet of the existing waterlines. The soil investigation consisted of using stainless steel, hand auger sample collection techniques from land surface to a completion depth of approximately six feet below land surface (bls) at the majority of the boring locations and approximately seven feet bls at specific soil boring locations.

During the field investigations, all discrete soil samples were examined for visual and olfactory indications of petroleum contamination. In addition discrete soil samples were collected for field screening at one-foot depth intervals from land surface to the completion depths. Soil hydrocarbon vapor field screening was conducted using a MicroFID Organic vapor Analyzer (OVA) equipped with a flame ionization detector (FID) in accordance with the methods described in Rule 62-770.200(19) Florida Administrative Code (FAC). Prior to use in the field and confirmed during the field investigation activities, documentation of the OVA calibration was conducted using 500 ppm methane. Please refer to the calibration sheets included with the soil boring collection logs provided in **Appendix A.**

Samples were tested by placing the soil into two 16-ounce glass containers, leaving half of the container empty. The containers were capped with aluminum foil and a metal lid and set aside for a minimum of five minutes. The head space inside the container of each sample was analyzed using the OVA with the temperature maintained between 20° C and 32° C. When organic vapors were detected in the soil samples, soil testing procedures included screening the second sub-sample with a granular activated carbon (GAC) filter. Use of the GAC filter removes petroleum hydrocarbon vapors and allows naturally occurring methane to be measured and recorded. Elevated OVA readings above 10 parts-per-million (ppm) were reported at specific soil borings advanced during this assessment.

During the field investigations, five representative soil samples were collected for laboratory analysis from specific soil borings and various depths. Specifically, soil samples were collected at SB-20 at approximately five feet bls, at SB-32 at approximately four feet bls, at SB-42 at approximately four feet bls, and at SB-52 at approximately three feet bls. A fifth soil sample was collected from the area located between soil boring locations SB-26 and SB-27, at approximately two feet bls. This soil sample was designated as SB-27 @ 2' for this assessment on the chain-of-custody submitted for laboratory analysis. The representative soil samples were collected in order to confirm the petroleum impacts identified in the area of the existing water lines during the OVA field screening activities. In addition, all five soil samples were analyzed for the specific laboratory parameters ("pre-burn samples) required by KleenSoil, Inc., a licensed and permitted thermal treatment facility located in close proximity of the site at Port Manatee. The representative soil samples were submitted to a State certified laboratory for analysis of the following: volatile organic compounds (VOCs) by EPA Method 8260; low level polynuclear aromatic hydrocarbons (L.L. PAHs) by EPA Method 8270; Total Recoverable Petroleum Hydrocarbons (TRPH) by the Florida Petroleum Range Organics (FL-PRO) method; specific total metals including arsenic, cadmium, chromium, and lead; Polychlorinated Biphenyls (PCBs) by EPA Method 8082; and Total Extractable Organic Halides (TOX) by EPA Method 9023. All soil sampling activities were conducted in accordance with the FDEP's Standard Operating Procedures for field sampling (FS 3000). Following collection (on respective days), the soil samples collected were immediately placed on wet ice and delivered to SunLabs, Inc. (SunLabs), a Florida certified laboratory, under strict chain-of-custody, for laboratory analysis. Please refer to **Figure F-2** for the approximate soil boring and soil sampling locations. Please refer to **Figure F-3, Figure F-4 and Figure F-5 (Match Line Figures for F-2).** Please refer to **Table 1** for the Summary Table of OVA Field Readings obtained during the ESA. Please refer to **Appendix A** for the Geologic Profile Soil Boring Logs prepared for the soil boring advanced during this assessment.

2.2 Groundwater Investigation Methodologies

During the soil field investigation activities referenced above, three temporary groundwater monitoring wells (TMWs) were advanced at specific soil boring locations on January 27, 2009, for the collection of a representative groundwater samples for laboratory analysis. Specifically, temporary monitoring well TMW-1 was advanced at SB-20 approximately 380 feet west of SB-1. TMW-2 was advanced at SB-32 approximately 560 feet west of SB-1 and TMW-3 was advanced at SB-42 approximately 710 feet west of SB-1.

During the field investigations five existing (permanent, stick-up type) groundwater monitoring wells were identified in close proximity to the area of investigation, associated with the TMI facility. The five existing groundwater monitoring wells are located specifically to the west of the truck entrance way associated with the TMI facility. The wells identified are located approximately twenty-five to the north of the existing

water line and approximately ten feet south of the TMI facility fence line. For the purposes of this investigation and report preparation, these existing wells have been designated from east to west starting from the west side of the truck entranceway as MW-1, MW-2, MW-3, MW-4 and MW-5. During the field investigations, depth to groundwater measurements and free-product measurements (when applicable) were obtained from the existing wells utilizing an oil/water interface probe on January 21 and January 28, 2009 and during the subsequent groundwater sampling activities conducted on February 3, 2009. Please refer to **Figure F-2** for the locations of the temporary groundwater wells advanced during this assessment and existing groundwater monitoring wells associated with the TMI facility.

As noted above, the surficial groundwater table was encountered between approximately five feet bls to six feet bls depending on the existing well locations and dates of measurement. In order to assess the potential groundwater impacts along the existing water lines, one, five-foot Schedule 40 PVC, 1-inch by ½-inch U-pack temporary monitoring well with associated ½-inch riser/casing was advanced on January 27, 2009 at the respective soil boring locations referenced above (TMW-1, TMW-2 and TMW-3). The TMWs were advanced to a depth of approximately eight feet bls, which is approximately two and a half feet into the groundwater table of the surficial aquifer. Following installation, the TMWs were allowed to stabilize within the surficial aquifer zone for approximately 24-hours prior to the purge/development activities utilizing a peristaltic pump equipped with virgin silicone pump head tubing and virgin polyethylene down well tubing.

On January 28, 2009 GLE returned to the site to complete the groundwater assessment activities. The purge/development activities were conducted at each temporary well location prior to the collection of representative groundwater samples from each temporary well. In addition to TMW-1, TMW-2 and TMW-3, GLE attempted to collect a representative groundwater sample from the existing well MW-5 located within the western portion of the investigation area in close proximity and to the east-northeast of the intersection of NDS and Eastern Avenue. This existing well MW-5 was immediately purged dry following the start-up of the peristaltic pump at the time of the January 28, 2009 sampling event. Therefore, representative groundwater samples were not collected at this well location during this assessment.

During the development of TMW-3, no apparent free-product was noted at the location of TMW-3 during this assessment. Therefore, field stabilization parameters including pH, temperature, specific conductance, dissolved oxygen and turbidity were recorded prior to sample collection. The discrete groundwater samples collected from TMW-3 were submitted for laboratory analysis of volatile organic aromatics (VOA) by EPA Method 8260, L.L. PAHs by EPA Method 8270, TRPH by the FL PRO Method, specific metals including total cadmium, copper, lead and zinc by EPA Method 6010, hexevalent chromium by EPA Method 7196, ultra trace mercury by EPA Method 1631E (which

includes a field blank) and Total Organic Carbon by method SM5310C. The parameter list referenced above included the constituent requirements established for Generic Permits for Discharges from Petroleum Contaminated Sites to order to apply for a National Pollutant Discharge Elimination System (NPDES) discharge permit from the FDEP in the event that a dewatering system is determined necessary for the installation activities. Following collection, the representative groundwater samples were immediately placed on wet ice. The samples were then delivered directly to the SunLabs Inc., in Tampa, Florida. All groundwater sample collection activities were conducted in accordance with FDEP's Standard Operating Procedures for field sampling (FS 2200).

During the groundwater investigations conducted on January 28, 2009, a thin layer of free-product was noted in the purge development water generated from TMW-1 and a significant layer of free-product was noted in the purge development water generated at TMW-2. Therefore, the field stabilization parameters referenced above were not obtained from these temporary wells as to not damage the field monitoring equipment utilized with the petroleum product encountered. In addition, due to the presence of the thin layer of free-product noted at TMW-1 and significant layer of free-product noted at TMW-2, representative groundwater samples were not collected for laboratory analysis from these respective TMWs on January 28, 2009. As a result of the existing free-product encountered in TMW-1 and TMW-2, GLE immediately contacted the representatives of SunLabs, in order to determine if representative samples could be submitted for laboratory analysis. GLE requested that laboratory analysis be conducted in an attempt to determine the chemical nature of the existing petroleum product, as being associated with either a gasoline or diesel release.

Upon clarification from the representatives of SunLabs, GLE returned to the site on February 3, 2009 for the collection of representative groundwater samples from TMW-1 and TMW-2, respectively. Specifically, GLE purged approximately one gallon from TMW-1 into a one-gallon drinking water container in order to measure the free-product layer at this location. Following the purging of approximately one-gallon, groundwater was decanted directly into the laboratory containers provided for the laboratory parameters as referenced above. In addition, GLE purged approximately two gallons from TMW-2 into a 2.5-gallon drinking water container with release siphon in order to measure the free-product layer at this location. Immediately following the purge activities, the free-product layer was measured and groundwater samples were collected from the groundwater beneath the free-product layer within the 2.5-gallon container for laboratory analysis of volatile organic aromatics (VOA) including Naphthalene by EPA Method 8260. The groundwater samples collected from TMW-1 and TMW-2 were immediately placed on wet ice and delivered directly to SunLabs the same day. Due to the free-product encountered at these respective temporary well locations the groundwater sampling procedures were modified as determined applicable in order to meet the work assignment tasks and data objectives.

3.0 RESULTS OF INVESTIGATIVE METHODOLIES

3.1 Soil Investigative Findings

During the soil field investigation activities, a compacted limestone road base/asphalt layer was identified along the north side of NDS and immediately to the south of the existing water lines (the southern most water line). Due to the location of the existing water lines with respect to the compacted road base layer noted along NDS as referenced above, no soil boring investigations were able to be advanced to the south of the existing water lines as initially proposed. Therefore, GLE initiated the soil investigations between thirty-three and thirty-five feet to the south of the fence line associated with the TMI facility and along the north side of the existing water lines and to the south of the existing sanitary sewer force main. Soil borings were advanced at fifteen-foot increments from east to west for this assessment. During the soil investigation activities conducted, miscellaneous (compacted) rock, gravel, degraded limestone, and clayey fill material was identified at land surface throughout the entire investigation. In addition, specific soil borings along NDS down to the intersection of Eastern Avenue were noted with fill material from approximately land surface to approximately four feet bls. Due to the rock/gravel fill material encountered, several attempts were made at specific soil boring locations in an attempt to reach appropriate depths to complete the field screening activities, as proposed. However, refusal (rock debris) was noted at specific boring locations advanced to the west of the truck entranceway associated with the TMI facility. In addition, refusal (rock/gravel debris) was identified in the western portion of the investigation area, primarily in close proximity to the railroad crossing near the intersection of NDS at Eastern Avenue. Please refer to the Geologic Sample Collection Logs included in **Appendix A**.

In addition to the rock, clay fill material identified from land surface to approximately four feet bls (as referenced above), silty fine sands, and green/gray clay were noted at approximately four to five feet bls, at the majority of the soil borings advanced during this assessment. Furthermore, dark organic fine sands to gray fine to course sands were noted from approximately five feet bls to boring completion depths of approximately six feet bls at most boring locations and to completion depths of approximately seven feet bls at specific locations. It should be noted that dark organic sandy soil with decomposed vegetation/roots was identified at approximately five to six feet bls at specific boring locations advanced during this assessment. Based on field observations, the silty clay layer identified at approximately four feet bls was noted as being moist to wet depending on the soil boring location. In addition, the surficial aquifer groundwater table was noted at approximately five feet bls during this assessment.

Soil Borings SB-1 through SB-15 were advanced starting from the southeast corner of the TMI facility fence line to the west at fifteen-foot measured length increments to the eastside of the truck entranceway associated with the TMI facility. Based on field

observations and the review of OVA field screening data, no olfactory indications of petroleum impact were documented for soil samples collected from soil boring locations SB-1 through SB-15. In addition, no elevated OVA readings above 10 ppm were reported in the soil samples field screed with the OVA except for SB-10 at six feet bls. Please note SB-15 was advanced directly to the south of the three existing mailboxes associated with the TMI facility and approximately 215 feet to the west of SB-1. It should be noted that no soil borings were advanced through the asphalt layer and truck entranceway associated with the TMI facility during this assessment. This asphalt paved truck entranceway was measured and referenced to be approximately 100 feet in width from east to west. **(See Figure F-2)**

Based on the review of the soil OVA data collected and analytical data for soil samples collected during this investigation, petroleum impacted soils were identified within the area of the existing water lines beginning on the west side of the truck entranceway associated with the TMI facility. Olfactory indications of petroleum impacts and elevated OVA readings were documented starting at soil boring location SB-16, located approximately 320 feet west of SB-1. The olfactory indications of petroleum impacts and elevated OVA readings were documented at approximately four to five feet bls to completion depths of six feet from SB-16 to soil boring location SB-19. In addition, olfactory indications of petroleum impacts and elevated OVA readings were documented at soil boring SB-20 at approximately three feet bls to the completion depths of six feet bls, and extended westward from SB-20 to soil boring location SB-24. Furthermore, olfactory indications of petroleum impact and elevated OVA readings were documented at soil boring SB-25 at approximately one-foot bls to the completion depth of six feet bls. These petroleum impacts found from one foot bls to six feet bls, extended from SB-25 to soil boring location SB-36. Finally, olfactory indications of petroleum impact and elevated OVA readings were documented at soil boring SB-37 at approximately three feet bls to the completion depths of six feet bls through to soil boring location SB-43.

During the field investigation activities five representative soil samples were collected from specific soil borings and specific depth intervals for laboratory analysis. Specifically, discrete soil samples were collected at soil boring location SB-20 at approximately five feet bls, at SB-32 at approximately four feet bls, at SB-42 at approximately four feet bls and at SB-52 at approximately 2-3 feet bls. The fifth soil sample was collected from the area located between soil boring locations SB-26 and SB-27 (designated as SB-27 at 2') for this assessment. Based on the review of the laboratory analytical report, specific petroleum constituents were reported above their respective Groundwater Cleanup Target Levels (GCTLs) based on leachability during this assessment. The analytical data for soil samples collected from SB-20 and the soil sample collected between soil boring SB-26 and SB-27 (designated as SB-27) during this assessment, confirms that petroleum impacted soils exist in close proximity to the existing water lines and the proposed area of excavation for the new water line installation activities. In addition, elevated OVA readings were documented at soil boring

SB-32, which exhibited free product during this assessment. Furthermore, elevated readings were documented in the soil at soil boring locations SB-33 through SB-36 during this assessment.

The analytical data obtained during this assessment was submitted to the representatives of KleenSoil for review and authorization to transport the petroleum impacted soils to their facility for thermal treatment in accordance with State regulations. As per a conversation with the representatives of KleenSoil on February 18, 2009, specific metals exceeded the allowable KleenSoil permit limit at that time and additional analytical data was required, as necessary, prior to their authorization for the receipt of petroleum impacted soil excavated for thermal treatment. As per the electronic mail correspondence dated February 20, 2009, KleenSoil requested that Synthetic Precipitate Leaching Procedure (SPLP) analysis specifically for chromium be completed before disposal approval could be provided. Therefore, GLE contacted SunLabs, Inc. the contracted certified laboratory to complete the SPLP analysis by EPA Method 1312 as requested by KleenSoil. Upon receipt of the SPLP analytical data from SunLabs, the analytical reports were submitted to the representatives of KleenSoil for review and comment. Following the review of the SPLP analytical data and based on the electronic mail correspondence dated April 10, 2009, KleenSoil issued written approval and authorization for the disposal of petroleum impacted soil at their facility. Please refer to the correspondence e-mails received from the representatives of KleenSoil included in **Appendix E**.

All soil analytical data was compared to the FDEP's Soil Cleanup Target Levels SCTLs) based on leachability criteria as per Chapter 62-777, F.A.C., during this assessment. The soil OVA Summary Table is included as **Table 1.** The Geologic Collection Logs are provided in **Appendix A.** Soil Analytical Summary Tables received from the contracted laboratory are provided with the respective laboratory analytical reports with respective Chain of Custody forms in **Appendix B.** Please refer to **Figure F-6** for the estimated area of petroleum impacted soil identified along the existing, and proposed waterlines along NDS, east of Eastern Avenue and adjacent to the TMI facility.

Please note during the temporary monitoring well installation activities associated with TMW-4, advanced to the west of Eastern Avenue, olfactory indications of petroleum impacted soil was noted from approximately five feet bls to boring completion depth of approximately eighth feet bls. Therefore, any petroleum impacted soils encountered during the "Jack and Bore" activities proposed for the new water line to cross the intersection of Eastern Avenue at NDS would need to be disposed of accordingly at KleenSoil. Furthermore, any additional petroleum impacted soils identified during the waterline installation activities, not specifically identified through these investigations or presented in this report, would need to be disposed of accordingly at KleenSoil.

3.2 Groundwater Investigation Findings

During the field investigation activities conducted, an approximate 2.2-foot layer (on average for the three measurements) of free-product was identified in the existing well designated as MW-1 during the field investigations conducted. In addition, a 0.60-foot layer of free-product was documented in the existing well designated as MW-3 during the groundwater sampling investigations conducted on January 28, 2009. However, the free-product layer was not identified at MW-3 during the subsequent groundwater sampling investigations conducted on February 3, 2009. During this assessment the surficial aquifer groundwater table was encountered at 5.83 feet bls, on average, for measurements obtained from MW-5 and MW-2, on January 21, 2009. In addition, the surficial aquifer groundwater table was encountered at 6.14 feet bls on average for measurements obtained from MW-2, MW-3, MW-4 and MW-5, on January 28, 2009. Finally, the surficial aquifer groundwater table was encountered at 4.60 feet bls on average for measurements obtained from MW-2, MW-3, MW-4 and MW-5, on February 3, 2009. Please note that this area experienced a seasonal rainfall event, which occurred sometime between January 28, 2009 and February 3, 2009. Based on the average measurements obtained during this assessment, the surficial aquifer groundwater table did exhibit a rise in the water table due to the seasonal rainfall event experienced. Please refer to **Table 2** for a summary of the depth to water and free-product measurements obtained from existing wells MW-1 through MW-5, during the field investigations conducted.

During this assessment three temporary groundwater monitoring wells (TMWs) were advanced at soil boring locations SB-20 (TMW-1), SB-32 (TMW-2), and at SB-42 (TMW-3). Based on field observations for the groundwater samples collected at TMW-3, no indication of free-product was noted in the purge/development water at this location on January 28, 2009. In addition, although contaminants of concern were reported above laboratory detection limits, none of the contaminants of concern identified were reported above their applicable Groundwater Cleanup Target Levels (GCTLs) at the time of this assessment. Furthermore, the analytical data were compared to the allowable concentration limits for the discharge parameters associated with an NPDES permit during the review of the analytical report. No contaminants of concern were reported at TMW-3, above the allowable parameter concentrations for the NPDES permit requirements.

During the groundwater assessment activities conducted on January 28, 2009, a thin layer of free-product was documented in the purge development water obtained from TMW-1 and a significant layer of free-product was noted in the development water obtained from TMW-2 during the January 28, 2009 groundwater sampling event. Due to the presence of free-product at these respective well locations, GLE contacted the representatives of SunLabs to discuss the procedures for submitting free-product impacted groundwater samples to the laboratory for analysis, accordingly. Upon clarification from SunLabs, GLE returned to the site on February 3, 2009 to complete the groundwater sampling and

investigation activities at TMW-1 and TMW-2. During the February 3, 2009 subsequent groundwater sampling event, approximately one-inch of free product was noted in a one-gallon container utilized to collect the purge/development water for TMW-1. In addition, approximately 3.5-inches of free-product was noted in the 2.5-gallon container utilized to collect the purge/development water from TMW-2 during the February 3, 2009, event. Upon completion of the purge/development, representative groundwater samples were collected from TMW-1 and submitted for the analytical parameter list for the requirements of the NPDES permit. However, only volatile organic compound constituents were analyzed for from the groundwater sample collected from TMW-2 due to the significant layer of free-product noted at this temporary well location.

Based on the review of the analytical report for the groundwater samples collected from TMW-1, specific contaminants of concern including benzene, ethylbenzene, 1-methylnaphthalene, 2-methylnaphthalene, Naphthalene, total xylenes, total organic carbon and trace mercury were reported above their applicable GCTLs and their applicable NPDES concentration limits, respectively. In addition, the VOC sample collected from TMW-2 was reported with specific contaminants of concern including benzene, ethylbenzene, total xylenes and naphthalene, which were reported above their applicable GCTLs and applicable NPDES concentration limits, respectively. Please note total organic carbon, total metals, hexavalent chromium and trace level mercury samples were not collected during this assessment from TMW-2, due to the significant thickness of free-product noted at this temporary well location. Please refer to **Figure F-7** for the estimated area of free-product and the estimated area of petroleum impacted groundwater for the area of investigation.

As per a conversation with Mr. Mike Lukowich, P. E., of the FDEP Southwest District office, Industrial Waste Permitting Department, the trace mercury concentration reported for TMW-1 during this assessment was above the allowable NPDES permit limit, which would have restricted the authorization of an NPDES permit. Mr. Lukowich stated that a second sample should be collected for TMW-1, in an attempt to have trace mercury reported below the applicable permit limit of 0.025 micrograms per liter (µg/L). All groundwater analytical data will need to be submitted with the appropriate NPDES application forms and application fees, accordingly for review, comment and issuance of an NPDES permit, if applicable, prior to initiating the dewatering and discharge activities (if required) at the site.

As authorized in Change Order #1 (CO#1) additional groundwater assessment activities were conducted at TMW-1, specifically for the analysis of trace level mercury as recommended by the FDEP representative. Furthermore, as requested by the representatives of MC, a TMW was advanced to the west of the intersection of North Dock Street and Eastern Avenue. This additional groundwater assessment was conducted to document potential petroleum impacts at this intersection for the noted "Jack and Bore" activities proposed for the installation of the waterline underneath this intersection.

GLE mobilized to the site on March 25, 2009 to complete the additional groundwater sample collection activities at TMW-1. Following the purge and development of the well (approximately one-half gallon) GLE collected representative groundwater samples for the trace level mercury analysis in accordance with the Standard Operating Procedure (SOP) Clean Sampling for Ultratrace Metals FS 8200. GLE requested that two trace mercury sample kits be obtained from two independent certified laboratories (Southern Analytical and Jupiter Laboratory) to complete the trace level mercury analysis by EPA Method 1631E. Therefore, GLE collected spilt samples from TMW-1 utilizing the sample kits received from respective independent laboratories. In accordance with the method analysis field blanks were collected utilizing respective laboratory-supplied de-ionized water. During the groundwater investigations conducted on March 25, 2009, a thin layer of free-product was observed in the purge development water generated from TMW-1, as previously noted during the initial assessment activities. Please refer to the sample collection log prepared for the subsequent sampling of TMW-1, as referenced above included in **Appendix A**. The groundwater analytical results are included in **Appendix B**. The location of TMW-1 is depicted on **Figure 2** and **Figure 4** of the initial assessment report prepared by GLE.

In addition to the subsequent sampling of TMW-1 as referenced above, GLE reviewed prior assessment reports to determine if an existing groundwater monitoring well was able to be located in an area directly to the west of the intersection of Eastern Avenue and NDS. As noted in the prior assessment reports reviewed by GLE and on site figures associated with those prior assessment reports, a free-product recovery system exists throughout the southwest portion TMI facility. The free-product recovery system was noted in the area directly to the west of TMI facility across Eastern Avenue as well as to the south-southwest of the TMI facility across NDS at Eastern Avenue. During the additional assessment activities on March 25, 2009, GLE noted the manhole locations, product recovery wells and additional stick-up type monitoring wells that exist in the area to the west of Eastern Avenue. Specifically, one stick-up type groundwater monitoring well, designated as MW4-06 on the prior assessment reports was identified in close proximity to the west of Eastern Avenue and to the northwest of NDS and the existing railroad tracks. Therefore, GLE attempted to collect a representative groundwater sample from the existing well MW4-06. However, weathered free product and sandy sludge material was noted in the purge/development water produced from this well location at that time. Due the presence of weathered free product and sandy sludge produced from this well location, GLE was not able to collect a representative groundwater sample for the NPDES parameters as proposed. GLE determined that a temporary well would be necessary in this area for the collection of a representative groundwater sample.

GLE returned to the site on March 26, 2009, in an attempt to advance a soil boring in the area to the west of Eastern Avenue and in close proximity to the existing water line, which passes through this intersection at NDS. After several boring attempts and refusal

encountered in this area, GLE was able to advance one soil boring into the top of the surficial aquifer, noted at approximately five feet (bls. GLE then advanced a temporary groundwater monitoring well (one, five-foot Schedule 40 PVC, 1-inch by ½-inch U-pack temporary monitoring well with associated ½-inch riser/casing) at this location for the collection of a representative groundwater sample for the analysis of the NPDES parameter list, referenced above. This temporary groundwater monitoring well was designated as TMW-4 for these investigation activities. Following installation, the purge/development activities were completed utilizing a peristaltic pump equipped with virgin silicone pump head tubing and virgin polyethylene down well tubing. GLE purged approximately one and a half gallons of groundwater from this well location prior to the sample collection activities. Following collection, the samples were submitted to SunLabs for the analysis of the NPDES parameters. Trace mercury split samples were collected and submitted for analysis to the respective independent laboratories, as referenced above. In addition to the laboratory parameters required for the NPDES permit application, GLE was informed by the representatives of Manatee County Sanitary Sewer Department of specific parameters required for the discharge into the sanitary sewer system, if determined applicable for the de-watering activities. Total metals including arsenic, chromium, molybdenum and nickel were analyzed by EPA Method 6010. In addition, chloride was requested and analyzed by EPA Method 300. Please refer to **Appendix A** for the Geologic Log and Groundwater Sample Collection Log prepared for TMW-4. Please refer to **Appendix B** for the analytical laboratory report for groundwater samples collected for laboratory analysis from TMW-4. Please refer to **Figure F-8** for the site plan depicting the existing free-product recovery system, existing monitoring well MW4-06 and the approximate location of TMW-4 advanced to the west of Eastern Avenue during the additional assessment activities.

During the field investigation activities conducted on March 25 and March 26, 2009, free-product was identified in the purge water produced from TMW-1. In addition, weathered free product and sandy sludge was identified in the existing monitoring well MW4-06 located to the west and in close proximity to Eastern Avenue at North Dock Street. Due to the weathered free-product noted at MW4-06, a representative groundwater sample was not collected from this well location at that time. However, GLE returned to the site on March 26, 2009 to advance a temporary monitoring well (TMW-4) in close proximity (approximately fifteen feet) to the south-southeast of MW4-06. Although olfactory indications of petroleum impacts were noted in the subsurface soils at approximately five feet bls and at the top of the surficial aquifer during the installation of TMW-4, no apparent indication of free-product was noted in the purge/development water produced at the TMW-4 location at the time of sample collection. The top of the surficial aquifer was noted at approximately five feet bls at TMW-4 during the additional assessment activities.

Based on the review of the analytical report for the subsequent trace mercury groundwater samples collected from TMW-1, trace mercury was reported at 0.021 micrograms per liter (µg/L) in the sample submitted to Jupiter Labs. In addition, trace mercury was reported at

0.00097 µg/L, in the field blank sample collected for analysis. Trace mercury was reported in TMW-1 as non-detected at 0.0002 µg/L in the sample submitted to Southern Analytical for analysis. However, trace mercury was reported at 0.0016 µg/L in the field blank collected and submitted to Southern Analytical for analysis. The reported concentrations for trace mercury reported by independent laboratories in the subsequent groundwater in the samples collected from TMW-1 were reported below the applicable permit limit of 0.025 µg/L, required by the FDEP.

No apparent free product was noted during the purge/development and sampling activities of TMW-4 on March 26, 2009. However, based on the review of the analytical data for the groundwater samples collected from TMW-4, specific petroleum contaminants of concern including benzene, ethylbenzene, naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene were reported above their applicable GCTLs and their applicable NPDES permit limits, respectively. However, trace level mercury was reported in TMW-4 as non-detected at 0.00025 µg/L in the groundwater sample and the field blank sample submitted to Jupiter Laboratory for analysis. In addition, trace level mercury was reported as non-detected at 0.0002 µg/L in the groundwater sample and the field blank sample submitted to Southern Analytical for analysis. All groundwater analytical data collected to date will need to be submitted with the appropriate NPDES application forms and application fees, accordingly for review, comment and issuance of an NPDES permit, if applicable, prior to initiating the dewatering and discharge activities (if required) at the site.

Please note as per the electronic mail correspondence received from Mr. Jeff Goodwin of Manatee County Utilities/Sanitary Sewer Department on April 14, 2009, the sanitary sewer system discharge can be a second option for the de-watering discharge activities if determined necessary. The sanitary sewer department would need to be notified several weeks in advance and prior to initiating the discharge activities in order to accommodate our request. Please refer to the correspondence documentation received from Mr. Goodwin included in **Appendix E.**

4.0 CONCLUSIONS

Based on the investigation findings, petroleum impacted soils do not appear to exist in the soil borings advanced to the east of the truck entranceway associated with the TMI facility. However, the data suggests that petroleum impacted soil does exist along the existing waterlines beginning at the west side of the truck entranceway associated with the TMI facility. The depths to petroleum impacted soils in the area to the west of the entranceway varies depending on the soil boring location from approximately four feet bls down to the boring completion depths at approximately six feet bls from SB-16 through to SB-24. Petroleum impacted soils were noted from approximately land surface to the boring completion depths of approximately six feet bls at SB-25 through to SB-36. Additional petroleum impacted soil was documented at approximately three feet bls to the

boring completion depths of approximately six feet bls at SB-37 through to SB-46. Although elevated OVA readings were noted in the soil samples collected from SB-48, at five and six feet bls and at SB-49 at approximately six feet bls, no olfactory indications of petroleum impacts were noted in these borings, respectively. The extent of petroleum impacted soils is estimated to be approximately 450 feet starting from SB-16 at the west end of the truck entranceway going west along the existing waterlines through to SB-46.

Based on the utility mark out for the existing waterlines, GLE estimates the width of the excavation for the installation of the new waterline to be approximately five to seven feet wide (north to south). In addition, the initial estimated depth of the excavation previously provided by the representatives of Manatee County and CH2Mhill, is anticipated to be approximately five feet bls. Utilizing the estimates for the excavation area as referenced above (450 linear feet, by 7 feet width by 5 feet in depth) GLE estimates the area of impacted soils to be approximately 15,750 cubic feet or approximately 583 cubic yards, at this time. Please note the TMI facility's main terminal petroleum fuel transfer lines exist along the western fence and boundary line associated with the TMI facility at the intersection of Eastern Avenue and NDS. These lines run north to south and under NDS just to the east of the NDS-Eastern Avenue intersection. Based on the additional assessment activities requested and conducted to the west of Eastern Avenue, olfactory indications of petroleum impacted soil were noted from approximately five feet bls to boring completion depth of approximately eighth feet bls. The estimated area of petroleum impacted soil referenced above does not include any impacted soil which may exist though the east truck entranceway associated with the TMI facility and/or at the intersection of Eastern Avenue and NDS.

Based on field observations, the soil beneath the green/gray clay layer at approximately four feet bls may intersect the capillary fringe and/or the surficial aquifer groundwater table. Therefore, depending on regional rainfall events (specifically the wet season and potentially the dry season), the water table in this area may rise due to hydrogeologic conditions at the site. Based on field observations, free-product and petroleum-impacted groundwater exists with the area of the existing waterline, to the west of the truck entranceway associated with the TMI facility. In addition, petroleum-impacted groundwater exists in the area to the west of Eastern Avenue along NDS. In the event that de-watering activities are required for the "Jack and Bore" activities, a mobile groundwater treatment system would be required to manage the free-product and petroleum-impacted groundwater. Mobile Treatment Services (MTS) has provided a tentative cost estimate for an adequate treatment system for these site activities. In addition, GLE has obtained a tentative quote from Clark Environmental for fees associated with the transport and disposal of free product and sludge, which may be generated during the de-watering activities proposed. The mobile treatment system will be designed to separate the free-product for disposal as well as to meet the permit requirements associated with the NPDES permit for discharge, to sanitary sewer discharge, accordingly.

Please refer to **Appendix D** for the tentative cost estimates obtained from MTS and Clark Environmental. As part of Change Order #2, GLE will verify the service activities and tentative cost estimates previously received from MTS and Clark Environmental. Any additional outside concerns associated with the installation of a dewatering system, the design of the treatment system by MTS, and the disposal of product will be discussed and presented in Change Order #2, as requested by the representatives of MC.

5.0 Recommendations

GLE recommends that the depth of the water line excavation along NDS be limited to approximately four feet bls for the installation of the new waterline. As the depth to petroleum impacted soils varies starting from SB-16 through SB-46, it may be difficult to segregate the clean soil from petroleum impacted soil during the proposed excavation activities. Therefore, GLE recommends that all of the excavated material located between SB-16 through approximately SB-46 (approximately 450 linear feet), be transported to KleenSoil, for thermal treatment. As noted above GLE estimates the area of impacted soils to be approximately 15,750 cubic feet or approximately 583 cubic yards, at this time. The estimated area of petroleum impacted soil referenced above does not include any impacted soil which may exist beneath the truck entranceway associated with the TMI facility or that may exist at the intersection of Eastern Avenue and NDS. GLE recommends that all petroleum-impacted soil excavated during the water line installation activities be transported and disposed of at the KleenSoil facility. In addition, any petroleum-impacted soils encountered during the "Jack and Bore" activities proposed at the intersection of Eastern Avenue and NDS also needs to be disposed of accordingly at KleenSoil. Furthermore, any additional petroleum-impacted soils identified during the waterline installation activities, not specifically identified through these investigations or presented in this report would also need to be disposed of accordingly at KleenSoil.

As previously discussed, prior to initiating the assessment activities, the excavation and waterline installation activities should be conducted during the "dry season" (typically after October and before May) in an attempt to avoid any significant regional rainfall events and/or a significant rise in the surficial aquifer groundwater table. The NPDES application should be completed and submitted with the application fee to the FDEP for review and comment. The NPDES permit (if issued by the FDEP at that time) would apply to any discharge of all groundwater generated during the construction activities and would not be limited to the areas identified with petroleum-impacted groundwater and free-product identified. In addition, the NPDES permit would require appropriate sampling of the effluent water as presented in the permit, with the appropriate discharge monitoring forms submitted to the FDEP, accordingly.

In the event that an NPDES permit is not issued by the FDEP for this site based on the analytical data or information presented, then the treated effluent water generated during the dewatering activities would need to be discharged via the sanitary sewer system. The

municipal sanitary sewer facility has requested sufficient notification and scheduling prior to any associated discharge activities. We believe that the FDEP will issue an NPDES permit for this project.

As a third contingency and last viable option, GLE suggests the treated groundwater could be discharged in an appropriate location for infiltration, specifically on the TMI property. The representatives of TMI would need to be contacted to authorize this activity, as well as to determine the appropriate area/location to receive the discharge water. The designated area would need to have sufficient capacity to receive the effluent water and the effluent water would not be allowed to be discharge beyond the property boundary of the TMI facility. Furthermore, the selected area authorized by TMI for the effluent discharge must possess adequate permeability to allow for the infiltration of the effluent water in the subsurface soil at the TMI site. Finally, the effluent discharge water could not be allowed to infiltrate or enter into any offsite drainage swales, offsite wetlands, offsite retention ponds, or any creeks, rivers, lakes and navigable waterways adjacent to the TMI facility, at any time.

FIGURES

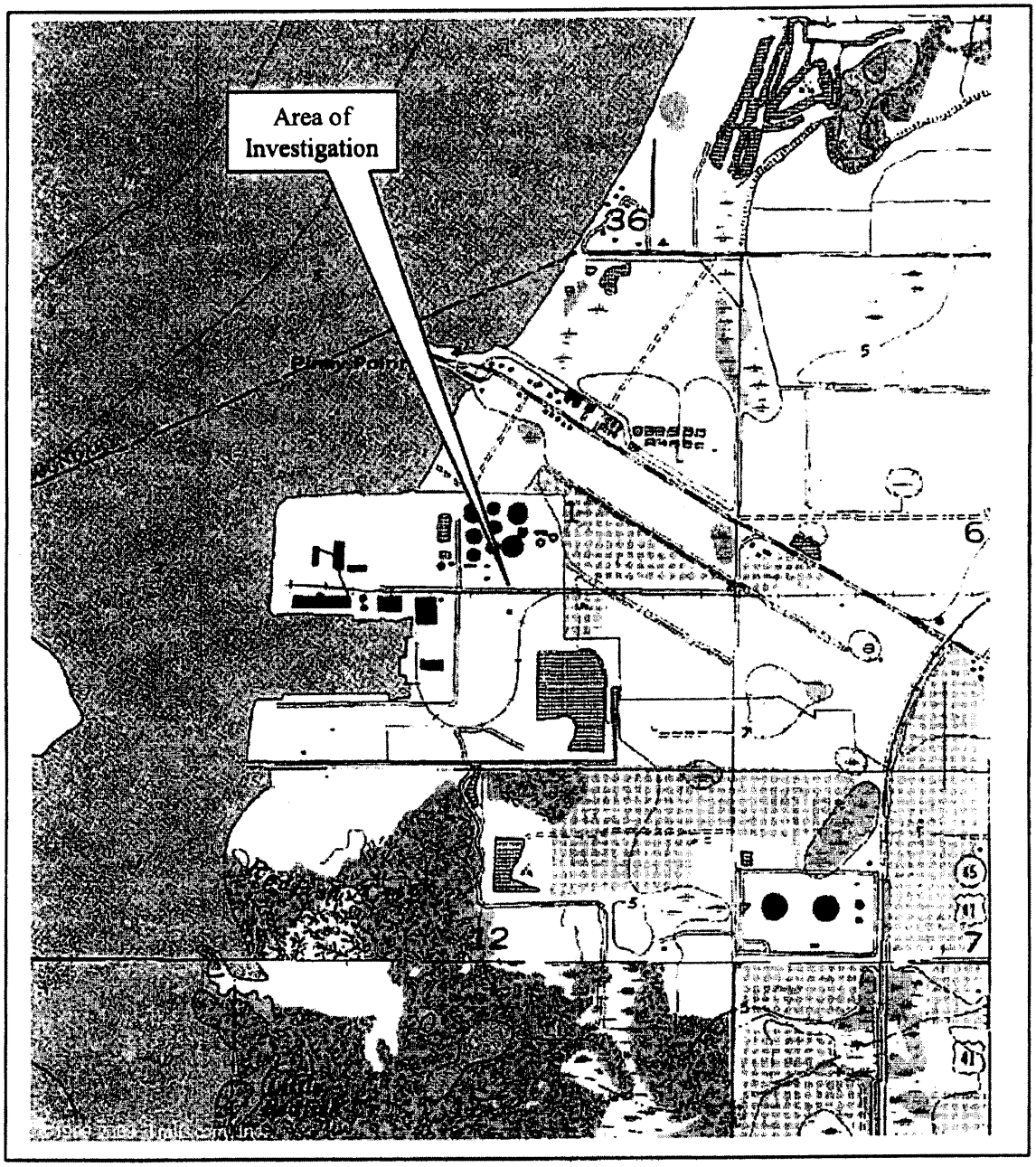

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Figure 1. Site Map
USGS 7.5-Minute Series Topographic Map
Cockroach Bay, Florida
Dated 1964, Photorevised 1987

Not to Scale

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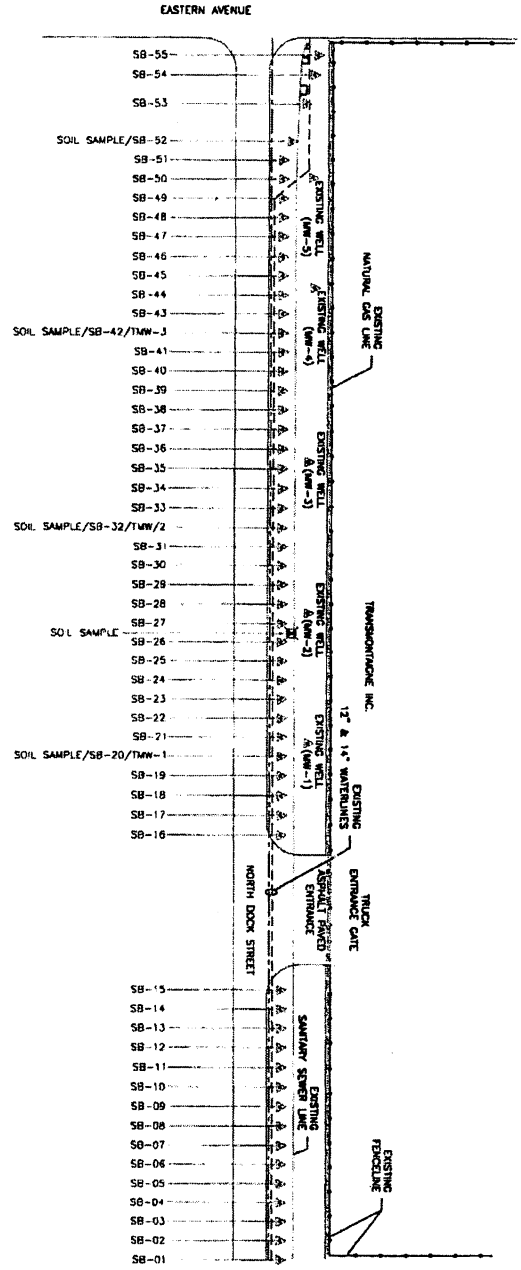

LEGEND

- SOIL SAMPLE LOCATION
- SOIL BORING LOCATION
- EXISTING MONITORING WELL LOCATION
- EXISTING 12" AND 14" WATERLINES
- EXISTING NATURAL GAS LINE
- EXISTING SANITARY SEWER LINE

SITE & AREA LAYOUT

PORT MANATEE
WATERLINE INSTALLATION
NORTH DOCK STREET
PALMETTO, FLORIDA

Prepared for:
MANATEE COUNTY PUBLIC WORKS DEPT.
BRADENTON, FLORIDA

Prepared By: GLE ASSOCIATES, INC.
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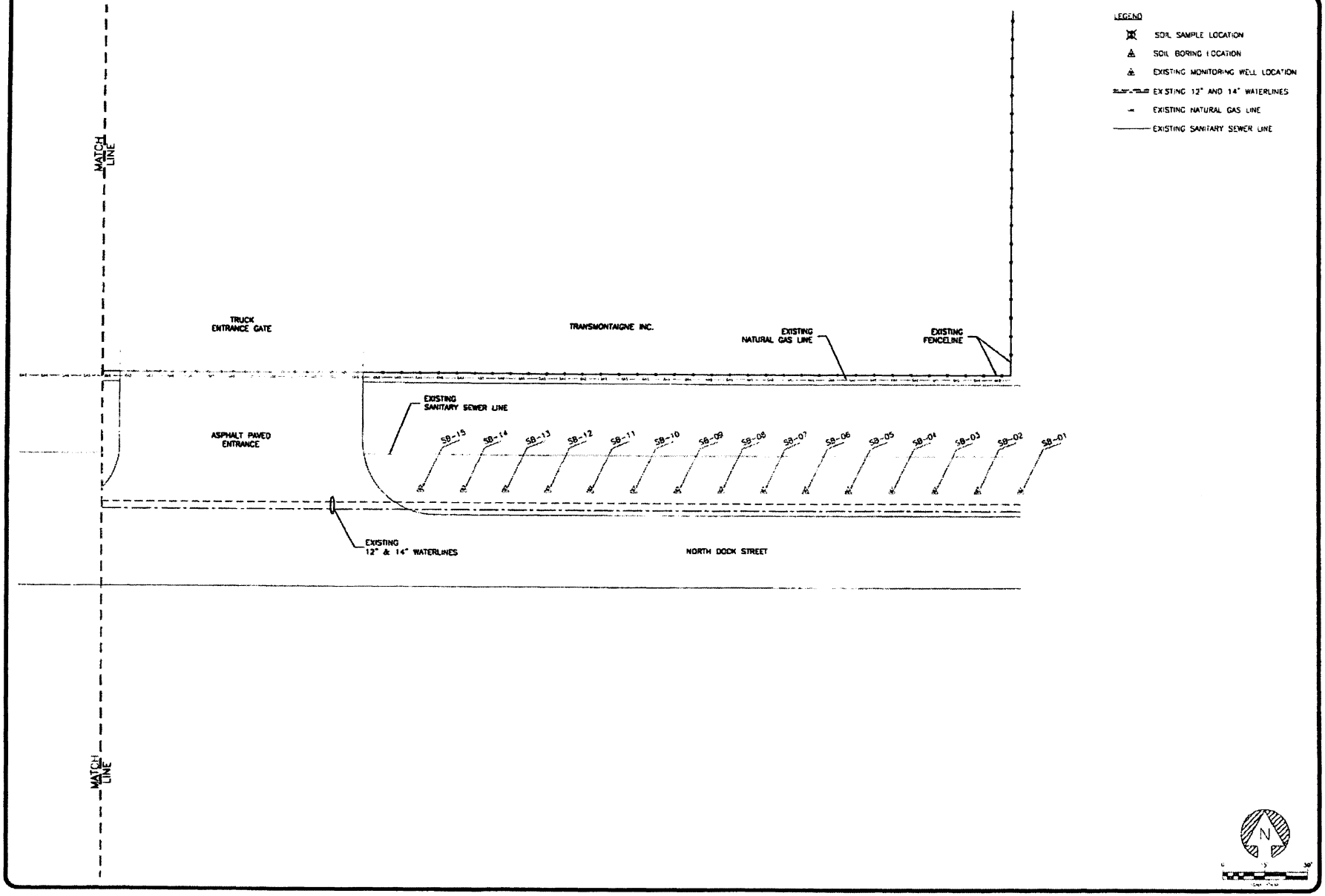
F-2



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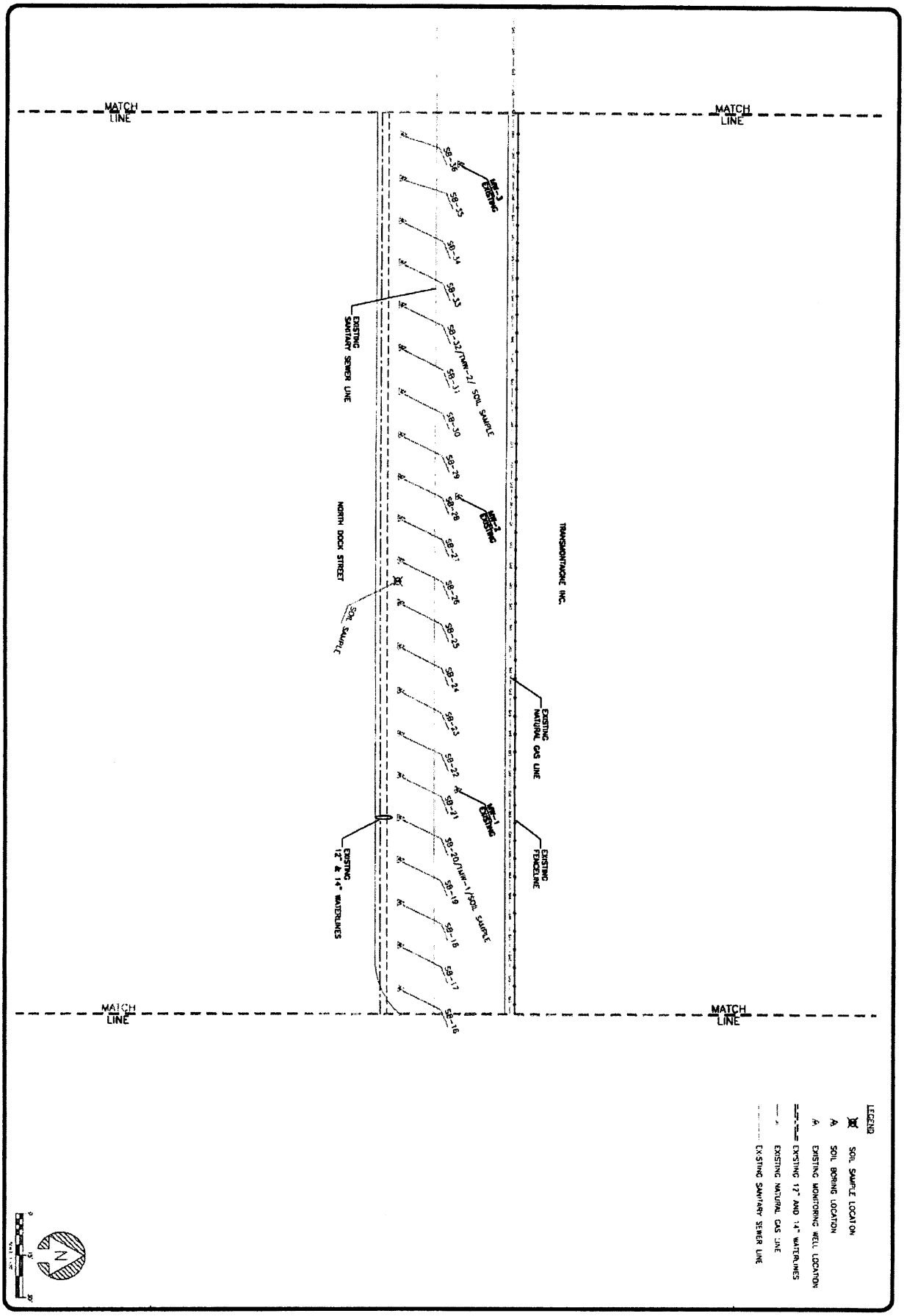
SITE & AREA LAYOUT

PORT MANATEE
WATERLINE INSTALLATION
NORTH DOCK STREET
PALMETTO, FLORIDA

DRAWN: RPH
CHECKED: MAM
DATE: 02/05/09
JOB NO.: 09310-00089
SCALE: N.T.S.
GLE FILE NO.: 09310-00089
SHEET: F-3
OF 6 SHEET(S)



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SITE & AREA LAYOUT

PORT MANATEE
WATERLINE INSTALLATION
NORTH DOCK STREET
PALMETTO, FLORIDA

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BRADENTON, FLORIDA

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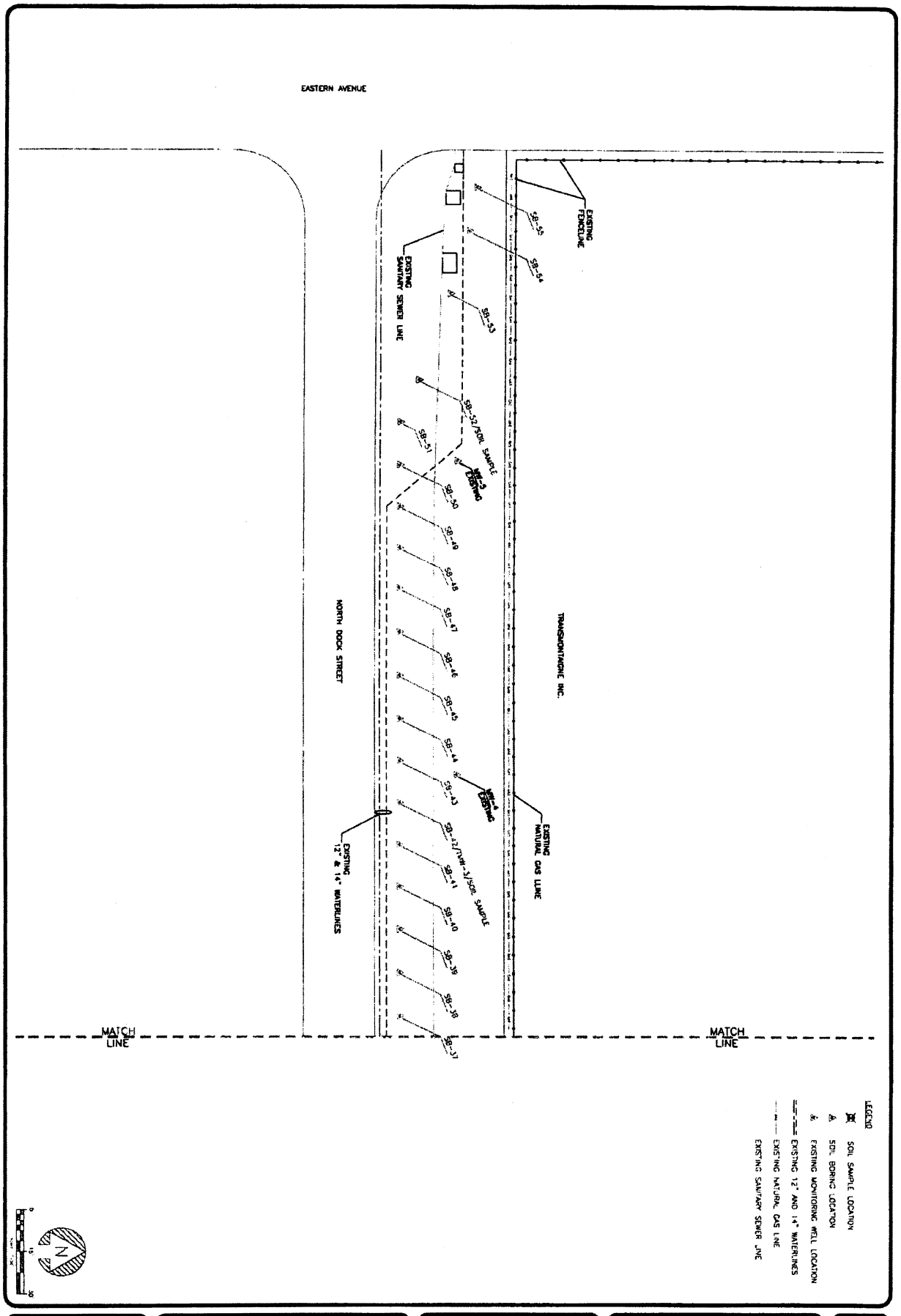

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SITE & AREA LAYOUT

PORT MANATEE
WATERLINE INSTALLATION
NORTH DOCK STREET
PALMETTO, FLORIDA

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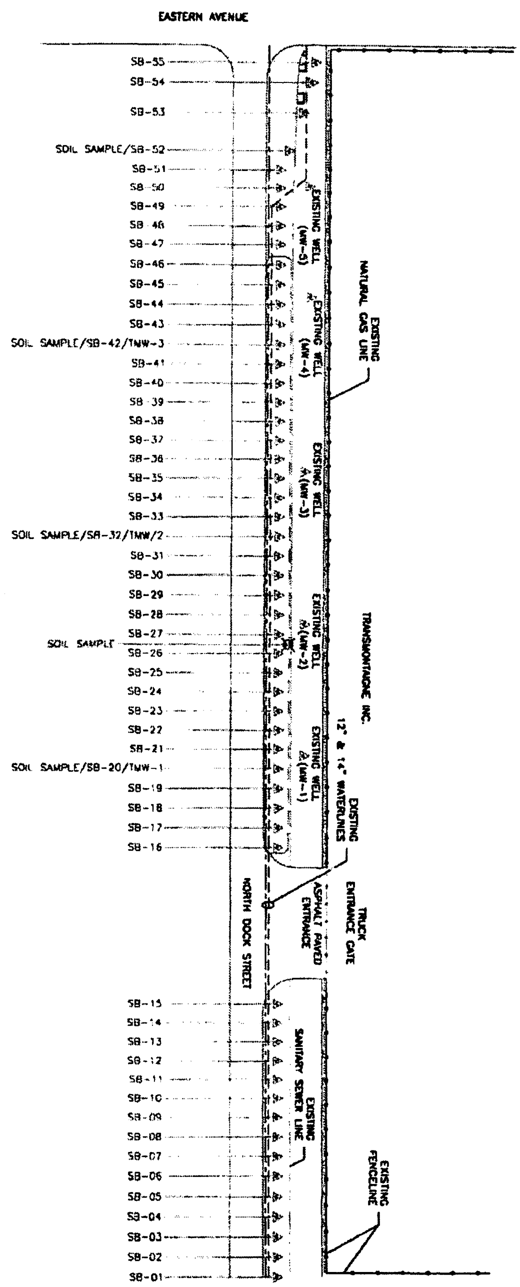

LEGEND

- SOIL SAMPLE LOCATION
- SOIL BORING LOCATION
- EXISTING MONITORING WELL LOCATION
- EXISTING 12" AND 14" WATERLINES
- EXISTING NATURAL GAS LINE
- EXISTING SANITARY SEWER LINE
- ESTIMATED AREA OF PETROLEUM IMPACTED SOIL

ESTIMATED AREA OF PETROLEUM IMPACTED SOIL NEAR EXISTING WATERLINE

PORT MANATEE
WATERLINE INSTALLATION
NORTH DOCK STREET
PALMETTO, FLORIDA

Prepared for:
MANATEE COUNTY PUBLIC WORKS DEPT.
BRADENTON, FLORIDA

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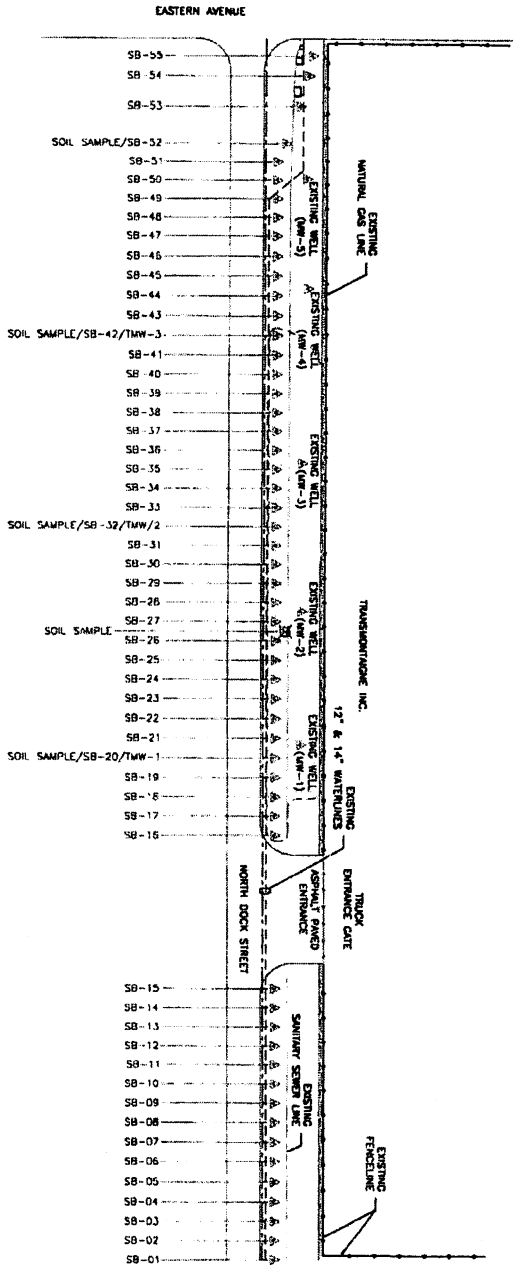
F-6
of 6 SHEETS



LEGEND

- SOIL SAMPLE LOCATION
- SOIL BORING LOCATION
- EXISTING MONITORING WELL LOCATION
- EXISTING 12" AND 14" WATERLINES
- EXISTING NATURAL GAS LINE
- EXISTING SANITARY SEWER LINE
- ESTIMATED AREA OF FREE PRODUCT IMPACT
- ESTIMATED AREA OF GROUND WATER IMPACT

FIGURE 7

ESTIMATED AREA OF FREE-PRODUCT IMPACTS

PORT MANATEE
WATERLINE INSTALLATION
NORTH DOCK STREET
PALMETTO, FLORIDA

Prepared for:
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BRADENTON, FLORIDA

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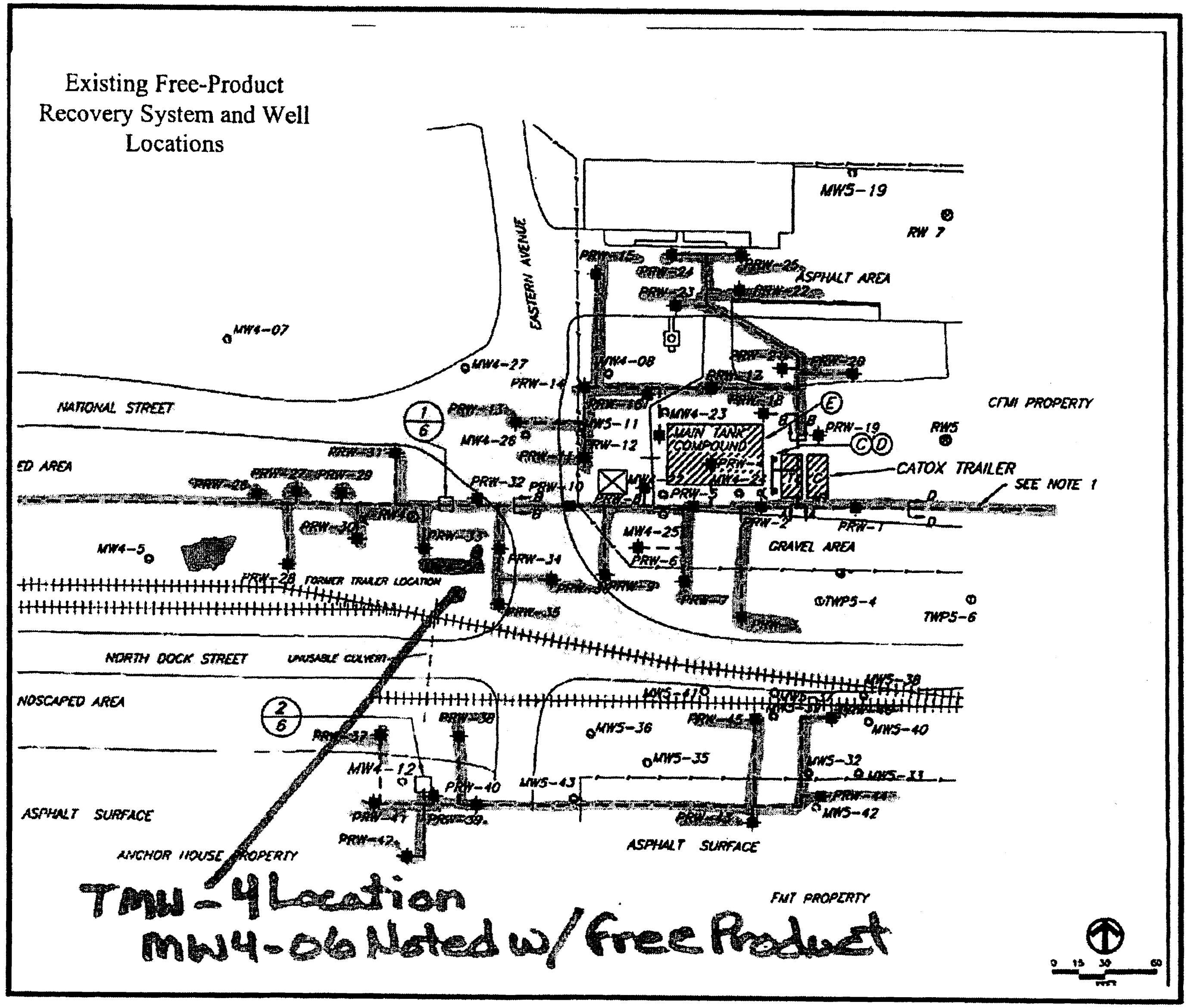

Figure F-8. Site Map
Port Manatee
TMW-4 Location West of Eastern Avenue
And Free-Product Recovery System

Not to Scale

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Checked: PR	
Date: 04/23/09	Figure: F-8

TABLES

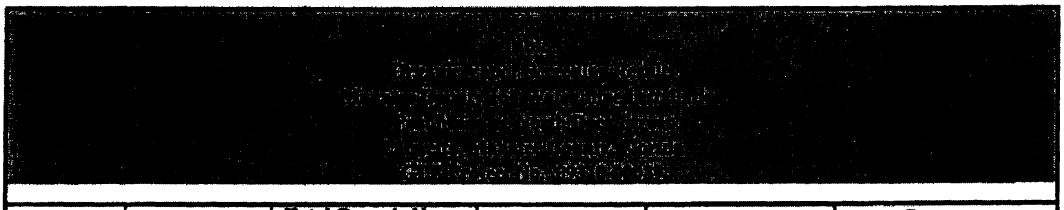
Sample Designation	Sample Collection Depth (ft bls[1])	Total Organic Vapor Concentration (unfiltered) (ppm[2])	Vapor Concentration (filtered) (ppm)	Vapor Concentration (ppm)	Comments
SB-1	1	0.0	—	0.0	Dry / No Odor
	2	0.0	—	0.0	Dry
	3	0.0	—	0.0	Dry
	4	0.0	—	0.0	Dry
	5	0.0	—	0.0	Moist/No Odor
	6	0.0	—	0.0	Wet/No Odor
SB-2	1	0.0	—	0.0	Dry / No Odor
	2	0.0	—	0.0	Dry
	3	0.0	—	0.0	Dry
	4	0.0	—	0.0	Moist/No Odor
	5	0.0	—	0.0	Wet
	6	0.0	—	0.0	Wet/No Odor
SB-3	1	0.0	—	0.0	Dry / No Odor
	2	0.0	—	0.0	Dry
	3	0.0	—	0.0	Dry
	4	0.0	—	0.0	Slight Moist/No Odor
	5	0.0	—	0.0	Moist/Wet
	6	0.0	—	0.0	Wet/No Odor
SB-4	1	0.0	—	0.0	Dry/Refusal at 1' bls
	2	NS	—	NS	—
	3	NS	—	NS	—
	4	NS	—	NS	—
	5	NS	—	NS	—
	6	NS	—	NS	
SB-5	1	0.0	—	0.0	Dry / No Odor
	2	0.0	—	0.0	Dry
	3	0.0	—	0.0	Dry
	4	0.0	—	0.0	Dry
	5	0.0	—	0.0	Moist/No Odor
	6	0.0	—	0.0	Wet/No Odor
SB-6	1	0.0	—	0.0	Dry / No Odor
	2	0.0	—	0.0	Dry
	3	0.0	—	0.0	Dry
	4	0.0	—	0.0	Dry
	5	0.0	—	0.0	Moist/No Odor
	6	0.0	—	0.0	Wet/No Odor
SB-7	1	0.0	—	0.0	Dry / No Odor
	2	0.0	—	0.0	Dry
	3	0.0	—	0.0	Dry
	4	0.0	—	0.0	Dry
	5	0.0	—	0.0	Moist/No Odor
	6	0.0	—	0.0	Wet/No Odor
SB-8	1	0.0	—	0.0	Dry / No Odor
	2	0.0	—	0.0	Dry
	3	0.0	—	0.0	Dry
	4	0.0	—	0.0	Dry
	5	2.8	—	2.8	Moist/No Odor
	6	0.0	—	0.0	Wet/No Odor
SB-9	1	0.0	—	0.0	Dry / No Odor
	2	0.0	—	0.0	Dry
	3	0.0	—	0.0	Dry
	4	0.0	—	0.0	Dry
	5	0.0	—	0.0	Moist/No Odor
	6	0.0	—	0.0	Wet/No Odor
SB-10	1	0.0	—	0.0	Dry/No Odor
	2	0.0	—	0.0	Dry
	3	0.0	—	0.0	Dry
	4	0.9	—	0.9	Moist
	5	31.4	25.4	6.0	Moist to Wet/Sulfur Odor
	6	22.8	4.1	18.7	Wet/Sulfur Odor

Sample Designation	Sample Collection Depth (ft bls[1])	Total Organic Vapor Concentration (unfiltered) (ppm[2])	Vapor Concentration (filtered) (ppm)	Vapor Concentration (ppm)	Comments
SB-11	1	0.0	—	0.0	Dry/No Odor
	2	0.0	—	0.0	Dry
	3	0.0	—	0.0	Dry
	4	0.0	—	0.0	Dry
	5	0.0	—	0.0	Moist/Wet/No Odor
	6	1.6	—	1.6	Wet/Sulfur Odor
SB-12	1	0.0	—	0.0	Dry/No Odor
	2	0.0	—	0.0	Dry
	3	0.0	—	0.0	Dry
	4	0.0	—	0.0	Dry/Moist
	5	6.5		6.5	Moist to Wet/Sulfur Odor
	6	0.0	—	0.0	Wet/Sulfur Odor
SB-13	1	0.0	—	0.0	Dry/No Odor
	2	0.0	—	0.0	Dry
	3	0.0	—	0.0	Dry
	4	0.0	—	0.0	Dry
	5	15.9	17.7	0.0	Moist to Wet/Sulfur Odor
	6	4.9	—	4.9	Wet/Sulfur Odor
SB-14	1	0.0	—	0.0	Dry/No Odor
	2	0.0	—	0.0	Dry
	3	0.0	—	0.0	Dry
	4	0.0	—	0.0	Dry
	5	14.1	18.3	—	Moist to Wet/Sulfur Odor
	6	0.0	—	0.0	Wet/Sulfur Odor
SB-15	1	0.0	—	0.0	Dry/No Odor
	2	0.0	—	0.0	Dry
	3	0.0	—	0.0	Dry
	4	0.0	—	0.0	Dry
	5	19.0	65.1	—	Moist to Wet/Sulfur Odor
	6	14.1	19.3	—	Wet/Sulfur Odor
SB0-16	1	0.0	—	0	Dry No Odor
	2	0.0	—	0	Dry
	3	0.0	—	3.1	Dry
	4	0.0	—	0	Dry
	5	417.2	41.8	375.4	Moist/Sulfur/Petroleum Odor
	6	50.7	41.9	8.8	Moist Wet/Sulfur/Pet. Odor
	7	207.4	61.1	46.3	WetSulfur/Petroleum Odor
SB-17	1	0.0	—	0.0	Dry/No Odor
	2	0.0	—	0.0	Dry
	3	0.0	—	0.0	Dry
	4	84.0	0	84.0	Moist/Dry/Strong Pet. Odor
	5	630.4	71.7	785.7	Moist/Wet/Petroleum Odor
	6	775.7	63.4	712.3	Wet/Petroleum Odor
SB-18	1	0.0	—	0.0	Dry/Refusal at 1' bls
	2	NS	—	NS	—
	3	NS	—	NS	—
	4	NS	—	NS	—
	5	NS		NS	—
	6	NS	—	NS	—
SB-19	1	0.0	—	0.0	Dry/No Odor
	2	0.0	—	0.0	Dry
	3	0.0	—	0.0	Dry
	4	45.7	6.1	39.6	Dry/Refusal at 4.5' bls
	5	NS	—	NS	—
SB-20	1	0	—	0	Dry
	2	3.4	—	0	Dry
	3	32.2	1.9	30.3	Dry
	4	1,451	6.3	1,444.7	Dry/Pet. Odor
Soil Sample	5	2,200	7.1	2,192.9	Dry to Moist/Strong Pet. Odor
[redacted]	6	1,878	11.6	1,866.4	Moist/Wet/Strong Pet. Odor
	7	2,448	444.9	2,003.1	Wet/Petroleum Odor

Sample Designation	Sample Collection Depth (ft bls[1])	Total Organic Vapor Concentration (unfiltered) (ppm[2])	Vapor Concentration (filtered) (ppm)	Vapor Concentration (ppm)	Comments
SB-21	1	0.0	—	0.0	Dry No Odor
	2	0.0	—	0.0	Dry No Odor
	3	NS	—	NS	—
	4	NS	—	NS	—
	5	NS	—	NS	—
	6	NS	—	NS	—
SB-22	1	0.0	—	0.0	Dry
	2	0.0	—	0.0	Dry
	3	0.0	—	0.0	Dry
	4	65.3	0	65.3	Dry/Slight Pet. Odor
	5	238.2	227.2	11.0	Dry to Moist/Strong Pet. Odor
	6	1,863	264.3	1,598.70	Moist/Wet/Strong Pet. Odor
	7	810.7	1,149	—	Wet/Strong Petroleum Odor
SB-23	1	NS	—	NS	Refusal at Land Surface
	2	NS	—	NS	—
	3	NS	—	NS	—
	4	NS	—	NS	—
	5	NS	—	NS	—
	6	NS	—	NS	—
SB-24	1	0.0	—	0.0	Dry
	2	0.0	—	0.0	Dry
	3	0.0	—	0.0	Dry to Moist
	4	95.4	13.4	82.0	Moist/Slight Pet.Odor
	5	145.2	62.9	82.3	Moist to Wet/Pet. Odor
	6	66.4	39.3	27.1	Wet/Slight Pet. Odor
SB-25	1	86.5	15.7	70.8	Slight Pet. Odor
	2	2325.0	1005	1320.0	Petroleum odor
	3	NS	—	NS	Refusal at 2.5' bls
	4	NS	—	NS	—
	5	NS	—	NS	—
	6	NS	—	NS	—
SB-26	1	228.2	58.9	169.3	Dry
	2	3706.0	1509.0	2197.0	Dry/Pet. Odor
Soil Sample	3	3247.0	846.1	2400.9	Dry/Strong Pet. Odor
	4	NS	—	NS	Refusal at 3' bls
	5	NS	—	NS	—
	6	NS	—	NS	—
SB-27	1	151.4	0	151.4	Dry/Slight Pet. Odor
	2	NS	—	NS	Refusal at 1.5' bls
	3	NS	—	NS	—
	4	NS	—	NS	—
	5	NS	—	NS	—
	6	NS	—	NS	—
SB-28	1	2100.0	95.4	2004.6	Dry/Pet. Odor
	2	32.9	0	32.9	Dry/Pet. Odor
	3	438.1	166.8	271.3	Dry/Pet. Odor
	4	NS	—	NS	Refusal at 3.5' bls
	5	NS	—	NS	—
	6	NS	—	NS	—
SB-29	1	35.7	0	35.7	Dry/No Odor
	2	22.1	4.5	17.6	Dry/No Odor
	3	435.7	71.3	364.4	Dry/Pet. Odor
	4	NS	—	NS	Refusal at 3' bls
	5	NS	—	NS	—
	6	NS	—	NS	—
SB-30	1	NS	—	NS	Refusal at Land Surface
	2	NS	—	NS	—
	3	NS	—	NS	—
	4	NS	—	NS	—
	5	NS	—	NS	—

Sample Designation	Sample Collection Depth (ft bls[1])	Total Organic Vapor Concentration (unfiltered) (ppm[2])	Vapor Concentration (filtered) (ppm)	Vapor Concentration (ppm)	Comments
SB-31	1	19.8	2.4	17.4	Dry/No Odor
	2	423.1	137.0	386.1	Dry/Pet. Odor
	3	583.4	409.4	174.0	Dry/Pet. Odor
	4	420.4	93.5	326.9	Dry/Pet. Odor
	5	719.8	590.2	129.6	Moist/Pet. Odor
	6	3026.0	340.9	2685.1	Strong Petroleum odor
	7	2456.0	803.5	1652.5	Wet Strong Pet. Odor
SB-32	1	1528.0	88.0	1440.0	Dry/Pet. Odor
	2	2231.0	152.8	2078.2	Dry/Pet. Odor
	3	3178.0 +	290.3	2867.7	Dry/Pet. Odor
Soil Sample	4	3122.0	495.3	2626.7	Dry/Pet. Odor
[redacted]	5	3893.0 +	833.9	2859.1	Moist to Wet/Pet. Odor
	6	3600.0 +	292.9	1927.0	Wet/Pet. Odor
SB-33	1	28.1	26.4	1.7	Dry/No Odor
	2	396.0	432	—	Dry
	3	621.8	572.3	49.5	Dry/Slight Pet. Odor
	4	368.1	347.3	20.8	Dry/Slight Pet. Odor
	5	326.4	269.9	56.5	Moist /Slight Pet. Odor
	6	3696 +	360.1	3000 +	Wet/Pet. Odor
SB-34	1	216.3	54	162.3	Dry/No Odor
	2	2495.0	406.7	2088.3	Dry/Pet. Odor
	3	3538.0	181.5	3356.5	Dry/Pet. Odor
	4	2402.0	334.4	2067.6	Dry/Pet. Odor
	5	2201.0	929.2	1271.8	Moist /Slight Pet. Odor
	6	3671 +	201.7	3469.3 +	Wet/Strong Pet. Odor
SB-35	1	62.6	0.8	61.8	Dry/No Odor
	2	247.0	151.7	95.3	Dry/Pet. Odor
	3	2275.0	354.9	1920.1	Dry/Pet. Odor
	4	1670.0	399.4	1270.6	Moist/Pet. Odor
	5	1097.0	1020	77.0	Moist to Wet/Pet. Odor
	6	2818.0	534.7	2083.3	Wet/Strong Pet. Odor
SB-36	1	544.3	7.4	536.9	Dry/Pet. Odor
	2	550.0	0.0	550.0	Dry/Pet. Odor
	3	511.1	0.0	511.1	Dry/Pet. Odor
	4	1004.0	554.3	449.7	Moist/Pet. Odor
	5	1318.0	477.7	840.3	Moist to Wet/Pet. Odor
	6	1900.0	414.6	1485.4	Wet/Strong Pet. Odor
SB-37	1	0.0	—	0.0	Dry/Pet. Odor
	2	0.0	—	0.0	Dry/Pet. Odor
	3	827.8	295.9	531.9	Dry/Pet. Odor
	4	1209.0	750.7	458.3	Moist/Pet. Odor
	5	759.4	515.5	243.9	Moist to Wet/Pet. Odor
	6	2846.0	398.4	2447.6	Wet/Strong Pet. Odor
SB-38	1	0.0	—	0.0	Dry/No Odor
	2	0.0	—	0.0	Dry/No Odor
	3	0.0	—	0.0	Dry/Slight Pet. Odor
	4	72.9	28.8	44.1	Dry to Moist/Pet. Odor
	5	299.7	224.0	75.7	Moist to Wet/Pet. Odor
	6	3289.0	2034.0	1255.0	Wet/Strong Pet. Odor
SB-39	1	0.0	—	0.0	Dry/No Odor
	2	0.0	—	0.0	Dry/No Odor
	3	0.0	—	0.0	Dry/No Odor
	4	15.5	10.2	5.3	Dry to Moist /No Pet. Odor
	5	120.6	66.0	54.6	Moist to Wet/No Pet. Odor
	6	581.3	719.7	—	Wet/No Pet. Odor
SB-40	1	0.0	—	0.0	Dry/No Odor
	2	0.1	—	0.0	Dry/No Odor
	3	0.0	—	0.0	Dry/No Odor
	4	3.7	—	3.7	Dry to Moist /No Pet. Odor
	5	301.1	94.1	207.0	Moist to Wet/No Pet. Odor
	6	2177.0	1188.0	989.0	Wet/No Pet. Odor

Sample Designation	Sample Collection Depth (ft bls[1])	Total Organic Vapor Concentration (unfiltered) (ppm[2])	Vapor Concentration (filtered) (ppm)	Vapor Concentration (ppm)	Comments
SB-41	1	0.0	—	0.0	Dry/No Odor
	2	27.5	38.5	—	Dry/No Odor
	3	61.5	85.7	—	Dry/No Odor
	4	28.3	22.9	5.4	Dry to Moist /No Pet. Odor
	5	59.4	42.5	301.1	Moist to Wet/No Pet. Odor
	6	2227.0	1079.0	1148.0	Wet/No Pet. Odor
SB-42	1	0.0	—	0.0	Dry/No Odor
	2	0.0	—	0.0	Dry/No Odor
	3	73.3	159.7	—	Dry/No Odor
Soil Sample	4	82.9	35.6	47.3	Dry to Moist /No Pet. Odor
[illegible]	5	283.2	102.5	59.4	Moist to Wet/No Pet. Odor
	6	3693.0 ♦	1734.0	1959.0 ♦	Wet/No Pet. Odor
SB-43	1	1.1	—	1.1	Dry/No Odor
	2	6.0	—	6.0	Dry/No Odor
	3	41.0	44.1	—	Dry/No Odor
	4	172.9	85.3	87.6	Dry to Moist /No Pet. Odor
	5	299.5	304.1	—	Moist to Wet/No Pet. Odor
	6	1297.0	655.9	641.1	Wet/No Pet. Odor
SB-44	1	0.0	—	0.0	Dry/No Odor
	2	0.0	—	0.0	Dry/No Odor
	3	0.2	—	0.2	Dry/No Odor
	4	0.7	—	0.7	Dry to Moist /No Pet. Odor
	5	26.4	15.1	9.3	Moist to Wet/No Pet. Odor
	6	201.0	133.3	67.3	Wet/No Pet. Odor
SB-45	1	0.0	—	0.0	Dry
	2	NS	—	NS	Refusal at 2' bls
	3	NS	—	NS	—
	4	NS	—	NS	—
	5	NS	-	NS	—
	6	NS	—	NS	—
SB-46	1	85.8	3.9	81.9	Dry
	2	137.6	126.4	11.2	Moist/No Odor
	3	273.8	255.7	18.1	Moist/Wet/No Odor
	4	69.0	47.8	21.2	Wet/No Odor
	5	35.5	48.5	—	Very Wet at 5' bls
	6	NS	—	NS	—
SB-47	1	0.0	—	0.0	Dry/No Odor
	2	0.0	—	0.0	Refusal at 2' bls
	3	NS	—	NS	—
	4	NS	—	NS	—
	5	NS		NS	—
	6	NS	—	NS	—
SB-48	1	0.0	—	0.0	Dry/No Odor
	2	0.0	—	0.0	Dry/No Odor
	3	0.0	—	0.0	Dry/No Odor
	4	0.8	—	0.8	Dry to Moist /No Pet. Odor
	5	60.7	43.3	17.4	Moist to Wet/No Pet. Odor
	6	1198.0	834.0	364.0	Wet/No Pet. Odor
SB-49	1	0.0	—	0.0	Dry/No Odor
	2	0.0	—	0.0	Dry/No Odor
	3	0.0	—	0.0	Dry/No Odor
	4	0.0	—	0.0	Dry to Moist /No Pet. Odor
	5	0.5	—	0.5	Moist to Wet/No Pet. Odor
	6	57.5	18.3	39.2	Wet/No Pet. Odor
SB-50	1	0	—	0	Dry
	2	0	—	0	Dry
	3	0	—	0	Dry/Refusal at 3' bls
	4	NS	—	NS	Wet
	5	NS	—	NS	Wet



Sample Designation	Sample Collection Depth (ft bls[1])	Total Organic Vapor Concentration (unfiltered) (ppm[2])	Vapor Concentration (filtered) (ppm)	Vapor Concentration (ppm)	Comments
SB-51	1	0.0	—	0.0	Dry / No Odor
	2	0.0	—	0.0	Dry/No Odor
	3	1.4	—	1.4	Dry/No Odor
	4	123.7	74.8	48.9	Moist to Wet/No Odor
	5	NS	—	NS	Refusal at 4' bls
SB-52	1	0.0	—	0.0	Dry / No Odor
	2	0.0	—	0.0	Dry/No Odor
Soil Sample	3	54.8	55.6	—	Dry/No Odor
	4	1.0	—	1.0	Moist/No Odor
	5	NS	7.8	NS	Refusal at 4' bls
SB-53	1	0	—	0	Dry / No Odor
	2	0	—	0	Dry/No Odor
	3	0	—	0	Dry/No Odor
	4	NS	—	NS	Refusal at 3.5' bls
	5	NS	—	NS	—
SB-54	1	0	—	0	Dry
	2	NS	—	NS	Refusal at 1' bls
	3	NS	—	NS	—
	4	NS	—	NS	—
	5	NS	—	NS	—
SB-55	1	NS	—	NS	—
	2	NS	—	NS	—
	3	NS	—	NS	—
	4	NS	—	NS	—
	5	NS	—	NS	—

1 - feet below land surface (bls)
2 - parts per million
3 - NS = No Sample

WELL NO.	MW-1			MW-2			MW-3			MW-4		
DIAMETER	1-INCH			1-INCH			2-INCH			2-INCH		
WELL DEPTH (FEET)	NM			NM			NM			NM		
SCREEN INTERVAL (FEET)	NM			NM			NM			NM		
TOC ELEVATION	NM			NM			NM			NM		
DATE	SU	DTW	FP	SU	DTW	FP	SU	DTW	FP	SU	DTW	FP
January 21, 2009	2.57	10.23	2.42	2.47	8.16	NM	NM	NM	NM	NM	NM	NM
January 28, 2009	2.57	9.75	1.95	2.47	8.28	NM	2.37	8.40	0.60	3.35	9.82	NM
February 3, 2009	2.57	9.80	2.22	2.47	7.06	NM	2.37	7.14	NM	3.35	7.70	NM

WELL NO.	MW-5			MW4-06								
DIAMETER	2-INCH			2-inch								
WELL DEPTH	10.21			11.75								
SCREEN INTERVAL	NM			NM								
TOC ELEVATION	NM			NM								
DATE	SU	DTW	FP	ELEV	DTW	FP	ELEV	DTW	FP	ELEV	DTW	FP
January 21, 2009	2.00	7.91	NM									
January 28, 2009	2.00	8.23	NM									
February 3, 2009	2.00	6.70	NM									
March 25, 2009					10.53	1.31						

Notes = SU is for Stick Up Well Measurement to Land Surface, NM = Not Measured
Elevations are in Feet
No Data = Blank

GCTL		1	40	30	20	20	14	28	28	5000
NADC		**100**	**400**	**300**	**200**	**200**	**140**	**280**	**280**	**50000**
TMW-1	02/03/2009	8.5	9	92	160	24	**220**	**340**	270	NA
TMW-2	02/03/2009	24	3.7	250	**770**	<0.5K	NA	NA	NA	NA
TMW-3	01/28/2009	0.99	BDL	0.23	BDL	BDL	BDL	BDL	BDL	NA
TMW-4	03/26/2009	**17**	BDL	**48**	**27**	2.7	**35**	**35**	**54**	NA

Notes:

1) All sample concentrations are reported in ug/L, unless otherwise indicated

2) BDL = Below Laboratory Detection Limits

3) "Highlighted" concentrations are over No Further Action (NFA) limits.

4) "**Bold**" concentrations are over Natural Attenuation (NA) limits.

5) NA = Not Available or Applicable

6) TMW-1 exhibited limited free-product, TMW-2 free-product noted

APPENDIX A
Geologic Profiles/Groundwater Sampling Logs
Applicable OVA and Meter Calibration Sheets

Peterson Environmental, Inc.
Environmental Equipment Rental
Supplies & Service

ph # 813-871-2626
fax# 813-871-1366

Certificate of Calibration

Instrument: MicroFid

Serial Number: CZNK304

Date: 1/20/2009

Standard	Reading
Ambient Air	0.0ppm
10ppm Methane	
100ppm Methane	
500ppm Methane	500.7ppm
1,000ppm Methane	
10,000 Methane	
100ppm Isobutylene	
5% CO2	
15% CO2	
(2.5% vol.) Methane 50%LEL	
(15% vol.) Methane 300%LEL	
100ppm CO	
Zero O2	

Calibrated By: B Anderson

Peterson Environmental, Inc.
Environmental Equipment Rental
Supplies & Service

ph # 813-871-2626
fax# 813-871-1366

Certificate of Calibration

Instrument: MicroFid

Serial Number: CZNK304

Date: 1/22/2009

Standard	Reading
Ambient Air	0.2ppm
10ppm Methane	
100ppm Methane	
500ppm Methane	501.4ppm
1,000ppm Methane	
10,000 Methane	
100ppm Isobutylene	
5% CO2	
15% CO2	
(2.5% vol.) Methane 50%LEL	
(15% vol.) Methane 300%LEL	
100ppm CO	
Zero O2	

Calibrated By: B Anderson

Florida Department of Environmental Protection - Division of Waste Management - Bureau of Petroleum Storage Systems

BORING LOG

Page 1 of _____

Boring/Well Number: SB-01	Permit Number: N/A	FDEP Facility Identification Number:
Site Name: Transmontaigne/N. Dock Street 16" Water Line Installation	Borehole Start Date: 01/2/2009 End Date: 01/2/2009	Borehole Start Time: 0845 ☑ AM ☐ PM End Time: 0900 ☑ AM ☐ PM
Environmental Contractor: GLE Associates	Geologist's Name: —	Environmental Technician's Name: M. Madonna / D. Delgado
Drilling Company: N/A	Pavement Thickness (inches): N/A	Borehole Diameter (inches): 3 Inch Hand Auger
Borehole Depth (feet): 6		
Drilling Method(s): Hand Auger	Apparent Borehole DTW (in feet from soil moisture content): 6'	Measured Well DTW (in feet after water recharges in well):
OVA (list model and check type): ☑ FID ☐ PID		

Disposition of Drill Cuttings [check method(s)]: ☐ Drum ☐ Spread ☑ Backfill ☐ Stockpile ☐ Other

(describe if other or multiple items are checked):

Borehole Completion (check one): ☐ Well ☐ Grout ☐ Bentonite ☑ Backfill ☐ Other (describe)

Sample Type	Sample Depth Interval (feet)	Sample Recovery (inches)	SPT Blows (per six inches)	Unfiltered OVA	Filtered OVA	Net OVA	Depth (feet)	Sample Description (include grain size based on USCS, odors, staining, and other remarks)	USCS Symbol	Moisture Content	Lab Soil and Groundwater Samples (list sample number and depth or temporary screen interval)
HA	1			Ø	—	Ø	1	Backfill material Brown fine sand		D	no odor
HA	2			Ø	—	Ø	2	Brown/tan fine sand		D	
HA	3			Ø	—	Ø	3			D	
HA	4			Ø	—	Ø	4			D	
HA	5			Ø	—	Ø	5	Brown/tan silty sand		M	
HA	6			Ø	—	Ø	6	Dark brown silty sand		W	
							7				
							8				
							9				
							10				
							11				
DP							12				

Sample Type Codes: PH = Post Hole; HA = Hand Auger; SS = Split Spoon; ST = Shelby Tube; DP = Direct Push; SC = Sonic Core; DC = Drill Cuttings

Moisture Content Codes: D = Dry; M = Moist; W = Wet; S = Saturated

Florida Department of Environmental Protection - Division of Waste Management - Bureau of Petroleum Storage Systems

BORING LOG

Boring/Well Number: SB-02	Permit Number: N/A	FDEP Facility Identification Number:
Site Name: Transmontaigne/N. Dock Street 16" Water Line Installation	Borehole Start Date: 01/ /2009 End Date: 01/ /2009	Borehole Start Time: 0905 ☑ AM ☐ PM End Time: 0923 ☐ AM ☐ PM
Environmental Contractor: GLE Associates	Geologist's Name: —	Environmental Technician's Name: M. Madonna / D. Delgado
Drilling Company: NA	Pavement Thickness (inches): NA	Borehole Diameter (inches): 3 Inch Hand Auger
Borehole Depth (feet): 6'		
Drilling Method(s): Hand Auger	Apparent Borehole DTW (in feet from soil moisture content): 5'	Measured Well DTW (in feet after water recharges in well):
OVA (list model and check type): ☑ FID ☐ PID		

Disposition of Drill Cuttings [check method(s)]: ☐ Drum ☐ Spread ☐ Backfill ☐ Stockpile ☐ Other

(describe if other or multiple items are checked):

Borehole Completion (check one): ☐ Well ☐ Grout ☐ Bentonite ☐ Backfill ☐ Other (describe)

Sample Type	Sample Depth Interval (feet)	Sample Recovery (inches)	SPT Blows (per six inches)	Unfiltered OVA	Filtered OVA	Net OVA	Depth (feet)	Sample Description (include grain size based on USCS, odors, staining, and other remarks)	USCS Symbol	Moisture Content	Lab Soil and Groundwater Samples (list sample number and depth or temporary screen interval)
HA	1			Ø	—	Ø	1	Grass Tan/orange fine sand		D	no odors
HA	2			Ø	—	Ø	2			D	
HA	3			Ø	—	Ø	3			D	
HA	4			Ø	—	Ø	4	Grey silty sand		M	
HA	5			Ø	—	Ø	5	Dark brown silty sand		W	
HA	6			Ø	—	Ø	6	Dark brown silty sand		W	
							7				
							8				
							9				
							10				
							11				
DP							12				

Sample Type Codes: PH = Post Hole; HA = Hand Auger; SS = Split Spoon; ST = Shelby Tube; DP = Direct Push; SC = Sonic Core; DC = Drill Cuttings

Moisture Content Codes: D = Dry; M = Moist; W = Wet; S = Saturated

Florida Department of Environmental Protection - Division of Waste Management - Bureau of Petroleum Storage Systems

BORING LOG

Boring/Well Number: SB-03	Permit Number: N/A		FDEP Facility Identification Number:
Site Name: Transmontaigne/N. Dock Street 16" Water Line Installation	Borehole Start Date: 01/21/2009 End Date: 01/21/2009	Borehole Start Time: 0925 ☑ AM ☐ PM End Time: 0949 ☑ AM ☐ PM	
Environmental Contractor: GLE Associates	Geologist's Name: —		Environmental Technician's Name: M. Madonna / D. Delgado
Drilling Company: NA	Pavement Thickness (inches): NA	Borehole Diameter (inches): 3 Inch Hand Auger	Borehole Depth (feet): 6'
Drilling Method(s): Hand Auger	Apparent Borehole DTW (in feet from soil moisture content): 6'	Measured Well DTW (in feet after water recharges in well):	OVA (list model and check type): ☑ FID ☐ PID

Disposition of Drill Cuttings [check method(s)]: ☐ Drum ☐ Spread ☑ Backfill ☐ Stockpile ☐ Other

(describe if other or multiple items are checked):

Borehole Completion (check one): ☐ Well ☐ Grout ☐ Bentonite ☑ Backfill ☐ Other (describe)

Sample Type	Sample Depth Interval (feet)	Sample Recovery (inches)	SPT Blows (per six inches)	Unfiltered OVA	Filtered OVA	Net OVA	Depth (feet)	Sample Description (include grain size based on USCS, odors, staining, and other remarks)	USCS Symbol	Moisture Content	Lab Soil and Groundwater Samples (list sample number and depth or temporary screen interval)
HA	1			Ø	–	Ø	1	Grass Light brown fine sand		D	no odor
HA	2			Ø	–	Ø	2				
HA	3			Ø	–	Ø	3				
HA	4			Ø	–	Ø	4	Lite Brown fine Sand some Rocks		D	No Odor
HA	5			Ø	–	Ø	5	Grey silty clayey sand Dark brown Sand		M	no odor
HA	6			Ø	–	Ø	6	Grey/brown fine sand		W	no odor
							7	with roots.			
							8				
							9				
							10				
							11				
DP							12				

Sample Type Codes: PH = Post Hole; HA = Hand Auger; SS = Split Spoon; ST = Shelby Tube; DP = Direct Push; SC = Sonic Core; DC = Drill Cuttings

Moisture Content Codes: D = Dry; M = Moist; W = Wet; S = Saturated

Florida Department of Environmental Protection - Division of Waste Management - Bureau of Petroleum Storage Systems

BORING LOG

Page 1 of _____

Boring/Well Number: SB- 04	Permit Number: N/A	FDEP Facility Identification Number:
Site Name: Transmontaigne/N. Dock Street 16" Water Line Installation	Borehole Start Date: 01/ /2009 End Date: 01/ /2009	Borehole Start Time: 0952 ☑ AM ☐ PM End Time: 1005 ☐ AM ☐ PM
Environmental Contractor: GLE Associates	Geologist's Name: —	Environmental Technician's Name: M. Madonna / D. Delgado
Drilling Company: NA	Pavement Thickness (inches): NA	Borehole Diameter (inches): 3 Inch Hand Auger
Borehole Depth (feet): 2		
Drilling Method(s): Hand Auger	Apparent Borehole DTW (in feet from soil moisture content): NA	Measured Well DTW (in feet after water recharges in well):
OVA (list model and check type): ☑ FID ☐ PID		

Disposition of Drill Cuttings [check method(s)]: ☐ Drum ☐ Spread ☑ Backfill ☐ Stockpile ☐ Other

(describe if other or multiple items are checked):

Borehole Completion (check one): ☐ Well ☐ Grout ☐ Bentonite ☑ Backfill ☐ Other (describe)

Sample Type	Sample Depth Interval (feet)	Sample Recovery (inches)	SPT Blows (per six inches)	Unfiltered OVA	Filtered OVA	Net OVA	Depth (feet)	Sample Description (Include grain size based on USCS, odors, staining, and other remarks)	USCS Symbol	Moisture Content	Lab Soil and Groundwater Samples (list sample number and depth or temporary screen interval)
HA	1			0	—	0	1	Grass Tan fine sand w/ filling material/rocks		D	no odor
HA	2						2				
HA	3						3				
HA	4						4				
HA	5						5				
HA	6						6				
							7				
							8				
							9				
							10				
							11				
DP							12				

Sample Type Codes: PH = Post Hole; HA = Hand Auger; SS = Split Spoon; ST = Shelby Tube; DP = Direct Push; SC = Sonic Core; DC = Drill Cuttings

Moisture Content Codes: D = Dry; M = Moist; W = Wet; S = Saturated

SITE SPECIFIC HEALTH AND SAFETY PLAN

FOR
PORT MANATEE
16 INCH WATERLINE INSTALLATION
ALONG NORTH DOCK STREET

Project # 6012570

1.0 Introduction

1.1 Objective and Scope

The purpose of this Health and Safety Plan (HASP) is to address the potential hazards involved with the petroleum contamination exposure of the project personnel during the installation of the 16" waterline along North Dock Street in the specific area of TransMontaigne Partners LP Co. (TLP). The HASP will establish health and safety guidelines to be used during the waterline installation activities. Due to specific site conditions the potential exists for petroleum contamination to be encountered, over an approx. length of 500 ft in front of TLP and to the west of the drive entrance, during construction activities including impacted soil and groundwater.

1.2 Site Location and Background

The waterline installation of 16" DIP activities are proposed in the area of existing waterlines located parallel to North Dock Street to the intersection of Eastern Ave just west of TLP. The existing waterlines and proposed installation activities will be conducted in close proximity to the south of the TLP facility.

During the field assessment activities conducted in January 2009, by GLE along North Dock Street the entire length of the TLC facility was tested for petroleum impacted soil and free product was documented within onsite monitoring wells. In addition, GLE documented free product in temporary groundwater monitoring wells in the area west of the entrance to TLP. GLE issued an Environmental Site Assessment (ESA) report documenting the location of both impacted soils and free product.

2.0 Assignment of HASP Responsibility

2.1 The following describes the health and safety designations and general responsibilities, which shall be implemented for the specific construction zone in front of TLP. All construction personnel shall adhere to these HASP procedures during the performance of their work. Each person is responsible for completing tasks safely and reporting unsafe acts/ conditions to his immediate supervisor.

2.2 On-site hazards include chemical hazards in the TPL area. The contaminants of concern at the site are petroleum products; specifically benzene, arsenic, cadmium, chromium, and petrochemical fuels. Both specific chemicals and metals in the ground soil and ground water sample analysis results are presented in the GLE ESA. These products can affect the body if inhaled, come in contact with the eyes or skin, or are ingested. These materials may be released during soil intrusive activities or the de-watering activities. The primary concern is for skin exposure and inhalation exposure to contaminated soils.

2.3 Atmospheric monitoring by FID/OVA/PID will be conducted by GLE, an environmental consultant, which has been contracted by Manatee County for the monitoring and handling of these specific contaminations. GLE will be on site during soil intrusive activates in the specific area along TLP using multi-gas monitoring devices to perform ambient monitoring during the waterline installation activities. GLE is not in charge of job site safety and/or the contractors' and their staff employees' monitoring during the installation activities in order to meet the Occupational Safety and Health Association (OSHA) requirements.

2.4 De-watering activities are anticipated during the construction activities. The 16" DIP depth has been reduced to 3' in the specific area along TLP and construction will be performed during the fall dry season to minimize any de-watering. Free product was identified in the area west of the entrance to TLP. A groundwater mobile treatment system will be utilized to segregate the free product from the groundwater by a licensed contractor, as needed. The dissolved phase groundwater contamination will be processed through the mobile treatment system (if needed) prior to subsequent discharge through an applicable means (NPDES permit, Sanitary Sewer permit) pending regulatory and County utility approval. GLE will submit the permit application to obtain the NPDES permit for Manatee County, and will be managing the groundwater mobile treatment system only in those areas with free product or where petroleum impacted groundwater is encountered.

2.5 The following protocols shall be utilized during all site work when additional petroleum contamination is suspected through noticeable odors, or visual indications:

- 2.5.1 Halt work immediately
- 2.5.2 Report the suspected condition to immediate supervisor
- 2.5.3 Perform ambient monitoring (by GLE) to confirm contamination

2.6 Table 1 presents the actions and suggested safety measures to be considered during construction in the contaminated area along 500' in front of TLP and the J&B area at Eastern Ave.

Table 1
Contaminated Soil Safety And Control Measures

Task	Hazards	Safety Measures	Control Measures
Discovery of Petroleum Contaminated Soils	Dermal contact Inhalation[1] Operation of heavy equip. Toxic / explosive atmospheres	Use of PPE Monitoring, respiratory protection Emergency shut-off for spark hazard & Continuous monitoring / use of sparkless/grounded equip.	Proceed with caution.
Excavation Trenching Augering Sampling	Dermal contact Inhalation Operation of heavy equip. Toxic / explosive atmospheres	Use of PPE Monitoring, respiratory protection Emergency shut-off for spark hazard & Continuous monitoring / use of sparkless/grounded equip.	Any trenching, excavating, or other soil-intrusive activities performed within a contaminated area shall be performed in conjunction with temporary soil containment and soil stockpiling, as necessary.
Soil Stockpiling	Dermal contact Inhalation contact Operation of heavy equip. Toxic / explosive atmospheres	Use of PPE Monitoring, respiratory protection Emergency shut-off for spark hazard Continuous monitoring / use of sparkless/grounded equipment	Stockpiling of contaminated soils on the site such that no further contamination occurs prior to removal for treatment /disposal may occur. Security of the stockpile is needed to prevent unauthorized access and exposure. Soil stockpiling shall take place in a pre-determined and prepared impervious area prepared with two layers of 6-mil plastic sheeting. The area should be prepared with sufficient berming to prevent run-off from any possible saturated soils in the stockpile. The pile shall be covered daily, or immediately in the event of rain, with 6-mil plastic sheeting. The cover layer of plastic shall be securely fastened down to prevent unplanned removal due to weather conditions. Sheeting shall be repaired with duct tape. Stockpiled soils should be removed from the site for treatment /disposal at frequent intervals, and shall not be stored on-site for more than 25 days.

2.7 Table 2 presents the actions and suggested safety measures to be considered during construction associated with the management of free product during the dewatering along 500' in front of TLP and at the J&B area at Eastern Ave.

Table 2 Free Product Safety And Control Measures			
Task	Hazards	Safety Measures	Control Measures
Free Product Recovery	Dermal contact Inhalation [1] Operation of heavy equip. Toxic / explosive atmospheres	Use of PPE[2] Monitoring, respiratory protection Emergency shut-off for spark hazard & Continuous monitoring / use of sparkless/grounded equipment	Bailing, pumping, and use of adsorbent booms, pads and other materials. Care should be taken to avoid the recovery of groundwater, as much as possible. Six-mil plastic sheeting shall be utilized as necessary around the free product recovery area to prevent contamination of previously uncontaminated soils, ground cover and equipment.
Recovered Free Product Containment within 55 gallon drums	Dermal contact Inhalation Operation of heavy equip. Toxic / explosive atmospheres	Use of PPE Monitoring, respiratory protection Emergency shut-off for spark hazard & Continuous monitoring / use of sparkless/grounded equipment	A de-watering system will be installed. Free product and dissolved phase petroleum impacted groundwater shall be separated, for disposal purposes. Recovered free product is to be contained in DOT-approved, frac tank or 55 gallon drums, which will be staged onsite in an appropriate location associated with a mobile treatment system. Clark environmental will be contracted for the transport and disposal of free product generated during the installation activities.
Recovered Free Product Container Labeling/ Storage/ Disposal	Dermal contact Inhalation Toxic / explosive atmospheres	Use of PPE Monitoring, respiratory protection Continuous monitoring / use of sparkless/grounded equipment	Recovered free product will be stored in an appropriate volume container or in 55-gallon drums located at the site. Any adsorbent material drums shall be stored in a pre-determined storage location, which provides security from contact with non-project personnel and is located on an impervious surface. Drums shall be labeled with the information. Storage shall be limited to 25 days on-site.

2.8 Ambient Monitoring of Organic vapors/aromatic compounds associated with contaminated soil.
Organic vapors/aromatic compounds may have an adverse health impact, which may be present in petrochemical fuels. The construction contractor will be responsible for having MSDS sheets for these various compounds, which are listed in the ESA report.

2.9 Personnel Protective Equipment
The protective clothing and equipment indicated below shall be considered the minimum for project personnel taking part in activities which create the potential for exposure to suspected or known contamination. These items are selected to reduce the potential for exposure, and are divided into four categories, which are designated as Levels A, B, C and D.

LEVEL D Involves some form of skin protection, but no respiratory protection:

- Coveralls or long pants
- Hard hat
- Chemical-resistant gloves
- Chemical-resistant, steel-toed safety boots/shoes
- Safety glasses

LEVEL C Involves level D +skin protection, and a low-level of respiratory protection:

- Full or half-face air-purifying, canister-equipped respirator
- Non-permeable gloves

LEVEL B Involves level C + increased level of skin protection, and level of respiratory protection:

- Pressure-demand full-face SCBA, or pressure-demand supplied-air respirator with escape SCBA
- Coveralls or long pants, and long sleeves, or disposable chemical resistant one-piece suit with hood
- Inner and outer chemical-resistant gloves

LEVEL A Involves level B +increased level of skin protection, and level of respiratory protection:

- Fully-encapsulating, chemical-resistant suit
- Two-way radio communications

2.10 Contamination control zones

Contamination control zones are maintained to prevent the spread of contamination and to prevent unauthorized people from entering hazardous areas in front of TPL. The construction Forman will be responsible for designation of the control zones in the area of TPL, as necessary.

2.10.1 Exclusion Zone (EZ) Consists of the specific entire area of suspected contamination. All employees entering the EZ must use the required personal protective equipment and will have the appropriate training for hazardous waste work. The EZ is the defined area where there is a possible respiratory and/or contact health hazard. The location of each exclusion zone will be identified by cones or other appropriate means.

2.10.2 Contamination Reduction Zone *(CRZ)* this transition area will be established if necessary to perform decontamination of personnel and equipment. All personnel entering or leaving the EZ will pass through this area to prevent any cross-contamination. Tools and any equipment or machinery will be decontaminated in a specific location. The decontamination of all personnel will be performed on site adjacent to the exclusion zone. Personal protective outer garments and respiratory protection will be removed in the CRZ and prepared for cleaning or disposal. This zone is the only appropriate corridor between the EZ and the SZ.

2.10.3 Support Zone *(SZ) This is a clean area outside the CRZ located to prevent employee exposure to hazardous substances. Eating, drinking, or smoking will be permitted in the support area only after face and hands have been washed.*

2.10.4 Decontamination General Rules All personnel working in the contaminated zone must undergo personal decontamination prior to entering the support zone. The personnel decontamination area will consist of the following stations:

Station 1: Personnel leaving the contaminated zone will remove the gross contamination from their outer clothing and boots.

Station 2: Personnel will remove their outer garment and gloves and deposit them in the lined waste receptacles. Personnel will wipe their respirators (if used), hard hats, and boots with clean, damp cloths and then remove those items. Those items are then hand carried to the next station.

Station 3: Personnel will thoroughly wash their hands and face before leaving the decontamination zone. Respirators will be sanitized and then placed in a clean plastic ziplock bag.

3.0 Emergency medical treatment and contingency planning

3.1 **First Aid - General**

- Survey the scene. Determine if it is safe to proceed. Protect yourself from exposure before attempting to rescue the victim.
- Do a primary survey of the victim. Check for airway obstruction, breathlessness, and pulse. Assess likely routes of chemical exposure by examining the eyes, mouth, nose, and skin of the victim for symptoms.
- Phone Emergency Medical Services (EMS). Give the location, telephone number used, caller's name, what happened, number of victims, victims' condition, and help being given.
- Perform rescue breathing as necessary.
- Perform cardiopulmonary resuscitation (CPR) as necessary.
- Do a secondary survey of the victim. Check vital signs and do a head-to-toe exam.
- Treat other conditions as necessary. If the victim can be moved, take him to a location away from the work area where EMS can gain access.

3.2 First Aid - Inhalation

Any employee complaining of symptoms of chemical overexposure will be removed from the work area and transported to the designated medical facility for examination and treatment.

3.3 First Aid - Ingestion

Call EMS and consult a poison control center for advice. If available, refer to the MSDS for information on inducing vomiting, if recommended. If unconscious, keep the victim on his side and clear the airway if vomiting occurs.

3.4 First Aid - Skin Contact

Project personnel who have had skin contact with contaminants will, unless the contact is severe, proceed through the decontamination zone, to the wash-up area. Personnel will remove any contaminated clothing, and then wash the affected area with water for at least 15 minutes. The worker should be transported to the medical facility listed below, if they show any sign of skin reddening, irritation, or if they request a medical examination.

3.5 First Aid - Eye Contact

Project personnel who have had contaminants splashed in their eyes or who have experienced eye irritation while in the contaminated zone must immediately proceed to the eyewash station, set up in the decontamination zone. Do not decontaminate prior to using the eyewash. Remove whatever protective clothing is necessary to use the eyewash. Flush the eye with clean running water for at least 15 minutes. Arrange prompt transport to the designated medical facility.

UNIVERSAL
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GEOTECHNICAL EXPLORATION
16" WATER MAIN REPLACEMENT
PORT MANATEE – NORTH DOCK STREET
MANATEE COUNTY, FLORIDA
MANATEE COUNTY PROJECT NO.: 404-6012570

March 26, 2009

Project No.: 1130.0900012
Report No: 9083

Prepared By:
Universal Engineering Sciences, Inc.
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March 26, 2009

Manatee County Government
Public Works Department
Project Management Division
1022 26th Ave. East
Bradenton, FL 34208

Attention: Mr. Paul Schamell, Project Manager

Reference: **GEOTECHNICAL EXPLORATION**
16" Water Main Replacement
Port Manatee – North Dock Street
Manatee County, Florida
MANATEE COUNTY PROJECT NO.: 404-6012570
UES Project No.: 1130.0900012
UES Report No.: 9083

Dear Mr. Schamell:

Universal Engineering Sciences, Inc. (UES) has completed the geotechnical exploration and engineering evaluation for the proposed 16 inch Water Main project at Port Manatee along North Dock Street in Manatee County, Florida.

In this report, we present the results of our field and laboratory explorations for the Water Main project and an engineering evaluation of the subsurface conditions with respect to the proposed construction.

If you have any questions concerning this report or if we can be of any further assistance in the interim, please do not hesitate to contact this office.

Respectfully submitted,

UNIVERSAL ENGINEERING SCIENCES, INC.
Certificate of Authorization Number 549

Robert Gomez, P.E. #58348
Branch Manager

RG/AJ:

3cc: Client

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1.0 INTRODUCTION

1.1 GENERAL

In this report, we present the results of the subsurface exploration for the proposed Water Main project located on North Dock Street at Port Manatee in Manatee County, Florida. Specifically, the project is located within Section 1, Township 33 South and Range 17E in Manatee County, Florida. A general location plan of the project area appears in Appendix A: Site Location Plan. We have divided this report into the following sections.

1.0 Introduction - Defines what we did

2.0 Exploration Procedures - Describes how we did it

3.0 Findings - Describes what we encountered

4.0 Recommendations - Describes what we encourage you to do

5.0 Limitations - Describes the restrictions inherent in this report

Appendices - Presents support materials referenced in this report

1.2 PROJECT DESCRIPTION

A set of project plans was provided for this report showing the plan and profiles of the proposed water main construction limits. The project under consideration will involve the replacement of a water line along North Dock Street at Port Manatee in Manatee County. The water line will include a16-inch diameter pipe to be installed using Jack and Bore construction and open cuts excavation.

Our recommendations are based upon the above considerations and the results of our explorations. If any of this information is incorrect or if you anticipate any changes inform Universal Engineering Sciences so that we may review our recommendations.

1.3 PURPOSE AND SCOPE

The purposes of this exploration were:

- to explore the general subsurface soil conditions along the roadway;
- to interpret and review the subsurface soil conditions with respect to the proposed construction; and
- to provide geotechnical recommendations for the proposed water main construction.

This study was generally conducted according to the guidelines set forth in the Florida Department of Transportation Soil and Foundation Manual.

This report presents an evaluation of site conditions on the basis of traditional geotechnical

procedures for site characterization. The recovered soil samples were not examined, either visually or analytically for chemical composition or environmental hazards.

2.0 EXPLORATION PROCEDURES

2.1 FIELD EXPLORATION

We explored the subsurface conditions at the Jack and Bore locations along North Dock Street with fourteen (14) SPT soil test borings to a depth of 15 feet.

We performed the Standard Penetration Test continuously in each of the borings according to the procedures of ASTM D-1586. The basic procedure for the Standard Penetration Test is as follows: A standard split-barrel sampler is driven into the soil by a 140-pound hammer falling 30 inches. The number of blows required to drive the sampler 1-foot, after seating 6 inches, is designated the penetration resistance, or N-value; this value is an index to soil strength and consistency.

Jar samples of the soils encountered will be held in our laboratory for you inspection for 60 days unless we are notified otherwise.

The borings were field located by Universal Engineering Sciences, Inc. based on the project plans with stationing information, measured and estimated distances, and relationships to obvious landmarks.

2.2 LABORATORY INVESTIGATION

The soil samples recovered from the soil test borings were returned to our office and then a geotechnical engineering staff member visually examined and reviewed the field descriptions. We selected representative soil samples for laboratory testing consisting of 10 Sieve Analysis tests, 13 Moisture Content tests, 4 Atterberg Limits and 1 Modified Proctor tests. We performed these tests to aid in classifying the soils and to help evaluate the general engineering characteristics of the site soils.

The results of the laboratory investigation program completed are enclosed in Appendix B.

3.0 FINDINGS

3.1 SURFACE CONDITIONS

A Universal Engineering Sciences representative performed a visual site inspection of the property to gain a "hands-on" familiarity with the project area.

The overall roadway alignment along the shoulders where the replacement water line will be installed is relatively flat. Based on topographic information from the plans, the existing ground surface elevation along the alignment where the borings were drilled generally ranges from around +6 to +10 feet N.G.V.D. In general, North Dock Street and the other intersecting roads consist of grassed areas along the road shoulders.

3.2 SOIL SURVEY INFORMATION

We examined the U.S.D.A. Soil Conservation Service (SCS) Soil Survey of Manatee County fo

relevant information about the roadway project. The Manatee County Soil Survey identifies one (1) predominant soil type along the general roadway alignment, as further described in Table 1 (USDA Soil Conservation Service, 1983). Note that we also provided site specific estimate of the seasonal groundwater level in Section 4.1 of this report.

TABLE 1, USDA Soil Conservation Service Soil Classification

Soil No.	Name	Drainage Characteristics	Hydrologic Group	Seasonal High Water Table
20	EauGallie	Poorly Drained	B/D	0 – 1.0 feet within existing ground surface

3.3 SUBSURFACE CONDITIONS

The detailed subsurface conditions encountered during our field explorations are illustrated in Appendix C: Boring Logs. The locations of borings have been identified by station number on the individual boring logs. The classifications and descriptions shown on the logs are generally based upon visual characterizations of the recovered soils samples and a limited number of laboratory tests.

Variations in the depth thickness, classification, and consistency of the subsurface soils occurred along the alignment at the individual test boring locations. The following generalized soil profile is intended to provide an overview of the soil conditions encountered. The individual Boring Logs should be consulted for specific soil and groundwater related information along the alignment.

Table 2: Generalized Soil Profile, summarizes the soil strata encountered.

TABLE 2
Generalized Soil Profile

Typical Depth (ft)	Soil Descriptions
0 – 2.5	Medium dense and loose brown and gray fine SAND and fine SAND with varying amounts of clay [SP, SP-SC]
2.5 – 5.5	Medium dense fine clayey SAND and fine SAND with trace silt [SC, SP-SM]
5.5 – 8	Medium dense and loose silty fine SAND, clayey SAND and clay with trace of rock fragments and shell [SC, CL, SM]
8 – 15*	Medium dense and loose fine SAND with trace of silt and SAND with trace of shell fragments and trace of rock fragments [SP-SM, SC]
*	**Termination of Deepest Boring**
[ ]	**Bracketed Text Indicates USCS Classification**

We encountered groundwater at depths varying from 3.5 to 9 feet below existing grade at the boring locations at the time of our exploration.

4.0 RECOMMENDATIONS

The following recommendations are based upon a review of the attached soil tests data, our understanding of the proposed construction, and experience with similar projects and subsurface conditions. If the roadway alignment or grading plans change from those discussed previously, we request the opportunity to review and possibly amend our recommendations with respect to those changes.

Additionally, if subsurface conditions are encountered during construction, which were not encountered in the borings, report those conditions immediately to us for observation and recommendations.

In this section of the report, we present our detailed recommendations for:

- **Groundwater Control**
- **Roadway Embankment**
- **Water Main Construction**

4.1 GROUNDWATER CONTROL

The groundwater table will fluctuate seasonally depending upon local rainfall. The normal seasonal high groundwater level typically occurs in the August-September period at the end of the rainy season. The seasonal high groundwater level is affected by a number of factors, such as drainage characteristics of the soils; land surface elevation, relief points (i.e. drainage ditches, lakes, rivers, swampy areas) and distance to relief points.

Several other factors influence the determination of the seasonal high water table (SHWT). When soils are subjected to alternating cycles of saturation and drying, discoloration or staining that is not part of the dominant soil color occurs. This is called mottling, and manifests itself in various shades of gray, brown, red or yellow. There are numerous processes that lead to this discoloration, including mineral accretions, oxidation, and bacteria growth within the soil. The presence of this discoloration indicates that groundwater has, at some point in time, reached that elevation and remained there long enough to cause any or all of these processes to occur. The SHWT elevation is assumed to be the highest point at which mottling is observed regardless of whether water is present at the time of observation. This estimate is independent of the actual location of the groundwater table.

Based upon our visual inspection of the recovered soil samples, review of information obtained from the USDA soil survey of Manatee County, existing site conditions and our knowledge of local and regional hydrology, our best estimate is that the seasonal high groundwater level could be on the order of 1.5 to 2.0 feet below the existing grade at the testing boring locations, on average. Water could be temporarily ponded in the ditches and other low lying areas of the overall site especially during periods of heavy rainfall.

It should be noted that the estimated seasonal high groundwater levels do not provide any assurance that groundwater levels will not exceed those estimated levels during any given year in the future. Should impediments to surface water drainage exist on site, or should rainfall intensity and duration, or total rainfall quantities exceed normally anticipated rainfall quantities, groundwater levels may exceed our seasonal high estimates. Also, on-site and/or off-site surface water alterations and improvements can cause variations in seasonal high groundwater levels.

Temporary dewatering may be required during site preparation, initial embankment and fill placement in the lower lying slough or depressional areas along the alignment, particularly if construction takes place during the rainy season. Temporary dewatering will also likely be a construction consideration during drainage, and utility excavations. We recommend that the contract documents provide for determining the depth to the groundwater table just prior to construction and for any required remedial dewatering. In general, we recommend that the water surface be maintained at least 24 inches below all earthwork and compaction surfaces.

4.2 ROADWAY EMBANKMENT

We offer the following recommendations for site preparation and embankment construction for the roadway alignment where needed during construction.

4.2.1 Site Preparation

The following procedures should be followed to properly prepare the alignment area for roadway embankment construction.

1. If required, perform remedial dewatering prior to any earthwork operations.

2. Strip the proposed construction limits of all vegetation, roots, topsoil, existing improvements, debris and other deleterious materials within the limits of the pavement, shoulder, sidewalk, and other structural areas.

3. Proof-roll the subgrade with a heavily loaded, rubber-tired vehicle under the observation of a Universal Engineering Sciences' geotechnical engineer or his representative. Proof-rolling will help locate any zones of especially loose or soft soils not encountered in the soil test borings. Then undercut, or otherwise treat these zones as recommended by the engineer.

4. Proof-compact the subgrade from the surface by a vibratory roller until you obtain a minimum density of 100 percent of the standard Proctor maximum dry density (AASTHO T-99) to a depth of 1 foot below the existing site grade.

5. Test the subgrade for compaction at a frequency of not less than one test every 500 feet for each lane, shoulder, bike path, sidewall, curb or other structural area per foot of depth of improvement.

4.2.2 Embankment Materials and Construction

We recommend the construction of the roadway and associated embankments proceed according to F.D.O.T. Section 160. The fill material utilized should consist of clean sand with less than 5 percent soil fines. Fill materials with soil fines between 5 and 12 percent may be used when above the water table, so long as strict moisture control is applied (within 2% of optimum moisture). The fill material should be placed in uniform 10 to 12 inch loose lifts and compacted to 100 percent of the standard Proctor maximum dry density (AASHTO T-99). Field density tests should be performed on each layer of fill material at a frequency of one test for every 500 linear feet of construction for each lane or associated area.

The surficial soils at the site would generally be suitable for use in embankment construction. However, fill from off-site borrow sources will generally be required above existing grades along the majority of the alignment. The borrow soil placed within the stabilized subgrade layer must meet an LBR of 40 or will need to be stabilized after placement to achieve the minimum LBR value.

4.3 WATER MAIN CONSTRUCTION

Based on the project plan, the replacement Water Main will be placed about 7 to 14 feet below existing grades. In general, the soils at these levels are loose to medium dense fine sands and fine sands with trace of silt and clay and trace of shell fragments and rock fragments. These soils should be suitable for support of the planned utility improvements and for reuse as backfill. Some clay soils with high fine content were encountered at borings B-7, B-8, B-10, B-12 and B-13 between 6 and 9 feet. If re-used for backfill, these soils will need to be mixed with sandy soils to achieve proper moisture level and compaction. Soils excavated from below the water table may require spreading and drying prior to reuse to achieve moisture content sufficient to obtain the recommended degree of compaction. Further, any clayey sand type soils will require extensive aeration and drying prior to reuse.

4.3.1 Trench Excavation and Backfill Recommendations

The following are our recommendations for construction of the proposed utility improvements.

1. If deemed necessary by the contractor, install a dewatering system capable of maintaining a groundwater level at least 2 feet below bottom of pipe level.

2. After excavation to design invert elevations, the in-situ bedding soils should be compacted to at least 95 percent of the Modified Proctor test maximum dry density (ASTM D 1557) to a depth of 12 inches below the bedding level. Compaction in confined areas can probably be achieved using jumping jacks or light weight walk-behind vibratory sleds and/or rollers.

3. After constructing the utility lines, backfill with suitable sand fill placed in 6 to 8 inch loose lifts. Each lift should be compacted to at least 95 percent of the Modified Proctor test maximum dry density (ASTM D 1557). Beneath pavement areas, the top 12 inches of backfill should be compacted to at least 98 percent. Additionally, when/where applicable local jurisdictional compaction requirements should be followed when stricter than the recommendations herein.

4. If difficult compaction operations are encountered beneath the utilities due to excessive fines and/or wet conditions, saturated soils could be over-excavated and replaced with FDOT No. 57 stone.

5. Excavation work will be required to meet OSHA Excavation Standard Subpart P regulations, Type C Soils. Either a trench box, braced sheet pile structure or an excavation with temporary side slopes cut back at 1.5 horizontal to 1.0 vertical can be implemented. The side slope of 1.5 horizontal to 1.0 vertical is contingent upon the dewatering system adequately controlling slope seepage. Sheet piling should be designed according to OSHA sheeting and bracing requirements. We

recommend a Florida registered Professional Engineer design any required sheeting/bracing system.

6. Within Right-of-Way driveways connecting to FDOT or county roads, the local county authority criteria and requirements for trench backfill and compaction should govern the testing procedures.

4.3.2 Jack and Bore Discussion

It is our understanding that the proposed construction includes the installation of a 16-inch diameter water main along the road alignment. Portions of the water main pipe will be installed utilizing Jack and Bore (J&B) with steel casing ranging between 16 and 30 inches in diameter and lengths of 30 to 130 feet. The depth of the pipe is planned at 7 to 13 feet for the J&B construction.

UES performed soil test borings along the road alignment to evaluate the soil conditions and develop soil design parameters for the water main pipe installation and the J&B program. Based on the SPT soil test boring, the following Table 3 outlines the soil design parameters at different depths to aid in the construction/design of the J&B program.

Table 3
Estimated Soil Design Parameters

Depth (feet)	Saturated Unit Weight (pcf)	Buoyant Unit Weight (pcf)	Friction Angle (Phi)	Average SPT N-Value (ASTM D 1586)	Estimated Overburden Pressure at depth (psf)
0 – 6	116	53	34	12	700 @ 6'
6 – 10	114	51	30	9	900 @ 10'
10 – 15	116	53	32	12	1200 @ 15'

The J&B installation should be performed in accordance with FDOT Section 556: Jack and Bore of the Florida Department of Transportation, and Standard Specifications for Road and Bridge Construction, 2007. The project plans indicated steel casing size in the order of 16, 24 and 30 inches for lengths ranging between 7 and 13 feet. Per the FDOT specification, the size of the steel casing should be at least 6 inches larger than the largest outside diameter of the carrier.

Successful J&B program depends much on the soils type, depth of pipe, and contractor's operator experience. Typically, sandy soils with trace of silt and clay and clayey soils were encountered in the borings. Some trace of shell fragments and rock fragments were encountered below 6 feet in the borings. The soil borings did not encounter any hard rock or cemented material which would obstruct the J&B casing installation. It should be noted that the soil conditions between borings may vary.

The J&B contractor bidding this project should provide written confirmation that the drilling equipment proposed for use are suitable for the soil conditions and planned depths indicated. Further, we recommend a quality control program as specified in FDOT Section 556 for the J&B construction.

5.0 LIMITATIONS

During the early stages of most construction projects, geotechnical issues not addressed in this report may arise. Because of the natural limitations inherent in working with the subsurface, it is not possible for a geotechnical engineer to predict and address all possible problems. An Association of Engineering Firms Practicing in the Geosciences (ASFE) publication, "Important Information About Your Geotechnical Engineering Report" appears in Appendix E, and will help explain the nature of geotechnical issues.

Further, we present documents in Appendix D: Constraints and Restrictions, to bring to your attention the potential concerns and development and the basic limitations of a typical geotechnical report.

6.0 SUMMARY

In summary, we understand that you proposed to construct a new water main along North Dock Street at Port Manatee in Manatee County, Florida. We have performed field and laboratory exploration to provide geotechnical engineering recommendations for groundwater consideration and water main construction.

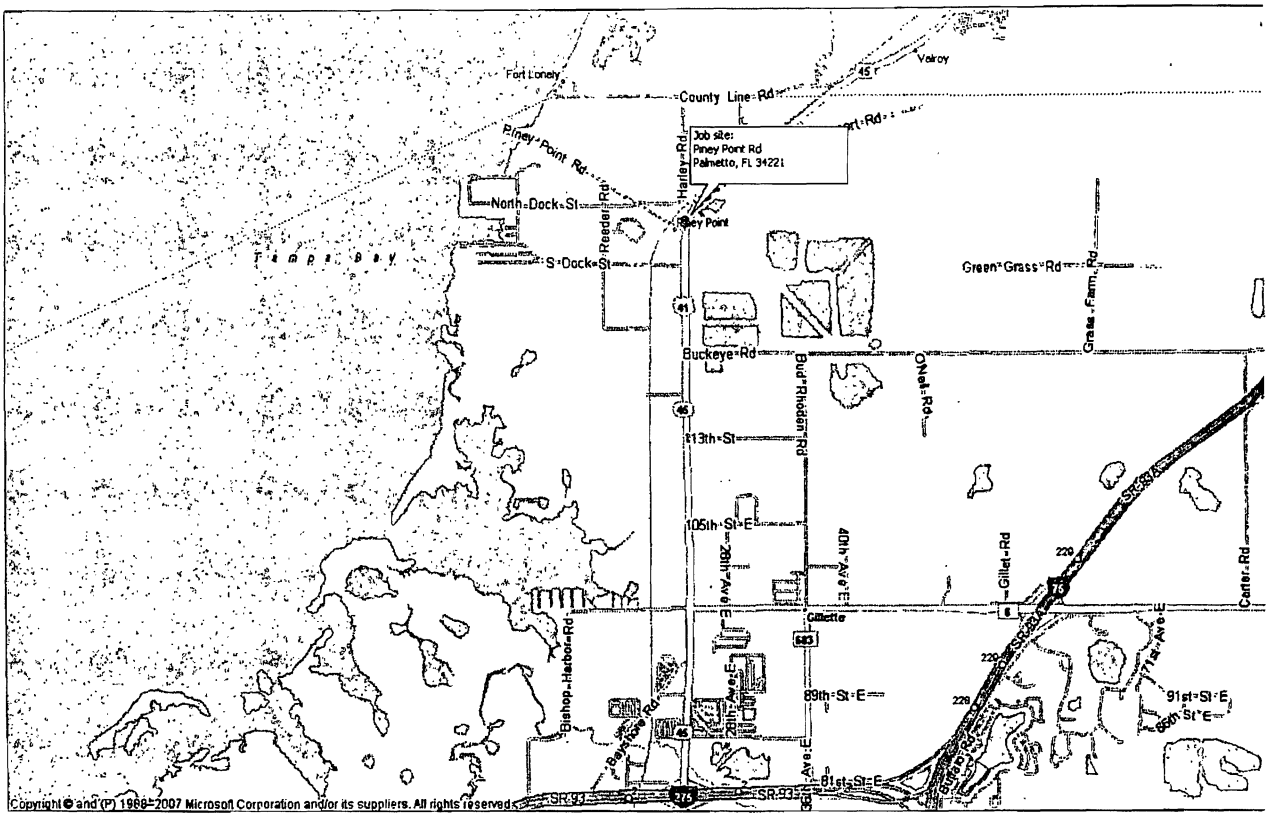
The soils encountered generally consist of loose, very loose and medium dense fine sand and fine sand with trace silt and clay from existing grade to depth of 10 feet. Below and extending to 15 feet, medium dense and loose silty sand with clay and trace of shell and rock fragments were encountered. We encountered groundwater at a depth of 3.5 to 9 feet below existing grade at the time of our exploration.

Our best estimate is the seasonal high groundwater table would be 1.5 to 2.0 feet below the average existing site grades. Water could be temporarily ponded in the ditches and other low lying areas of the overall site especially during periods of heavy rainfall.

Our soil borings did not encounter hard rock or cemented soils within the explored depth of 15 feet.

We hope this report meets your needs and discusses the problems associated with the proposed development. We would be pleased to meet you and discuss any geotechnical engineering aspects of the project.

APPENDICES



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PORT MANATEE 16" WATER LINE REPLACEMENT
NORTH DOCK STREET, PINEY POINT RD.
PALMETTO, FLORIDA

SITE LOCATION PLAN

DRAWN BY:	S.C	DATE:	MARCH. 2009	CHECKED BY:	R.G	DATE:	MARCH. 2009
SCALE:	NOT TO SCALE	PROJECT NO:	1130.0900012.0000	REPORT NO:	9083	APPENDIX:	

APPENDICES

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Site Location Plan

APPENDIX B

Summary Laboratory Test Results
Description of Testing Procedures

APPENDIX C

Boring Logs
Key to Boring Logs
Pavement Cores

APPENDIX D

Information About Your Geotechnical Report
Constraints and Restrictions

SUMMARY OF LABORATORY RESULTS

Project:	Port Manatee 16" Water line, Nort Dock Street National Street Palmetto, Florida	**Project No.:**	1130.0900012.0000
Client:	Manatee County Public Works	**Report No.:**	9083

Boring No	Sample No	Sample Description	No 200 %	Water Content, %	LL	PL	PI	USCS Classification	Sampling Method (ASTM)
B - 1	4	Dark brown fine sand with silt (SP-SM)	9.7	19.0				SP-SM	D-1586
B - 2	7	Light gray clayey sand with shell fragments (SC)	25.3	27.0				SC	D-1586
B-2	9	Gray fine sand with trace of clay and of shell fragments and trace phosphate (SC)	12.3	20.0				SC	D-1586
B-3	3	Brown fine sand with trace of silt (SM)	13.5	16.0				SM	D-1586
B-3	6	Light gray clayey with of shell fragments (SC)	31.2	29.0				SC	D-1586
B-4	4	Brown silty sand with trace wood (SM)	12.3	22.0				SM	D-1586
B-4	6	Ligth gray fine sand with trace clay and trace of shell fragments, trace of rock fragments (SP-SC)	10.0	17.0				SP-SC	D-1586
B-4	7	Light gray fine sand with trace clay and shell fragments, trace of rock fragments (SP-SC)	11.7	18.0				SP-SC	D-1586
B-8	7	Dark brown fine sand with trace of silt (SP-SM)	11.5	27.0				SP-SM	D-1586
B-7	4	Brown sandy clay (CL)	80.5	70.0	38.2	23.6	14.6	CL	D-1586
B-8	4	Gray clay (CL)	70.2	41.0	32.5	24.4	8.1	CL	D-1586
B-9	2	Brownish yellow clayey sand (SC)	59.7	32.0				SC	D-1586
B-14	6	Gray clayey sand with trace clay (SC)	48.9	36.0				SC	D-1586

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SOILS TESTING RESULTS

Client: Manatee County Public Works
Project: Port Manatee 16" Water Line
Project No.: 1130.0900012.0000

Report Date: 3/24/2009
Report No.: 9083
Technician: M. Janney

TEST DATA

Sample: B-6, S-3

Gradation:	% Passing
#4	89%
#8	85%
#10	84%
#40	65%
#60	45%
#200	2%

Sample: B-11, S-2

Gradation:	% Passing
#4	71%
#8	62%
#10	60%
#40	46%
#60	38%
#200	8%

Sample: B-9, S-3

Gradation:	% Passing
#4	74%
#8	48%
#10	44%
#40	25%
#60	20%
#200	8%

Sample: B-2, S-4

Gradation:	% Passing
#4	100%
#8	100%
#10	100%
#40	90%
#60	73%
#200	1%

Sample: B-5, S-4

Gradation:	% Passing
#4	99%
#8	99%
#10	99%
#40	94%
#60	73%
#200	1%

Sample: B-13. S-9

Gradation:	% Passing
#4	100%
#8	100%
#10	100%
#40	96%
#60	80%
#200	1%

Sample: B-7, S-3

Gradation:	% Passing
#4	92%
#8	74%
#10	66%
#40	35%
#60	26%
#200	9%

Sample: B-8, S-7

Gradation:	% Passing
#4	89%
#8	78%
#10	75%
#40	41%
#60	23%
#200	4%

Sample: B-12, S-4

Gradation:	% Passing
#4	100%
#8	100%
#10	100%
#40	98%
#60	91%
#200	15%

Sample: B-11, S-5

Gradation:	% Passing
#4	100%
#8	100%
#10	100%
#40	97%
#60	91%
#200	23%

Sample: B-8, S-4 **Plastic Index:** 8.16

Sample: B-7, S-4 **Plastic Index:** 14.59

Universal Engineering Sciences, Inc.
Reviewed By

Brewster Dombkowski
CSD Manager

Universal Engineering Sciences

Robert Gomez, P. E.
Florida Registration # 58348

UNIVERSAL
ENGINEERING SCIENCES
Consultants In: Geotechnical Engineering
Environmental Sciences • Construction Material Testing

1748 Independence Blvd., Suite B-1 • Sarasota, FL 34234 • (941) 358-7410

Project Name: Port Manatee 16" Water Line
Client: Manatee County Public Works
Project Number: 1130.0900012.0000
Report Date: 03/25/09
Report Number: 9083

Sample Identification:
Description: Yellow-brown sand with trace clay and rock
Location: B-8, 3-5 feet depth
Date Sampled: 03/19/09

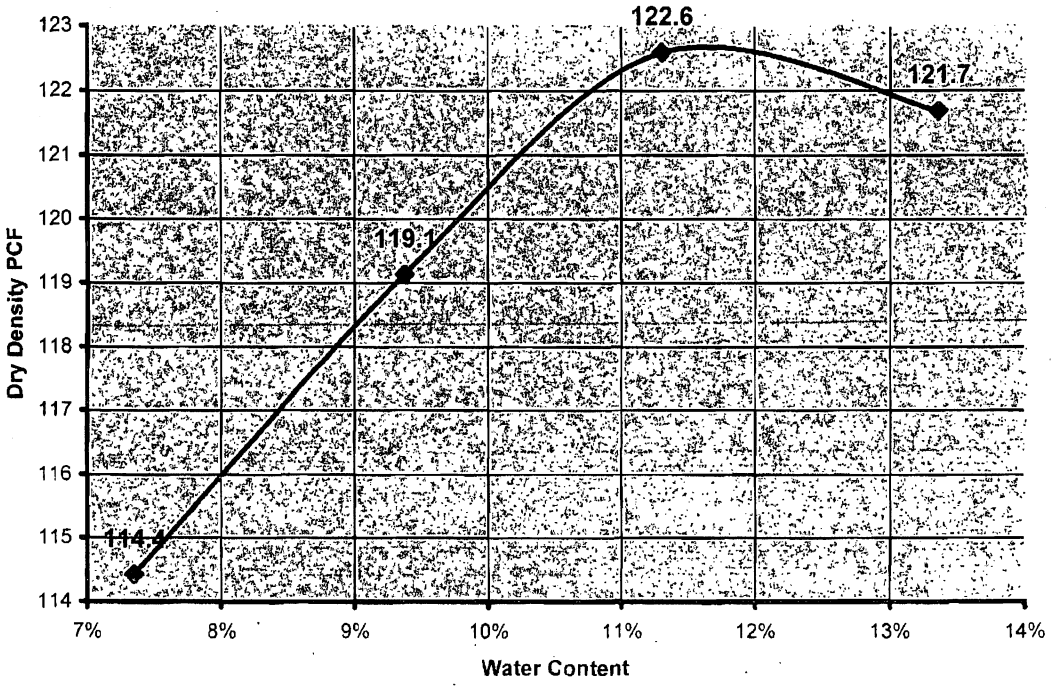
Compaction Method: Mechanical

Standard Proctor:
Modified Proctor: AASHTO T-180

Results:

		%Passing
Max. Dry Density:	**122.6 pcf**	**#200 Sieve**
Optimum Water %:	**11.3 %**	**21.1%**

Date Tested: 03/23/09
Technician: M. Janney



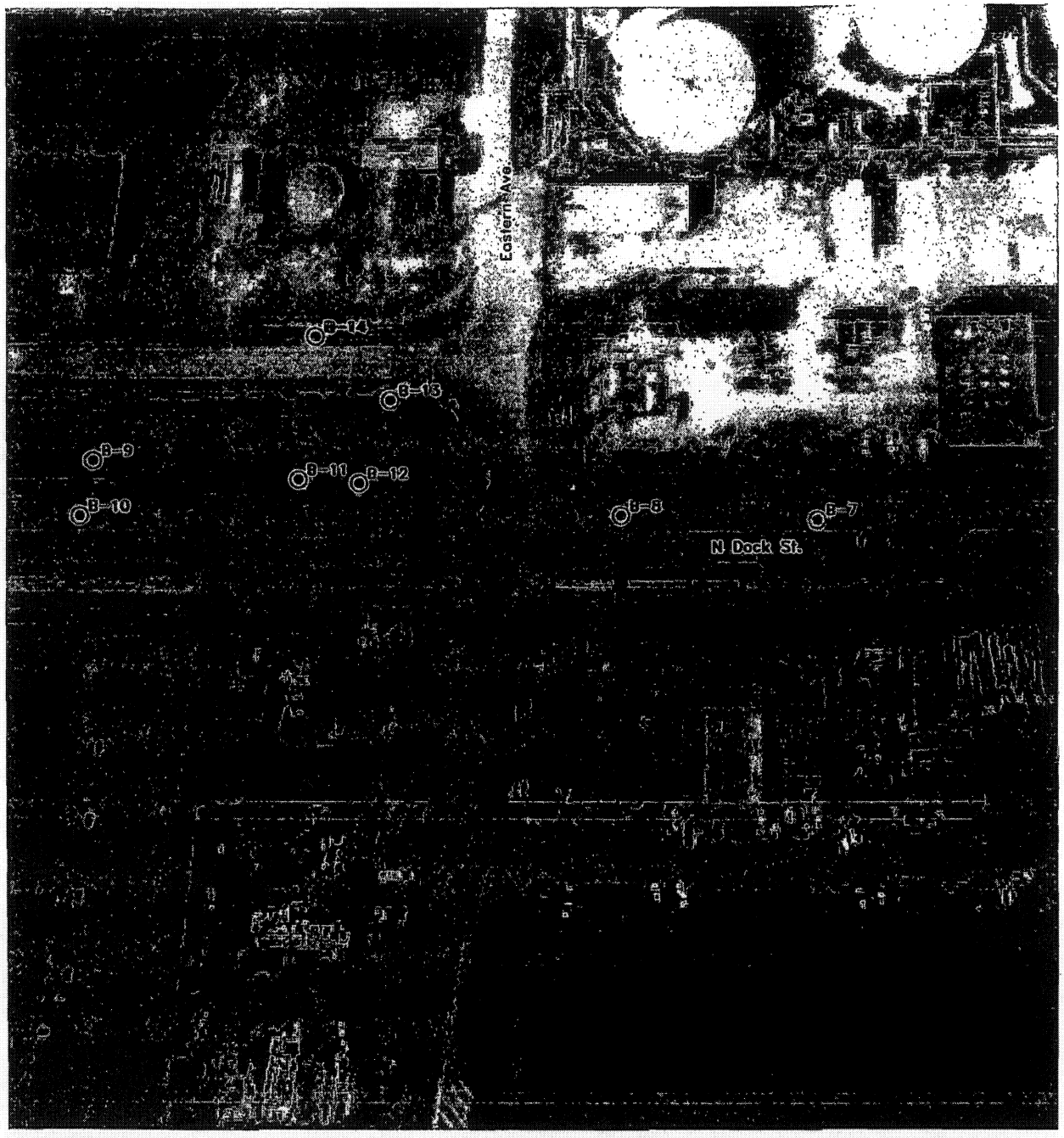
Results may exceed Project Specifications

Universal Engineering Sciences, Inc.
Reviewed By

Brewster Dombkowski
CSD Manager

Universal Engineering Sciences

Robert Gomez, P. E.
Florida Registration # 58348



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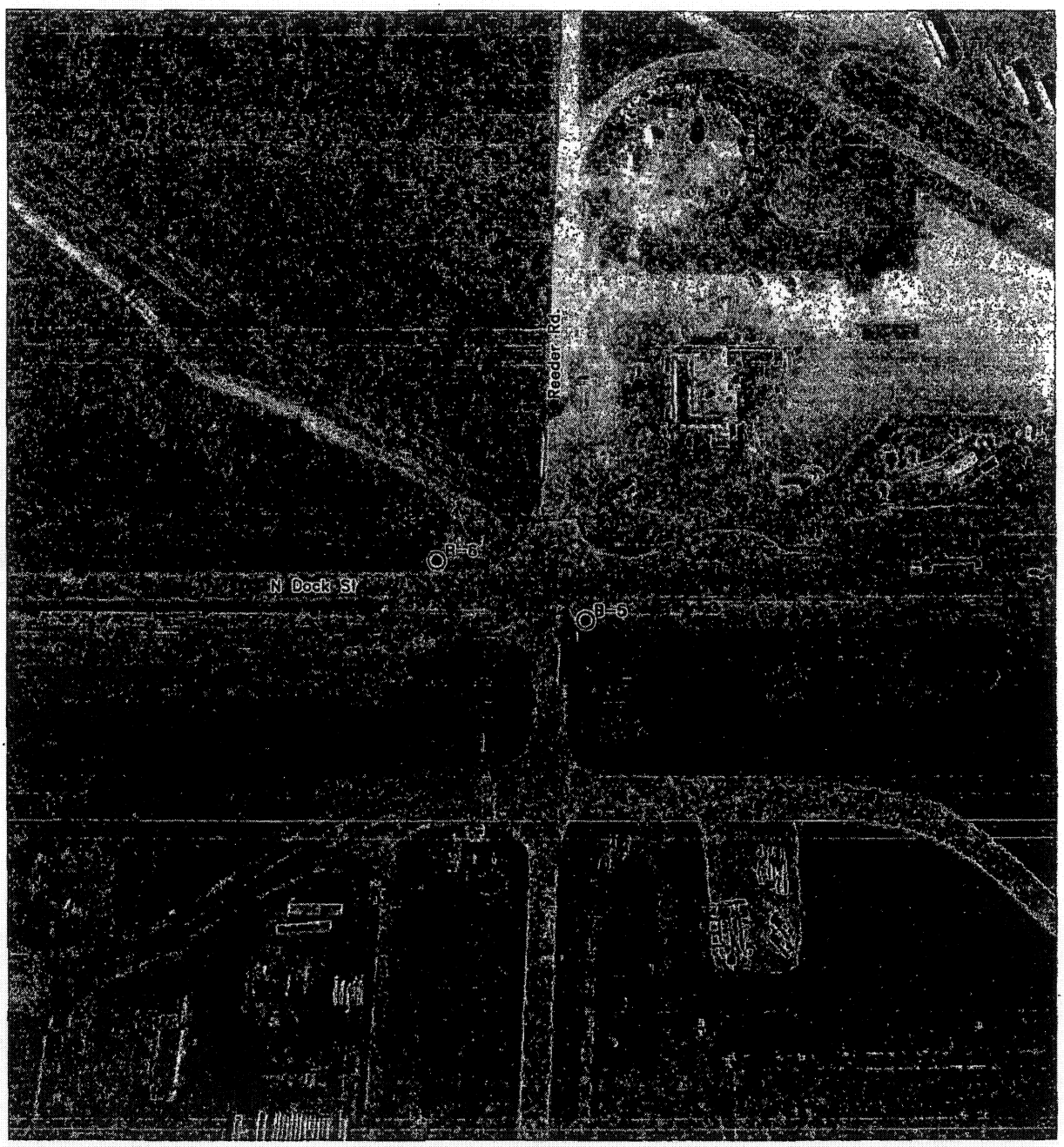
ENGINEERING SCIENCES

PORT MANATEE 16" WATER LINE REPLACEMENT
NORTH DOCK STREET, PINEY POINT RD
PALMETTO, FLORIDA

BORING LOCATION PLAN
B-7,B-8,B-9,B-10,B-11,B-12,B-13,B-14

DRAWN BY: S.C	DATE: MARCH. 2009	CHECKED BY: R.G	DATE: MARCH. 2009
SCALE: NOT TO SCALE	PROJECT NO: 1130.0900012.0000	REPORT NO: 9083	APPENDIX:



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ENGINEERING SCIENCES

PORT MANATEE 16" WATER LINE REPLACEMENT
NORTH DOCK STREET, PINEY POINT RD.
PALMETTO, FLORIDA

BORING LOCATION PLAN
B-5, B-6

DRAWN BY:	S.C	DATE:	MARCH. 2009	CHECKED BY:	R.G	DATE:	MARCH. 2009
SCALE:	NOT TO SCALE	PROJECT NO:	1130.0900012.0000	REPORT NO:	9083	APPENDIX:	

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ENGINEERING SCIENCES

PORT MANATEE 16" WATER LINE REPLACEMENT
NORTH DOCK STREET, PINEY POPINT RD
PALMETTO, FLORIDA

BORING LOCATION PLAN
B-1,B-2,B-3,B-4

DRAWN BY: S.C	DATE: MARCH. 2009	CHECKED BY: R.G	DATE: MARCH. 2009
SCALE: NOT TO SCALE	PROJECT NO: 1130.0900012.0000	REPORT NO: 9083	APPENDIX:

APPENDICES

APPENDIX A

Site Location Plan

APPENDIX B

Summary Laboratory Test Results
Description of Testing Procedures

APPENDIX C

Boring Logs
Key to Boring Logs
Pavement Cores

APPENDIX D

Information About Your Geotechnical Report
Constraints and Restrictions

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	1130.0900012.0000
REPORT NO.:	9083
PAGE:	1

PROJECT: Port Manatee 16" WaterLine, North Dock Street
National Street
Palmetto, Florida

BORING DESIGNATION: **B-1** SHEET: **1 of 1**
SECTION: 1 TOWNSHIP: 335 RANGE: 17 E

CLIENT: Manatee County Public Works

LOCATION: See boring location plan, Sta 59+00 L.S

REMARKS: Elevation and Sta # estimated from plan profile

G.S. ELEVATION (ft): 8.00 DATE STARTED: 3/16/09
WATER TABLE (ft): 4 DATE FINISHED: 3/16/09
DATE OF READING: 3/16/09 DRILLED BY: RT
EST. W.S.W.T. (ft): TYPE OF SAMPLING: ASTM 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0						Medium dense brown fine sand (SP)						
		5-6-7	13			Loose dark grayish brown fine sand with trace of silt (SP-SM)						
		6-4-4	8	▼		Medium denseBrown fine sand (SP)						
5		5-5-6	11			Medium dense dark brown fine sand with trace of silt (SP-SM)						
		7-7-6	13			Medium dense olive gray fine sand with trace of clay and trace of shell , trace of rock fragments (SP-SC)	9.7	19				
		3-6-5	11			Loose light olive gray clayey sand with trace of shell and trace of rock fragments (SC)						
10		3-3-2	5			Very loose olive gray clayey sand with trace of shell and trace of rock fragments (SC)						
		2-2-2	4			Very loose olive gray clayey sand with trace of shell and trace of rock fragments (SC)						
		2-2-1	3			Medium dense olive gray clayey sand with trace of shell (SC)						
15		3-6-5	11			Boring terminated at 15'						
20												

QALL NORTH DOCK ST 16 WATER MAIN REPLACEMENT.GPJ UNIENGSC.GDT 3/25/09

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	1130.0900012.0000
REPORT NO.:	9083
PAGE:	2

PROJECT: Port Manatee 16" WaterLine, North Dock Street
National Street
Palmetto, Florida

BORING DESIGNATION: **B-2** SHEET: **1 of 1**
SECTION: 1 TOWNSHIP: 335 RANGE: 17 E

CLIENT: Manatee County Public Works

LOCATION: See boring location plan, Sta 57+70, L. S.

REMARKS: Elevation and Sta # estimated from plan profile

G.S. ELEVATION (ft): 8.00
WATER TABLE (ft): 3.5
DATE OF READING: 3/13/09
EST. W.S.W.T. (ft):

DATE STARTED: 3/13/09
DATE FINISHED: 3/13/09
DRILLED BY: RT
TYPE OF SAMPLING: ASTM 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0						Medium dense dark grayish brown fine sand (SP)						
		5-9-13	22			Medium dense light brown fine sand (SP)						
		12-13-14	27	▼		Medium dense dark yellowish brown fine sand (SP)						
5		7-7-6	13			Loose dark yellowish brown fine sand (SP)						
		3-4-5	9			Medium dense olive gray fine sand with traces clay and rock fragments and trace of shell (SP-SC)		20				
		3-6-8	14			Loose light gray clayey sand with trace of rock fragments and trace of shell (SC)						
10		3-5-5	10			Very loose light gray clayey sand with shell fragments (SC)						
		2-2-2	4			Loose gray fine sand with trace of clay and traces shell fragments and trace of rock fragments (SP-SC)	25.3	27				
		3-4-2	6			Very loose gray fine sand with trace of clay and of shell fragments and trace phosphate (SC)						
15		2-1-3	4			Boring terminated at 15'	12.3	20				
20												

QALL NORTH DOCK ST 16 WATER MAIN REPLACEMENT.GPJ UNIENGSC.GDT 3/25/09

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	1130.0900012.0000
REPORT NO.:	9083
PAGE:	3

PROJECT: Port Manatee 16" WaterLine, North Dock Street
National Street
Palmetto, Florida

BORING DESIGNATION: **B-3** SHEET: **1 of 1**
SECTION: 1 TOWNSHIP: 335 RANGE: 17 E

CLIENT: Manatee County Public Works

LOCATION: See boring location plan, Sta 56+ 80, L.S

REMARKS: Elevation and Sta # estimated from plan profile

G.S. ELEVATION (ft): 8.00
WATER TABLE (ft): 4
DATE OF READING: 3/13/09
EST. W.S.W.T. (ft):

DATE STARTED: 3/13/09
DATE FINISHED: 3/13/09
DRILLED BY: RT
TYPE OF SAMPLING: ASTM 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0						Medium dense dark gray fine sand (SP)						
		6-5-8	13			Medium dense very dark brown fine sand with trace of silt (SP-SM)						
		8-8-4	12	▼		Medium dense brown fine sand with trace of silt (SM)						
5		7-5-6	11			Medium dense olive gray fine sand with trace clay and shell fragments I (SP-SC)	13.5	16				
		6-7-8	15			Loose brown fine sand with trace of silt and shell, trace of rock fragments (SP-SM)						
		4-3-3	6			Very loose light gray clayey with of shell fragments (SC)						
10		3-2-2	4			Loose light gray clayey with of shell fragments (SC)	31.2	29				
		3-3-4	7			Very loose olive gray fine sand with trace clay and trace of shell fragments, trace of rock fragments (SP-SC)						
		2-1-2	3			Very loose olive gray fine sand with trace clay and shell fragments (SP-SC)						
15		2-2-1	3			Boring terminated at 15'						
20												

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	1130.0900012.0000
REPORT NO.:	9083
PAGE:	4

PROJECT: Port Manatee 16" WaterLine, North Dock Street
National Street
Palmetto, Florida

BORING DESIGNATION: **B-4** SHEET: **1 of 1**
SECTION: 1 TOWNSHIP: 335 RANGE: 17 E

CLIENT: Manatee County Public Works

LOCATION: See boring location plan, Sta 57+40, R. S.

REMARKS: Elevation and Sta # estimated from plan profile

G.S. ELEVATION (ft): 8.00
WATER TABLE (ft): 3.5
DATE OF READING: 3/13/09
EST. W.S.W.T. (ft):

DATE STARTED: 3/13/09
DATE FINISHED: 3/13/09
DRILLED BY: RT
TYPE OF SAMPLING: ASTM 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0						Medium dense brownish gray fine sand (SP)						
		6-7-8	15									
						Medium dense light brown fine sand (SP)						
		7-8-7	15	▼								
						Medium dense brown fine sand with traces of silt (SP-SM)						
5		6-7-6	13									
						Medium dense brown silty sand with trace wood (SM)						
		6-6-6	12				12.3	22				
						Medium dense gray olive fine sand with trace clay and trace of shell fragments, trace of rock fragments (SP-SC)						
		3-5-6	11									
						Medium dense ligth gray fine sand with trace clay and trace of shell fragments, trace of rock fragments (SP-SC)						
10		3-6-6	12				10	17				
						Loose light gray fine sand with trace clay and shell fragments, trace of rock fragments (SP-SC)						
		3-3-4	7				11.7	18				
						Medium dense gray clayey sand with of shell fragments and phospate (SC)						
		4-5-6	12									
						Loose gray olive clayey sand with of shell fragments (SC)						
15		3-4-4	8									
						Boring terminated at 15'						
20												

QALL NORTH DOCK ST 16 WATER MAIN REPLACEMENT.GPJ UNIENGSC.GDT 3/25/09

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	1130.0900012.0000
REPORT NO.:	9083
PAGE:	5

PROJECT: Port Manatee 16" WaterLine, North Dock Street
National Street
Palmetto, Florida

BORING DESIGNATION: **B-5** SHEET: **1 of 1**
SECTION: 1 TOWNSHIP: 335 RANGE: 17 E

CLIENT: Manatee County Public Works

LOCATION: See boring location plan, Sta 45+30 30, L. S.

REMARKS: Elevation and Sta # estimated from plan profile

G.S. ELEVATION (ft): 8.00 DATE STARTED: 3/17/09
WATER TABLE (ft): 5 DATE FINISHED: 3/17/09
DATE OF READING: 3/17/09 DRILLED BY: RT
EST. W.S.W.T. (ft): TYPE OF SAMPLING: ASTM 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0						Medium dense brown fine sand (SP)						
		6-5-8	13			Medium dense brown fine sand (SP)						
		7-7-6	13			Medium dense brown fine sand with trace of shell (SP)						
5		7-8-4	12	▼		Dark gray fine sand with trace of silt and trace of shell fragments (SP-SM)						
		7-7-5	12			Loose gray fine sand (SP)		17				
		2-3-3	6			Loose dark brown fine sand with trace of silt (SP-SM)						
10		3-3-6	9			Loose dark brown fine sand with trace os silt (SP-SM)						
		5-5-3	8			Medium dense gray fine sand with trace clay and trace of rock fragments (SP-SC)						
		10-9-10	19			Loose gray fine sand with trace clay and trace of shell fragments, trace of rock fragments (SP-SM)						
15		5-4-5	9			Boring terminated at 15'						
20												

QALL NORTH DOCK ST 16 WATER MAIN REPLACEMENT.GPJ UNIENGSC.GDT 3/25/09

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	1130.0900012.0000
REPORT NO.:	9083
PAGE:	6

PROJECT: Port Manatee 16" WaterLine, North Dock Street
National Street
Palmetto, Florida

BORING DESIGNATION: **B-6** SHEET: **1 of 1**
SECTION: 1 TOWNSHIP: 335 RANGE: 17 E

CLIENT: Manatee County Public Works

LOCATION: See boring location plan, Sta 44+00, R. S.

REMARKS: Elevation and Sta # estimated from plan profile

G.S. ELEVATION (ft): 9.00
WATER TABLE (ft): 3
DATE OF READING: 3/17/09
EST. W.S.W.T. (ft):

DATE STARTED: 3/17/09
DATE FINISHED: 3/17/09
DRILLED BY: RT
TYPE OF SAMPLING: ASTM 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0						Medium dense brown fine sand (SP)						
		6-8-5	13	▼		Loose brown fine sand with trace of silt (SP-SM)						
		5-5-3	8			Very loose brown fine sand with trace of silt (SP-SM)						
5		3-2-2	4			Loose dark brown silty sand with clayey sand and trace of shell fragments (SM)		13				
		5-4-5	9			Loose dark brown silty sand with clayey sand and shell fragments (SM)						
		7-4-6	10			Medium dense gray fine sand with trace of clay and shell fragments (SP-SC)						
10		5-7-8	15			Medium dense brown fine sand with trace clay and shell fragments (SP-SC)						
		9-7-4	11			Loose gray fine sand with trace clay and shell fragments, trace of rock fragments (SP-SC)						
		4-3-3	6			Loose olive gray clayey sand with shell fragments, trace of rock fragments (SC)						
15		3-2-3	5			Boring terminated at 15'						
20												

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	1130.0900012.0000
REPORT NO.:	9083
PAGE:	7

PROJECT: Port Manatee 16" WaterLine, North Dock Street
National Street
Palmetto, Florida

BORING DESIGNATION: **B-7** SHEET: **1 of 1**
SECTION: 1 TOWNSHIP: 335 RANGE: 17 E

CLIENT: Manatee County Public Works

LOCATION: See boring location plan, Sta 17+20, R. S.

REMARKS: Elevation and Sta # estimated from plan profile

G.S. ELEVATION (ft): 6.00
WATER TABLE (ft): 5
DATE OF READING: 3/17/09
EST. W.S.W.T. (ft):

DATE STARTED: 3/17/09
DATE FINISHED: 3/17/09
DRILLED BY: RT
TYPE OF SAMPLING: ASTM 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0						Medium dense ligh brown fine sand with trace of rock fragments (SP)						
		8-8-7	15			Medium dense light yellowish brown fine sand with trace clay and trace of rock fragments (SP-SM)						
		7-6-6	12			Medium dense brown clayey sand and trace of rock fragments (SC)						
5				▼								
		6-8-6	14			Firm brown sandy clay (CL)		28				
		3-2-3	5			Loose brown fine sand with wood (SP)	80.5	70	38.2	14.6		
		3-3-4	7			Medium dense dark brown fine sand with trace of silt (SP-SM)						
10		5-13-13	26			Medium dense dark brown fine sand with trace of silt (SP-SM)						
		12-12-12	24			Loose brown fine sand with trace silt/light olive gray clayey sand (SP-SM/SC)						
		3-4-5	9			Loose dark brown fine sand with trace of silt (SP-SM)						
15		3-4-4	8			Boring terminated at 15'						
20												

QALL NORTH DOCK ST 16 WATER MAIN REPLACEMENT.GPJ UNIENGSC.GDT 3/26/09

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	1130.0900012.0000
REPORT NO.:	9083
PAGE:	8

PROJECT: Port Manatee 16" WaterLine, North Dock Street
National Street
Palmetto, Florida

BORING DESIGNATION: **B-8** SHEET: **1 of 1**
SECTION: 1 TOWNSHIP: 335 RANGE: 17 E

CLIENT: Manatee County Public Works

LOCATION: See boring location plan, Sta 16+00, R. S.

REMARKS: Elevation and Sta # estimated from plan profile

G.S. ELEVATION (ft): 6.00
WATER TABLE (ft): 4.5
DATE OF READING: 3/18/09
EST. W.S.W.T. (ft):

DATE STARTED: 3/18/09
DATE FINISHED: 3/18/09
DRILLED BY: RT
TYPE OF SAMPLING: ASTM 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0						Medium dense dark yellowish brown fine sand with trace clay and trace of shell fragments (SP-SC)						
		8-8-7	15									
						Medium dense dark yellowish brown fine sand with trace clay and trace of shell fragments (SP-SC)						
		7-9-7	16	▼				12				
						Medium dense grayish yellow clayey sand with silty sand (SC-SM)						
5												
		6-5-6	11			Firm gray clay (CL)						
		4-3-2	5			Stiff gray clay (CL)	70.2	41	32.5	8.1		
		2-3-6	9			Medium dense gray /black fine sand with trace of silt (SP-SM)						
10		7-7-9	16			Medium dense dark brown fine sand with trace of silt (SP-SM)						
		10-14-14	28			Loose dark brown fine sand with trace of silt (SP-SM)	11.5	27				
		4-5-5	10			Loose dark brown fine sand with trace of silt (SP-SM)						
15		4-4-4	8			Boring terminated at 15'						
20												

QALL NORTH DOCK ST 16 WATER MAIN REPLACEMENT.GPJ UNIENGSC.GDT 3/25/09

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	1130.0900012.0000
REPORT NO.:	9083
PAGE:	9

PROJECT: Port Manatee 16" WaterLine, North Dock Street
National Street
Palmetto, Florida

BORING DESIGNATION: **B-9** SHEET: **1 of 1**
SECTION: 1 TOWNSHIP: 335 RANGE: 17 E

CLIENT: Manatee County Public Works

LOCATION: See boring location plan, Sta 1+120, R. S.

REMARKS: Elevation and Sta # estimated from plan profile

G.S. ELEVATION (ft): 10.00
WATER TABLE (ft): 8
DATE OF READING: 3/19/09
EST. W.S.W.T. (ft):

DATE STARTED: 3/19/09
DATE FINISHED: 3/19/09
DRILLED BY: RT
TYPE OF SAMPLING: ASTM 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./DAY)	ORG. CONT. (%)
0						Medium dense light yellowish brown fine sand with trace of clay (SP-SC)						
		8-7-6	13			Medium dense brownish yellow clayey sand (SC)						
		6-7-7	14			Medium dense brownish yellow clayey sand (SC)	59.7	32				
5		6-8-5	13			Medium dense brownish yellow Brownish yellow clayey sand (SC)		49				
		8-10-9	19			Loose gray clayey sand (SC)						
		5-5-5	10	▼		Medium dense Brown fine sand (SP) (Sample has petroleum odor)						
10		5-6-6	12			Medium dense Brown fine sand (SP) (Sample has petroleum odor)						
		12-11-12	23			Medium dense Brown fine sand with trace of silt (SP-SM)						
		5-9-10	19			Medium dense dark brown fine sand with trace of silt (SP-SM)						
15		6-10-11	21			Boring terminated at 15'						
20												

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	1130.0900012.0000
REPORT NO.:	9083
PAGE:	10

PROJECT: Port Manatee 16" WaterLine, North Dock Street
National Street
Palmetto, Florida

BORING DESIGNATION: **B-10** SHEET: **1 of 1**
SECTION: 1 TOWNSHIP: 335 RANGE: 17 E

CLIENT: Manatee County Public Works

LOCATION: See boring location plan, Sta 1+20, L. S. (S. S.)

REMARKS: Elevation and Sta # estimated from plan profile

G.S. ELEVATION (ft): 10.00
WATER TABLE (ft): 7
DATE OF READING: 3/20/09
EST. W.S.W.T. (ft):

DATE STARTED: 3/20/09
DATE FINISHED: 3/20/09
DRILLED BY: RT
TYPE OF SAMPLING: ASTM 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./DAY)	ORG. CONT. (%)
0						Medium dense brown fine sand with trace of clay and trace of rock fragments (SC)						
		6-7-7	14			Medium dense brown fine sand with trace of clay (SC)						
		7-5-7	12			Loose brown fine sand with trace of clay and trace of shell fragments (SC)						
5		6-6-4	10			Firm yellowish brown clay / clayey sand (SC/CL)						
		3-2-3	5	▼		Medium dense gray clayey sand (SC)						
		8-8-6	14			Medium dense brown fine sand (SP)						
10		6-4-7	17			Medium dense dark grayish brown fine sand with trace of silt (SP-SM)						
		4-4-8	12			Medium dense dark brown fine sand with trace of silt (SP-SM)						
		8-6-7	13			Medium dense dark brown silty sand (SM)						
15		7-7-8	15			Boring terminated at 15'						
20												

QALL NORTH DOCK ST 16 WATER MAIN REPLACEMENT.GPJ UNIENGSC.GDT 3/25/09

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	1130.0900012.0000
REPORT NO.:	9083
PAGE:	11

PROJECT: Port Manatee 16" WaterLine, North Dock Street
National Street
Palmetto, Florida

BORING DESIGNATION: **B-11** SHEET: **1 of 1**
SECTION: 1 TOWNSHIP: 335 RANGE: 17 E

CLIENT: Manatee County Public Works

LOCATION: See boring location plan, Sta 7+00, left of casing

REMARKS: Elevation and Sta # estimated from plan profile

G.S. ELEVATION (ft): 10.00
WATER TABLE (ft): 9
DATE OF READING: 3/19/09
EST. W.S.W.T. (ft):

DATE STARTED: 3/19/09
DATE FINISHED: 3/19/09
DRILLED BY: RT
TYPE OF SAMPLING: ASTM 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./DAY)	ORG. CONT. (%)
0						Medium dense yellowish brown fine sand with trace of clay (SP-SC)						
		8-7-8	15			Medium dense light yellowish brown fine sand with trace of clay and trace of rock fragments (SP-SC)						
		7-6-6	12			Loose gray clayey sand any silty (SC)		11				
5		6-5-3	8			Loose gray clayey sand any silty (SC)						
		3-2-3	5			Loose gray clayey sand any silty (SC)						
		2-3-3	6	▼		Loose dark brown fine sand with trace of silt (SP-SM)		32				
10		2-3-4	7			Loose black fine sand with trace of silt (SP-SM)						
		4-3-3	6			Medium dense brown fine sand with trace of silt (SP-SM)						
		5-7-7	14			Medium dense brown fine sand with trace of silt (SP-SM)						
15		7-6-8	14			Boring terminated at 15'						
20												

QALL NORTH DOCK ST 16 WATER MAIN REPLACEMENT.GPJ UNIENGSC.GDT 3/25/09

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	1130.0900012.0000
REPORT NO.:	9083
PAGE:	12

PROJECT: Port Manatee 16" WaterLine, North Dock Street
National Street
Palmetto, Florida

BORING DESIGNATION: **B-12** SHEET: **1 of 1**
SECTION: 1 TOWNSHIP: 335 RANGE: 17 E

CLIENT: Manatee County Public Works

LOCATION: See boring location plan, Sta 7+00 R of casing (S. S.)

REMARKS: Elevation and Sta # estimated from plan profile

G.S. ELEVATION (ft): 10.00
WATER TABLE (ft): 9
DATE OF READING: 3/19/09
EST. W.S.W.T. (ft):

DATE STARTED: 3/19/09
DATE FINISHED: 3/19/09
DRILLED BY: RT
TYPE OF SAMPLING: ASTM 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0						Medium dense Yellowish brown fine sand with trace of clay and trace of rock fragments (SP-SC)						
		8-8-7	15			Medium dense yellowish brown fine sand with trace of clay and trace of rock fragments (SP-SC)						
		7-7-6	13			Loose brown clayey sand and silty (SC)						
5		6-4-5	9			Loose gray / brownish yellow fine sand with trace of silt (SP-SM)						
		3-3-3	6			Soft gray clay (CL) (Sample has petroleum odor)		19				
		3-2-2	4	▼		Loose black fine sand with trace of silt (SP-SM) (Sample has petroleum odor)						
10		2-3-3	6			Loose dark brown fine sand with trace of silt (SP-SM) (Sample has petroleum odor)						
		4-3-4	7			Medium dense brown fine sand with trace of silt (SP-SM)						
		7-7-11	18			Medium dense dark brown fine sand with trace of silt (SP-SM)						
15		6-6-10	16			Boring terminated at 15'						
20												

QALL NORTH DOCK ST 16 WATER MAIN REPLACEMENT GPJ UNIENGSC.GDT 3/25/09

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	1130.0900012.0000
REPORT NO.:	9083
PAGE:	13

PROJECT: Port Manatee 16" WaterLine, North Dock Street
National Street
Palmetto, Florida

BORING DESIGNATION: **B-13** SHEET: **1 of 1**
SECTION: 1 TOWNSHIP: 335 RANGE: 17 E

CLIENT: Manatee County Public Works

LOCATION: See boring location plan, Sta 8+50, R. S. (S. S.)

REMARKS: Elevation and Sta # estimated from plan profile

G.S. ELEVATION (ft): 10.00 DATE STARTED: 3/18/09
WATER TABLE (ft): 9 DATE FINISHED: 3/18/09
DATE OF READING: 3/18/09 DRILLED BY: RT
EST. W.S.W.T. (ft): TYPE OF SAMPLING: ASTM 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0												
						Medium dense light yellowish brown clayey sand with silty sand (SC/SM)						
		7-9-7	16									
						Loose light yellowish brown clayey sand with silty sand (SC/SM)						
		6-4-3	7									
						Loose yellowish brown fine sand with trace of clay (SP-SC)						
5												
		4-5-4	9									
						Loose brown fine sand with trace silt and clayey sand (SP-SM/SC)						
		4-4-4	8									
						Firm gray sandy clay (CL) (Sample has petroleum odor)						
		5-3-2	5	▼								
						Very loose gray clayey sand (SC) (Sample has petroleum odor)						
10		1-1-2	3									
						Medium dense dark brown fine sand with trace of silt and trace of wood (SP-SM)						
		6-6-5	11									
						Medium dense black fine sand with trace of silt (SP-SM)						
		8-10-10	20									
						Medium dense very dark brown fine sand with trace of silt (SP-SM)						
15		7-9-10	19					21				
						Boring terminated at 15'						
20												

QALL NORTH DOCK ST 16 WATER MAIN REPLACEMENT.GPJ UNIENGSC.GDT 3/25/09

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	1130.0900012.0000
REPORT NO.:	9083
PAGE:	14

PROJECT: Port Manatee 16" WaterLine, North Dock Street
National Street
Palmetto, Florida

BORING DESIGNATION: **B-14** SHEET: **1 of 1**
SECTION: 1 TOWNSHIP: 335 RANGE: 17 E

CLIENT: Manatee County Public Works

LOCATION: See boring location plan, Sta 10+80, L. S. (N.S)

REMARKS: Elevation and Sta # estimated from plan profile

G.S. ELEVATION (ft): 10.00
WATER TABLE (ft): 9
DATE OF READING: 3/18/09
EST. W.S.W.T. (ft):

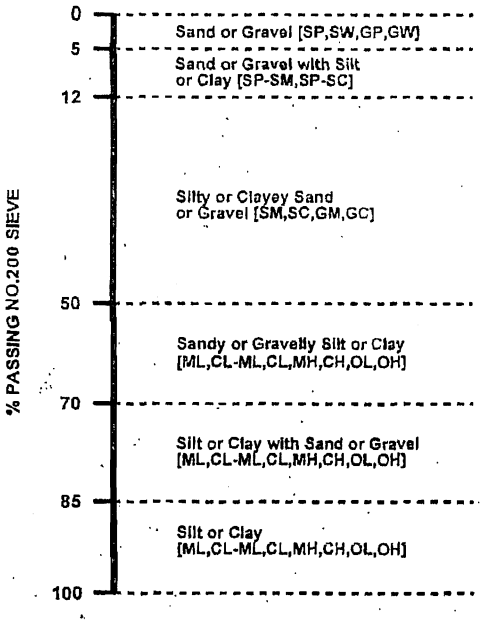
DATE STARTED: 3/18/09
DATE FINISHED: 3/18/09
DRILLED BY: RT
TYPE OF SAMPLING: ASTM 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0						Medium dense light yellowish brown fine sand with trace of clay and trace of shell, trace of rock fragments (SP-SC)						
		5-6-5	11			Medium dense light yellowish brown fine sand with trace of clay and trace of shell, trace of rock fragments (SP-SC)						
		5-8-7	15			Medium dense yellowish brown fine sand with trace of clay (SP-SC)						
5		7-7-8	15			Loose gray clayey sand with yellow brown fine sand with trace of silt (CL / SP-SM)						
		4-4-4	8			Soft gray clay (CL)						
		3-1-2	3	▼		Very loose gray clayey sand with trace clay (SC)						
10		2-2-2	4			Medium dense dark brown fine sand with trace of silt and trace of wood (SP-SM)	48.9	36				
		6-6-10	16			Medium dense dark brown fine sand with trace of silt (SP-SM)						
		6-11-14	25			Medium dense dark brown fine sand with trace of silt (SP-SM)						
15		7-10-11	21			Boring terminated at 15'						
20												

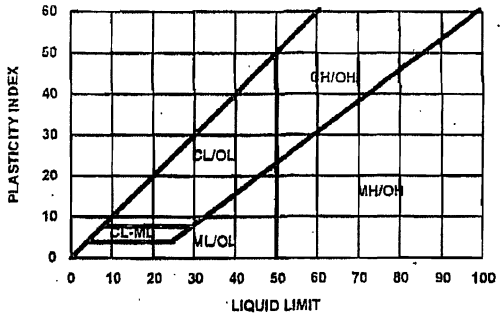
QALL NORTH DOCK ST 16 WATER MAIN REPLACEMENT.GPJ UNIENGSC.GDT 3/25/09

KEY TO BORING LOGS

SOIL CLASSIFICATION CHART*



UNIVERSAL ENGINEERING SCIENCES, INC.



PLASTICITY CHART

GROUP NAME AND SYMBOL

COARSE GRAINED SOILS

- WELL-GRADED SANDS [SW]
- POORLY-GRADED SANDS [SP]
- POORLY-GRADED SANDS WITH SILT [SP-SM]
- POORLY-GRADED SANDS WITH CLAY [SP-SC]
- SILTY SANDS [SM]
- CLAYEY SANDS [SC]
- SILTY CLAYEY SANDS [SC-SM]
- WELL-GRADED GRAVELS [GW]
- POORLY-GRADED GRAVELS [GP]
- POORLY-GRADED GRAVELS WITH SILT [GP-GM]
- POORLY-GRADED GRAVELS WITH CLAY [GP-GC]
- SILTY GRAVELS [GM]
- CLAYEY GRAVELS [GC]

FINE GRAINED SOILS

- INORGANIC SILTS SLIGHT PLASTICITY [ML]
- INORGANIC SILTY CLAY LOW PLASTICITY [CL-ML]
- INORGANIC CLAYS LOW TO MEDIUM PLASTICITY [CL]
- INORGANIC SILTS HIGH PLASTICITY [MH]
- INORGANIC CLAYS HIGH PLASTICITY [CH]

HIGHLY ORGANIC SOILS

- ORGANIC SILTS/CLAYS LOW PLASTICITY [OL]**
- ORGANIC SILTS/CLAYS MEDIUM TO HIGH PLASTICITY [OH]**
- PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS [PT]**

RELATIVE DENSITY

(SAND AND GRAVEL)

VERY LOOSE - 0 to 4 Blows/ft.
LOOSE - 5 to 10 Blows/ft.
MEDIUM DENSE - 11 to 30 Blows/ft.
DENSE - 31 to 50 Blows/ft.
VERY DENSE - more than 50 Blows/ft.

CONSISTENCY

(SILT AND CLAY)

VERY SOFT - 0 to 2 Blows/ft.
SOFT - 3 to 4 Blows/ft.
FIRM - 5 to 8 Blows/ft.
STIFF - 9 to 16 Blows/ft.
VERY STIFF - 17 to 30 Blows/ft.
HARD - more than 30 Blows/ft.

* IN ACCORDANCE WITH ASTM D 2487 - UNIFIED SOIL CLASSIFICATION SYSTEM.

** LOCALLY MAY BE KNOWN AS MUCK.

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

APPENDICES

APPENDIX A

Site Location Plan

APPENDIX B

Summary Laboratory Test Results
Description of Testing Procedures

APPENDIX C

Boring Logs
Key to Boring Logs
Pavement Cores

APPENDIX D

Information About Your Geotechnical Report
Constraints and Restrictions

Important Information About Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual

subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely on Your ASFE-Member Geotechncial Engineer for Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you ASFE-member geotechnical engineer for more information.

ASFE
The Best People on Earth
8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone: 301/565-2733 Facsimile: 301/589-2017
e-mail: info@asfe.org www.asfe.org

CONSTRAINTS AND RESTRICTIONS

WARRANTY

Universal Engineering Sciences has prepared this report for our client for his exclusive use, in accordance with generally accepted soil and foundation engineering practices, and makes no other warranty either expressed or implied as to the professional advice provided in the report.

UNANTICIPATED SOIL CONDITIONS

The analysis and recommendations submitted in this report are based upon the data obtained from soil borings performed at the locations indicated on the Boring Location Plan. This report does not reflect any variations which may occur between these borings.

The nature and extent of variations between borings may not become known until excavation begins. If variations appear, we may have to re-evaluate our recommendations after performing on-site observations and noting the characteristics of any variations.

CHANGED CONDITIONS

We recommend that the specifications for the project require that the contractor immediately notify Universal Engineering Sciences, as well as the owner, when subsurface conditions are encountered that are different from those present in this report.

No claim by the contractor for any conditions differing from those anticipated in the plans, specifications, and those found in this report, should be allowed unless the contractor notifies the owner and Universal Engineering Sciences of such changed conditions. Further, we recommend that all foundation work and site improvements be observed by a representative of Universal Engineering Sciences to monitor field conditions and changes, to verify design assumptions and to evaluate and recommend any appropriate modifications to this report.

MISINTERPRETATION OF SOIL ENGINEERING REPORT

Universal Engineering Sciences is responsible for the conclusions and opinions contained within this report based upon the data related only to the specific project and location discussed herein. If the conclusions or recommendations based upon the data presented are made by others, those conclusions or recommendations are not the responsibility of Universal Engineering Sciences.

CHANGED STRUCTURE OR LOCATION

This report was prepared in order to aid in the evaluation of this project and to assist the architect or engineer in the design of this project. If any changes in the design or location of the structure as outlined in this report are planned, or if any structures are included or added that are not discussed in the report, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and the conclusions modified or approved by Universal Engineering Sciences.

USE OF REPORT BY BIDDERS

Bidders who are examining the report prior to submission of a bid are cautioned that this report was prepared as an aid to the designers of the project and it may affect actual construction operations. Bidders are urged to make their own soil borings, test pits, test caissons or other investigations to determine those conditions that may affect construction operations. Universal Engineering Sciences cannot be responsible for any interpretations made from this report or the attached boring logs with regard to their adequacy in reflecting subsurface conditions which will affect construction operations.

STRATA CHANGES

Strata changes are indicated by a definite line on the boring logs which accompany this report. However, the actual change in the ground may be more gradual. Where changes occur between soil samples, the location of the change must necessarily be estimated using all available information and may not be shown at the exact depth.

OBSERVATIONS DURING DRILLING

Attempts are made to detect and/or identify occurrences during drilling and sampling, such as: water level, boulders, zones of lost circulation, relative ease or resistance to drilling progress, unusual sample recovery, variation of drilling resistance, obstructions, etc.; however, lack of mention does not preclude their presence.

WATER LEVELS

Water level readings have been made in the drill holes during drilling and they indicate normally occurring conditions. Water level may not have been stabilized at the last reading. This data has been reviewed and interpretations made in this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, tides and other factors not evident at the time measurements were made and reported. Since the probability of such variations is anticipated, design drawings and specifications should accommodate such possibilities and construction planning should be based upon such assumptions of variations.

LOCATION OF BURIED OBJECTS

All users of this report are cautioned that there was no requirement for Universal Engineering Sciences to attempt to locate any man-made buried objects during the course of this exploration and that no attempt was made by Universal Engineering Sciences to locate any such buried objects. Universal Engineering Sciences cannot be responsible for any buried man-made objects which are subsequently encountered during construction that are not discussed within the text of this report.

TIME

This report reflects the soil conditions at the time of investigation. If the report is not used in a reasonable amount of time, significant changes to the site may occur and additional review may be required.