

ADDENDUM 1



TOWN OF SOUTHWEST RANCHES

TECHNICAL SPECIFICATIONS FOR HANCOCK ROAD GUARDRAIL IMPROVEMENTS

Craven Thompson & Associates, Inc.
ENGINEERS, PLANNERS, SURVEYORS, LANDSCAPE ARCHITECTS

TECHNICAL SPECIFICATIONS

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SECTION 01010

SUMMARY OF WORK

PART 1 - GENERAL

1.01 THE REQUIREMENT

- A. The work to be performed under this Contract shall consist of furnishing all tools, equipment, materials, supplies, and manufactured articles and for furnishing all transportation and services, including fuel, power, water, and essential communications, and for the performance of all labor, work, or other operations required for the fulfillment of the Contract in strict accordance with the Contract Documents. The work shall be complete, and all work, materials, and services not expressly shown or called for in the Contract documents which may be necessary for the complete and proper construction of the work in good faith shall be performed, furnished, and installed by the CONTRACTOR as though originally so specified or shown, at no increase in cost to the TOWN OF SOUTHWEST RANCHES (also referred as "OWNER").
- B. Prior to construction, the CONTRACTOR shall verify existing utilities identified on the Drawings and locate other potential utilities in their working area that may not be shown on the Drawings. The utility verifications consist of excavation to verify tie-in points and to locate potential conflicts that may affect the work as shown on the Drawings. The CONTRACTOR shall be responsible for the coordination of this work with the associated utility owners and permitting agencies having jurisdiction over the specific locations to be verified. The contractor shall coordinate with the utility owners to relocate any utilities identified for relocation or need relocation for the construction of the project.
- C. Wherever the Contract Documents address a third party, i.e., SUBCONTRACTOR, manufacturer, etc., it is to be considered as the CONTRACTOR through the third party.

1.02 SCOPE

- A. The work to be performed includes installation of guardrails along the canal bank on Hancock Road in the Town of Southwest Ranches as shown in the plans.

The work to be performed includes but not limited to installation of guardrails, removal of some existing guardrails, connection to existing guardrails, restoration of canal banks, and installation of Rip-Rap headwalls as shown on the plans. The construction activities include but are not limited to surveying, locating and protecting existing utilities, maintenance of traffic, maintaining continuous utility services and property access, erosion control, coordination with different agencies such as the Town of Southwest Ranches, Central Broward Water Control District, City of Sunrise (water service provider), AT&T, and FPL, preparation and submittal of shop drawings and record drawings, testing, and other restorations.

Work shall be performed ensuring continuous operation and appropriate performance of all existing water, sewer, stormwater and franchise utilities systems, to minimize impacts to canal banks, roadway traffic, parking, residents and /or businesses and shall be coordinated with the Town in advance.

- B. It is the intent of the OWNER to obtain a complete and working installation under this contract and any items of labor, materials or equipment, which may reasonably be assumed as necessary to accomplish this end, should be supplied whether or not specifically shown on the plans or described herein. Maintenance of the existing utility systems is mandated throughout the construction period.

1.03 WORK BY OTHERS

- A. The CONTRACTOR shall cooperate fully with all workers of the Town, or other public or private agencies engaged in the relocation, altering, or otherwise rearranging any facilities which interfere with the progress of the work, and shall schedule the work so as to minimize interference with said relocation, altering, or rearranging of facilities.
- B. The CONTRACTOR'S attention is directed to the fact that work will/may be conducted at the site by other contractors during the performance of the work under this Contract. The CONTRACTOR shall conduct its operations so as to cause a minimum of interference with the Work of such other contractors, and shall cooperate fully with such contractors to provide continued safe access to their respective portions of the site, as required to perform their respective contracts.
- C. When two or more contracts are being executed at one time on the same or adjacent land in such manner that Work on one contract may interfere with that on another, the OWNER shall determine the sequence and order of the Work. When the territory of one contract is the necessary or convenient means of access for the execution of another contract, such privilege of access or any other reasonable privilege may be granted by the OWNER to CONTRACTOR.

1.04 LOCATION OF THE PROJECT

- A. The project is located on Hancock Road, within a residential neighborhood, in the Town of Southwest Ranches, Florida.

1.05 CONTRACT DRAWINGS

- A. The work to be performed is shown on the set of Contract Drawings entitled "Hancock Road Guardrail Improvements", Town of Southwest Ranches P.O. No. 20-0030.

1.06 CONTRACTOR FURNISHED MATERIAL AND EQUIPMENT

- A. All equipment, materials, or devices incorporated in this project shall be new and unused, unless indicated otherwise in the Contract Documents and shall be the products of reliable manufacturers who, unless otherwise specified, have been regularly engaged in the manufacture of such material and equipment for at least five (5) years. Procedures and additional requirements regarding manufacturer's experience and substitutions are included in Section 01300 - Submittals.

1.07 EXAMINATION OF CONTRACT DOCUMENTS AND SITE

- A. The Bidder is required to carefully examine the site of the work and the Contract Documents for the work contemplated. It will be assumed that the Bidder has investigated and is fully informed as to the requirements of the Contract Documents, laws, ordinances, codes and any other factors which may affect the performance of the work. Failure to be so informed will not relieve a successful Bidder of his obligation to

furnish all material, equipment and labor necessary to carry out the provision of the Contract Documents and to complete the contemplated work for the consideration set forth in his Bid.

- B. The CONTRACTOR shall contact representatives for other utilities, facilities in proximity of the work and Sunshine State One Call Inc., to obtain the as-built information from them directly. The utilities shown on Drawings are based upon available records supplied from various sources. The OWNER makes no guarantee, either expressed or implied, as to their accuracy or completeness.

1.08 ITEMS SPECIFIED ON DRAWINGS

- A. Certain items of material and/or equipment, and their installation may be specified on the Drawings and not mentioned in the Specifications. Such items are to be considered as both shown on the Drawings and noted in the Specifications and be provided by the CONTRACTOR in accordance with the Specification on the Drawings.

1.09 FIELD LAYOUT OF WORK

- A. All work under this Contract shall be constructed in accordance with the Contract Drawings or as directed by the ENGINEER. Elevations of existing ground, structures and appurtenances are believed to be reasonably correct but are not guaranteed to be absolute and therefore are presented only as an approximation. Any error or apparent discrepancy in the data shown or omissions of data required for accurately accomplishing the stake-out survey shall be referred immediately to the ENGINEER for interpretation or correction.
- B. All survey work for construction control purposes shall be made by the CONTRACTOR at his expense.
- C. The CONTRACTOR shall establish all base lines for the location of the principal component parts of the work together with benchmarks and batter boards adjacent to the work. Based upon the information provided by the Contract Drawings, the CONTRACTOR shall develop and make all detail surveys necessary for construction. The OWNER will furnish information and location of existing benchmarks.
- D. The CONTRACTOR shall have the responsibility to carefully preserve the benchmarks, reference points and stakes. In case of destruction thereof by the CONTRACTOR or resulting from his negligence, he shall be held liable for any expense and damage resulting therefrom and shall be responsible for any mistakes that may be caused by the unnecessary loss or disturbance of such bench marks, reference points and stakes.
- E. Existing or new control points, property markers, and monuments that will be established or are destroyed during the normal course of construction shall be re-established by the CONTRACTOR; and all reference ties recorded therefore shall be furnished to the ENGINEER. All computations necessary to establish the exact position of the work shall be made and preserved by the CONTRACTOR.
- F. The ENGINEER may check all or any portion of the work, and the CONTRACTOR shall afford all necessary assistance to the ENGINEER in carrying out such checks. Any necessary corrections to the work shall be performed immediately by the CONTRACTOR and he shall accept all responsibility for the accuracy and completeness of his work.

1.10 ENVIRONMENTAL PROTECTION

- A. The CONTRACTOR shall furnish all labor and equipment and perform all WORK required for the prevention of environmental pollution during and as a result of the WORK under this contract. The CONTRACTOR shall be responsible for preparing and complying with the requirements of the National Pollution Prevention Discharge Elimination System (NPDES) and Storm Water Pollution Prevention Plan (SWPPP), including preparation and submittal of the Notice of Intent (NOI) prior to start of construction. For the purpose of this contract environmental pollution is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life, affect other species of importance to man, or degrade the utility of the environment for aesthetic and recreational purposes. The control of environmental pollution requires consideration of air, water, land and involves noise, solid waste management and management of radiant energy and radioactive materials, as well as other pollutants.
- B. The CONTRACTOR shall take all steps necessary to protect water quality in the connected waters around the project and shall utilize such additional measures as directed by the ENGINEER. Silt screens, hay bales, turbidity curtains, or other control measures to prevent pollution shall not be removed until the turbidity of the affected waters is equal to or lower than the ambient turbidity of undisturbed segments of adjacent surface waters.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

- END OF SECTION -

SECTION 01025

BASIS OF PAYMENT

PART 1 - GENERAL

1.01 GENERAL

- A. Payments to the CONTRACTOR shall be made on the basis of the Bid Items in the Bid Schedule as full and complete payment for furnishing all materials, labor, tools and equipment, and for performing all operations necessary to complete the work included in the Contract Documents. Such compensation shall also include payments for any loss or damages arising directly or indirectly from the work, or from any discrepancies between the actual quantities of work and those shown in the Contract Documents, or from any unforeseen difficulties which may be encountered during the prosecution of the work until the final acceptance by the OWNER.
- B. The prices stated in the Bid Schedule include all costs and expenses for taxes, labor, equipment, materials, commissions, transportation charges and expenses, patent fees and royalties, labor for handling materials during inspection, together with any and all other costs and expenses for performing and completing the work as shown on the plans and specified herein. The Basis of Payment for an item at the price shown in the Bid Schedule shall be in accordance with its description of the item in this Section and as related to the work specified and as shown on the Drawings. Unit prices where used will be applied to the actual quantities furnished and installed in conformance with the Contract Documents.
- C. The CONTRACTOR'S attention is called to the fact that the quotations for the various items of work are intended to establish a total price for completing the work in its entirety. Should the CONTRACTOR feel that the cost of any item of work has not been established by the Bid Schedule or Basis of Payment, he shall include the cost for that work in some other applicable Bid Item for each construction package so that his Bid Schedule for the project does reflect his total price for completing the work in its entirety.
- D. The CONTRACTOR shall submit, with each Payment Request, a list of MBE/SBE Subcontractors, that he is or will be utilizing for his contract. For each MBE/SBE Subcontractor, the following information shall be provided:
 - 1. Total sub-contract dollar amount.
 - 2. Amount paid to date.

1.02 MEASUREMENT

- A. The quantities for payment under this Contract shall be determined by actual measurement of the completed items, in place, ready for service and accepted by the OWNER, in accordance with the Schedule of Payment Values as described in Section 01300, unless otherwise specified. Representatives of the CONTRACTOR and OWNER/ENGINEER shall witness all field measurements.

1.03 PAYMENT ITEMS

A. MOBILIZATION / DEMOBILIZATION (Bid Item No. 1)

The lump sum price bid for this item shall be full compensation for all mobilization and demobilization activities, including but not limited to bonds, insurance, scheduling and other permit package submittals, site/subsurface investigation, utility coordination, temporary facilities, any space required for staging, laydown, storage, parking, construction equipment, shop drawing submittals, etc., furnishing and installing all erosion and turbidity control devices, including perimeter silt fence, turbidity barriers and any other BMP's necessary to prevent sediment from washing into surrounding areas and canal during rainfall events. The bid price for this item shall also include the cost for complying with the requirements of Central Broward Water Control District (CBWCD) and/or NPDES permit and all other activities necessary to prepare and complete the contract work not included in any other bid item. Payment for demobilization shall include all work related to demobilization, site cleanup, final restoration of all affected areas, road, pavement, parking area, sidewalk, fences, yard, sod, bushes, etc., in accordance with the Contract Documents. Payment for mobilization/demobilization shall be made as follows: seventy percent (70%) for mobilization and thirty percent (30%) for demobilization. The lump sum price of mobilization/demobilization shall not exceed 7% of the sum of bid items 2 thru 12.

B. MAINTENANCE OF TRAFFIC (Bid Item No. 2)

The lump sum price bid for this item shall be full compensation for Maintenance of Traffic (MOT) in accordance with the Florida Department of Transportation (FDOT) Standard Specifications for Road & Bridge Construction Latest edition and the Standard Plans Index 102 Series, latest editions and the Town of Southwest Ranches Standards. The contractor's proposed maintenance of traffic plan is to be submitted to and approved by the Engineer and any other jurisdictional agencies (City, FDOT, County etc.). The bid price for this item shall include a Traffic Engineer preparing the MOT plans if necessary, for the required plan approval. Payment for MOT will be made in equal monthly amounts for the duration of the Contract Time.

C. FURNISH & INSTALL GUARDRAIL (TL-3) (Bid Item No. 3)

Measurement for payment for furnishing and installing guardrail will be based upon the actual length of guardrail installed in field all in accordance with the requirements of the Contract Documents. The guardrail length will be measured along the centerline of installed panels, between the points labeled Begin/End Guardrail Station shown on the Plans measured from the centerline of the panel's post bolt slots at the approach/trailing ends. Payment for furnishing and installing guardrail will be made at the unit price per linear feet, per category, named in the Bid Schedule which price shall constitute full compensation for the complete installation of the guardrail complying with the latest Florida Department of Transportation (FDOT) standards, specifications and details, including but not limited to guardrails and ancillaries, Controlled Release Terminals (CRT), standard posts, asphalt paving, grading, hardware, any excavation, dewatering, sheeting, backfill, compaction, testing, restoration, cleanup, and photographs of work completed all in accordance with the contract documents.

No additional payment will be made for any guardrail details, standards, or installation method revisions made by FDOT that does not match the plans as shown. FDOT Guardrail standards at the time of Bid shall be used for bidding purposes to provide all necessary materials, equipment, labor, etc. for a complete and functional installation.

D. FURNISH & INSTALL END TREATMENTS PARALLEL APPROACH TERMINAL (TL-2 NON-GATING) (Bid Item No. 4)

Measurement for payment for furnishing and installing end treatments will be based upon the actual number of End Treatments, per category, installed in field all in accordance with the requirements of the Contract Documents. Payment for furnishing and installing end treatments will be made at the unit price, each, per category, named in the Bid Schedule which price shall constitute full compensation for the complete installation of the functional end treatment connected to the guardrail complying with the latest FDOT standards, specifications, and details, including all ancillaries, hardware, asphalt paving, grading, any excavation, dewatering, sheeting, backfill, compaction, testing, restoration, cleanup, and photographs of work completed all in accordance with the contract documents.

No additional payment will be made for any guardrail details, standards, or installation method revisions made by FDOT that does not match the plans as shown. FDOT Guardrail standards at the time of Bid shall be used for bidding purposes to provide all necessary materials, equipment, labor, etc. for a complete and functional installation.

E. CONNECTION TO EXISTING GUARDRAIL (Bid Item No. 5)

Measurement for payment for connection to existing guardrail will be based upon the actual number of connections to existing guardrail made in the field all in accordance with the requirements of the Contract Documents. Payment for connection to existing guardrail will be made at the unit price, each, named in the Bid Schedule which price shall constitute full compensation for the connection to existing guardrail complying with the latest FDOT standards, specifications, and details, including all ancillaries, asphalt paving, grading, any excavation, dewatering, sheeting, backfill, compaction, testing, restoration, cleanup, and photographs of work completed all in accordance with the contract documents. The cost of removal of any portion of the existing guardrail for the required connection shall be part of this bid price and will not be paid separately under Bid Item 10, Remove Guardrail.

F. FURNISH & INSTALL DEEP POST/ SPECIAL POST/ ENCASED POST (Bid Item No. 6)

Measurement for payment for furnishing and installing deep post/ special post/ encased post will be based upon the actual number of such posts installed in the field all in accordance with the requirements of the Contract Documents. Payment for furnishing and installing deep post/ special post/ encased post will be made at the unit price, each, named in the Bid Schedule which price shall constitute full compensation for the installation of such post complying with the latest FDOT standards, specifications, and details, including all ancillaries, paving, grading, any excavation, dewatering, sheeting, backfill, compaction, testing, restoration, cleanup, and photographs of work completed all in accordance with the contract documents.

G. REMOVE GUARDRAIL (Bid Item No. 7)

Measurement for payment for removing guardrail will be based upon the actual length of guardrail removed in the field all in accordance with the requirements of the Contract Documents. The length of guardrail removed will be measured along the centerline of panels removed. Payment for removing guardrail will be made at the unit price per linear feet, named in the Bid Schedule which price shall constitute full compensation for the complete removal of the guardrail complying with the latest Florida Department of Transportation (FDOT) standards and details, including but not limited to guardrails and ancillaries, Controlled Release Terminals (CRT), end terminals, asphalt paving, grading, any excavation, dewatering, sheeting, backfill, compaction, testing, restoration, cleanup, and photographs of work completed all in accordance with the contract documents.

H. CANAL BANK RESTORATION FILL (Bid Item No. 8)

Measurement for payment for Canal Bank Restoration Fill will be based upon the actual cubic yards of canal bank filled for restoration as shown on plans, measured and estimated from the existing top of bank line based on the existing and final cross sections shown on the plans closest to the filled area, all in accordance with the requirements of the Contract Documents. Payment for Canal Bank Restoration Fill will be made at the unit price per cubic yard, named in the Bid Schedule which price shall constitute full compensation for the complete fill of the of the canal bank with material complying with FDOT embankment material specifications, stabilized, high performance turf reinforcement mat, pinning, etc. and Central Broward Water Control District (CBWCD) standards and details. The restored canal bank shall match the slope of the adjacent undisturbed existing canal bank or as shown on plans all in accordance with the contract documents. As-built plans of the cross sections of the restored canal bank meeting the requirements of CBWCD shall be provided to the ENGINEER and CBWCD.

I. CANAL RESTORATION EXCAVATION (Bid Item No. 9)

Measurement for payment for Canal Restoration Excavation will be based upon the actual cubic yards of canal excavated for restoration as shown on plans, measured and estimated from the existing top of bank line based on the existing and final cross sections shown on the plans closest to the excavated area, all in accordance with the requirements of the Contract Documents. Payment for Canal Restoration Excavation will be made at the unit price per cubic yard, named in the Bid Schedule which price shall constitute full compensation for the complete excavation of the of the canal as shown on plans and complying with Central Broward Water Control District (CBWCD) standards and details all in accordance with the contract documents. As-built plans of the cross sections of the restored canal meeting the requirements of CBWCD shall be provided to the ENGINEER and CBWCD.

J. CONSTRUCT RIP-RAP HEADWALL PER CBWCD STANDARD (Bid Item No. 10)

Measurement for payment for constructing Rip-Rap Headwall will be based upon the number of headwalls constructed in the field all in accordance with the requirements of the Contract Documents. Payment for constructing Rip-Rap Headwall will be made at the unit price, each, named in the Bid Schedule which price shall constitute full compensation for constructing Rip-Rap Headwall including but not limited to the removal of existing headwall, extending the drainage pipe as required, furnishing all material

required for constructing the headwall as shown on plans to meet CBWCD requirements, associated excavation, and filling/restoration of the canal bank all in accordance with the contract documents. As-built plans of the headwall constructed meeting the requirements of CBWCD shall be provided to the ENGINEER.

K. RESTORATION OF SOD, SIGNAGE, PAVEMENT MARKINGS, ETC. (Bid Item No. 11)

The lump sum price bid for this item shall be full compensation for furnishing and installing sod in all disturbed areas outside the pavement including the restored canal bank up to the waterline, the relocation of any roadside signs, mail boxes, etc. to facilitate installation of guardrail, and for the restoration of any disturbed pavement markings or any other required restoration not included in other bid items. All restoration shall be completed to the satisfaction of the jurisdictional authority.

L. SURVEY STAKEOUT & AS-BUILT (Bid Item No. 12)

The lump sum price bid for this item shall be full compensation for construction survey, stake out, and preparation of As- Built record drawings signed and sealed by a Florida Licensed Surveyor. All survey is to be done in conformance with the drawings, specifications, permits and agency requirements. The cost of as-built plan preparation for the canal bank restoration and headwall construction shall also be included in this Bid Item. Payment for survey stakeout & as-built shall be made as follows: thirty percent (30%) on survey stakeout and seventy percent (70%) on as-built approval by the CBWCD and/or OWNER.

M. PRE-CONSTRUCTION AUDIO-VIDEO RECORDING (Bid Item No. 13)

The lump sum price bid for this item shall be full compensation for furnishing an audio-video record of the pre-construction project area to capture existing conditions of all areas of work and adjacent areas prior to beginning work, acceptable to the ENGINEER and the OWNER.

N. UTILITY ADJUSTMENTS: RELOCATING WATER SERVICE, WATER METER, OR BACKFLOW PREVENTER ALLOWANCE (Bid Item No. 14)

Included in this allowance is work associated with removal, relocation or reinstallation of water services including backflow preventers, meters and meter boxes, etc. All work authorized for payment shall be authorized in writing by the OWNER prior to the work. Amount to be paid per removal, relocation, reinstallation, etc. shall be negotiated or agreed to by both parties. The OWNER reserves the right to award any, all, or none of the money associated with this allowance

O. CONSIDERATION FOR INDEMNIFICATION (Bid Item No. 15)

In recognition of the CONTRACTOR'S indemnification obligations, the OWNER will pay to the CONTRACTOR the specific consideration of one hundred dollars (\$100.00). Payment of said specific consideration shall be made at the time of the payment of the first progress estimate and the CONTRACTOR shall acknowledge payment of this consideration by letter to the OWNER after receipt of the progress payment.

P. UNDEFINED CONDITIONS ALLOWANCE (Bid Item No. 16)

Included in this allowance is work associated with undefined conditions or conflicts developing from undefined conditions. All work authorized for payment shall be authorized in writing by the OWNER prior to the work. Amount to be paid per undefined conditions or conflict shall be negotiated or agreed to by both parties. The OWNER reserves the right to award any, all, or none of the money associated with this allowance.

- END OF SECTION -

SECTION 01070

ABBREVIATIONS

PART 1 - GENERAL

1.01 THE REQUIREMENT

- A. Wherever in these specifications references are made to the standards, other published data of the various national, regional, or organizations may be referred to by their acronym or abbreviation user of these specifications, the following acronyms or abbreviations these specifications shall have the meanings indicated herein.

1.02 ABBREVIATIONS AND ACRONYMS

AAMA	-	Architectural Aluminum Manufacturer's Association
AASHTO	-	American Association of the State Highway and ACI American Concrete Institute
ACOE	-	Army Corps of Engineers
ACPA	-	American Concrete Pipe Association
AFBMA	-	Anti-Friction Bearing Manufacturer's Association, AGMA American Gear Manufacturer's Association
AHGDA	-	American Hot Dip Galvanizers Association
AI	-	The Asphalt Institute
AIA	-	American Institute of Architects
AISC	-	American Institute of Steel Construction
AISI	-	American Iron and Steel Institute
AITC	-	American Institute of Timber Construction
AMCA	-	Air Moving and Conditioning Association
ANSI	-	American National Standards Institute, Inc.
APA	-	American Plywood Association
API	-	American Petroleum Institute
APHA	-	American Public Health Association
APWA	-	American Public Works Association
ASA	-	Acoustical Society of America
ASAE	-	American Society of Agriculture Engineers
ASCE	-	American Society of Civil Engineers

- ASHRAE - American Society of Heating, Refrigerating, and Air-Conditioning Engineers
- ASLE - American Society of Lubricating Engineers
- ASME - American Society of Mechanical Engineers
- ASMM - Architectural Sheet Metal Manual
- ASSE - American Society of Sanitary Engineers
- ASTM - American Society for Testing and Materials
- AWPA - American Wood Preservers Association
- AWPI - American Wood Preservers Institute
- AWS - American Welding Society
- AWWA - American Water Works Association
- BCDPEP - Broward County Department of Planning and Environmental Protection (formerly BCDNRP)
- BCEPD - Broward County Environmental Protection Department (formerly BCDPEP)
- BCEPGMD - Broward County Environmental Protection and Growth Management Department (formerly BCEPD)
- BCHD - Broward County Health Department
- BHMA - Builders Hardware Manufacturer's Association
- CBWCD - Central Broward Water Control District
- CMA - Concrete Masonry Association
- CRSI - Concrete Reinforcing Steel Institute
- DIPRA - Ductile Iron Pipe Research Association
- EIA - Electronic Industries Association
- ETL - Electrical Test Laboratories
- FBC - Florida Building Code
- FDEP - Florida Department of Environmental Protection
- FDOT - Florida Department of Transportation
- FS - Federal Specifications
- IEEE - Institute of Electrical and Electronics Engineers
- IES - Illuminating Engineering Society
- IPCEA - Insulated Power Cable Engineers Association
- ISA - Instrument Systems and Automation

- ISO - International Organization for Standardization
- MBMA - Metal Building Manufacturers Association
- MMA - Monorail Manufacturers Association
- MTI - Marine Testing Institute
- NAAM - National Association of Architectural Metal Manufacturers
- NACE - National Association of Corrosion Engineers
- NBS - National Bureau of Standards
- NEC - National Electrical Code
- NEMA - National Electrical Manufacturer's Association
- NFPA - National Fire Protection Association
- NIOSH - National Institute of Occupational Safety and Health
- NIST - National Institute of Standards and Testing
- NRCA - National Roofing Contractors Association
- NSF - National Science Foundation
- OSHA - Occupational Safety and Health Administration
- PCA - Portland Cement Association
- SMACCNA - Sheet Metal and Air Conditioning Contractors National Association
- SSPC - Steel Structures Painting Council
- SSPWC - Standard Specifications for Public Works Construction
- SFWMD - South Florida Water Management District
- UL = Underwriters Laboratories, Inc.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

- END OF SECTION -

SECTION 01090

APPLICABLE STANDARDS AND CODES

PART 1 - GENERAL

1.01 GENERAL

- A. Wherever reference is made to any published standards, codes, or standard specifications, it shall mean the latest standard code, specification, or tentative specification of the technical society, organization, or body referred to, which is in effect at the date of opening of bids.
- B. The following is a partial list of typical abbreviations which may be used in the Specifications and the organizations to which they refer:

AASHTO	- American Association of State Highway and Transportation Officials
ACI	- American Concrete Institute
ACIFS	- American Cast Iron Flange Standards
AGA	- American Gas Association
AGMA	- American Gear Manufacturers Association
AIA	- American Institute of Architects
AISC	- American Institute of Steel Construction
AISI	- American Iron and Steel Institute
ANSI	- American National Standard Institute
API	- American Petroleum Institute
ASCE	- American Society of Civil Engineers
ASHRAE	- American Society of Heating, Refrigeration, and Air Conditioning Engineers
ASME	- American Society of Mechanical Engineers
ASTM	- American Society of Testing and Materials
AWI	- Architectural Woodwork Institute
AWPA	- American Wood Preservers Association
AWS	- American Welding Society
AWWA	- American Water Works Association
BHMA	- Builder's Hardware Manufacturers Association
CIPRA	- Cast Iron Pipe Research Association
CRSI	- Concrete Reinforcing Steel Institute
CSA	- Canadian Standards Association
DHI	- Door and Hardware Institute
DOT	- Florida Department of Transportation
EI	- Edison Electric Institute
FBC	- Florida Building Code
ICEA	- Insulated Cable Engineers Association
IEEE	- Institute of Electrical and Electronic Engineers
IPCEA	- Insulated Power Cable Engineers Association
ISO	- Insurance Service Offices
NAAMM	- National Association of Architectural Metal Manufacturers
NBS	- National Bureau of Standards
NCP I	- National Clay Pipe Institute
NEC	- National Electric Code

NEMA - National Electrical Manufacturers Association
NFPA - National Fire Protection Association
NLMA - National Lumber Manufacturers Association
OSHA - Occupational Safety and Health Act
SAE - Society of Automotive Engineers Standards
SHBI - Steel Heating Boiler Institute
SSPC - Steel Structures Painting Council
UL - Underwriters' Laboratories, Inc.

- C. CONTRACTOR shall, when required, furnish evidence satisfactory to the ENGINEER that materials and methods are in accordance with such standards where so specified.
- D. In the event any questions arise as to the application of these standards or codes, copies shall be supplied on site by the CONTRACTOR.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

- END OF SECTION -

SECTION 01200
PROJECT MEETINGS

PART 1 - GENERAL

1.01 PRECONSTRUCTION

- A. A preconstruction meeting will be held to acquaint representative of the OWNER and various agencies with those in responsible charge of the CONTRACTOR's activities for the project. The meeting will cover such subjects as the following: insurance certificates; permits and licenses; affirmative action employment; construction schedules; cost breakdown and application for payments; material deliveries, storage and payments; shop drawings and submittals; job-site inspection by the ENGINEER; safety and emergency action procedures; operations of the existing utilities; field offices, security and other housekeeping procedures; list of subcontractors; liquidated damages; communications; coordinating; and other appropriate matters.

1.02 PROGRESS

- A. A progress meeting shall be held on a once-per-week basis for the purpose of coordinating and expediting the work. The CONTRACTOR, as a part of his obligations under the Contract, shall attend in person or by an authorized representative to attend and to act on his behalf. The ENGINEER will conduct such meetings and as necessary, with the CONTRACTOR's input, issue an agenda.
- B. In addition, the ENGINEER or CONTRACTOR may call for special job site meetings for the purpose of resolving unforeseen problems or conflicts which may impede the construction schedule. The ENGINEER will prepare a brief summary report of the decisions or understandings concerning each of the items discussed at the meeting.
- C. At weekly progress meetings, the CONTRACTOR shall submit to the ENGINEER for review a current three (3) week progress schedule. This schedule submission shall include a two week look ahead schedule and reflect status of the work performed during the preceding week.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

- END OF SECTION -

SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.01 THE REQUIREMENT

- A. This section specifies the means of all submittals. Document submittals may be in electronic format complying with the requirements and acceptable to the ENGINEER. All submittals, whether their final destination is to the OWNER, ENGINEER, or other representatives of the OWNER, shall be directed through the ENGINEER. A summary of the key types of submittals and the number of copies required, if in hardcopy format, is as follows:

<u>Copies to ENGINEER</u>	<u>Type of Submittal</u>
4	Construction schedule
4	Schedule of payment items
2	Audio visual preconstruction record
6	Progress estimates
4	Shop drawings
4	Certificates of compliance
2	Warranties
1*	Product samples
1	Record drawings
5	Final Record Drawings

*Unless otherwise required in the specific Section where requested.

1.02 SUBMITTAL PROCEDURES

- A. Transmit each submittal with a form acceptable to the ENGINEER, clearly identifying the project CONTRACTOR, the enclosed material and other pertinent information specified in other parts of this section. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.
- B. Revise and resubmit submittals as required, identify all changes made since previous submittals. Resubmittals shall be noted as such.
- C. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.

1.03 CONSTRUCTION PROGRESS SCHEDULE

- A. The CONTRACTOR shall have the capability of preparing and utilizing the specified construction progress scheduling techniques. A statement of capability shall be

submitted in writing to the ENGINEER with the return of the executed Agreement to the OWNER and will verify that either the CONTRACTOR's organization has in-house capability qualified to use the technique or that the CONTRACTOR employs a consultant who is so qualified. Capability shall be verified by description of the construction projects to which the CONTRACTOR or its consultant has successfully applied the scheduling technique and which were controlled throughout the duration of the project by means of systematic use and updating of the construction progress schedule, the network analysis and associated reports. The submittal shall include the name of the individual on the CONTRACTOR's staff who will be responsible for the construction progress schedule, and associated reports and for providing the required updating information of same. The CONTRACTOR shall submit its proposed progress (baseline) schedule to the ENGINEER for review and comment within thirty days of the Notice to Award. The ENGINEER shall have the authority to determine acceptability/correctness of the schedule logic and activity interrelationships. The use of extraneous, nonworking activities and activities which add restraints to the construction schedule shall not be accepted. Baseline schedules that do not meet their contract completion dates shall not be accepted.

B. The Contractor's progress schedule (baseline and monthly updates) shall be computer generated and resource loaded. Each construction progress schedule, and associated report shall include the following tabulations: a list of activities in numerical order, a list of activity precedence, schedules sequenced by Early Start Date, Total Float, and Late Start Date. Each schedule and report shall include the following minimum items.

1. Activity Numbers
2. Estimated Duration
3. Activity Description
4. Early Start Date (Calendar Dated)
5. Early Finish Date (Calendar Dated)
6. Latest Allowable Start Date (Calendar Dated)
7. Latest Allowable Finish Date (Calendar Dated)
8. Status (whether critical)
9. Estimated Cost of The Activity
10. Total Float and Free Float

C. In addition, each construction progress schedule, network analysis and report shall be prefaced with the following summary data:

1. Contract Name and Number
2. CONTRACTOR'S Name

3. Contract Duration and Float
 4. Contract Schedule
 5. The Effective or Starting Date of The Schedule (the date indicated in the Notice-to-Proceed)
- D. The work day to calendar date correlation shall be based on an 8-hour day and 40-hour week with adequate allowance for holidays and all other special requirements of the Work. A total of six (6) days for adverse weather shall also be allowed for in the progress schedule.
- E. If the CONTRACTOR desires to make changes in its method of operating which affect the construction progress schedule and related items, the CONTRACTOR shall notify the ENGINEER in writing stating what changes are proposed and the reason for the change. If the ENGINEER accepts these changes, in writing, the CONTRACTOR shall revise and submit, without additional cost to the OWNER, all of the affected portions of the construction progress schedule, and associated reports. The construction progress schedule and related items shall be adjusted by the CONTRACTOR only after prior acceptance, in writing by the ENGINEER. Adjustments may consist of changing portions of the activity sequence, activity durations, division of activities, or other adjustments as may be required. The addition of extraneous, nonworking activities and activities which add restraints to the construction progress schedule shall not be accepted.
- F. Except where earlier completions are specified, schedule dates which show completion of all Work prior to the contract completion date shall, in no event, be the basis for claim for delay against the OWNER by the CONTRACTOR.
- G. Construction progress schedules and related items which contain activities showing negative float or which extend beyond the contract completion date will not be accepted by the ENGINEER.
- H. Whenever it becomes apparent from the current construction progress schedule and associated reports that delays to the critical path have resulted and the contract completion date will not be met, or when so directed by the ENGINEER, the CONTRACTOR shall take some or all of the following actions at no additional cost to the OWNER. They shall submit to the ENGINEER for approval, a written statement of the steps they intend to take to remove or arrest the delay to the critical path in the current construction progress schedule, including a computer generated schedule revision to reflect proposed actions.
1. Increase construction manpower in such quantities and crafts as will substantially eliminate the backlog of work.
 2. Increase the number of working hours per shift, shifts per day, working days per week, the amount of construction equipment, or any combination of the foregoing, sufficiently to substantially eliminate the backlog of work.
 3. Reschedule activities to achieve maximum practical concurrency of accomplishment of activities, and comply with the revised schedule.

- I. If when so requested by the ENGINEER, the CONTRACTOR should fail to submit a written statement of the steps they intend to take or should fail to take such steps as reviewed and accepted in writing by the ENGINEER, the ENGINEER may direct the CONTRACTOR to increase the level of effort in manpower (trades), equipment and work schedule (overtime, weekend and holiday work, etc.) to be employed by the CONTRACTOR in order to remove or arrest the delay to the critical path in the current construction progress schedule, and the CONTRACTOR shall promptly provide such level of effort at no additional cost to the OWNER.
- J. If the completion of any activity, whether or not critical, falls more than 100 percent behind its previously scheduled and accepted duration, the CONTRACTOR shall submit for approval a schedule adjustment showing each such activity divided into two activities reflecting completed versus uncompleted work.
- K. Shop drawings which are not approved on the first submittal or within the time scheduled, and equipment which does not pass the specified tests and certifications shall be immediately rescheduled.
- L. The contract time will be adjusted only in accordance with the General Requirements and other portions of the Contract Documents as may be applicable. If the ENGINEER finds that the CONTRACTOR is entitled to any extension of the contract completion date, the ENGINEER's determination as to the total number of days extension shall be based upon the current construction progress schedule and on all data relevant to the extension. Such data shall be included in the next updating of the schedule and related items. Actual delays in activities which, according to the construction progress schedule, do not affect any contract completion date will not be the basis for a change therein.
- M. From time to time it may be necessary for the contract schedule of completion time to be adjusted by the OWNER in accordance with the General Requirements and other portions of the Contract Documents as may be applicable. Under such conditions, the ENGINEER will direct the CONTRACTOR to reschedule the Work or contract completion time to reflect the changed conditions, and the CONTRACTOR shall revise the construction progress schedule and related items accordingly, at no additional cost to the OWNER.
- N. Available float time may be used by the OWNER through the OWNER'S ENGINEER.
- O. The OWNER controls the float time and, therefore, without obligation to extend either the overall completion date or any intermediate completion dates, the OWNER may initiate changes that absorb float time only. OWNER initiated changes that affect the critical path on the network diagram shall be the sole grounds for extending the completion dates. CONTRACTOR initiated changes that encroach on the float time may be accomplished only with the OWNER'S concurrence. Such changes, however, shall give way to OWNER initiated changes competing for the same float time.
- P. To the extent that the construction project schedule, or associated report or any revision thereof shows anything not jointly agreed upon or fails to show anything jointly agreed upon, it shall not be deemed to have been accepted by the ENGINEER. Failure to include on a schedule any element of Work required for the performance of this Contract shall not excuse the CONTRACTOR from completing all Work required within any

applicable completion date, notwithstanding the review of the schedule by the ENGINEER.

- Q. Review and acceptance of the construction progress schedule, and related reports, by the ENGINEER is advisory only and shall not relieve the CONTRACTOR of the responsibility for accomplishing the Work within the contract completion date. Omissions and errors in the construction progress schedule, and related reports shall not excuse performance less than that required by the Contract and in no way make the ENGINEER an insurer of the CONTRACTOR'S success or liable for time or cost overruns flowing from any shortcomings in the construction progress schedule, and related reports.
- R. The CONTRACTOR shall present and discuss the proposed schedule at the preconstruction conference.
- S. The construction progress schedule shall be based upon the precedence diagramming method of scheduling and shall be prepared in the form of a horizontal bar chart showing in detail the proposed sequence of the Work and identifying all construction activities included but not limited to yard piping, all structures and treatment units and all related Work specified herein to be performed under the Contract. The schedule shall be time scaled, identifying the first day of each week, with the estimated date of starting and completion of each stage of the Work in order to complete the project within the contract time. The project critical path shall be clearly identified in color or by other means acceptable to the ENGINEER.
- T. The progress schedule shall be plotted on 22-inch by 34-inch and 11-inch by 17-inch paper and shall be revised and updated monthly, depicting progress through the last day of the current month and scheduled progress through completion. Ten (one 22-inch by 34-inch and nine 11-inch by 17-inch), schedules, required schedule "sorts" (tabulations) and an electronic copy of the baseline schedule shall be submitted for review and acceptance. Five (one 22-inch by 34-inch and four 11-inch x 17-inch) up-to-date copies of the schedule and five copies of tabulations and an electronic copy shall be submitted along with the application for monthly progress payments for the same period.
- U. The construction progress schedule shall be developed and maintained using Primavera Sure Trak as manufactured by Primavera Systems, Inc., or equal.

1.04 SCHEDULE OF PAYMENT VALUES

- A. The CONTRACTOR shall submit a Schedule of Payment Values, in accordance with Section 01025, for all items in the proposal that are to be paid for on a lump sum basis. The schedule shall contain the labor and material values of the component parts of Work for the purpose of making progress payments during the construction period. The Schedule of Payment Values shall directly correlate on an item by item basis (unless otherwise accepted by the ENGINEER) to each individual activity detailed in the construction progress schedule.
- B. The schedule shall be given in sufficient detail for the proper identification of Work accomplished. Each item shall include its proportional share of all costs including the CONTRACTOR's overhead, contingencies and profit. The sum of all scheduled items shall equal the total value of the Contract.

- C. If the CONTRACTOR anticipates the need for payment for materials stored on the project site, it shall also submit a separate list covering the cost of materials, delivered and unloaded with taxes paid. This list shall also include the installed value of the item with coded reference to the Work items in the Schedule of Payment Items.
- D. The CONTRACTOR shall expand or modify the above schedule and materials listing as required by the ENGINEER'S initial or subsequent reviews.
- E. The CONTRACTOR shall update the Schedule of Payment Values monthly for reviewing by the ENGINEER. The payment applications shall be reviewed by the ENGINEER in accordance with the updated Schedule of Payment Values.

1.05 SHOP DRAWINGS, PROJECT DATA AND SAMPLES

- A. General: A Shop Drawing Submittal Schedule shall be provided by the CONTRACTOR within thirty (30) days of the Notice to Proceed.
- B. The CONTRACTOR shall furnish for review four (4) copies of shop drawings, project data, samples and other submittal items required by the Contract Documents. Two (2) copies shall be returned to the CONTRACTOR stamped "No Exceptions" or "Note Comments". Where major corrections are indicated, two (2) copies will be returned stamped "Rejected" or "Resubmit" and a new submittal is required (4 copies).
- C. The review of the CONTRACTOR'S submissions shall in no way relieve the CONTRACTOR of any of his responsibilities under the Contract. An acceptance of a submission shall be interpreted to mean that there are no specific objections to the submitted material, subject to conformance with the Contract Drawings and Specifications.
- D. All submissions shall be dated and properly referenced to the specifications section and Contract Drawing number. The submittal number shall match the following submittal numbering system (or an equivalent system as approved by the ENGINEER):

Submittal Numbering System

- 1. Package ID: The package number will reflect the CSI (specification) section number as it appears in the specifications.
- 2. Subgroup ID: The submittal number will include the CSI number followed by two additional codes. The first will define the type of submittal as follows:
 - 01 Product Data, Specifications, Cut Sheets, Manufacturers certification or approval letters.
 - 02 Shop Drawings
 - 03 Product Samples and Mock-Ups
 - 04 Special requirements as required in the contract documents
 - 05 As-Built Drawings

- 06 Warranties
- 07 O&M
- 08 Spare Parts

The second code will identify individual submittals within that submittal type. The number to the left of the decimal represents the submittal number and the number to the right of the decimal represents the revision number.

Example:

<u>Package</u>	<u>Submittal</u>	<u>Description</u>
03300	03300-01-1.1	Concrete Admixture A, First Submittal
06400	06400-01-1.2	← Re-submittal

By the following this code system, all submittals may be entered into the Document Tracking System prior to receipt of submittals. When a particular submittal is received, locate the entry in the Document Tracking project file, add the appropriate information and process. The Document Tracking System will provide the next sequence number.

- E. Shop Drawings and Project Data within practical limits shall be submitted as a single complete package for any operating system and shall include all items of equipment and mechanical units involved in the functioning of such system. Where applicable, the submission shall include elementary wiring diagrams showing circuit functioning and necessary interconnection wiring diagrams for construction.
- F. All submissions shall bear the CONTRACTOR'S stamp certifying that they have been checked for conformance and accuracy. Submissions without the CONTRACTOR'S stamp of approval will not be reviewed by the ENGINEER and will be returned to the CONTRACTOR.
- G. For any submission containing any departure from the Contract Documents and the CONTRACTOR shall include proper explanation in his letter of submittal.
- H. Work on fabricated or special items shall not be commenced until the required submission information has been reviewed and accepted.
- I. Standard items shall not be assembled or shipped until the required submission information has been reviewed and accepted.

- J. Prior review actions shall not relieve the CONTRACTOR of the responsibility for correcting errors, deviations, and/or omissions discovered at a later date.
- K. Shop Drawings: Shop Drawings include, but are not limited to, layout drawings, installation drawings, construction drawings, certified and interconnecting wiring diagrams, etc. The CONTRACTOR shall be responsible for security of all the information, details, dimension, drawings, etc. necessary to prepare submission drawings required and necessary under this Contract and to fulfill all other requirements of his Contract. The CONTRACTOR shall secure such information, details, drawings, etc. from all possible sources including the Contract Drawings, drawings prepared by subcontractors, ENGINEER, manufacturers, CONTRACTORS, etc.
- L. Submission drawings shall accurately and clearly present the following:
 - 1. All working and installation dimensions.
 - 2. Arrangement and sectional views.
 - 3. Units of equipment in the proposed position for installation, details of required attachments and connections and dimensioned locations between units and in relation to the structures.
 - 4. Necessary details and information for making connections between the various trades including but not limited to, power supplies and interconnection wiring between units, accessories, appurtenances, etc.
- M. Product Data: Where manufacturer's publications in the form of catalogs, brochures, illustrations, or other data sheets are submitted in lieu of prepared shop drawings, such submission shall specifically indicate the particular item offered. Identification of such items and relative pertinent information shall be made with indelible ink. Submissions showing only general information will not be accepted.
- N. Product data shall include materials of construction, dimensions, performance characteristics, capacities, wiring diagrams, piping and controls, etc.
- O. Samples: CONTRACTOR shall furnish for review all samples as required by the Contract Documents or requested by the ENGINEER.
- P. Samples shall be of sufficient size or quantity to clearly illustrate the quality, type, range of color, finish or texture and shall be properly labeled to show the nature of the work where the material represented by the sample will be used.
- Q. Samples shall be checked by the CONTRACTOR for conformance to the Contract Documents before being submitted to the ENGINEER and shall bear the CONTRACTOR'S stamp certifying that they have been so checked. Transportation charges on samples submitted to the ENGINEER shall be prepaid by the CONTRACTOR.
- R. ENGINEER's review will be for compliance with the Contract Documents, and his comments will be transmitted to the CONTRACTOR with reasonable promptness.

- S. Accepted samples will establish the standards by which the completed work will be judged.

1.06 OPERATION AND MAINTENANCE INSTRUCTIONS (MANUALS)

- A. Individual Instructions: The CONTRACTOR, through manufacturer's representatives or other qualified individuals, shall provide instruction of designated employees of the OWNER in the operation and care of all equipment furnished.

- B. Written Instructions: The CONTRACTOR shall furnish and deliver to the ENGINEER, prior to the fifty percent completion point of construction, and no later than thirty (30) days prior to operator training, ten (10) complete sets of instructions, technical bulletins, and any other printed matter such as diagrams, prints or drawings, containing full information required for the proper operation, maintenance, and repair of the equipment. As a minimum, the following shall be included in this submittal:

1. Operating Instructions
2. Troubleshooting Information
3. Maintenance Schedule(s)
4. Lubrication Schedule
5. Location of Service Centers
6. Parts Diagram and List
7. Spare Parts List (spare parts furnished shall be defined)
8. Special Tools List
9. Installation Instructions
10. Assembly & Erection Drawings
11. Dimensional Drawings
12. Wiring Diagram(s)
13. Storage Instructions

- C. These requirements are a prerequisite to the operation and acceptance of equipment. Each set of instructions shall be bound together in appropriate three-ring binders. A detailed Table of Contents shall be provided for each set. Written operation and maintenance instructions shall be required for all equipment items supplied for this project. The amount of detail shall be commensurate with the complexity of the equipment item. Submittal shall be made for all mechanical and electrical equipment included but not limited to pumps, valves, gates, etc.

- D. Information not applicable to the specific piece of equipment installed on this project shall be struck from the submission. Information provided shall include a source of replacement parts and names of service representatives, including address and telephone number.
- E. Extensive pictorial cuts of equipment are required for operator reference in servicing.
- F. When written instructions include shop drawings and other information previously reviewed by the ENGINEER, only those editions thereof which were accepted by the ENGINEER, and which accurately depict the equipment installed, shall be incorporated in the instructions.

1.07 RECORD DRAWINGS

- A. The CONTRACTOR shall keep and maintain, at the job site, one record set of Drawings. On these, it shall mark all project conditions, locations, configurations, and any other changes or deviations which may vary from the details represented on the original Contract Drawings, including buried or concealed construction and utility features which are revealed during the course of construction. Special attention shall be given to recording the horizontal and vertical location of all buried utilities that differ from the locations indicated, or which were not indicated on the Drawings. As-Built furnished grade information shall be included on the record drawings. Said record drawings shall be supplemented by detailed sketches as necessary or directed to indicate, fully, the Work as actually constructed. These master record drawings of the CONTRACTOR'S representation of as-build conditions, including all revisions made necessary by addenda and change orders shall be maintained up-to-date during the progress of Work.
- B. The record drawings shall be received on the 20th working day of every second month after the month in which the final notice to proceed is given as well as on completion of Work. Failure to maintain the record drawings up-to-date shall be grounds of withholding monthly progress payments until such time as the record drawings are brought up-to-date.
- C. In the case of those drawings which depict the detail requirement for equipment to the assembled and wired in the factory, such as motor control centers and the like, the record drawing shall be updated by indicating those portions which are superseded by change order drawings or final shop drawings, and by including appropriate reference information describing the change orders by number and the shop drawings by manufacturer, drawing, and revision numbers.
- D. Record drawings shall be accessible to the ENGINEER at all times during the construction period.
- E. Upon substantial completion of the Work and prior to final acceptance, the CONTRACTOR shall finalize and deliver a complete set of final record drawings to the ENGINEER for transmittal to the OWNER, conforming to the construction records of the CONTRACTOR. This set of drawings shall consist of corrected drawings showing the reported location of the Work. The information submitted by the CONTRACTOR and incorporated in the Final Record Drawings will be assumed to be correct, and the ENGINEER will not be responsible for the accuracy of such information, and for any errors or omissions which may appear on the Final Record Drawings as a result.

- F. The information submitted by the CONTRACTOR in the Final Record Drawings shall be certified by a land surveyor registered in the State of Florida. For clarity, Final Record Drawings needs to be redrawn and clearly labeled as "Record Drawings". Notations indicated in the drawings shall be legible and printed in black ink. No handwritten notes are allowed.
- G. Final payment will not be acted upon until the ENGINEER certifies the record drawings as required by the agencies having jurisdiction. Said up-to-date record drawings shall be in the form of a set of prints with carefully plotted information.
- H. All final record drawings shall be certified by the Engineer of Record. Such certification shall evidence that ENGINEER has reviewed the information, finds it in substantial accordance with the design; and where deviations from the design exist, that said deviations are not to the detriment of the system. ENGINEER's certification shall read as follows:

"I HEREBY NOTIFY THE OWNER OF THE COMPLETION OF CONSTRUCTION OF ALL THE COMPONENTS OF THE WATER, FACILITIES FOR THE ABOVE REFERENCED PROJECT AND CERTIFY THAT THEY HAVE BEEN CONSTRUCTED IN SUBSTANTIAL CONFORMANCE WITH THE PLANS AND SPECIFICATIONS PERMITTED BY THE AGENCIES HAVING JURISDICTION"

- I. The CONTRACTOR shall submit all electronic media files of the paving, grading, water, sewer and drainage plans, reports, other supporting information, and the final version of as-builts drawings shall be submitted to the ENGINEER's office. The information provided shall contain an index file with a brief description of the electronic filing contents, and shall be labeled with project name, company name, and point of contact. Documents and spreadsheets shall be submitted in either MS Word, Excel, or other format approved by the ENGINEER. Drawings shall be submitted in AutoCad 2019, or other format approved by the ENGINEER.
- J. Final Record Drawings submitted to the OWNER as part of the project acceptance shall contain **at least** the following information:
 - 1. Drawings shall be legibly marked to record actual construction.
 - 2. Drawings shall show actual location of all underground and above ground water and wastewater, stormwater piping and related appurtenances. All changes to piping location including horizontal and vertical locations of utilities and appurtenances shall be clearly shown and referenced to permanent surface improvements. Drawings shall also show actual installed pipe material, class, etc. Profile sheets shall be updated to include all field measurements and elevations taken during construction.
 - 3. Drawings shall clearly show all field changes of dimension and detail including changes made by field order or by change order.
 - 4. Drawings shall clearly show all details not on original contract drawings but constructed in the field. All equipment and piping relocation shall be clearly shown.

5. Location of all manholes, hydrants, tees, reducers, crosses, valves, and valve boxes shall be shown. All tees, reducers, crosses, and valves shall be referenced from at least two (2) and preferably three (3) permanent points such as building corners and roadway intersections.
6. Dimensions between all manholes shall be field verified and shown. The rim, inverts and grade elevations of all manholes shall be shown.

1.08 WARRANTIES

- A. Original warranties, called for in the Contract Documents, shall be submitted to the OWNER through the ENGINEER. When warranties are required, they shall be submitted prior to request for payment.
- B. When advance copies of warranties are requested, they shall be submitted with, and considered as shop drawings.
- C. The CONTRACTOR shall warrant to the OWNER that all material and labor used in the construction are covered by his warrantee for a minimum of a one year period upon approval and acceptance by the OWNER. The CONTRACTOR shall replace or repair defects at no cost to the OWNER during the warrantee period. No visible or potential leakage shall be allowed during the warrantee period.

1.09 CERTIFICATES

- A. Copies of certificates of compliance and test reports shall be submitted for requested items to the ENGINEER prior to request for payment.

1.10 AUDIO-VISUAL PRECONSTRUCTION RECORD

- A. General: Prior to commencing work, the CONTRACTOR shall have a continuous color audio-video DVD recording taken of the entire Project, including existing areas that will be disturbed by the Contractor's operations, to serve as a record of preconstruction conditions. No construction shall begin prior to review and acceptance of the recordings covering the respective, affected construction area by the ENGINEER. The ENGINEER shall have the authority to reject all or any portion of the video DVD not conforming to the specifications and order that it be redone at no additional charge. The CONTRACTOR shall reschedule unacceptable coverage within five days after being notified. The ENGINEER shall designate those areas, if any, to be omitted from or added to the audio-video coverage. Audio-video recordings shall not be performed more than ninety days prior to construction in any area. All DVDs and written records shall become property of the OWNER.
- B. Services: The CONTRACTOR shall engage the services of a professional electrographer. The color audio-video recordings shall be prepared by a responsible commercial firm known to be skilled and regularly engaged in the business of preconstruction color audio-video documentation. The electrographer shall furnish to the ENGINEER a list of all equipment to be used for the audio-video taping, i.e., manufacturer's name, model number, specifications and other pertinent information. Additional information to be furnished by the electrographer is the names and addresses

of two references that the electrographer has performed color audio-video taping for on projects of a similar nature within the last twelve months.

- C. Audio-Video DVDs: Audio-video DVDs shall be new. The DVDs shall be compatible for with a standard player-receiver.
- D. Equipment: All equipment, accessories, materials and labor to perform this service shall be furnished by the CONTRACTOR.
 - 1. The total audio-video system shall reproduce bright, sharp, clear pictures with accurate colors and shall be free from distortion, tearing, rolls or any other form of imperfection. The audio portion of the recording shall reproduce the commentary of the camera operator with proper volume and clarity, and be free from distortion and interruptions.
 - 2. When conventional wheeled vehicles are used, the distance from the camera lens to the ground shall not be less than twelve feet. In some instances, audio-video tape coverage may be required in areas not accessible by conventional wheeled vehicles. Such coverage shall be obtained by walking or special conveyance acceptable to the ENGINEER.
 - 3. The color video camera used in the recording system shall have a horizontal resolution of 300 lines at center, a luminance signal to noise ratio of 45 dB and a minimum illumination requirement of twenty-five foot-candles.
- E. Recorded Information - Audio: Each tape shall begin with the current date, project name and municipality and be followed by the general location; i.e., process structure, or area, viewing side and direction of progress. The audio track shall consist of an original live recording. The recording shall contain the narrative commentary of the electrographer, recorded simultaneously with his fixed elevation video record of the zone of influence of construction.
- F. Recorded Information - Video: All video recordings must, by electronic means, display continuously and simultaneously, generated with the actual taping, transparent digital information to include the date and time of recording. The date information shall contain the month, day and year. The time information shall contain the hours, minutes, and seconds. Additional information shall be displayed periodically. Such information shall include, but not be limited to, project name, bid package number, process structure or area, and the viewing side. This transparent information shall appear on the extreme upper left hand third of the screen.
- G. Conditions for Taping: All taping shall be done during times of good visibility. No taping shall be done during precipitation, mist or fog. The recording shall only be done when sufficient sunlight is present to properly illuminate the subjects of recordings and to produce bright, sharp video recordings of those subjects.
- H. Tape Coverage: Tape coverage shall include all surface features located within the zone of influence of construction supported by appropriate audio coverage. Such coverage shall include, but not be limited to, existing road, driveways, sidewalks, curbs, pavement, landscaping, fences, signs and interior and exterior of existing structures affected by the work and the exteriors of structures adjacent to the work, and any other

on-site area that will be occupied or impacted by the CONTRACTOR or any of his subcontractors or suppliers within the area covered.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

- END OF SECTION -

SECTION 01400

TESTING AND INSPECTION

PART 1 - GENERAL

- A. All testing and inspection will be in accordance with the General Conditions.
- B. The work or actions of the testing laboratory shall in no way relieve the CONTRACTOR of his obligations under the Contract. The laboratory testing work will include such inspections and testing required by the Contract Document, existing laws, codes, ordinances, Standards, etc. The testing laboratory will have no authority to change the requirements of the Contract Documents, nor perform or approve any of the CONTRACTOR'S work.
- C. The CONTRACTOR shall allow the ENGINEER ample time and opportunity for testing materials and equipment to be used in the work. He shall advise the ENGINEER promptly upon placing orders for materials and equipment so that arrangements may be made, if desired, for inspection before shipment from the place of manufacture. The CONTRACTOR shall at all times furnish the ENGINEER and his representatives, facilities including labor, and allow proper time for inspecting and testing materials, equipment, and workmanship. The CONTRACTOR must anticipate that possible delays may be caused him in the execution of his work due to the necessity of materials and equipment being inspected and accepted for use. The CONTRACTOR shall furnish, at his own expense, all samples of materials required by the ENGINEER for testing, and shall make his own arrangement for providing water, electric power, or fuel for the various inspections and tests of structures and equipment. As a minimum, 24-hours advance written notice shall be provided by the CONTRACTOR for rebar, structural and similar inspections by the ENGINEER. The amount of time required for advance written notice by the CONTRACTOR to the ENGINEER for other inspections depends upon other factors and shall be solely at the ENGINEER's discretion.
- D. The CONTRACTOR shall furnish the services of representatives of the manufacturers of certain equipment, as prescribed in other sections of the Specifications. The CONTRACTOR shall also place his orders for such equipment on the basis that, after the equipment has been tested prior to final acceptance of the work, the manufacturer will furnish to the OWNER the certified statements that the equipment has been installed properly and is ready to be placed in functional operation. Tests and analyses required of equipment shall be paid for by the CONTRACTOR, unless specified otherwise in the section which covers a particular piece of equipment.
- E. The OWNER will bear the cost of all additional tests, inspections, or investigations undertaken by the order of the ENGINEER for the purpose of determining conformance with the Contract Documents if such test, inspection, or investigations are not specifically required by the Contract Documents, and if conformance is ascertained thereby. Whenever nonconformance is determined by the ENGINEER as a result of such test, inspections, or investigations, the CONTRACTOR shall bear the full cost thereof or shall reimburse the OWNER for said cost. The cost of any additional tests and investigations, which are ordered by the ENGINEER to ascertain subsequent conformance with the Contract Documents, shall be borne by the CONTRACTOR.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

- END OF SECTION -

SECTION 01410

CONTRACTOR'S HEALTH AND SAFETY PLAN

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope:

1. This Section describes CONTRACTOR's responsibilities for a written site-specific health and safety plan (SSHP). CONTRACTOR shall conduct all construction activities in a safe manner so as not to result in:
 - a. injuries to employees, Subcontractors or other persons with an interest at or near the Site;
 - b. employee exposures to health hazards above the occupational limits established by the Occupational Health and Safety Administration (OSHA), the American Conference of Governmental Industrial Hygienists (ACGIH), or the Nuclear Regulatory Commission (NRC);
 - c. exposure of area residents to air contaminants above the levels established for general public exposure by the Environmental Protection Agency (EPA), NRC, or the State in which the Project is located;
 - d. significant increases in the levels of contaminants in soil, water, or sediment near the Site; or
 - e. violations of OSHA, or other Laws or Regulations.
- B. Any disregard of the provisions of the SSHP may, without limitation, be deemed just and sufficient reason for termination of CONTRACTOR's services for cause.

1.02 QUALITY ASSURANCE

A. Qualifications:

1. Engage an industrial hygienist certified by the American Board of Industrial Hygiene or a safety professional certified by the Board of Certified Safety Professionals to prepare or supervise the preparation of the SSHP.
2. Submit qualifications along with SSHP.

B. Regulatory Requirements: CONTRACTOR's health and safety practices shall follow the standards and guidelines established in the following:

1. 29 CFR 1904, OSHA, Record Keeping.
2. 29 CFR 1910, OSHA, General Industry Standards.

3. 29 CFR 1926, OSHA, Construction Industry Standards.
4. 29 CFR 1926.65, OSHA, Hazardous Waste Operations and Emergency Response.
5. 49 CFR 171.8, DOT, Hazardous Materials in Transport.
6. 40 CFR Parts 261.3, 264 and 265, EPA, Resource Conservation and Recovery Act.
7. 29 CFR 1910.146, OSHA, Permit-Required Confined Spaces.
8. 29 CFR 1926.1101, OSHA, Asbestos

1.03 SUBMITTALS

A. Submit to ENGINEER the following:

1. CONTRACTOR's SSHP.
2. Qualifications of industrial hygienist or safety professional.
3. Health and safety reports.
4. Accident reports.

PART 2 - GENERAL

2.01 GENERAL PROVISIONS

- A. Submit SSHP to ENGINEER one week prior to the Preconstruction Conference, or 30 days prior to planned mobilization at the Site, whichever is sooner.
- B. The SSHP shall bear a stamp or specific written indication that CONTRACTOR has satisfied CONTRACTOR's obligations under the Contract Documents with respect to CONTRACTOR's review and approval of the SSHP.
- C. ENGINEER will review and either accept or return for revision CONTRACTOR's SSHP in accordance with the Schedule of Submittals acceptable to ENGINEER. ENGINEER's review and acceptance will be only to determine if the topics covered by the SSHP conform to the Contract Documents.
- D. ENGINEER's review and acceptance will not extend to means, methods, techniques, procedures of construction, or to whether the representations made in the SSHP comply with regulatory standards or standards of good practice.
- E. At the time of submittal, CONTRACTOR shall give ENGINEER specific written notice of variations, if any, that the SSHP may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the submittal; and, in addition, by a specific notation made on each submittal to ENGINEER for review and acceptance of each such variation.

- F. No Work shall be performed on the Site until the written SSHP has been accepted by the ENGINEER.
- G. Notwithstanding any other provision of the Contract Documents, extensions to the Contract Times will not be granted if caused by undue delay by CONTRACTOR in developing or revising the SSHP.

2.02 WRITTEN HEALTH AND SAFETY PROGRAM

- A. The SSHP, which shall be kept on the Site, shall address the safety and health hazards of each phase of operations on the Site and include the requirements and procedures for employee protection. The SSHP as a minimum, shall address and include the following:
 - 1. The organizational structure of CONTRACTOR's organization.
 - 2. A comprehensive work plan.
 - 3. A safety and health risk or hazard analysis for each task and operation found in the work plan.
 - 4. Employee training assignments including copies of 40-hour, 24-hour Supervised Field Activities, 8-hour Supervisors, and 8-hour Refresher Training Certificates for all CONTRACTOR's employees assigned to the Project.
 - 5. Personal protective equipment to be used by employees for each of the tasks and operations being conducted. Respirator fit test certificates for all CONTRACTOR employees assigned to the Project.
 - 6. Medical Surveillance Requirements: Medical clearance certificates for all CONTRACTOR's employees assigned to the Project.
 - 7. Frequency and types of air monitoring, personnel monitoring, and environmental sampling techniques and instrumentation to be used, including methods of maintenance and calibration of monitoring and sampling equipment.
 - 8. Site control measures for purposes, including but not limited to:
 - a. preventing trespassing;
 - b. preventing unqualified or unprotected workers from entering restricted areas;
 - c. preventing tracking of contaminants out of the Site;
 - d. maintaining log of employees on and visitors to the Site;
 - e. delineating hot, cold and support zones;
 - f. locating personnel and equipment decontamination zones; and
 - g. communicating routes of escape and gathering points.

9. Decontamination procedures.
10. An emergency response plan for safe and effective responses to emergencies, including the necessary PPE and other equipment.
11. Confined space entry procedures (if applicable).
12. A spill containment program.

C. Organizational Structure:

1. The organizational structure part of the SSHP shall refer to or incorporate information on the specific chain of command and specify the overall responsibilities of supervisors and employees, and shall include, at a minimum, the following elements:
 - a. designation of a general supervisor who has the responsibility and authority to direct all hazardous waste operations.
 - b. a Site safety and health supervisor who has the responsibility and authority to implement and modify the SSHP and verify compliance.
 - c. all other personnel needed for hazardous waste Site operations and emergency response and their general functions and responsibilities.
 - d. The lines of authority, responsibility, and communication.
2. The organizational structure shall be reviewed and updated as necessary to reflect the current status of Site operations.

D. Work Plan:

1. The comprehensive work plan part of the SSHP shall refer to or incorporate information on the following:
 - a. The tasks and objectives of the Site operations and the logistics and resources required to achieve those tasks and objectives.
 - b. The anticipated activities as well as the CONTRACTOR's normal operating procedures.
 - c. The personnel and equipment requirements for implementing the work plan.

- E. The SSHP shall include procedures that will be used to ensure safe waste handling during the excavating, handling, loading, and transporting activities.

2.03 ACCIDENT REPORTING AND INVESTIGATION

- A. Document all accidents resulting in bodily injury using OSHA 301 form.

- B. Submit copies of completed OSHA 301 forms to the ENGINEER weekly.
- C. Based upon the results of an accident investigation, make modifications to the SSHP by changing tasks or procedures to prevent a recurrence.
- D. Post a copy of CONTRACTOR's OSHA 300A report in a conspicuous place onsite.

2.04 DAILY HEALTH AND SAFETY FIELD REPORTS

- A. Submit to ENGINEER daily health and safety field reports including, but not limited to, weather conditions, delays encountered in construction, and acknowledgment of deficiencies noted along with corrective actions taken on current and previous deficiencies. In addition, the daily health and safety air monitoring results, documentation of instrument calibration, new hazards encountered, and PPE utilized shall be included.
- B. The daily health and safety field reports shall include a description of problems, real or anticipated, encountered during the course of Work that should be brought to the attention of the ENGINEER and notification of deviations from planned Work shown in the previously submitted daily health and safety field report(s).

PART 3 - EXECUTION (Not Used)

- END OF SECTION -

SECTION 01500

CONSTRUCTION CONSIDERATIONS

PART 1 - GENERAL

1.01 HYDRAULIC UPLIFT ON STRUCTURES

- A. The CONTRACTOR shall be completely responsible for any structures, stormwater conflicting structure, tanks, wet wells, pipelines, manholes, foundations, cellars, or similar structures that may become buoyant during the construction operations due to the ground water, floods or buoyancy of piping caused due to the placement of flowable backfills before the structure is put into operation. Should there be any possibility of buoyancy of a pipeline or structure, the CONTRACTOR shall take the necessary steps to prevent its buoyancy. Damage to any structures due to floating or flooding shall be repaired or the structures replaced at the CONTRACTOR'S expense.

1.02 WATER TIGHTNESS OF STRUCTURES

- A. General: It is the intent of these specifications that all concrete work, sealing work around built-in items and penetrations be performed as required to ensure that groundwater, rainwater, wastewater, chemical solutions or other process liquids in tanks, wetwells, channels, and containers will not leak into any buildings and/or equipment rooms, pipe galleries, habitable areas, or other generally dry areas.
1. The required watertightness shall be achieved by quality concrete construction and proper sealing of all joints and penetrations.
 2. Each unit shall be tested separately, and the leakage tests shall be made prior to backfilling and before equipment is installed unless otherwise approved by the ENGINEER. Only potable water shall be used for the tests.
 3. The watertightness of buildings exclusive of the portions designed to contain liquids will consist of checking for leaks due to rain or groundwater infiltration.
 4. The CONTRACTOR shall provide at his own expense all labor, material, temporary bulkheads, pumps, water, measuring devices, etc., necessary to perform the required test.
- B. Built-in Items and Penetrations: All pipe sleeves, built-in items and penetrations shall be sealed as detailed and as required to ensure a continuous watertight seal.

1.03 CUTTING AND PATCHING

- A. The CONTRACTOR shall perform all cutting and patching of his work that may be required to make its several parts come together properly and fit it to receive or be received by such other work. The CONTRACTOR shall not endanger any work of others by cutting, excavating or otherwise altering their work and shall only cut or alter work with the written consent of the ENGINEER and of the other contractors whose work will be affected.

1.04 ABANDONMENT AND SALVAGE OF EXISTING FACILITIES

- A. General: The scope of work requires the CONTRACTOR to interface with existing structures, and piping which will be abandoned or otherwise removed and/or relocated as part of the work. Prior to beginning any work associated with existing facilities to be abandoned, salvaged, or otherwise removed or relocated, the CONTRACTOR shall inform the OWNER and the ENGINEER of his intent so that all arrangements can be made with the OWNER for isolating pipelines (where possible) or otherwise removing existing facilities from service to the extent possible. The CONTRACTOR shall not proceed without written authorization from the OWNER. **The CONTRACTOR shall contact and coordinate accordingly with utilities companies prior to and during the execution of the relocation, removal or abandonment of existing utilities structures. Existing utilities coordination is exclusively the responsibility of the CONTRACTOR.**
- B. Pipelines: The CONTRACTOR shall abandon, salvage or otherwise remove existing pipelines or segments of existing pipelines shown to be abandoned in place, salvaged, or removed as part of the contract work. Unless otherwise indicated in the Contract Documents, all piping shown on the Drawings to be abandoned shall be abandoned in place. Pipe shown to be abandoned need only be removed a minimum three feet clear of new utilities to be installed. Abandon-in-place shall be defined as installing plugs, or other permanent closure, as reviewed and accepted by the owner, on all terminations, open ends or ends of pipe designated as being cut, capped and anchored in an acceptable manner. The pipe will remain buried unless otherwise noted.
- C. Piping indicated on the Drawings as being removed, or any piping to be abandoned which interferes with new structures or piping, shall be excavated and removed using methods which will not disturb adjacent piping or other facilities. All pipe materials shall be subject to salvage by the OWNER as defined below. Any remaining piping on both ends of pipe segments removed shall be abandoned in-place, per the above definition. After piping has been removed, the CONTRACTOR shall backfill the evacuated area in accordance with requirements set forth in other sections of these specifications.
- D. Equipment: The CONTRACTOR shall abandon, salvage or otherwise remove existing equipment or other facilities as shown on the Contract Drawings or indicated herein. In all cases, the CONTRACTOR shall exercise caution when handling the existing equipment so as not to disturb or damage adjacent facilities. The CONTRACTOR shall make all repairs to adjacent facilities which may be damaged as a result of the CONTRACTOR's efforts in abandoning, salvaging or otherwise removing existing facilities, at no additional cost to the OWNER.
- E. Salvage: The OWNER may desire to salvage certain items of existing equipment which are to be dismantled and removed during the course of construction. Prior to removal of any existing equipment or piping from the site of work, the CONTRACTOR shall ascertain from the OWNER whether or not the particular item or items are to be salvaged. Items to be salvaged shall be stockpiled on the site, in a location as designated by the OWNER. All other items of equipment shall be disposed of off-site by the CONTRACTOR at his own expense, in accordance with applicable laws, ordinances and regulations.

1.05 DIMENSIONS OF EXISTING STRUCTURES

- A. Where the dimensions and locations of existing structures are of critical importance in the installation or connection of new work, the CONTRACTOR shall verify such dimensions and locations in the field before the fabrication of any materials or equipment which is dependent on the correctness of such information.

1.06 REHABILITATION

- A. Certain areas of existing structures, piping, conduits, and the like will be affected by work necessary to complete modifications under this Contract. The CONTRACTOR shall be responsible to rehabilitate those areas affected by its construction activities.
- B. Where new rectangular openings are to be installed in concrete or concrete masonry walls or floors, the CONTRACTOR shall score the edges of each opening (both sides of wall or elevated slab) by saw cutting clean straight lines to a minimum depth of one inch and then chipping out the concrete. Alternately, the opening can be formed by saw cutting completely through the slab or wall. Saw cuts deeper than one inch (or the depth of cover over existing reinforcing steel, whichever is less) shall not be allowed to extend beyond the limits of the opening. Corners shall be made square and true by a combination of core drilling, chipping, or grinding. All necessary precautions shall be taken during removal of concrete to prevent debris from falling and damaging adjacent equipment or piping. Saw cuts allowed to extend beyond the opening shall be repaired by filling with nonshrink grout. The concrete around any exposed reinforcement steel shall be chipped back and exposed reinforcement steel cut a minimum of 1-1/2 inches from the finished face of the new opening. The inside face of the new opening shall be grout to fill any voids and cover the exposed aggregate and shall be trowel-finished to provide a plumb and square opening.
- C. Where new conduit or piping is to be installed through existing concrete walls, the CONTRACTOR shall accurately position the core-drill openings. Openings shall be adequately sized to allow alignment of piping or conduit and fittings without deflection and to provide adequate clearance for satisfactory packing in the annular space between the piping or conduit and the core drilling opening as shown on the Drawings.
- D. Where new piping is to be connected to existing piping, the existing piping shall be cut square and the ends properly prepared for the connection shown on the drawings. Any damage to the lining and coating of the existing piping shall be repaired by the CONTRACTOR.
- E. Where existing equipment, equipment pads and bases, piping, piping supports, electrical panels and devices, conduits, and associated appurtenances are removed, the CONTRACTOR shall rehabilitate the affected area such that little or no evidence of the previous installation remains. Opening in concrete floors, walls, and ceiling from piping, conduit, and fastener penetrations shall be filled with nonshrink grout and finished to match the adjacent area. Concrete pads and bases for equipment and supports shall be removed by chipping away concrete and cutting any exposed reinforced steel and anchor bolts a minimum of 1-1/2 inches below finished grade. The area of concrete to be rehabilitated shall be scored by saw cutting clean, straight lines to a minimum depth of 1-1/2 inches, and all concrete within the scored lines removed to a minimum depth of 1-1/2 inches. The area within the scored lines shall be patched with nonshrink grout to

match the adjacent grade and finish. Abandoned connections to piping and conduits shall be terminated with blind flanges, caps, and plugs suited for the material, type, and service of the pipe or conduit.

- F. Where existing structural steel members are removed or modified, the surface of the remaining existing steel members damaged by construction activities shall be repaired. The affected areas shall be surface prepared and coated in accordance with Contract Documents.
- G. Disposal of Debris: All debris, materials, piping, and miscellaneous waste products from the work described in this section shall be removed from the project as soon as possible. They shall be disposed of in accordance with applicable federal, state, and local regulations. The CONTRACTOR is responsible for determining these regulations and shall bear all costs or retain any profit associated with disposal of these items.

1.07 INSTALLATION OF EQUIPMENT

- A. CONTRACTOR shall have on hand sufficient personnel, proper equipment, and machinery of ample capacity to facilitate the work.
- B. CONTRACTOR shall be responsible for locating, aligning and leveling all equipment and shall employ a licensed surveyor to set all lines and levels of equipment to the accuracy required.
- C. Complete manufacturers installation instructions, including permissible tolerances, shall be furnished in duplicate with each unit of equipment or set of identical units.
- D. All equipment shall be installed in accordance with the shop drawings; inclusive of manufacturers' specifications, drawings and tolerances; under the direct supervision of the required manufacturers ENGINEER. No instructions shall be issued that are contrary to written specifications without prior written approval by the OWNER's ENGINEER.
- E. Equipment shall be erected in a neat and workmanlike manner on the foundations' at the locations and elevations shown on the drawings unless otherwise indicated by the ENGINEER during installation.

1.08 SUPERVISION BY MANUFACTURER'S REPRESENTATIVES

- A. The CONTRACTOR shall provide the services of qualified equipment manufacturers technical representatives who shall adequately supervise the installation and testing of all equipment furnished under this Contract and instruct the CONTRACTOR's personnel and OWNER's operating personnel in its maintenance and operation.

1.09 EQUIPMENT MANUFACTURER'S CERTIFICATION

- A. As a condition precedent to acceptance of equipment installed and operating, the CONTRACTOR will provide the OWNER with written certification, obtained from each company manufacturing equipment for the project, that the equipment is installed and does operate in accordance with the specifications and manufacturers recommendations.

1.10 SLEEVES AND OPENINGS

- A. The CONTRACTOR shall provide all openings, chases, etc., to fit his own work and that of any other subcontractors and contractors. All such openings or chases shown on the Contract Drawings, or reasonably implied thereby, or as confirmed or modified by shop, setting or erecting drawings approved by the ENGINEER, shall be provided by the CONTRACTOR.
- B. Where pipes or conduits are to pass through slabs or walls, or where equipment frames or supports are to be installed as integral part of an opening, the sleeves, opening, forms or frames shall be furnished by the installer of the pipes, conduits or equipment, but shall be placed by the CONTRACTOR.
- C. Where hanger inserts, anchor bolts and similar items are to be embedded in concrete as an integral part of a slab or wall, they shall be furnished by the installer of the pipe or other equipment requiring the hanger, etc. but shall be placed by the CONTRACTOR.
- D. When requested by the CONTRACTOR, the installer of the pipes, conduit, or equipment, including those contractors or subcontractors who require openings or chases in slabs and walls for passage of ducts, mounting or equipment, etc., shall furnish all necessary information, instructions, and materials to effect accurate installation of the required openings, chases, sleeves, frames, inserts, etc. When such items are secured in position, and just prior to construction of the surrounding slab or wall, the subcontractor or contractor for whom the items are installed shall ascertain the proper number, locations, and settings thereof; and the CONTRACTOR shall schedule his operations so as to provide a reasonable opportunity and time interval for such inspection.
- E. Any cost resulting from correction of defective, ill-timed, or mislocated work, or for subsequent work which becomes necessary because of omitted openings, chases, sleeves, frames, inserts, etc., shall be borne by the subcontractor or contractor responsible therefor. No contractor or subcontractor shall arbitrarily cut, drill, alter, damage, or otherwise endanger the work of another Contractor. In no case shall beams lintels, or other structural members be cut without the approval of the ENGINEER. The nature and extent of any corrective or additional work shall be subject to the approval of the ENGINEER following consultation with the affected parties.

1.11 OBSTRUCTIONS

- A. All water pipes, storm drains, sanitary sewers, force mains, gas or other pipe, telephone or power cables or conduits and all other obstructions, whether or not shown, shall be temporarily supported across utility line excavations. The CONTRACTOR shall be responsible for any damage to any such pipes, conduits, or structures. Approximate locations of known water, sanitary, drainage, power and telephone installations along route of new pipelines or in the vicinity of new work are shown, but must be verified in the field by the CONTRACTOR. The CONTRACTOR shall uncover these pipes, ducts, cables, etc., carefully, by hand, prior to installing new lines. Any discrepancies or differences found shall be brought to the attention of the ENGINEER in order that necessary changes may be made to permit installation of new work. These conditions are supplemental to general requirements elsewhere in the Contract Documents.

1.12 SITE CONDITIONS

- A. The CONTRACTOR acknowledges that he has investigated prior to bidding and satisfied himself as to the conditions affecting the Work, including but not restricted to those bearing upon transportation, disposal, handling and storage of materials, availability of labor, water, electric power, roads and uncertainties of weather, canal stages, tides, water tables or similar physical conditions at the site, the conformation and conditions of the ground, the character of equipment and facilities needed preliminary to and during prosecution of the Work. The CONTRACTOR further acknowledges that he has satisfied himself as to the character, quality and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is reasonably ascertainable from an inspection of the site, or any contiguous site, as well as from information presented by the Drawings and Specifications made a part of this Contract, or any other information made available to him prior to receipt of Bids. Any failure by the CONTRACTOR to acquaint himself with the available information will not relieve him from responsibility for estimating properly the difficulty or cost of successfully performing the Work. The OWNER assumes no responsibility for any conclusions or interpretations made by the CONTRACTOR on the basis of the information made available by the OWNER.

1.13 SUBSURFACE INVESTIGATIONS

- A. The CONTRACTOR shall be responsible for having determined to his satisfaction, prior to the submission of his bid, the nature and location of the work, the conformation of the ground, the character and quality of the substrata, the types and quantity of materials to be encountered, the nature of the groundwater condition, the character of equipment and facilities required preliminary to and during the performance of the work, the general and local conditions and all other matters which can in any way affect the work under this Contract. The prices established for the work to be done shall reflect all costs pertaining to the work. Any claims for extras based on the substrata or ground water table conditions will be disallowed.
- B. The CONTRACTOR further acknowledges that he assumes all risk contingent upon the nature of the subsurface conditions actually encountered by him in performing the work covered by the Contract, even though such actual conditions may result in the CONTRACTOR performing more or less work than he originally anticipated.

1.14 DIFFERING SITE CONDITIONS

- A. The CONTRACTOR shall promptly and before such conditions are disturbed, notify the OWNER in writing of: (1) subsurface or latent physical conditions at the site differing materially from those indicated in this contract, or (2) unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for this contract. The OWNER will promptly investigate the conditions, and if he finds that such conditions do materially so differ and cause an increase or decrease in the CONTRACTOR's cost of, or the time required for, performance of any part of the work under this contract, whether or not changed as a result of such conditions, an equitable adjustment shall be made and the contract modified in writing accordingly.

1.15 PROTECTION OF PROPERTY

- A. The CONTRACTOR shall protect all property that may be affected by his work or operations. The location and extent of underground and covered facilities are not guaranteed and the CONTRACTOR is cautioned to proceed with care in order to prevent the undermining or damage to existing utilities including piping, power cable, utility poles, conduit, duck bank, fiber optic cable, gas, telephone and cable TV services, structures, piping, and other facilities.
- B. The CONTRACTOR shall take all measures necessary to protect new and existing mechanical equipment from dust and debris. All protective measures shall be furnished, installed, lighted, ventilated, maintained, and removed at the CONTRACTOR'S own cost.
- C. When city water is being used, the supply source shall be protected against contamination in accordance with existing codes and regulations.
- D. In the event any of the CONTRACTOR'S activities were to disrupt or endanger any facilities, he shall at his own expense make all necessary repairs or replacements necessary to correct the situation to the satisfaction of the ENGINEER. Such work shall progress continuously to completion on a 24-hour per day, seven workday basis. The CONTRACTOR shall be responsible for the services of repair crews on call 24 hours per day for emergencies that arise involving work under this Contract.

1.16 WEATHER CONDITIONS

- A. Work that may be affected by inclement weather shall be suspended until proper conditions prevail. In the event of impending storms the CONTRACTOR shall take necessary precautions to protect all work, materials and equipment from exposure. The OWNER reserves the right, through the opinion of the ENGINEER, to order that additional protection measures over and beyond those proposed by the CONTRACTOR, be taken to safeguard all components of the project. The CONTRACTOR shall not claim any compensation for such precautionary measures so ordered, nor claim any compensation from the OWNER for damage to the work from the elements of weather.

1.17 FIRE PROTECTION

- A. The CONTRACTOR shall take all necessary precautions to prevent fires at or adjacent to the work, including his own buildings and trailers. Adequate fire extinguisher and hose line stations shall be provided throughout the work area.

1.18 SAFETY AND HEALTH REQUIREMENTS

- A. The CONTRACTOR shall comply in every respect with all Federal, State and local safety and health regulations. Copies of the Federal Regulations may be obtained from the U.S. Department of Labor, Occupational Safety and Health Administration, 3200 East Oakland Park Boulevard, Room 204, Bridge Building, Fort Lauderdale, Florida 33300.
- B. The CONTRACTOR shall provide all barricades and flashing warning lights or other devices necessary to warn pedestrians and area traffic.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

- END OF SECTION -

SECTION 01510

UTILITIES, SERVICES AND STAGING AREA

PART 1 - GENERAL

1.01 GENERAL

- A. The CONTRACTOR shall provide for utilities and services for his own operations. These shall include electrical power, water, ventilation, sanitary facilities. The CONTRACTOR shall furnish, install and maintain all temporary utilities during the contract period including removal upon completion of the work. Such facilities shall comply with regulations and requirements of the National Electrical Code, OSHA, Florida Power and Light, and applicable Federal, State and local codes, etc. In addition, the CONTRACTOR shall provide the following:

1.02 TEMPORARY POWER (NOT USED)

1.03 TEMPORARY WATER

- A. The CONTRACTOR shall supply all water used for construction, flushing, testing, and temporary sanitary facilities. The CONTRACTOR shall provide and maintain all piping, fittings, adapters, and valving required. It is the CONTRACTOR'S responsibility to arrange through the potable water supplier for a 2-inch fire hydrant water meter. A deposit to be paid by the CONTRACTOR is required for meter rental and all water shall be purchased at the prevailing rate.

1.04 TEMPORARY VENTILATION (NOT USED)

1.05 TEMPORARY SANITARY FACILITIES

- A. The CONTRACTOR shall provide and maintain adequate and clean sanitary facilities for the construction work force and visitors. The facilities shall comply with local codes and regulations and be situated at approved locations.

1.06 TEMPORARY TELEPHONE SERVICE (NOT USED)

1.07 SECURITY (NOT USED)

1.08 STAGING AREA

- A. The CONTRACTOR shall arrange, coordinate and take all necessary steps regarding his work effort to comply with constraints defined in Section 01520, "Maintenance of Facilities and Sequence of Construction", including offsite parking, staging, storage, etc., as required. Costs associated with these efforts shall be included in the bid for this project.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

- END OF SECTION -

SECTION 01520

MAINTENANCE OF FACILITIES AND SEQUENCE OF CONSTRUCTION

PART 1 - GENERAL

1.01 GENERAL

- A. The CONTRACTOR shall ensure the continuous operation of all existing sanitary sewer systems, potable water systems, and stormwater facilities during construction. In addition, the CONTRACTOR shall provide temporary traffic routing and coordinate his work so as to minimize impact to the utilities systems located in the area. In performing the work shown and specified, the CONTRACTOR shall plan and schedule his work as outlined in this Section.

1.02 CONSTRUCTION SCHEDULE

- A. The Construction Schedule shall be submitted by the CONTRACTOR in accordance with Section 01300, "Submittals", of these Specifications

1.03 USE OF FACILITIES BEFORE COMPLETION

- A. The OWNER reserves the right to enter and use any portion of the constructed facilities before final completion of the whole work to be done under this Contract.

1.04 CONNECTION OF EXISTING SYSTEMS

- A. All connections to existing systems shall be performed in such a manner that no damage and minimal interruption is caused to the existing installation. On completion of its installation, the CONTRACTOR shall complete the connection to the existing systems in a proper manner. Any damage caused to existing installations shall be repaired or replaced by the responsible CONTRACTOR at no additional cost to the OWNER.

1.05 COORDINATION WITH UTILITY PERSONNEL

- A. Before commencing work involving removing or placing in operation existing or new facilities or tie-ins to existing facilities, the CONTRACTOR shall notify the OWNER at least three (3) business days in advance in writing. The OWNER shall be responsible for removing facilities from operation as deemed necessary.
- B. The CONTRACTOR shall, under no circumstances, interfere with wastewater treatment plant, existing potable water, sewer and stormwater facilities without the owner's authorization, in writing, and supervision. The CONTRACTOR shall notify the OWNER's representative in writing a minimum of three work days prior to each scheduled service request. This notification shall be provided on the OWNER's standard form, or on an approved equivalent form completed in full by the CONTRACTOR.

1.06 COORDINATION WITH PRIVATE PROPERTY OWNERS (NOT USED)

1.07 GENERAL SEQUENCE OF CONSTRUCTION AND OPERATION REQUIREMENTS

- A. Work under the Contract shall be scheduled and performed in such a manner as to result in the least possible disruption to the public's use of roadways, driveways, parking areas, and utilities. Utilities shall include but not be limited to water, sewerage, irrigation, drainage structures, gas, electrical service, cable TV services, fiber optic cables, and telephone. Prior to commencing with the WORK, CONTRACTOR shall perform a location investigation of all existing underground and above ground utilities and facilities in accordance with Section 01530 entitled "*Protection of Existing Facilities*". Utilities that present potential conflict with the proposed piping shall be field verified with soft digging.
- B. The outlined sequence of construction does not include all items necessary to complete the work, but is intended to identify the sequence of critical events necessary to minimize any disruptions and to avoid any impact to continued collection system service. It shall be understood by the CONTRACTOR that the critical events identified are not all inclusive and that additional items of work not shown may be required. The sequence of construction is a precedence requirement and does not attempt to schedule the CONTRACTOR' work. It is intended only to indicate which activities must precede other activities in order to minimize interference's and disruptions.
- C. All work by the CONTRACTOR that disrupts the normal utilities operations shall be shown on the Construction Schedule specified in Section 01300, "Submittals", and specifically scheduled with the owner of that utility. Schedule notification shall consist of a written notice defining the work to be accomplished, the normal treatment plant that will be interrupted, the duration of the interruption, and the mitigating effort to be performed by the CONTRACTOR. The written notice shall be submitted to the OWNER fourteen days in advance of the proposed work and the OWNER will respond to the CONTRACTOR in writing within seven days of receipt of the notice regarding the acceptability of the proposed plan.
- D. At no time, the CONTRACTOR shall undertake closing off any pipelines, or opening valves, or take any other action which would affect the operation of the existing system, except as specifically required by the drawings and specifications, and until authorization is granted by the owner of the system or ENGINEER and after proper notification.
- E. Temporary installations required to complete a particular aspect of the work during the allowed time period shall be determined by the CONTRACTOR and implemented by the CONTRACTOR at no additional cost to the OWNER. All such temporary installations shall be subject to the review and acceptance of the ENGINEER.
- F. Sequence of certain major events and identification of time constraints for removing existing facilities from active service and installation of new facilities are described below in paragraph 1.08. No phase of work (or tasks within a phase) shall preclude or be performed in parallel with a subsequent phase unless specifically defined so in these documents. In all cases, work in each phase shall be checked out and accepted for satisfactory use, subject to the ENGINEER's approval, prior to the CONTRACTOR proceeding to the next phase of construction.

1.08 DETAILED SEQUENCE OF CONSTRUCTION AND OPERATION REQUIREMENTS

A. Phase I - Mobilization / Site Preparation / Bypass Pumping Set Up: Mobilize for work – Video working areas, set up staging and storage areas, obtain permits, develop and submit and get approval of bypass pumping and construction schedule, shop drawings, survey, locate existing utilities and elevations with soft digging, verify existing fittings to be connected, set up bypass pumping, and procure materials.

B. Phase II - Demolition and Reconstruction of the Pump Station Equipment:

The tasks included under this phase consist of removal and replacement of the Pump Station Equipment as shown on Plans.

1. Refer to Drawings for detailed construction including maintenance of traffic, demolition, excavation, dewatering, pollution prevention systems, piping installation, backfill, density test, forming work, cast concrete in place, pump station equipment installation, testing, and restoration.

C. Phase III - Final Sitework and Closeout: Final restoration of all affected areas, final grading, miscellaneous work, demobilization and related closeout activities as described in Section 01700 - Project Closeout.

D. Construction Constraints: CONTRACTOR shall comply with the following constraints during construction and utilize constraints in determining a sequence of construction:

1. **Construction work during the installation of the proposed work shall be limited to the pump station site. Nearby businesses and Homeowners shall have access to their driveways at all times.**

2. The excavation area shall be surrounded with barricades and obstructions illuminated with temporary light furnished, installed and maintained by the CONTRACTOR.

3. Final restoration of roads, driveways, sidewalks and all other paved areas shall be completed within five (5) business days after piping has been installed.

4. Contractor is expected to work regular hours between the hours of 7:00 a.m. and 4:00 p.m., Monday through Friday. Requests for approval to work during other than regular hours must be submitted to the Engineer at least 72 hours in advance of the period proposed for such overtime work and shall set forth the proposed schedule for overtime work to give Engineer ample time to arrange for his personnel to be at the site of the Work, even for work required to occur by contract. Contractor shall pay for the additional engineering charges on account of the overtime work, except when overtime is associated with contract-required. Such additional engineering charges shall be a subsidiary obligation of Contractor, and no extra payment shall be made by OWNER on account of such overtime work. The Contractor shall not violate the Hollywood Code of Noise Ordinance.

5. The CONTRACTOR shall pay liquidated damages of \$500/DAY for not complying with any one of the above requirements.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 COORDINATION WITH EXISTING UTILITIES AND OTHER AGENCIES

- A. The CONTRACTOR shall coordinate with Sunshine One-Call Notification at 1-800-432-4770 a minimum of 48 business hours prior to any excavation for location of existing underground facilities.
- B. CONSTRUCTION DEWATERING:
 - 1. All dewatering equipment such as pumps, air compressors, generators, etc. proposed for use during construction in residential areas shall be provided with noise enclosures suitable to meet the requirements of the Town of Southwest Ranches Noise Ordinance and/or Broward County Noise Ordinance, whichever is more stringent.
 - 2. There is no dewatering permit for this project. If the CONTRACTOR considers that as part of its means and methods of construction, a dewatering permit is required, it is the responsibility of the CONTRACTOR to secure the required permit in order to proceed with the execution of the construction.

3.02 COOPERATION

- A. The CONTRACTOR shall allow the OWNER or its agents, and other project contractors or their agents, to enter facilities being constructed under this Contract for the purpose of constructing, installing, operating, maintaining, removing, repairing, altering or replacing such equipment pipes, sewers, conduits, manholes, wires, or other structures and appliances which may be required to be installed at or in the work. The CONTRACTOR shall cooperate with all the aforesaid parties and shall allow reasonable provisions for the prosecution of any other work by the OWNER, or others, to be done in connection with his work, or in connection with normal use of the facilities.

- END OF SECTION -

SECTION 01530

PROTECTION OF EXISTING FACILITIES

PART 1 - GENERAL

1.01 THE REQUIREMENT

- A. The CONTRACTOR shall protect all existing utilities and improvements not designated for removal and shall restore damaged or temporarily relocated utilities and improvements to a condition equal to or better than they were prior to such damage or temporary relocation, all in accordance with requirements of the Contract Documents.
- B. The CONTRACTOR shall verify the exact locations and depths of all utilities shown and the CONTRACTOR shall make exploratory excavations of all utilities that may interfere with the Work. All such exploratory excavations shall be performed as soon as practicable after award of Contract and, in any event, a sufficient time in advance of construction to avoid possible delays to the CONTRACTOR'S Work. When such exploratory excavations show the utility location as shown to be in error, the CONTRACTOR shall so notify the OWNER.
- C. The number of exploratory excavations required shall be that number which is sufficient to determine the alignment and grade of the utility.

1.02 RIGHTS-OF-WAY (NOT USED)

1.03 PROTECTION OF STREET OR ROADWAY MARKERS (NOT USED)

1.04 RESTORATION OF FACILITIES

- A. General: All paved areas including asphaltic concrete berms cut or damaged during construction shall be replaced with similar materials and of equal thickness to match the existing adjacent undisturbed areas, except where specific resurfacing requirements have been called for in the Contract Documents or in the requirements of the agency issuing the permit. All temporary and permanent pavement shall conform to the requirements of the affected pavement. All pavements which are subject to partial removal shall be neatly saw cut in straight lines.
- B. Temporary Restoration: Temporary restoration includes repair to all driveways, sidewalks and roadways. They shall be swept clean and be maintained free of dirt and dust. All areas disturbed by the construction activities shall be restored to proper grade, cleaned up, including the removal of debris, trash, and deleterious materials. All construction materials, supplies, or equipment, including piles of debris shall be removed from the area. All temporarily restored areas shall be maintained by the CONTRACTOR. These areas shall be kept clean and neat, free of dust and dirt, until final restoration operations are completed. The CONTRACTOR is responsible to utilize dust abatement operations in the temporarily restored areas as required, to the satisfaction of the ENGINEER.

- C. Temporary Resurfacing: Wherever required by the public authorities having jurisdiction, the CONTRACTOR shall place temporary surfacing promptly after backfilling and shall maintain such surfacing for the period of time fixed by said authorities before proceeding with the final restoration and improvements.
- D. Permanent Resurfacing: In order to obtain a satisfactory junction with adjacent surfaces, the CONTRACTOR shall saw cut back and trim the edge so as to provide a clean, sound, vertical joint before permanent replacement of an excavated or damaged portion of pavement. Damaged edges of pavement along excavations and elsewhere shall be trimmed back by saw cutting in straight lines. All pavement restoration and other facilities restoration shall be constructed to finish grades compatible with adjacent undisturbed pavement, unless otherwise shown on the drawings.
- E. Final Restoration: Final restoration shall include the completion of all required pavement replacement of roadways, driveways, curbs, gutters, sidewalks and other existing improvements disturbed by the construction: final grading, placement of sod, installation or replacement of any trees or shrubs, repair of irrigation systems, pavement marking, etc., all complete and finished, acceptable to the ENGINEER.

1.05 EXISTING UTILITIES AND IMPROVEMENTS

- A. General: The CONTRACTOR shall protect all underground utilities and other improvements which may be impaired during construction operations. It shall be the CONTRACTOR'S responsibility to ascertain the actual location of all existing utilities and other improvements that will be encountered in its construction operations, and to see that such utilities or other improvements are adequately protected from damage due to such operations.
- B. Utilities to be Moved: In case it shall be necessary to move the property of any public utility or franchise holder other than those depicted on the plans, such utility company or franchise holder will, upon request of the CONTRACTOR, be notified by the OWNER to move such property within a specified reasonable time. When utility lines that are to be removed are encountered within the area of operations, the CONTRACTOR shall notify the OWNER a sufficient time in advance for the necessary measures to be taken to prevent interruption of service.
- C. Where the proper completion of the Work requires the temporary or permanent removal and / or relocation of an existing utility or other improvement which is shown, the CONTRACTOR shall remove and temporarily replace or relocate such utility or improvement in a manner satisfactory to the OWNER and the owner of the utility/facility. In all cases of such temporary removal or relocation, restoration to former location shall be accomplished by the CONTRACTOR in a manner that will restore or replace the utility or improvement as nearly as possible to its former locations and to as good or better condition than found prior to removal.
- D. OWNER'S Right of Access: The right is reserved to the OWNER and to the OWNER'S of public utilities and franchises to enter at any time upon any public street, alley, right-of-way, or easement for the purpose of making changes in their property made necessary by the Work of this Contract.

- E. Underground Utilities Shown or Indicated: Existing utility lines that are shown or the locations of which are made known to the CONTRACTOR prior to excavation and that are to be retained, and all utility lines that are constructed during excavation operations shall be protected from damage during excavation and backfilling and, if damaged, shall be immediately repaired by the CONTRACTOR.
- F. Underground Utilities Not Shown or Indicated: In the event that the CONTRACTOR damages any existing utility lines that are not shown or the locations of which are not made known to the CONTRACTOR prior to excavation by the OWNER and Sunshine One-Call Notification, a written report thereof shall be made immediately to the OWNER. The CONTRACTOR shall make the repairs immediately under the provisions for changes and extra work contained in the General Conditions.
- G. Approval of Repairs: All repairs to a damaged improvement are subject to inspection and approval by an authorized representative of the OWNER and the facility owner before being concealed by backfill or other work.
- H. No fill, excavation material, construction generated debris or equipment shall obstruct water valves, gas meters or sewer manholes. Water, sewer and gas service shall be made accessible to repair or maintenance crews representing the OWNER or a privately-owned utility company.
- I. Maintaining in Service: All oil and gasoline pipelines, power, and telephone or other communication cable ducts, gas and water mains, irrigation lines, reuse lines, sewer lines, storm drain lines, poles, and overhead power and communication wires and cables encountered along the line of the Work shall remain continuously in service during all the operations under the Contract, unless other arrangements satisfactory to the OWNER are made with the owner of said utilities. The CONTRACTOR shall be responsible for and shall repair all damage due to its operations, and the provisions of this Section shall not be abated even in the event such damage occurs after backfilling or is not discovered until after completion of the backfilling.

1.06 TREES WITHIN STREET RIGHTS-OF-WAY AND PROJECT LIMITS

- A. If any tree removal is required, the CONTRACTOR needs to coordinate with the ENGINEER, accordingly. All required permits related to tree removal are the responsibility of the CONTRACTOR.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

- END OF SECTION -

SECTION 01550

SITE ACCESS AND STORAGE

PART 1 – GENERAL

1.01 SITE ACCESS

- A. The CONTRACTOR shall make its own investigation of the condition of available public and private roads and of clearances, restrictions, bridge load limits, and other limitations affecting transportation and ingress and egress to the site of the Work. It shall be the CONTRACTOR's responsibility to construct and maintain any haul roads required for its construction operations.
- B. The CONTRACTOR will be responsible for monitoring its personnel, equipment and material deliveries.

1.02 STORAGE

- A. Little storage area is available within the work areas shown on the Drawings. Any equipment and materials stored here shall be in accordance with the manufacturer's recommendations and as indicated by the OWNER.
- B. Responsibility for protection and safekeeping of equipment and materials will be solely that of the CONTRACTOR, and no claim shall be made against the OWNER by reason of any act of an employee or trespasser. Should an occasion arise necessitating access to an area occupied by stored equipment and/or materials, the CONTRACTOR shall immediately move them.
- C. If the CONTRACTOR requires additional staging and storage area than shown on the Drawings, the CONTRACTOR shall obtain such areas from off site sources at no additional cost to the OWNER.
- D. Upon completion of the Contract, the CONTRACTOR shall remove from the storage and work areas all of their equipment, temporary fencing, surplus materials, rubbish, etc., and restore the area to its original or better conditions.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

- END OF SECTION -

SECTION 01560

SPECIAL CONTROLS

PART 1 - GENERAL

1.01 CHEMICALS

- A. All chemicals used during project construction or furnished for testing of project operation, whether herbicide, pesticide, disinfectant, polymer, reactant of other classification, will be required to show approval of either EPA or HUD. The handling, use, storage and disposal of such materials, containers or residues shall be in strict conformance with manufacturer and/or CONTRACTOR'S secured storage. Copies of antidote literature and a supply of antidotes shall be kept at the job site office.

1.02 DUST

- A. During all work for this Contract, the CONTRACTOR shall by the application of water and/or calcium chloride or other means, approved by the ENGINEER, eliminate dust annoyance to adjacent property, business establishments and the site. The CONTRACTOR shall take all protective measures, to the satisfaction of the ENGINEER, necessary to ensure that dust and debris does not enter any of the mechanical or electrical equipment. The CONTRACTOR shall be responsible for the cleanup of existing buildings, facilities, equipment, controls, etc., which have become soiled due to the lack of proper dust control as determined by the ENGINEER. The CONTRACTOR shall provide daily application of water to all unpaved areas designated by the ENGINEER in the field and to the satisfaction of the ENGINEER in the field.

1.03 NOISE

- A. Noise resulting from the CONTRACTOR'S work shall not violate any ordinance of the OWNER or the County and other requirements stated in the Broward County Chapter 27 Pollution Control in Broward County. The CONTRACTOR shall be responsible for curtailing noise resulting from his operation. He shall, upon written notification from the ENGINEER or the noise control officers, make any repairs, replacements, adjustments, additions and furnish mufflers when necessary to fulfill requirements.

1.04 EROSION ABATEMENT AND WATER POLLUTION

- A. It is imperative that the CONTRACTOR'S dewatering operations not contaminate or disturb the environment or properties adjacent to the Work. The CONTRACTOR, shall, therefore, schedule and control his operations to confine all runoff water from disturbed surfaces, water from dewatering and/or from excavation below the ground water table operations that becomes contaminated with lime silt, muck and other deleterious matter, fuels, oils, bitumens, calcium chloride, chemicals and other polluting materials.
- B. The CONTRACTOR shall construct temporary stilling basin(s) of adequate size and provide all necessary temporary materials, operations and controls including, but not limited to, filters, coagulants, screens and other means necessary to attain the required discharge water quality.
- C. The CONTRACTOR shall be responsible for providing, operating and maintaining materials and equipment used for conveying the clear water to the point of discharge.

All pollution prevention procedures, materials, equipment and related items shall be operated and maintained until such time as the dewatering operation is discontinued. Upon the removal of the materials, equipment and related items the CONTRACTOR shall restore the area to the condition prior to his commencing work.

1.05 HURRICANE AND STORM WARNINGS

- A. As the schedule for this project coincides, in part, with the recognized South Florida hurricane season, the CONTRACTOR's attention is drawn to the possibility of hurricane conditions, or severe storm conditions, occurring at the plant site during the course of Contract work.
- B. Within 30-days of the date of Notice-to-Proceed, the CONTRACTOR shall submit to the ENGINEER and Owner a Hurricane Preparedness Plan. The plan should outline the necessary measures which the CONTRACTOR proposes to perform at no additional cost to the Owner in case of a hurricane warning.
- C. In the event of inclement weather, or whenever the ENGINEER shall direct, the CONTRACTOR shall, and will cause Sub-Contractors to protect carefully the Work and materials against damage or injury by reasons of failure on the part of the CONTRACTOR to so protect the Work. Such Work and materials so damaged shall be removed and replaced at the expense of the CONTRACTOR.
 - 1. Hurricane Watch: Upon designation of a hurricane watch, CONTRACTORS shall be responsible for storing all loose supplies and equipment on the job site that may pose a danger. In addition, the CONTRACTOR shall remove all bulkheads and plugs in pipelines that would impede drainage in the case of flooding. Structures that may be in danger of floatation shall be flooded. The CONTRACTOR shall also cooperate with OWNER's personnel in protecting other structures at the site.
 - 2. Hurricane Warning: No mobile "temporary facility" shall be staffed during a hurricane warning. CONTRACTOR facilities meeting these criteria shall comply.
- D. The CONTRACTOR is advised to take all necessary precautions to protect his equipment by moving it to higher ground if in an area subject to flooding.

1.06 PESTS AND RODENTS

- A. The CONTRACTOR shall be responsible for maintaining the jobsite free from litter, rubbish and garbage. He shall provide containers for the disposal of garbage and other materials that attract and are breeding places for pests and rodents. The CONTRACTOR shall provide the services of an exterminator to inspect the jobsite on a periodic basis and to provide service as required to control pests and rodents.

1.07 PERIODIC CLEAN-UP; BASIC SITE RESTORATION

- A. During construction, the CONTRACTOR shall regularly remove from the site all accumulated debris and surplus materials of any kind which result from his operations, or whenever the accumulation in excess of one truck load. Unused equipment and tools shall be stored at the CONTRACTOR'S yard or base of operations for the project.

- B. When the work involves installation of sewers, drains, water mains, manholes, underground structures, or other disturbance of existing features in or across streets, rights-of-way, easements, or private property, the CONTRACTOR shall (as the work progresses) promptly backfill, compact, grade and otherwise restore the disturbed area to a basic condition which will permit resumption of pedestrian or vehicular traffic and any other critical activity or function consistent with the original use of the land. Unsightly mounds of earth, large stones, boulders, and debris shall be removed so that the site presents a neat appearance.
- C. The CONTRACTOR shall perform the clean-up work on a regular basis and as frequently as ordered by the ENGINEER. Basic site restoration in a particular area shall be accomplished immediately following the installation or completion of the required facilities in that area. Furthermore, such work shall also be accomplished, when ordered by the ENGINEER, if partially completed facilities must remain incomplete for some time period due to unforeseen circumstances.
- D. Upon failure of the CONTRACTOR to perform periodic clean-up and basic restoration of the site to the ENGINEER'S satisfaction, the ENGINEER may, upon five (5) days prior written notice to the CONTRACTOR, employ such labor and equipment as he deems necessary for the purpose, and all costs resulting therefrom shall be charged to the CONTRACTOR and deducted from the amounts of money that may be due him.

1.08 SECURITY

- A. The CONTRACTOR shall care for and protect against loss or damage of all material to be incorporated in the construction for the duration of the Contract and shall repair or replace damaged or lost materials and damage to structures.
- B. The CONTRACTOR shall be responsible for providing, and maintaining temporary fencing and gates and the daily securing of temporary fencing and gates used for construction purposes for the duration of the project.
- C. The CONTRACTOR shall strictly comply with working hours on the project site. Prior to any work outside of the standard working hours, the CONTRACTOR shall request the OWNER's approval via written request (at least 24 hours in advance). The written request shall clearly define the work to be performed, the names of the employees, their employer and their trade and the hours and days during which the work is planned. The CONTRACTOR shall comply with any additional security requirements including employee photo identification at all times on-site and employee parking passes.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

- END OF SECTION -

SECTION 01570

TRAFFIC REGULATIONS AND MAINTENANCE OF TRAFFIC

PART 1 - GENERAL

1.01 TRAFFIC CONTROL

- A. CONTRACTOR shall obey all traffic laws and comply with all the requirements, rules and regulations of the Florida State Department of Transportation, the Town of Southwest Ranches, Broward County and other local authorities having jurisdiction, to maintain adequate warning signs, lights, barriers, etc., for the protection of traffic on public roadways and the site.
- B. The CONTRACTOR shall maintain traffic and protect the public from all damage to persons and property within the Contract Limits, in accordance with the Contract Documents and all applicable state, city and local regulations. The CONTRACTOR shall conduct its construction operations so as to maintain and protect access, for vehicular and pedestrian traffic, to and from all properties and business establishments adjoining or adjacent to those streets affected by his operations, and to subject the public to a minimum of delay and inconvenience. Suitable signs, barricades, railing, etc. shall be erected and the work outlined by adequate lighting at night. Danger lights shall be provided as required. Watchmen, flagmen, and crossing guards shall be provided as may be necessary for the protection of traffic. Traffic Control and Maintenance of traffic during construction shall be included in the CONTRACTOR's bid and no additional payment shall be requested to the OWNER for these activities
- C. For the protection of traffic in public or private streets and alleyways, the CONTRACTOR shall provide, place, and maintain all necessary barricades, traffic cones, warning signs, lights, and other safety devices in accordance with the requirements of the "Manual of Uniform Traffic Control Devices, Part VI – Traffic Controls for Street and Highway Construction and Maintenance Operations", published by U.S. Department of Transportation, Federal Highway Administration (ANSI D6.1).
- D. The CONTRACTOR shall submit a Maintenance of Traffic (MOT) Plan for ENGINEER and/or CITY/County approval at least 15 days prior to construction work.
- E. All signs, signals, and barricades shall conform to the requirements of Subpart G, Part 1926, of the OSHA Safety and Health Standards for Construction.
- F. All dirt spilled from the CONTRACTOR'S trucks on existing pavements shall be removed by the CONTRACTOR immediately and whenever in the opinion of the OWNER the accumulation is sufficient to cause the formation of mud, dust, interference with traffic or create a traffic hazard.
- G. Areas designated by the Broward County Traffic Engineering Division as "Safe Walk Routes" shall adhere to the requirements of the Broward County Maintenance of Traffic School/Pedestrian.

1.02 TEMPORARY CROSSINGS

- A. General: Wherever necessary or required for the convenience of the public or individual residents at street or highway crossings, private driveways, or elsewhere, the CONTRACTOR shall provide suitable temporary bridges over unfilled excavations, except in such cases as the CONTRACTOR shall secure the written consent of the individuals or authorities concerned to omit such temporary bridges, which written consent shall be delivered to the OWNER prior to excavation. All such bridges shall be maintained in service until access is provided across the backfilled excavation. Temporary bridges for street and highway crossing shall conform to the requirements of the authority having jurisdiction in each case, and the CONTRACTOR shall adopt designs furnished by said authority for such bridges, or shall submit designs to said authority for approval, as may be required.
- B. Street Use: Nothing herein shall be construed to entitle the CONTRACTOR to the exclusive use of any public street, alleyway, or parking area during the performance of Work hereunder, and it shall so conduct its operations as not to interfere unnecessarily with the authorized work of utility companies or other agencies in such streets, alleyways, or parking areas. No street shall be closed to the public without first obtaining permission of the OWNER and proper governmental authority. Where excavation is being performed in primary streets or highways, one lane in each direction shall be kept open to traffic at all times unless otherwise provided or shown. Toe boards shall be provided to retain excavated material if required by the CITY or the agency having jurisdiction over the street or highway. Fire hydrants on or adjacent to the Work shall be kept accessible to fire-fighting equipment at all times. Temporary provisions shall be made by the CONTRACTOR to assure the use of sidewalks and the proper functioning of all gutters, sewer inlets, and other drainage facilities.
- C. The CONTRACTOR shall take all necessary precautions for the protection of the Work and the safety of the public. All barricades and obstructions shall be illuminated at night, and all lights shall be kept burning from sunset until sunrise. The CONTRACTOR shall station such guards or flaggers and shall conform to such special safety regulations relating to traffic control as may be required by the public authorities within their respective jurisdictions. All signs, signals, and barricades shall conform to the requirements of Subpart G, Part 1926, of the OSHA Safety and Health Standards for Construction.
- D. The CONTRACTOR shall remove traffic control devices when no longer needed, repair all damage caused by installation of the devices, and shall remove post settings and backfill the resulting holes to match grade.
- E. Temporary Street Closure: If closure of any street is required during construction, a formal application for a street closure shall be made to the authority having jurisdiction at least 30 days prior to the required street closure in order to determine necessary sign and detour requirements. Detour signs shall be provided, installed prior to street closure, and removed after construction by the CONTRACTOR.
- F. Temporary Driveway Closure: The CONTRACTOR shall notify the OWNER and occupant of closure of driveways to be closed, at least three working days prior to the closure. The CONTRACTOR shall minimize the inconvenience and minimize the time

period that the driveways will be closed. The CONTRACTOR shall fully explain to the owner/occupant how long the work will take and when closure is to start.

- G. Temporary Bridges: Whenever necessary, the CONTRACTOR shall provide suitable temporary bridges or steel plates over unfilled excavations, except in such cases as the CONTRACTOR shall secure the written consent of the individuals or authorities concerned to omit such temporary bridges or steel plates, which written consent shall be delivered to the ENGINEER prior to excavation. All such bridges or steel plates shall be maintained in service until access is provided across the backfilled excavation. Temporary bridges or steel plates for street and highway crossing shall conform to the requirements of the authority having jurisdiction in each case, and the CONTRACTOR shall adopt designs furnished by said authority for such bridges or steel plates, or shall submit designs to said authority for approval, as may be required.

1.03 CONTRACTOR PARKING

- A. CONTRACTOR shall be responsible for enforcing on-site parking regulations. The CONTRACTOR shall obtain off-site parking for all personnel vehicles as required.
- B. The CONTRACTOR and his personnel are cautioned against parking vehicles in the business zones for any extended period of time. If necessary, the CONTRACTOR shall obtain offsite parking areas for his personnel.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

- END OF SECTION -

SECTION 01600

EQUIPMENT AND MATERIALS

PART 1 - GENERAL

1.01 GENERAL

- A. All equipment, materials, instruments or devices incorporated in this project shall be new and unused, unless indicated otherwise in the Contract Documents.
- B. Equipment and materials to be incorporated in the work shall be delivered sufficiently in advance of their installation and use to prevent delay in the execution of the work, and they shall be delivered as nearly as feasible in the order required for executing the work.
- C. The CONTRACTOR shall protect all equipment and materials from deterioration and damage. The equipment and materials shall be handled and stored by the manufacturer, fabricator CONTRACTOR and CONTRACTOR before, during, and after shipment to prevent warping, twisting, bending, breaking, chipping, rusting, and any injury, damage or theft of any kind whatsoever. Any equipment exhibiting any of the above shall be removed and replaced at the CONTRACTOR'S expense for both labor and materials.

1.02 STORAGE

- A. The CONTRACTOR shall store its equipment and materials at their site in accordance with the manufacturer's recommendations and as directed by the ENGINEER in the field. No storage area will be provided by OWNER. The CONTRACTOR shall enforce the instructions of the OWNER and the ENGINEER regarding the posting of regulatory signs for loadings on structures, fire safety, and smoking areas.

1.03 HANDLING AND MAINTENANCE

- A. The manufacturer's storage instructions shall be carefully followed and any deviations shall be approved by the manufacturer in writing with a copy to the ENGINEER. Equipment with moving parts shall be rotated per the manufacturer's recommendations while in storage and during the period between installation and acceptance.
- B. All equipment shall be stored fully lubricated unless otherwise instructed by the manufacturer. Lubricants shall be changed upon completion of installation and as frequently as required thereafter during the period between installation and acceptance. New lubricants shall be put into the equipment at the time of acceptance.
- C. Equipment with electric motors having space heaters shall have the space heaters energized unless stored in a temperature and humidity-controlled building. Space heaters shall be energized at the time of installation and maintained until acceptance of the equipment.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

- END OF SECTION -

SECTION 01700

PROJECT CLOSEOUT

PART 1 - GENERAL

1.01 PROJECT CLOSEOUT

- A. As construction of the project enters the final stages of completion, the CONTRACTOR shall, in accordance with the requirements set forth in the Contract Documents, attend to or have already completed the following items:
1. Scheduling start-up and initial operation.
 2. Correcting or replacing defective work, including completion of items previously overlooked or work which remains incomplete, all as evidenced by the OWNER's "Punch" lists.
 3. Make final submittals.
 4. Attend to any other items listed herein or brought to the CONTRACTOR's attention by the OWNER.

1.02 CLOSEOUT TIMETABLE

- A. The CONTRACTOR shall establish dates for equipment testing, acceptance periods, and on-site instructional periods (as required under the Contract). Such dates shall be established not less than one week prior to beginning any of the foregoing items, to allow the OWNER, the ENGINEER, and their authorized representatives sufficient time to schedule attendance at such activities.

1.03 FINAL SUBMITTALS

- A. Before the acceptance of the project major milestones for substantial completion, the CONTRACTOR shall submit to the ENGINEER (or to the OWNER if indicated) certain records, certifications, etc., which are specified elsewhere in the Contract Documents. Missing, incomplete or unacceptable items, as determined by the ENGINEER or the OWNER, shall indicate non-compliance with substantial completion major milestone dates. A partial list of such items appears below, but it shall be the CONTRACTOR'S responsibility to submit any other items which are required in the Contract Documents:
1. Written Test results of project components.
 2. Performance affidavits for equipment and materials.
 3. Operation and Maintenance Manuals for equipment.
 4. Record Drawings: during the entire construction operation, the CONTRACTOR shall maintain records of all deviations from the Drawings and Specifications and shall prepare therefrom record drawings showing correctly and accurately all changes and deviations from the Work made during construction to reflect the

Work as it was actually constructed. These drawings shall conform to recognized standards of drafting, shall be neat, legible and on mylar or other reproducible material acceptable to the ENGINEER.

5. Written guarantees, where required.
6. Certificates of inspection and acceptance by local governing agencies having jurisdiction.
7. Releases from all parties who are entitled to claims against the subject project, property, or improvement pursuant to the provisions of law.

1.04 PUNCH LISTS

- A. Final cleaning and repairing shall be scheduled upon completion of the project.
- B. The ENGINEER will make his final inspection whenever the CONTRACTOR has notified the ENGINEER that the work is ready for the inspection. Any work not found acceptable and requiring cleaning, repair and/or replacement will be noted on the "Punch" list. Work that has been inspected and accepted by the ENGINEER shall be maintained by the CONTRACTOR, until final acceptance of the entire project.
- C. Whenever the CONTRACTOR has completed the items on the punch list, he shall again notify the ENGINEER that it is ready for final inspection. This procedure will continue until the entire project is accepted by the ENGINEER. The "Final Payment" will not be processed until the entire project has been accepted by the ENGINEER and all of the requirements in previous Article 1.03 "Final Submittals" have been satisfied.

1.05 MAINTENANCE AND GUARANTEE

- A. The CONTRACTOR shall comply with all maintenance and guarantee requirements of the Contract Documents.
- B. Replacement of earth fill or backfill, where it has settled below the required finish elevations, shall be considered as a part of such required repair work, and any repair or resurfacing constructed by the CONTRACTOR which becomes necessary by reason of such settlement shall likewise be considered as a part of such required repair work unless the CONTRACTOR shall have obtained a statement in writing from affected private owner or public agency releasing the OWNER from further responsibility in connection with such repair or resurfacing.
- C. The CONTRACTOR shall make all repairs and replacements promptly upon receipt of written order from the OWNER. If the CONTRACTOR fails to make such repairs or replacements promptly, the OWNER reserves the right to do the Work and the CONTRACTOR and his surety shall be liable to the OWNER for the cost thereof.

1.06 TOUCH-UP AND REPAIR

- A. The CONTRACTOR shall touch-up and repair damage to all field painted and factory finished equipment. Touch-up of equipment panels, etc., shall match as nearly as possible the original finish. If in the opinion of the ENGINEER the touch-up work is not satisfactory, the CONTRACTOR shall repaint the item.

1.07 FINAL CLEANUP

- A. The CONTRACTOR shall promptly remove from the vicinity of the completed Work, all rubbish, unused materials, concrete forms, construction equipment, and temporary structures and facilities used during construction. Final acceptance of the Work by the OWNER will be withheld until the CONTRACTOR has satisfactorily complied with the foregoing requirements for final cleanup of the project site.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

- END OF SECTION -

SECTION 02100

CLEARING AND GRUBBING

PART 1 - GENERAL

1.01 THE REQUIREMENT

- A. The CONTRACTOR shall furnish all materials, equipment and labor necessary to complete all clearing and grubbing as specified herein and in accordance with the Drawings. Only areas of dense vegetation are identified on the Drawings. Other areas may have vegetation and juvenile trees.
- B. The CONTRACTOR shall box and protect all trees, shrubs, lawns, and the like within areas to be preserved.

1.02 STANDARDS AND REGULATIONS

- A. The CONTRACTOR shall comply with all state, county and local regulations regarding disposal of debris resulting from the clearing and grubbing operation.
- B. The CONTRACTOR shall dispose of debris resulting from the clearing and grubbing operation at off-site locations in a lawful manner.

1.03 PROTECTION OF PERSONS AND PROPERTY

- A. All work shall be performed in such a manner to protect all personnel, workmen, pedestrians, and adjacent property and structures from possible injury or damage.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 GENERAL

- A. The Work specified in this section consists of clearing and grubbing within the areas required in the easements and right-of-ways to install the pipeline and appurtenances. The Work shall include the disposal of the resultant products and debris in areas provided by the CONTRACTOR unless noted otherwise.
- B. Property obstructions which are to remain in place, such as buildings, sewers, drains, pipelines, conduits, poles, walls, posts, bridges, etc., are to be carefully protected from injury and are not to be displaced, except for unusual cases when so specified by the ENGINEER.
- C. Standard clearing and grubbing shall consist of the complete removal and disposal of all trees, shrubs, timber, brush, a stump, roots, grass, weeds, rubbish and other obstructions resting on or protruding through the surface of the existing ground and the surface of excavated areas.

- D. Excavation resulting from the removal of trees, roots, and the like shall be filled with suitable material, as approved by the ENGINEER, and thoroughly compacted per the requirements contained in Section 02222 – Excavation and Backfill for Utilities and Section 02224 – Excavation and Backfill for Structures.

3.02 DISPOSAL OF MATERIALS

- A. Timber, stumps, brush, roots, rubbish and other objectionable material resulting from clearing and grubbing shall be disposed of in a lawful manner, off site by the CONTRACTOR.
- B. Burning of any debris resulting from the clearing and grubbing work will not be permitted at the site.

- END OF SECTION -

SECTION 02300

EARTHWORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All applicable provisions of the Bidding and Contract Requirements and Division 1 - General Requirements shall govern the work under this Section.

1.02 WORK INCLUDED

- A. Provide all labor, materials, necessary equipment and services to complete the Earthwork, as required to install the pipe as indicated on the drawings, as specified herein or both.
- B. Including but not necessarily limited to the following:
 - 1. Excavation, including demucking.
 - 2. Backfilling.
 - 3. Filling.
 - 4. Grading, general site and building pads.
 - 5. Compaction.
 - 6. Coordination with ENGINEER for offsite disposal of all excess materials and stock piling of suitable materials to be used as fill or backfill.
- C. Cutting, proofrolling, filling and grading to required lines, dimensions, contours and elevations for proposed improvements as shown and implied on the drawings and required by these specifications.
- D. Scarifying, compaction, moisture content conditioning and control, and removal of unsuitable material to ensure proper preparation of areas for the proposed improvements.
- E. Undertake any special construction procedures for the site recommended in the geotechnical report for preparation of building and pavement areas.
- F. There shall be no classification of excavation for measurement of payment regardless of materials encountered.
- G. The work of this Section includes all earthwork required for construction of the WORK. Such earthwork shall include, but not be limited to, the loosening, removing, loading, transporting, depositing, and compacting in its final location of all materials wet and dry, as required for the purposes of completing the work specified in the Contract Documents, which shall include, but not be limited to, the furnishing, placing, and

removing of sheeting and bracing necessary to safely support the sides of all excavation; all pumping, ditching, draining, and other required measures for the removal or exclusion of water from the excavation; the supporting of structures above and below the ground; all backfilling around structures and all backfilling of trenches and pits; the disposal of excess excavated materials; borrow of materials to makeup deficiencies for fills; and all other incidental earthwork, all in accordance with the requirement of the Contract Documents.

1.03 RELATED WORK

- A. All applicable sections of Division 1, 2, and 3.

1.04 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. **Codes:** All codes, as referenced herein, are specified in Section 01420, "Reference Standards".

B. **American Society for Testing and Materials (ASTM) - latest edition**

ASTM D 422	Method for Particle-Size Analysis of Soils.
ASTM D 698	Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-lb (2.49-kg) Rammer and 12-in (304.8-mm) Drop.
ASTM D 1556	Test Method for Density of Soil in Place by the Sand Cone Method.
ASTM D 1557	Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.54-kg) Rammer and 18-in (457-mm) Drop.
ASTM D 1633	Test Method for Compressive Strength of Molded Soil-Cement Cylinders.
ASTM D 2216	Laboratory Determination of Moisture content of Soil.
ASTM D 2419	Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
ASTM D 2487	Classification of Soils for Engineering Purposes.
ASTM D 2901	Test Method for Cement Content of Freshly-Mixed Soil-Cement.
ASTM D 2922	Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
ASTM D 3017	Test for Water Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 4253	Test Methods for Maximum Index Density of Soils Using a Vibratory Table.

ASTM D 4254 Test Methods for Minimum Index Density of Soils and Calculation of Relative Density.

ASTM D 4318 Test for Plastic Limit, Liquid Limit, and Plasticity Index of Soils

ASTM D 4429 Standard Test Method for CBR (California Bearing Ratio) of Soils in Place

C. American Association of State Highway and Transportation Officials (AASHTO) - latest edition

1. T 88 Particle Size Analysis of Soils

1.05 SUBSOIL INFORMATION

A. Refer to Section 02210 - Subsurface Investigation.

1.06 SITE INSPECTION

A. The CONTRACTOR shall visit the site and acquaint himself with all existing conditions. Make his own subsurface investigation to satisfy himself as to site and subsurface conditions, but such subsurface investigations shall be performed only under time schedules and arrangements approved in advance by the OWNER and ENGINEER.

1.07 TOPOGRAPHIC INFORMATION

A. The existing grades shown on the drawings are approximate only and no representation is made as to their accuracy or consistency. The CONTRACTOR shall verify all existing grades to the extent necessary to ensure completion of the job to the proposed grades indicated on the drawings.

1.08 DISPOSAL OF SURPLUS OR UNSUITABLE MATERIAL

A. Unsuitable material encountered during the course of construction shall be removed from the construction site at the expense of the CONTRACTOR. Unsuitable material shall not be stockpiled on-site. All suitable material shall be stockpiled at areas approved by the ENGINEER.

1.09 BENCH MARKS AND MONUMENTS

A. CONTRACTOR shall employ a registered Professional Surveyor and Mapper to lay out lines and grades as indicated. Bench marks shall be established by a Professional Surveyor and Mapper registered in the State of Florida. Bench marks shall be permanent and easily accessible and maintained and replaced if disturbed or destroyed. All benchmarks shall be North American Vertical Datum 1988 (NAVD88).

1.10 UTILITIES

A. Before starting site operations, arrange for the disconnection of all utility services designated to be removed, or are required to be disconnected for the satisfactory completion of the WORK.

- B. Locate all existing active utility lines traversing the site and determine the requirements for their protection. Preserve in operating condition all active utilities adjacent to or traversing the site and/or designated to remain.
- C. Observe rules and regulations governing respective utilities in working under requirements of this section. Adequately protect utilities from damage, remove or replace as indicated, specified or required. Remove, plug or cap inactive or abandoned utilities encountered in excavation. Record location of all utilities.

1.11 QUALITY ASSURANCE

- A. A geotechnical engineer may be retained by the OWNER to observe performance of work in connection with excavating, filling, grading, and compaction. This inspection will not relieve the CONTRACTOR from his responsibility to complete the work in accordance with the drawings and specifications. The CONTRACTOR shall re-adjust all work performed that does not meet technical or design requirements but make no deviations from the Contract documents without specific and written acceptance of the ENGINEER.
- B. Visual field confirmation and density testing of subgrade preparation and fill placement procedures shall be performed by the field geotechnical engineer as part of the construction testing requirements. The CONTRACTOR shall be informed as soon as possible of the test results.
- C. The ENGINEER shall prepare field reports that indicate compaction test location, elevation data, testing results and acceptability. The OWNER and CONTRACTOR shall be provided with written copies of the results within 24 hours of time test was performed.
- D. All costs related to reinspection, due to failures, shall be paid for by the CONTRACTOR at no additional expense to OWNER. The OWNER reserves the right to direct any inspection that is deemed necessary. CONTRACTOR shall provide free access to site for inspection activities.
- E. Where soil material is required to be compacted to a percentage of maximum density, the maximum density at optimum moisture content will be determined in accordance with ASTM D 1557. Where cohesionless, free draining soil material is required to be compacted to a percentage of relative density, the calculation of relative density will be determined in accordance with ASTM D 4253 and D 4254. Field density in-place tests will be performed in accordance with ASTM D 1556, ASTM D 2922, or by such other means acceptable to the ENGINEER.
- F. In case the tests of the fill or backfill show non-compliance with the required density, the CONTRACTOR shall accomplish such remedy as may be required to ensure compliance. Subsequent testing to show compliance shall be by a testing laboratory selected by the OWNER and shall be at the CONTRACTOR's expense.
- G. Particle size analysis of soils and aggregates will be performed using ASTM D 422.
- H. Determination of sand equivalent value will be performed using ASTM D 2419.

- I. **Unified Soil Classification System:** References in these specifications are to soil classification types and standards set forth in ASTM D 2487. The CONTRACTOR shall be bound by all applicable provisions of said ASTM D 2487 in the interpretation of soil classifications.
- J. Comply with requirements of all applicable building codes and other public agencies having jurisdiction upon the work.

1.12 SUBMITTALS

- A. Within 10 days after award of the contract, the CONTRACTOR shall submit to the OWNER, with his bid package, a schedule detailing the sequence, and time of completion of all phases of work under this section.
- B. At least 2 weeks in advance of imported fill use, the CONTRACTOR shall submit the following laboratory test data to the ENGINEER for each type of imported soil/gravel material to be used as compacted fill.
 - 1. Moisture and Density Relationship: ASTM D1557 or D698 as required by project geotechnical engineering study;
 - 2. Mechanical Analysis: AASHTO T-88; and,
 - 3. Plasticity Index: ASTM D 4318.
- C. Together with the above test data, the CONTRACTOR shall submit a 5 pound sample of each type of off-site fill material in an air tight container for the approval of the ENGINEER and OWNER.
- D. Submit the name of each material supplier and specific type and source of each material. Any change in source or soil type throughout the job requires approval of the OWNER and the ENGINEER.

PART 2 - PRODUCTS

2.01 SUITABLE FILL AND BACKFILL MATERIAL REQUIREMENTS

- A. **General:** Fill, backfill, and embankment materials shall be suitable selected or processed clean, fine earth, rock, or sand, free from grass, roots, brush, or other vegetation.
- B. Fill and backfill materials to be placed within 6 inches of any structure or pipe shall be free of rocks or unbroken masses of earth materials having a maximum dimension larger than 3 inches.
- C. **Suitable Materials:** Soils not classified as unsuitable as defined in Paragraph entitled, "Unsuitable Material" herein, are defined as suitable materials and may be used in fills, backfilling, and embankment construction subject to the specified limitations. In addition, when acceptable to the ENGINEER, some of the material listed as unsuitable may be used when thoroughly mixed with suitable material to form a stable composite.

D. Suitable materials may be obtained from on-site excavations, may be processed on-site materials, or may be imported. If imported materials are required to meet the requirements of this Section or to meet the quantity requirements of the project the CONTRACTOR shall provide the imported materials at no additional expense to the OWNER, unless a unit price item is included for imported materials in the bidding schedule.

E. On-site fill

1. On-site materials for use as fill shall consist of excavated soil from other portions of the site;
2. The CONTRACTOR shall use the on-site soil judiciously to facilitate the construction schedule including the use of the most readily compactable soil for fill in building areas and as fill within 2 feet of pavement subgrade;
3. Topsoil shall not be utilized as engineered fill;
4. Excavated material containing rock, stone or masonry debris smaller than 2 feet in its largest dimension, may be mixed with suitable material and utilized up to 3 feet below proposed subgrade;
5. Excavated material containing rock, stone or masonry debris smaller than 6 inches in its largest dimension may be mixed with suitable material and utilized up to 18 inches below proposed subgrade;
6. No material greater than 2 inches in its largest dimension may be utilized within 18 inches of proposed subgrade;
7. No material greater than 2 inches in its largest dimension may be utilized as backfill for storm drainage or utility trenches.
8. Prior to placement, on-site material to be used as fill shall not contain:
 - a. Debris other than crushed concrete and brick meeting the above requirements.
 - b. Timber or railroad ties.
 - c. Other deleterious materials such as steel rails, rebar, trash, etc.
 - d. Hazardous material - Unsuitable and deleterious materials and debris shall be disposed of off-site in accordance with all applicable regulations.

E. Off-site imported fill

1. If necessary, off-site fill shall be obtained and provided by the CONTRACTOR;
2. Fill shall be clean, well graded granular soil which is non-expansive and non-collapsible and shall have less than 20% by weight passing the #200 sieve. The portion passing the #200 shall be non-plastic. Fill with less fines (less than #200)

may be required on project specific basis and as required by ENGINEER. Likewise, fill with more than 20% fines may be acceptable on a project specific basis or as identified in a geotechnical engineering study;

- 3. Imported fill shall be free of all hazardous substances. Certification of compliance and, if requested, test results substantiating compliance shall be furnished to the OWNER and ENGINEER by the CONTRACTOR not less than one week prior to its intended use;
- 4. The OWNER reserves the right to test off-site fill material for conformance with these specifications; and,
- 5. The CONTRACTOR shall be responsible for all permits and regulatory requirements associated with offsite borrow sources.

F. The following types of suitable materials are designated and defined as follows:

- 1. Type 1 (one inch minus granular backfill): Crushed rock, gravel, or sand with 100 percent passing a 1-inch sieve and a sand equivalent value not less than 50.
- 2. Type 2 (one half inch minus granular backfill): Crushed rock, gravel, or sand with 100 percent passing a 1/2-inch sieve and a sand equivalent value not less than 50.
- 3. Type 3 (sand backfill): Sand with 100 percent passing a 3/8-inch sieve, at least 90 percent passing a number 4 sieve, and a sand equivalent value not less than 30.
- 4. Type 4 (coarse rock backfill): Crushed rock or gravel with 100 percent passing a 1-inch sieve and not more than 10 percent passing a Number 4 sieve.
- 5. Type 5 (pea gravel backfill - ASTM #89): Crushed rock or gravel with 100 percent passing a 1/2-inch sieve, 90 percent passing a Number 8 sieve and not more than 10 percent passing a Number 4 sieve.
- 6. Type 6 (coarse drainrock - ASTM #4): Crushed rock or gravel meeting the following gradation requirements:

<u>Sieve Size</u>	<u>Percentage Passing</u>
2-inch	100
1-1/2-inch	90-100
1-inch	20-55
3/4-inch	0-15
No. 200	0-3

- 7. Type 7 (graded drainrock): Crushed rock or gravel, durable and free from slaking or decomposition under the action of alternate wetting or drying. The material shall be uniformly graded and shall meet the following gradation requirements.

<u>Sieve Size</u>	<u>Percentage Passing</u>
1-inch	100
3/4-inch	90-100
3/8-inch	40-100
No. 4	25-40
No. 8	18-33
No. 30	5-15
No. 50	0-7
No. 200	0-3

The drainrock shall have a sand equivalent value not less than 75. The finish graded surface of the drainrock immediately beneath hydraulic structures shall be stabilized to provide a firm, smooth surface upon which to construct reinforced concrete floor slabs.

8. Type 8 (Ballast Rock / ¾" Rock): Crushed rock or gravel, durable and free from slaking or decomposition under the action of alternate wetting or drying. The material shall be uniformly graded and shall meet the following gradation requirements.

<u>Sieve Size</u>	<u>Percentage Passing</u>
1-inch	100
3/4-inch	40-60
No. 4	0-3
No. 8	0-3

9. Type 9: (Bedding rock – ASTM #67): Well graded crushed rock or gravel meeting the following gradation:

<u>Sieve Size</u>	<u>Percentage Passing</u>
1-inch	100
3/4-inch	98-100
1/2-inch	55-70
3/8-inch	30-40
No. 4	0-6

10. Type 10 (Class I crushed stone - ASTM #57): Manufactured angular, granular crushed stone, rock, or slag, with 100 percent passing a 1-inch sieve and less than 5 percent passing a Number 4 sieve.

11. Type 11 (aggregate base): Crushed rock aggregate base material of such nature that it can be compacted readily by watering and rolling to form a firm, stable base for pavements. At the option of the CONTRACTOR, the grading for either the 1-1/2-inch maximum size or 3/4-inch maximum size shall be used. The sand equivalent value shall be not less than 22, and the material shall meet the following gradation requirements.

<u>Sieve Size</u>	<u>Percentage Passing</u>	
	<u>1-1/2 inch Max.</u>	<u>3/4-inch Max.</u>
2-inch	100	-
1-1/2 inch	90-100	-
1-inch	-	100
3/4-inch	50-85	90-100
No. 4	25-45	35-55
No. 30	10-25	10-30
No. 200	2-9	2-9

12. Type 12 (aggregate subbase): Crushed rock aggregate subbase material that can be compacted readily by watering and rolling to form a firm stable base. The sand equivalent value shall be not less than 18 and shall meet the following gradation requirements.

<u>Sieve Size</u>	<u>Percentage Passing</u>
3-inch	100
2-1/2 inch	87-100
No. 4	35-95
No. 200	0-29

13. Type 13 (cement-treated backfill): Material which consists of Type 7 material, or any mixture of Types 3, 7, 10 and 11 materials which has been cement-treated so that the cement content of the material is not less than 5 percent by weight when tested in accordance with ASTM D 2901. The ultimate compressive strength at 28 days shall be not less than 400 psi when tested in accordance with ASTM D 1633.
14. Type 14 (topsoil): Stockpiled topsoil material which has been obtained at the site by removing soil to a depth not exceeding 2 feet. Removal of the topsoil shall be done after the area has been stripped of vegetation and debris as specified.
15. Type 15 (trench plug): Low permeable fill material, a nondispersible clay material having a minimum plasticity index of 10.

- G. If approved by the ENGINEER, any bituminous concrete on the site shall be milled/removed prior to placing any fill and shall be reused only onsite immediately below the pavement stone base course.

2.02 UNSUITABLE MATERIAL

- A. Unsuitable soils for fill material shall include soils which, when classified under ASTM D 2487, fall in the classifications of Pt, OH, CH, MH or OL.
- B. In addition, any soil which cannot be compacted sufficiently to achieve the percentage of maximum density specified for the intended use shall be classed as unsuitable material.

2.03 USE OF FILL, BACKFILL, AND EMBANKMENT MATERIAL TYPES

- A. The CONTRACTOR shall use the types of materials as designated herein for all required fill, backfill, and embankment construction hereunder.
- B. Where these Specifications conflict with the requirements of any local agency having jurisdiction, or with the requirements of a material manufacturer, the ENGINEER shall be immediately notified. In case of conflict therewith, the CONTRACTOR shall use the most stringent requirement, as determined by the ENGINEER.
- C. Fill and backfill types shall be used in accordance with the following provisions:
 1. Embankment fills shall be constructed of any mixture of Type 1 through Type 11 materials.
 2. Pipe zone backfill, as defined under Paragraph 3.15 "Pipe and Utility Trench Backfill" herein, shall consist of the following materials for each pipe material listed below. Where pipelines are installed on grades exceeding 4 percent, and where backfill materials are graded such that there is less than 10 percent passing a Number 4 sieve, trench plugs of Type 13 or 14 materials shall be provided at maximum intervals of 200 feet or as shown on the Drawings.
 - a. Mortar coated pipe, concrete pipe, and uncoated ductile iron pipe shall be provided Type 1, 2, 3, 4, 5, 9 or 10 pipe zone backfill materials.
 - b. Coal tar enamel coated pipe, polyethylene encased pipe, tape wrapped pipe, and other non-mortar coated pipe shall be backfilled with Type 3 pipe zone backfill material.
 - c. Plastic pipe and vitrified clay pipe shall be backfilled with Type 9 or 10 pipe zone backfill material.
 3. Trench zone backfill for pipelines as defined under Paragraph 3.15 "Pipe and Utility Trench Backfill" shall be or any of Types 1 through 11 backfill materials or any mixture thereof, except that Type 14 material may be used for trench zone backfill in agricultural areas unless otherwise shown or specified.
 4. Final backfill material for pipelines under paved area, as defined under Paragraph 3.15 "Pipe and Utility Trench Backfill" shall be Type 11 backfill material. Final backfill under areas not paved shall be the same material as that used for trench backfill, except that Type 14 material shall be used for final backfill in agricultural areas unless otherwise shown or specified.
 5. Trench backfill and final backfill for pipelines under structures shall be the same material as used in the pipe zone, except where concrete encasement is required by the Contract Documents.
 6. Aggregate base materials under pavements shall be Type 11 material constructed to the thicknesses shown or specified. Where specified or shown, aggregate subbase shall be Type 12 Material.

7. Backfill around structures shall be or Types 1 through Type 11 materials, or any mixture thereof.
8. Backfill materials beneath structures shall be as follows:
 - a. Drainrock materials under hydraulic structures or other water retaining structure with underdrain systems shall be Type 7 or Type 8 material.
 - b. Under concrete hydraulic structures or other water retaining structures without underdrain systems, Types 7, 8 or 11 materials shall be used.
 - c. Under structures where groundwater must be removed to allow placement of concrete, Type 6 material shall be used.
 - d. Under all other structures, Type 4, 5, 6, 7, 8, 9 or 11 material shall be used.
9. Backfill used to replace pipeline trench over-excavation shall be a layer of Type 6, 7, 8, 9 or 10 materials. This backfill material shall be wrapped with filter fabric to prevent migration of fines for wet trench conditions. The same material as used for the pipe zone backfill may be used if the trench conditions are not wet. Filter fabric shall be **Mirafi 140 N, Mirafi 700 X, or equal.**
10. The top 6 inches of fill on reservoir roofs, embankment fills around hydraulic structures, and all other embankment fills shall consist of Type 14 material, topsoil.

2.04 EMBANKMENT

- A. The maximum sizes of rock which will be permitted in the completed fill areas are as follows:

<u>Depth Below Finish Grade</u>	<u>Maximum Allowable Diameter</u>
Top 4 inches	1 inch
4 inches to 12 inches	3-1/2 inches
12 inches to 2 feet	6 inches
2 feet to 4 feet	12 inches
4 feet to 8 feet	24 inches
Below 8 feet	36 inches

- B. Embankments shall be constructed of material containing no muck, stumps, roots, brush, vegetable matter, rubbish or other material that will not compact into a suitable and enduring roadbed, and material designated as undesirable shall be removed from the site. Where embankments are constructed adjacent to bridge end bents or abutments, rock larger than 3-1/2 inches in diameter shall not be placed within three feet of the location of any abutment.
- C. Fill material containing debris, sod, biodegradable materials shall not be used as fill in construction areas.

- D. Fill material required for the building pads and for pavement subgrade shall be granular fill, free of organic material.
- E. Fill material required for pervious and sodded areas shall have a maximum organic component of 10%. CONTRACTOR shall provide, at his cost, organic content test results for approval by the ENGINEER.

2.05 EQUIPMENT

- A. Compactor for mass earthwork shall be minimum 3 ton static drum weight vibratory roller or 5 ton static drum weight sheeps footed compactor as appropriate for the type of soil material at the site or other compactor approved by the ENGINEER.
- B. Compactor for trenches and where access or maneuverability is limited use, a double drum walk behind roller or vibratory plate compactor or "jumping jack" tampers.

PART 3 - EXECUTION

3.01 GENERAL

- A. Prior to bidding of all work within this section, the CONTRACTOR shall become thoroughly familiar with the geotechnical engineering study, if available, as well as the site, site conditions, and all portions of the Work falling within this section.
- B. The CONTRACTOR shall refer to the erosion control drawings, if provided, for staging of earthwork operations and for erosion control measures to be implemented prior to commencement of earthwork.
- C. Locate and identify existing utilities that are to remain and protect them from damage.
- D. Notify utility companies to allow removal and/or relocation of any utilities that are in conflict with the proposed improvements.
- E. Protect fences, structures, sidewalks, paving, curbs, etc. to remain from equipment and vehicular traffic.
- F. Protect benchmarks, property corners and all other survey monuments from damage or displacement. If a marker needs to be removed/relocated it shall be referenced by a licensed land surveyor and replaced, as necessary, by the same at no additional cost to the OWNER.
- G. Remove from the site, material encountered in grading operations that, in opinion of OWNER or ENGINEER, is unsuitable or undesirable for backfilling in pavement or building areas as per Paragraph 2.01.
- H. Identify required lines, levels, contours and datum to bring site grades to the proposed subgrade conditions inferred from the drawings.
- I. Do not perform any work associated with this section prior to completion of all required inspections, tests and approvals.

- J. When performing grading operations during periods of prolonged wet or dry weather, provide adequate measures for surface drainage and ground water control, and moisture control of soils (i.e., wetting or drying, scarify and discing) so as to place and compact the soil within the moisture content range a few percentage points of its optimum water content. Any disturbed areas should be proofrolled at the end of each day.
- K. Sloping, shoring, bracing, and fencing shall be installed in accordance with Federal OSHA requirements as well as the requirements of all regulatory authorities having jurisdiction.
- L. Allow no debris to accumulate on-site. Haul debris away from the site and dispose of at no cost to the OWNER.
- M. The CONTRACTOR shall remove and dispose of all excess excavated material at a site selected by the CONTRACTOR and reviewed by the ENGINEER.

3.02 JOB CONDITIONS

- A. Protection: Use all means necessary to protect existing objects and vegetation. In the event of damage, immediately make all repairs, and replacements necessary to the acceptance of the ENGINEER at no cost to the OWNER.

3.03 BACKFILL, FILLING & GRADING

- A. Grades:
 1. Cut, backfill, fill and grade to proper grade levels indicated. The proposed grades shown on the drawings are for establishing a finished grade over the site.
- B. Filling:
 1. Fill material shall be placed in horizontal layers and spread to obtain a uniform thickness.
 2. After compaction, layers of fill are not to exceed twelve (12) inches for cohesive soils or eight (8) inches for noncohesive soils.

3.04 STRUCTURE, ROADWAY, AND EMBANKMENT EXCAVATION

- A. **General:** Except when specifically provided to the contrary, excavation shall include the removal of all materials of whatever nature encountered, including all obstructions of any nature that would interfere with the proper execution and completion of the work. The removal of said materials shall conform to the lines and grades shown or ordered. Unless otherwise provided, the entire construction site shall be stripped of all vegetation and debris, and such material shall be removed from the site prior to performing any excavation or placing any fill. The CONTRACTOR shall furnish, place, and maintain all supports and shoring that may be required for the sides of the excavations, and all pumping, ditching, or other measure for the removal or exclusion of water, including taking care of storm water, groundwater, and wastewater reaching the site of the work from any source so as to prevent damage to the work or adjoining property. Excavations shall be sloped or otherwise supported in a safe manner in accordance with applicable

State safety requirements and the requirements of OSHA Safety and Health Standards for Construction (29CFR1926).

- B. **Excavation Beneath Structures and Embankments:** Except where otherwise specified for a particular structure or ordered by the ENGINEER, excavation shall be carried to the grade of the bottom of the footing or slab. Where shown or ordered, areas beneath structures or fills shall be over-excavated. The subgrade areas beneath embankments shall be excavated to remove not less than the top 6 inches of native material and where such subgrade is sloped, the native material shall be benched. When such over excavation is shown, both over-excavation and subsequent backfill to the required grade shall be performed by the CONTRACTOR. When such over-excavation is not shown but is ordered by the ENGINEER, such over-excavation and any resulting backfill will be paid for under a separate unit price bid item if such bid item has been established; otherwise payment will be made in accordance with a negotiated price. After the required excavation or over-excavation has been completed, the exposed surface shall be scarified to a depth of 6 inches, brought to optimum moisture content, and rolled with heavy compaction equipment to obtain 98 percent of maximum density.
- C. **Excavation Beneath Paved Areas:** Excavation under areas to be paved shall extend to the bottom of the aggregate base or subbase, if such base is called for; otherwise it shall extend to the paving thickness. After the required excavation has been completed, the top 12 inches of exposed surface shall be scarified, brought to optimum moisture content, and rolled with heavy compaction equipment to obtain 98 percent of maximum density. The finished subgrade shall be even, self-draining, and in conformance with the slope of the finished pavement. Areas that could accumulate standing water shall be regraded to provide a self-draining subgrade.
- D. **Notification of ENGINEER:** The CONTRACTOR shall notify the ENGINEER at least 3 days in advance of completion of any structure excavation and shall allow the ENGINEER a review period of at least one day before the exposed foundation is scarified and compacted or is covered with backfill or with any construction materials.

3.05 PIPELINE AND UTILITY TRENCH EXCAVATION

- A. **General:** Unless otherwise shown or ordered, excavation for pipelines and utilities shall be open-cut trenches. Trench widths shall be kept as narrow as is practical for the method of pipe zone densification selected by the CONTRACTOR, but shall have a minimum width at the bottom of the trench equal to the outside diameter of the pipe plus 24 inches for mechanical compaction methods and 18 inches for water consolidation methods. The maximum width at the top of the trench shall be equal to the outside diameter of the pipe plus 36 inches for pipe diameters 18 inches and larger and to the outside diameter of the pipe plus 24 inches for pipe diameters less than 18 inches, or as shown on the Drawings.
- B. **Trench Bottom:** Except when pipe bedding is required, the bottom of the trench shall be excavated uniformly to the grade of the bottom of the pipe. The trench bottom shall be given a final trim, using a string line for establishing grade, such that each pipe section when first laid will be continually in contact with the ground along the extreme

bottom of the pipe. Rounding out the trench to form a cradle for the pipe will not be required. Excavations for pipe bells and welding shall be made as required.

- C. **Open Trench:** The maximum amount of open trench permitted in any one location shall be 300 feet, or the length necessary to accommodate the amount of pipe installed in a single day, whichever is greater. All trenches shall be fully backfilled at the end of each day or, in lieu thereof, shall be covered by heavy steel plates adequately braced and capable of supporting vehicular traffic in those locations where it is impractical to backfill at the end of each day. The above requirements for backfilling or use of steel plate will be waived in cases where the trench is located further than 100 feet from any traveled roadway or occupied structure. In such cases, however, barricades and warning lights meeting OSHA requirements shall be provided and maintained. Requirements of Section 01550, Section 1.02B shall also apply.
- D. **Trench Over-Excavation:** Where the Drawings indicate that trenches shall be over-excavated, they shall be excavated to the depth shown, and then backfilled to the grade of the bottom of the pipe.
- E. **Over-Excavation:** When ordered by the ENGINEER, whether indicated on the Drawings or not, trenches shall be over-excavated beyond the depth shown. Such over-excavation shall be to the depth ordered. The trench shall then be backfilled to the grade of the bottom of the pipe. All work specified in this Section shall be performed by the CONTRACTOR when the over-excavation ordered by the ENGINEER is less than 6 inches below the limits shown. When the over-excavation ordered by the ENGINEER is 6 inches or greater below the limits shown, additional payment will be made to the CONTRACTOR for that portion of the work which is located below said 6-inch distance. Said additional payment will be made under separate unit price bid items for over-excavation and bedding if such bid items have been established; otherwise payment will be made in accordance with a negotiated price.
- F. Where pipelines are to be installed in embankment or structure fills, the fill shall be constructed to a level at least one foot above the top of the pipe before the trench is excavated.

3.06 OVER-EXCAVATION NOT ORDERED, SPECIFIED, OR SHOWN

- A. Any over-excavation carried below the grade ordered, specified, or shown, shall be backfilled to the required grade with the specified material and compaction. Such work shall be performed by the CONTRACTOR at its own expense.

3.07 EXCAVATION IN LAWN AREAS

- A. Where excavation occurs in lawn areas, the sod shall be carefully removed, kept damp, and stockpiled to preserve it for replacement. Excavated material may be placed on the lawn; provided that a drop cloth or other suitable method is employed to protect the lawn from damage. The lawn shall not remain covered for more than 72 hours. Immediately after completion of backfilling and testing of the pipeline, the sod shall be replaced and lightly rolled in a manner so as to restore the lawn as near as possible to its original condition. CONTRACTOR shall provide new sod if stockpiled sod has not been replaced within 72 hours.

3.08 EXCAVATION IN VICINITY OF TREES

- A. Except where trees are shown to be removed, trees shall be protected from injury during construction operations. No tree roots over 2 inches in diameter shall be cut without express permission of the ENGINEER. Trees shall be supported during excavation by any means previously reviewed and approved by the ENGINEER.

3.09 ROCK EXCAVATION

- A. Rock is defined as follows:
 - 1. Rock shall be classified as material having a blow count in excess of 30 blows per foot from a Standard Penetration Test (ASTM D-1586) and exceeding 1000 psi from an Unconfined Compression Strength Test (ASTM D-2938); and,
 - 2. General Excavation - Any material that cannot be excavated with a single-toothed ripper drawn by a crawler tractor having a minimum draw bar pull rated at not less than 71,000 lbs. (Caterpillar D9N or equivalent), and occupying an original volume of at least 2 cubic yards or more; and,
 - 3. Trench Excavation - Any material that cannot be excavated with a backhoe having a break out force rated at not less than 44,000 lbs. (Caterpillar 235D or equivalent), and occupying an original volume of at least 2 cubic yards.
- B. Rock excavation shall include removal and disposal of the following: (1) all boulders measuring 1/3 of a cubic yard or more in volume; (2) all rock material in ledges, bedding deposits, and unstratified masses which cannot be removed without systematic drilling and blasting; (3) concrete or masonry structures which have been abandoned; and (4) conglomerate deposits which are so firmly cemented that they possess the characteristics of rock as described in Paragraph 3.09(A).
- C. Said rock excavation shall be performed by the CONTRACTOR; provided, that should the quantity of rock excavation be affected by any change in the scope of the work, an appropriate adjustment of the contract price will be made under a separate bid item if such bid item has been established; otherwise payment will be made in accordance with a negotiated price.
- D. Explosives and Blasting: Blasting will not be permitted, except by express permission of the ENGINEER on a case-by-case basis. The use of explosives will be subject to the approval and regulations of all agencies having jurisdiction. If blasting is utilized at the site of the WORK, the CONTRACTOR shall take all precautions and provide all protective measures necessary to prevent damage to property and structures or injury to person. Prior to blasting, the CONTRACTOR shall secure all permits required by law for blasting operations and shall provide any additional hazard insurance required by the OWNER. The CONTRACTOR shall have a fully qualified and experienced blasting foreman in charge of all blasting operations.
- E. The CONTRACTOR will be held responsible for all and shall make good any damage caused by blasting or resulting from its possession or use of explosives on the WORK.

- F. All operations involving the handling, storage, and use of explosives shall be conducted in accordance with the requirements of the OSHA Standards for Construction, and in accordance with all local laws and regulations.

3.10 DISPOSAL OF UNSUITABLE EXCAVATED MATERIAL

- A. The CONTRACTOR shall remove and dispose of all unsuitable excavated material. This shall include muck, tree roots, rocks, garbage, debris, or any other material designated as unsuitable by Paragraph 2 of this Section. Disposal shall be at a site selected by the CONTRACTOR that is designated as an approved disposal site for the unsuitable material.

3.11 BACKFILL - GENERAL

- A. Backfill shall not be dropped directly upon any structure or pipe. Backfill shall not be placed around or upon any structure until the concrete has attained sufficient strength to withstand the loads imposed. Backfill around water retaining structures shall not be placed until the structures have been tested, and the structures shall be full of water while backfill is being placed.
- B. Except for drainrock materials being placed in over-excavated areas or trenches, backfill shall be placed after all water is removed from the excavation.

3.12 PLACING AND SPREADING OF BACKFILL MATERIALS

- A. Backfill materials shall be placed and spread evenly in layers. When compaction is achieved using mechanical equipment the layers shall be evenly spread so that when compacted each layer shall not exceed 6 inches in thickness.
- B. During spreading each layer shall be thoroughly mixed as necessary to promote uniformity of material in each layer. Pipe zone backfill materials shall be manually spread, tamped, and haunched around the pipe so that when compacted the pipe zone backfill will provide uniform bearing and side support.
- C. Where the backfill material moisture content is below the optimum moisture content water shall be added before or during spreading until the proper moisture content is achieved.
- D. Where the backfill material moisture content is too high to permit the specified degree of compaction the material shall be dried until the moisture content is satisfactory.

3.13 COMPACTION - GENERAL

- A. Compact each layer of fill in designated areas with approved equipment to achieve a maximum density at optimum moisture, AASHTO T 180 - latest edition.
 - 1. Building Pads: compaction shall be to 98% of maximum density, unless otherwise shown on the drawings or specifications. Building pads shall be within plus or minus one-tenth (0.1) of a foot of the elevations shown on the plans.

2. Refer to Sections 02741 Asphaltic Concrete Paving and 02751 Portland Cement Concrete Paving for compaction requirements in the affected areas.
 3. Under landscaped area, compaction shall be to 85% of maximum density, unless otherwise shown on the drawings.
- B. No backfill shall be placed against any masonry or other exposed building surface until permission has been given by the ENGINEER and in no case until the masonry has been in place seven days.
 - C. Heavy construction equipment will not be permitted within ten (10) feet of any masonry or other exposed building surface.
 - D. Compaction in limited areas shall be obtained by the use of mechanical tampers or approved hand tampers. When hand tampers are used, the materials shall be deposited in layers not more than four inches thick. The hand tampers used shall be suitable for this purpose and shall have a face area of not more than 100 square inches. Special precautions shall be taken to prevent any wedging action against masonry, or other exposed building surfaces.

3.14 COMPACTION OF FILL, BACKFILL, AND EMBANKMENT MATERIALS

- A. Each layer of Types 1, 2, 3, 7, 8, and 14 backfill materials as defined herein, where the material is graded such that at least 10% passes a No. 4 sieve, shall be mechanically compacted to the specified percentage of maximum density. Equipment that is consistently capable of achieving the required degree of compaction shall be used and each layer shall be compacted over its entire area while the material is at the required moisture content.
- B. Each layer of Type 4, 5, 6, and 13 backfill materials shall be compacted by means of at least 2 passes from a flat plate vibratory compactor. When such materials are used for pipe zone backfill, vibratory compaction shall be used at the top of the pipe zone or at vertical intervals of 24 inches, whichever is the least distance from the subgrade.
- C. Type 9 and 10 material requires mechanical spreading and placement to fill voids but does not require mechanical compaction or vibration. Tamping shall be used in pipe zone areas.
- D. Fill on structure roof slabs shall be deposited at least 30 days after the concrete roof slab has been placed. Equipment weighing more than 10,000 pounds when loaded shall not be used on a roof. A roller weighing not more than 8,000 pounds shall be used to compact fill on a roof.
- E. Flooding, ponding, or jetting shall not be used for fill on roofs, backfill around structures, backfill around reservoir walls, for final backfill materials, or aggregate base materials.
- F. Pipe zone backfill materials that are granular may be compacted by a combination of flooding and vibration using concrete vibrators or by jetting, when acceptable to the ENGINEER. Tamping shall be used to ensure adequate bedding in the pipe zone.

- G. Pipeline trench zone backfill materials, containing 5% or less of material passing a No. 200 sieve, may be compacted using flooding and jetting or vibration if the CONTRACTOR uses effective procedures that yield the specified compaction test results. Flooding and jetting shall not be done in such a manner that the pipe or nearby utilities are damaged, in areas of poorly draining or expansive soils, or where the use of the procedure is prohibited by any agency having jurisdiction over the street or right-of-way. Approved jet pipes or immersible vibrators shall be used so that each backfill layer is saturated and consolidated to its full depth before the next layer is placed. Jet pipes shall be kept at least 6 inches away from the pipe where the backfills being consolidated and 2 feet away from other pipes or utilities.
- H. Equipment weighing more than 10,000 pounds shall not be used closer to walls than a horizontal distance equal to the fill at that time. Hand operated power compaction equipment shall be used where use of heavier equipment is impractical or restricted due to weight limitations.
- I. Compaction Requirements: The following compaction test requirements shall be in accordance with AASHTO T-180, T-99-C or ASTM D 2487 as applicable. Where agency or utility company requirements govern, the highest compaction standards shall apply.

<u>Location or Use of Fill</u>	<u>Percentage of Maximum Density AASHTO T-180</u>	<u>Testing Frequency 1 per lift per</u>
Pipe zone backfill portion above bedding for flexible pipe.	100	150 lf
Pipe zone backfill bedding and over-excavated zones under bedding/pipe for flexible pipe, including trench plugs.	100	150 lf
Pipe zone backfill portion above bedding for rigid pipe.	100	150 lf
Pipe zone backfill bedding and over-excavated zones under bedding/pipe for rigid pipe.	100	150 lf
Final backfill, beneath paved areas or structures.	100	10,000 sf
Final backfill, not beneath paved areas or structures.	95	20,000 sf
Trench zone backfill, not beneath paved areas or structures, including trench plugs.	95	150 lf
Embankments.	98	20,000 sf

<u>Location or Use of Fill</u>	<u>Percentage of Maximum Density AASHTO T-180</u>	<u>Testing Frequency 1 per lift per</u>
Embankments, beneath paved areas or structures.	100	10,000 sf
Backfill beneath structures, hydraulic structures.	100	100 sf
Backfill around structures.	98	100 sf
Topsoil (type 14 material)	85	20,000 sf
Aggregate base or subbase (type 11 or 12 material)	100	10,000 sf

- J. Trench Backfill Requirements: the pipe has been structurally designed based upon the trench configuration specified herein.
- K. The CONTRACTOR shall maintain the indicated trench cross section up to a horizontal plane lying 6 inches above the top of the pipe.
- L. If, at any location under said horizontal plane, the CONTRACTOR slopes the trench walls or exceeds the maximum trench widths indicated in the Contract Documents, the pipe zone backfill shall be "improved" or the pipe class increased as specified herein, at no additional cost to the OWNER. "Improved" backfill shall mean sand-cement backfill or other equivalent materials acceptable to the ENGINEER.
- M. If the allowable deflection specified for the pipe is exceeded, the CONTRACTOR shall expose and reround or replace the pipe, repair all damaged lining and coating, and reinstall the pipe zone material and trench backfill as specified at no additional expense to the OWNER.

3.15 PIPE AND UTILITY TRENCH BACKFILL

- A. Pipe zone Backfill: The pipe zone is defined as that portion of the vertical trench cross-section lying between a plane 6 inches below the bottom surface of the pipe, i.e., the trench subgrade, and a plane at a point 6 inches above the top surface of the pipe. The bedding for flexible pipe is defined as that portion of pipe zone backfill material between the trench subgrade and the bottom of the pipe. The bedding for rigid pipe is defined as that portion of the pipe zone backfill material between the trench subgrade and a level line which varies from the bottom of the pipe to the springline as shown.
- B. Bedding shall be provided for all sewers, drainage pipelines, and other gravity flow pipelines. Unless otherwise specified or shown, for other pipelines the bedding may be omitted if all the following conditions exist.
 - 1. The pipe bears on firm, undisturbed native soil which contains only particles that will pass a one-inch sieve.

2. The excavation is not through rock or stones.
 3. The trench subgrade soils are classified as suitable fill and backfill materials per Paragraph 2.01.
 4. The trench subgrade soils have, as a maximum, a moisture content that allows compaction.
- C. Where bedding is required, after compacting the bedding the CONTRACTOR shall perform a final trim using a stringline for establishing grade, such that each pipe section when first laid will be continually in contact with the bedding along the extreme bottom of the pipe. Excavation for pipe bells and welding shall be made as required.
- D. The pipe zone shall be backfilled with the specified backfill material. The pipe zone shall be well tamped per manufacturer's recommendation to prevent sags or settlement of the pipe. The CONTRACTOR shall exercise care to prevent damage to the pipeline coating, cathodic bonds, or the pipe itself during the installation and backfill operations.
- E. Trench Zone Backfill: After the pipe zone backfill has been placed as specified above, and after all excess water has completely drained from the trench, backfilling of the trench zone may proceed. The trench zone is defined as that portion of the vertical trench cross-section lying between a plane 6 inches above the top surface of the pipe and a plane at a point 18 inches below the finished surface grade, or if the trench is under pavement, 18 inches below the roadway subgrade. If flooding, ponding, or jetting is used the pipe shall be filled with water to prevent flotation.
- F. Final Backfill: Final backfill is all backfill in the trench cross-sectional area within 18 inches of finished grade, or if the trench is under pavement, all backfill within 18 inches of the roadway subgrade.

3.16 EMBANKMENT CONSTRUCTION

- A. The area where an embankment is to be constructed shall be cleared of all vegetation, roots and foreign material. Following this, the surface shall be moistened, scarified to a depth of 6 inches, and rolled or otherwise mechanically compacted. Embankment fill material shall be placed and spread evenly in approximately horizontal layers. Each layer shall be moistened or aerated, as necessary. Unless otherwise approved by the ENGINEER, each layer shall not exceed 6 inches of compacted thickness. The embankment fill and the scarified layer of underlying ground shall be compacted to 95% of maximum density under structures and paved areas, and 90% of maximum density elsewhere.
- B. When an embankment fill is to be made and compacted against hillsides or fill slopes steeper than 4:1, the slopes of hillsides or fills shall be horizontally benched to key the embankment fill to the underlying ground. A minimum of 12 inches normal to the slope of the hillside or fill shall be removed and recompacted as the embankment fill is brought up in layers. Material thus cut shall be recompacted along with the new fill material at the CONTRACTOR's expense. Hillside of fill slopes 4:1 or flatter shall be prepared in accordance with Paragraph A, above.

- C. Where embankment or structure fills are constructed over pipelines, the first 4 feet of fill over the pipe shall be constructed using light placement and compaction equipment that does not damage the pipe. Heavy construction equipment shall maintain a minimum distance from the edge of the trench equal to the depth of the trench until at least 4 feet of fill over the pipe has been completed.

3.17 COMPACTION OF SUBGRADE SURFACES

- A. Any soft areas exhibiting excessive weaving or unsatisfactory material identified during excavation, fill placement, compaction and proof testing shall be removed, replaced with suitable fill, and compacted as specified.
- B. Prior to preparing the subgrade in low lying areas, perform the following procedures:
 - 1. Drain standing water by gravity or with a pump. Water should not be discharged directly to a storm drain system;
 - 2. After drainage of low area is complete, remove mulch, mud, debris, and other unsuitable material using equipment and methods that will minimize disturbance to the underlying soils;
 - 3. Thoroughly compact subgrade as specified.
 - 4. If proposed for fill, all muck, mud and other materials removed from above low areas shall be dried on-site by spreading in thin layers for observation by OWNER or owner's representative. If, after observation by OWNER material is found to be unsuitable, it shall be removed from the site.

3.18 UNDERCUT EXCAVATION

- A. When approved by OWNER and recommended by the ENGINEER, the CONTRACTOR may be required to remove natural soil materials in areas where fills are to be placed when determined to be undesirable in their location or condition. The CONTRACTOR shall be required to remove the undesirable material and backfill with approved material properly compacted.
- B. At locations where unstable soil is shown on the drawings or identified within the geotechnical engineering study, the removal and replacement of such soil shall be as directed on the drawings or as directed by the ENGINEER and the OWNER.
- C. At locations where soil is wet of optimum moisture, the CONTRACTOR shall provide a "good faith" effort in drying and discing these areas prior to completing undercut excavation as approved by the ENGINEER and OWNER.
- D. Where undercutting is required adjacent or beneath the location of the proposed drainage structure, undercut and backfill shall be done over a sufficient distance adjacent to the installation to prevent future operations from disturbing the completed drainage structure.
- E. All material removed in the work of undercut excavation will be classified by the geotechnical engineer and OWNER as either suitable for other use without excessive

manipulation and utilized by the CONTRACTOR elsewhere in the work, or unsuitable for future use and disposed of by the CONTRACTOR as directed by the ENGINEER.

- F. The CONTRACTOR shall conduct undercut operations in such a way that the necessary measurements can be taken before any backfill is placed.
- G. Backfill in undercut areas shall be placed as a continuous operation along with the undercutting operation. No backfill material shall be placed in water unless otherwise permitted by the ENGINEER.

3.19 EXCAVATION, FILL, AND SUBGRADE PREPARATION

A. General

1. The building limits shall be as identified on the construction drawings. The building subgrade shall be constructed to include a minimum of 10 feet beyond the building limits, or as directed by the OWNER;
2. Structures include buildings, footings, foundations, retaining walls, embankment berms for storm water detention basins, slabs, tanks, curbs, mechanical and electrical appurtenances or other man-made stationary features constructed above or below the ground surface;
3. The building pad subgrade shall be prepared in strict accordance with the geotechnical engineering study and these specifications, whichever is more stringent; and,
4. The CONTRACTOR shall cut or fill to the proposed subgrade elevations based on finished grades and the pavement thicknesses as shown on the drawings. Subgrade elevations shall be constructed to within 0 to minus ½ inch of the proposed grades specified.

B. Excavation

1. Where existing grades are above proposed subgrade elevation, excavate materials in the building areas to line and grade as shown in the drawings being careful not to over excavate beyond the elevations needed for building subgrades;
2. Excavate organic soils from within the building area. Excavated on-site organic soils, which are unsuitable for building fill, may be used in landscaped areas. Otherwise this material shall be disposed of off-site;
3. Unsuitable material, such as wood and any other deleterious materials determined to be unsuitable by the geotechnical engineer for use as on-site fill, shall be disposed of off site.

C. Subgrade Preparation for Fill

1. Existing grades below building areas shall be leveled prior to fill placement. The CONTRACTOR shall remove existing lawn and top soil in these areas prior to placement of any fill; and,
2. All existing grades below building areas shall be proofrolled and compacted per this section.

D. Fill Placement

1. No fill material shall be placed in areas of standing water, in areas of frozen or thawing ground, or in areas that have not been approved by the ENGINEER;
2. No fill materials shall be placed during unfavorable weather conditions. When work is interrupted by heavy rains, fill operations shall not be resumed until all saturated surficial soils are returned to satisfactory moisture content as determined by the ENGINEER;
3. Fill lift surfaces shall be made smooth and free from ruts or indentations at the end of any workday when precipitation is forecast to prevent saturation of surficial fill material. Fill surfaces shall be graded to drain and sealed with a smooth drum roller at the completion of each work day;
4. The fill shall be placed in uniform loose lifts not exceeding 12 inches and compacted in systemic method to achieve at least 6 passes of the compactor. Larger lift thickness, but no greater than 2 feet shall be permitted if broken rock is utilized and placed at least 6 feet below of finished grade;
6. Shot rock may be utilized as engineered fill as approved by the ENGINEER;
7. Each lift shall be compacted to the minimum densities listed in this section as appropriate for the project and as specified in the geotechnical engineering study;
8. The CONTRACTOR shall adjust the water content by aeration or adding water to achieve the required density. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to achieve proper compaction and facilitate the construction schedule;
9. Wet, saturated material shall be air dried as necessary to achieve the field densities specified in this Section. Removal and replacement shall not occur without prior approval or OWNER. Removal and replacement shall be used if necessary to facilitate the construction schedule;
10. Remove areas of finished subgrade found to have insufficient compaction density of depth necessary and replace with suitable compacted fill as approved by the OWNER or ENGINEER. Surface of subgrade after compaction shall be hard, uniform, smooth, stable, and true to grade and cross-section; and,
11. Fill placed on slopes greater than 1 vertical to 3 horizontal shall have each lift benched onto the slope at least 3 feet.

3.20 PROOFROLLING

- A. The work covered by this subsection consists of furnishing and operating, proofrolling equipment at the direction of the ENGINEER.
- B. Proofrolling shall be under the observation of the geotechnical engineer as described herein and under the following schedule:
 - 1. Immediately following the completion of excavation to proposed subgrades in cut areas, proofrolling shall be performed as specified; and,
 - 2. Immediately **prior to and following** stone base course placement, in pavement and building pad areas for final floor slab preparation, all subgrade and stone base areas shall be proofrolled. Any areas which deflect, rut or pump under the loaded dump truck shall be undercut and replaced with compacted fill material or stone base course as directed by the ENGINEER and approved by the OWNER, at no additional cost to the OWNER.
- C. Proofrolling shall be done with 1 pass of a fully loaded tandem dump truck equal to or exceeding 50,000 lbs or other construction equipment if approved by the ENGINEER.
- D. Construction methods shall be as follows:
 - 1. After the subgrade or stone base course has been completed the subgrade or stone base course shall then be proofrolled. The coverage areas and methods will be identified by the ENGINEER;
 - 2. The equipment shall be operated at a speed that the ENGINEER can comfortably and slowly walk along side the equipment;
 - 3. If it becomes necessary to take corrective action, such as but not limited to underdrain installation, undercut and backfill of an unsuitable material, and aeration of excessively wet material in areas that have been proofrolled, see Paragraph 3.18. These areas shall be proofrolled again following the completion of the necessary corrections. If the corrections are necessary due to the negligence of the CONTRACTOR, the corrective work and additional proofrolling shall be performed by the CONTRACTOR at no cost to the OWNER;
 - 4. The CONTRACTOR shall protect all structural facilities on the project, such as but not limited to box culverts, pipe culverts, and utilities, from damage by the proofrolling equipment.

3.21 MAINTENANCE OF SUBGRADE

- A. Finished subgrades shall be verified by the CONTRACTOR to ensure proper elevation and conditions for construction above subgrade.
- B. Protect subgrade from excessive construction traffic and wheel loading including concrete and dump trucks.

- C. Remove areas of finished subgrade judged to be unsatisfactory to the depth necessary and replace in a manner that will comply with compaction requirements by use of material equal to or better than the best subgrade material on site. Surface of subgrade after compaction shall be hard, uniform, smooth, stable, and true to grade and cross-section.

3.22 CORRECTION OF GRADE

- A. Bring to required grade levels areas where settlement, erosion or other grade changes occur.

3.23 MAINTENANCE AND PROTECTION OF WORK

- A. While construction is in progress adequate drainage for the roadbed shall be maintained at all times.
- B. The CONTRACTOR shall maintain all earthwork construction throughout the life of the contract, unless otherwise provided, and shall take all reasonable precautions to prevent loss of material from the roadway due to the action of wind or water. He shall repair at his expense, except as otherwise provided herein, any slides, washouts, settlement, subsidence, or other mishap which may occur prior to final acceptance of the work.
- C. All channels excavated as a part of the contract work shall be maintained against natural shoaling or other encroachments to the lines, grades, and cross sections shown on the plans, until final acceptance of the project.

3.24 AS-BUILT SURVEY

- A. At the completion of the work and prior to final inspection of the area, the CONTRACTOR shall provide the ENGINEER with an as-built topographic survey made by a registered Professional Surveyor & Mapper, of the State of Florida.
- B. The Professional Surveyor & Mapper is to certify on the survey whether or not the as-built conditions conform to the elevations shown on the Drawings to within plus or minus one-tenth (.1) of a foot.

3.25 MEASUREMENT AND PAYMENT

- A. There shall be no special measurement or payment for the work under this section, it shall be included in the associated bid item for this work.

END OF SECTION 02200

SECTION 02201

SUBSURFACE INVESTIGATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All applicable provisions of the Bidding and Contract Requirements and Division 1 - General Requirements shall govern the work under this section.

1.02 WORK INCLUDED

- A. Provide all labor, materials, necessary equipment and services to complete the subsurface investigation work, as required for the satisfactory completion of the WORK.
- B. The subsurface investigation for conditions of the project site is the sole responsibility of the CONTRACTOR. In preparing the Bid, the CONTRACTOR shall make all subsurface or surface investigations necessary to provide proper background and knowledge to determine the nature and extent of work required.

1.03 RELATED WORK

- A. Section 02100 - Clearing and Grubbing.
- B. Section 02200 - Earthwork.

1.04 MEASUREMENT AND PAYMENT

- A. There shall be no special measurement or payment for the work under this section, it shall be included in the lump sum price for bid item - Mobilization.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 02201

SECTION 02210

SITE GRADING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. The CONTRACTOR shall perform grading work within the limits, elevations and grades indicated on the Drawings and as specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Excavation and Backfill for Compaction
- B. Finish Grading
- C. Asphaltic Concrete Pavement

1.03 QUALITY CONTROL

- A. The site shall be graded to the required elevations. Existing elevations are shown on the Drawings and the finished surfaces shall be uniformly sloped between these locations and the required finished grade.
- B. Suitable excavated material shall be used in the formation of embankments as shown on the Drawings. The CONTRACTOR shall provide all additional fill material required to complete the embankments.

PART 2 - PRODUCTS

2.01 FILL

- A. Fill used for site grading shall be noncohesive, nonplastic, granular mixture of local sand and limerock, shall be free from vegetation, organic material or muck and shall contain no more than 8 percent material by weight which passes the No. 200 sieve. Broken concrete shall not be used in the fill. Fill material containing limerock shall have sufficient sand to fill the voids in the limerock, and no individual rocks or pieces of hard material that will not pass a 6-inch diameter ring shall be used in the fill; except that the upper 4-inches of all backfill or fills shall not contain any rock or hard material that will not pass a 3-inch diameter ring. All fill material shall be provided by the CONTRACTOR from any excess suitable on-site material or from off site sources, all subject to review and acceptance by the ENGINEER prior to use. The CONTRACTOR shall be responsible for determining the volume of material required for the site.

PART 3 – EXECUTION

3.01 GRADING AND COMPACTION

- A. Fill material shall be placed in lifts not to exceed 8-inches and compacted to a density of not less than 95 percent of maximum density at optimum moisture as determined by

ASTM D 1557. Fill material shall be within plus or minus 2 percentage points of optimum moisture content.

3.02 FINE GRADING

- A. After structures, bases and pavements are completed and the piping trenches backfilled, the disturbed areas of the site shall be fine graded. All construction debris, regardless of size, shall be removed. The completed surface shall be shaped to have a minimum 2% cross slope on roadways and minimum 4" depth of swales from edge of pavement. The completed surface shall be within 0.1 foot of the existing elevations shown on the Drawings, unless otherwise accepted by the ENGINEER. Minor adjustments to line and grade may be required as the work progresses in order to satisfy field conditions.

- END OF SECTION -

SECTION 02220

EXCAVATION, BACKFILL AND COMPACTION

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. The work included under this section consists of excavating, grading, backfilling and compacting as required for the construction of the canal bank restoration and all other structures included in the contract herein. The work shall comply with the applicable sections of the latest FDOT Standard Specifications for Road and Bridge Construction.
- B. Excavation shall include the removal of all material of whatever nature encountered, including all obstructions of any nature that would interfere with the proper execution and completion of the work. The removal of said material shall conform to the lines and grades indicated.
- C. When excavations are to be made in paved surfaces, the pavement shall be saw-cut ahead of the excavation by means of suitable sharp tools to provide a uniform sharp edge, with minimum disturbance of remaining material.

1.02 PROTECTION:

- A. Excavations
 - 1. Notify ENGINEER of unexpected subsurface conditions and discontinue work in affected area until notification to resume work.
 - 2. Provide and maintain adequate barricades and warning lights to protect open trenches.
 - 3. All trenches shall be fully backfilled at the end of each day.
- B. Existing Utilities:
 - 1. Those existing utilities that are to be retained shall be protected, and if damaged, shall be repaired by the CONTRACTOR at no additional cost to the OWNER.
 - 2. The CONTRACTOR shall notify CALL SUNSHINE at their toll free number 1-800-432-4770 and/or each utility individually, forty-eight (48) hours prior to any excavation.
- C. Contractor shall exercise care during excavation in areas of environmental sensitivity and advise the project engineer if any hazardous material is encountered.

PART 2 - PRODUCTS

2.01 MATERIAL:

- A. Material shall comply with the latest FDOT specifications for Road and Bridge Construction, the Drawings and other Contract Documents.

- B. Material used for backfill shall be select granular material, free from grass, roots, brush or other vegetation, rubbish, clay, marl, lumps of broken paving or boulders having maximum dimension larger than six (6") inches. Unsuitable material shall be removed from the site at the CONTRACTOR'S expense away from the project.
- C. Material coming within one foot (1'-0") of any structure or pipe shall be free of rocks or unbroken masses of earthy material having maximum dimension larger than two inches (2").
- D. If, in the ENGINEER'S opinion, material is unsuitable for backfill purposes, imported material having sand equivalent value of no less than twenty percent (20%) shall be used for this portion of the trench backfill. Imported sand backfill, when ordered by the ENGINEER, will be paid for under a separate unit bid item if such bid item has been established, otherwise payment will be made in accordance with a negotiated price.
- E. Suitable For Fills: Material classified as A-1, A-3, or A-2-4 under AASHTO M 145, free from vegetation and organic material, and with not more than 10 percent by weight passing the No. 200 sieve.
- F. Unsuitable for Fills: Materials classified as A-2-5, A-2-6, A-2-7, A-4, A-5, A-6, A-7 and A-8 under AASHTO M 145.
- G. Select Material: Suitable material containing no pieces or rock fragments larger than will pass a 3-inch diameter ring.

PART 3 - EXECUTION

3.01 EXCAVATION:

- A. Work shall comply with Section 120 of the FDOT Standard Specifications for Road and Bridge Construction.
- B. Trench and Excavation:
 - 1. Work shall comply with the latest FDOT Standard Specifications for Road and Bridge Construction.
 - 2. The maximum amount of open trench permitted in any one (1) location shall be fifty feet (50').
 - 3. All trenches shall be fully backfilled at the end of each day or, in lieu thereof, when approved by the ENGINEER, heavy steel plate adequately braced and capable of supporting vehicular traffic may be used in certain locations where it is impractical to backfill at the end of each day.
- C. Over-Excavation when Ordered:
 - 1. Trenches shall be over-excavated beyond the depth shown, when ordered by the ENGINEER. Such over-excavation shall be to the depth ordered.

2. The trench shall be refilled to the grade of the bottom of the pipe with either selected granular material obtained from the excavation, sand or crushed rock, at the option of the ENGINEER. When crushed rock bedding is ordered, the material shall be a well-graded material with maximum particle size of three-quarters of an inch (3/4").
3. Bedding material shall be placed in layers, brought to optimum moisture content, and compacted to ninety-five percent (95%) of maximum density.
4. Payment for over-excavation shall be paid for either on a negotiated price basis, or as the ENGINEER may determine in accordance with Section 10.4 of the General Conditions.

D. Over Excavation Not Ordered, Specified or Shown:

1. Any over-excavation carried below the grade ordered, specified or shown, shall be refilled to the required grade with suitable selected granular material.
2. Refilled material shall be moistened as required and compacted to ninety-five percent (95%) of maximum density.
3. Work required due to over excavation when not ordered shall be performed by the CONTRACTOR at his own expense.

E. Disposal of Excess Excavated Material:

1. The CONTRACTOR shall remove and dispose of all excess excavated material at his own expense.
2. All excess suitable material that cannot be used as fill on the site(s), is to remain property of the OWNER and shall be removed by the CONTRACTOR to a disposal site(s) as approved by ENGINEER.
3. All materials suitable for use as backfill shall be hauled to and used in areas where not enough suitable material is available from the excavation.
4. Unsuitable material such as trees, shrubs, etc. shall be the CONTRACTORS responsibility to load, haul and provide a disposal site.

3.03 BACKFILLING

- A. Work shall comply with Section 125-8 of the FDOT Specifications for Road and Bridge Construction, the drawings and all other contract documents.
- B. Backfill shall not be dropped directly upon any structure or pipe.
- C. Backfill shall not be placed around or upon any structure until the concrete has attained sufficient strength to withstand the loads imposed.
- D. Backfill around and beneath structures, and beneath paved areas:

1. Except where otherwise specified for a particular structure or ordered by the ENGINEER, backfill placed around and beneath structures, and beneath paved areas, shall be placed in horizontal layers not to exceed eight inches (8") in thickness, as measured before compaction.
2. The backfill shall be brought up evenly with each layer moistened and compacted by mechanical means to ninety-five percent (95%) of maximum density.

E. Pipe Trench Backfill:

1. Bedding, if required, shall be placed to the springline of the pipe and compacted before placing additional backfill on top of the pipe.
2. Pipe trenches shall then be backfilled to a level twelve inches (12") above the top of the pipe with select sandy material obtained from the excavation, free of any rocks or stones larger than two inches (2") in diameter, placed in six (6") layers, and thoroughly tamped.
3. After the backfill has been placed to a level of twelve inches (12") over the pipe, backfilling shall proceed by placing the backfill material in six inch (6") layers and thoroughly compacting by mechanical vibrations.
4. Each layer shall be moistened, tamped, rolled or compacted to ninety five percent (95%) of maximum density.

3.04 COMPACTION TESTING:

- A. Compaction testing specified herein are expressed as a percentage of maximum density. Maximum density shall be determined by AASHTO T-180, Method D.
- B. The CONTRACTOR shall retain an independent test laboratory approved by the ENGINEER to perform density and/or other soil tests.
- C. Laboratory and field density tests, which, in the opinion of the ENGINEER, are necessary to establish compliance with the compaction requirements of these specifications, shall be conducted by an independent test laboratory retained per sub section B above. CONTRACTOR shall give notice to the ENGINEER 24 hours in advance of required density tests.
- D. Any additional tests beyond the Contract Requirements ordered by the OWNER/ENGINEER which fail to meet minimum compaction requirements shall be paid by the CONTRACTOR. All tests shall be performed in the presence of the ENGINEER or his representative.
- E. Backfill/Embankments which does not comply with the specified densities, as indicated by such tests, shall be reworked and recompacted until the required compaction is secured, at no additional cost to the OWNER.

- END OF SECTION -

SECTION 02222

EXCAVATION AND BACKFILL FOR UTILITIES

PART 1 - GENERAL

1.01 THE REQUIREMENT

- A. Excavate, grade and backfill as required for underground piping systems and appurtenances as shown on the Drawings and specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Sodding
- B. Division 3 - Concrete

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Codes: All codes, as referenced herein, are specified in Section 01090, "Applicable Standards and Codes".

B. Commercial Standards:

ASTM D 422	Method for Particle-Size Analysis of Soils.
ASTM D 698	Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-lb (2.49-kg) Rammer and 12-in (304.8-mm) Drop.
ASTM D 1556	Test Method for Density of Soil in Place by the Sand-Cone Method.
ASTM D 1557	Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.54-kg) Rammer and 18-in (457-mm) Drop.
ASTM D 2419	Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
ASTM D 2922	Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

1.04 SUBMITTALS

- A. General: Submit information and samples to the ENGINEER for review as specified herein in accordance with Section 01300, "Submittals".
- B. Dewatering: The CONTRACTOR shall submit to the ENGINEER its proposed methods of handling trench water and the locations at which the water will be disposed of. Methods shall be acceptable to the ENGINEER before starting the excavation.

- C. Bedding and Backfill Materials: The CONTRACTOR shall notify the ENGINEER of the off-site sources of bedding and backfill materials, and submit to the ENGINEER a representative sample weighing approximately 50 lbs. The sample shall be delivered to a location on site determined by the ENGINEER.
- D. Sheeting System: Drawings of the sheeting system and design computations shall be submitted to the ENGINEER; however, the review of these drawings shall in no way relieve the CONTRACTOR of the responsibility to provide a safe and satisfactory sheeting and shoring system. Sheeting and shoring shall be designed by the CONTRACTOR, and the proposed design shall be sealed by a Professional ENGINEER registered in the State of Florida. If the ENGINEER is of the opinion that at any point sufficient or proper supports have not been provided, it may order additional supports put in at the CONTRACTOR's expense.
- E. Dewatering Permits: If the quantity or nature of water withdrawn requires approval/permits from regulatory agencies, the CONTRACTOR shall procure such permits at its expense and submit copies to the ENGINEER before commencing the work. The CONTRACTOR will not be granted contract time extensions due to dewatering permit processing delays.

1.05 QUALITY CONTROL

- A. An independent testing laboratory will be retained by the OWNER to do appropriate testing as described in Section 01400, "Testing and Inspection". The CONTRACTOR shall schedule its work so as to permit a reasonable time for testing before placing succeeding lifts and shall keep the laboratory informed of his progress. A minimum of 48 hours of notice shall be provided to the testing laboratory to mobilize its activities.

1.06 SUBSURFACE INFORMATION

- A. The CONTRACTOR shall be responsible for anticipating groundwater conditions and shall provide positive control measures as required. Such measures shall ensure stability of excavations, groundwater pressure control, prevention of tanks, pipes, and other structures from being lifted by hydrostatic pressures, and avoiding the disturbance of subgrade bearing materials.

1.07 TRENCH SAFETY ACT COMPLIANCE

- A. The CONTRACTOR by signing and executing the contract is, in writing, assuring that it will perform any trench excavation in accordance with the Florida Trench Safety Act, Section 553.60 et. seq. The CONTRACTOR has further identified the separate item(s) of cost of compliance with the applicable trench safety standards as well as the method of compliance as noted in the "Bid Forms" Section of the Contract front-end documents.
- B. The CONTRACTOR acknowledges that this cost is included in the applicable items of the Proposal and Contract and in the Grand Total Bid and Contract Price.
- C. The CONTRACTOR is, and the OWNER and ENGINEER are not, responsible to review or assess the CONTRACTOR's safety precautions, programs or costs, or the means, methods, techniques or technique adequacy, reasonableness of cost, sequences or procedures of any safety precaution, program or cost, including but not limited to,

compliance with any and all requirements of Florida Statute Section 553.60 et. seq. cited as the "Trench Safety Act". The CONTRACTOR is, and the OWNER and ENGINEER are not, responsible to determine if any safety or safety related standards apply to the project, including but not limited to, the "Trench Safety Act".

1.08 PROTECTION OF PROPERTY AND STRUCTURES

- A. The CONTRACTOR shall, at its own expense, sustain in place and protect from direct or indirect injury, all pipes, poles, conduits, walls, buildings, and all other structures, utilities, and property in the vicinity of its Work. Such sustaining shall be done by the CONTRACTOR. The CONTRACTOR shall take all risks attending the presence or proximity of pipes, poles, conduits, walls, buildings, and all other structures, utilities, and its Work. It shall be responsible for all damage, and assume all expenses, for direct or indirect injury and damage, caused by its Work, to any such pipe, structures, etc., or to any person or property, by reason of injury to them, whether or not such structures, etc., are shown on the Drawings.
- B. Barriers shall be placed at each end of all excavations and at such places as may be necessary along excavations to warn all pedestrian and vehicular traffic of such excavations. Barricades with flashing lights shall also be placed along excavation from sunset each day to sunrise of the next day until such excavation is entirely refilled, compacted, and paved. All excavations shall be barricaded where required to meet OSHA, local and Federal Code requirements, in such a manner to prevent persons from falling or walking into any excavation within the site fenced property limits.

1.09 DEWATERING PERMITS

- A. The CONTRACTOR shall be responsible for obtaining all permits required for the dewatering operation.

PART 2 -- PRODUCTS

2.01 BEDDING MATERIAL

- A. Bedding materials shall be furnished from acceptable off-site sources. The CONTRACTOR shall notify the ENGINEER of the sources of each material at least ten calendar days prior to the anticipated use of the materials.
- B. Screened gravel shall be used as bedding material for small diameter pipe (less than 24 inches). Screened gravel shall also be used as bedding material for fiberglass, PVC, HDPE or other plastic pipe when installation is in the wet. Screened gravel shall consist of hard, durable particles of proper size and graduation, and shall be free from organic material, wood, trash, sand, loam, clay, excess fines, and other deleterious materials. The gravel shall be graded within the following limits:

<u>Sieve Size</u>	<u>Percent Finer by Weight</u>
1 inch	100
3/4 inch	99
1/2 inch	65
No. 4	2

- C. Crushed stone shall be used for bedding of 24 inch and larger diameter pipe. Crushed stone shall also be used when the trench is within the water table for all types of piping except fiberglass, PVC, HDPE or other plastic pipe. Crushed stone shall consist of hard, durable, subangular particles of proper size and gradation, without clay, fines, and other deleterious materials. The stone shall be graded within the following limits:

<u>Sieve Size</u>	<u>Percent Finer by Weight</u>
5/8 inch	100
1/2 inch	40 – 100
3/8 inch	15 - 45
No. 10	0 – 5

- D. Sand shall be used for bedding polyvinyl chloride, fiberglass, HDPE and other plastic pipe when installed under dry trench conditions. Sand shall be graded sand with 100 percent passing a 3/8-inch sieve and not more than 5 percent passing a No. 200 sieve.

2.02 SELECT BACKFILL

- A. Select Backfill: Select backfill shall be clean sandy material passing through a 3/4-inch sieve as select backfill material.

2.03 GENERAL BACKFILL

- A. All other backfill (general backfill) placed above the select backfill shall pass through a 6-inch ring. General backfill shall contain no more than 10 percent organics. General backfill used under roadways shall be compatible with the materials and compaction specified under Section 02510, "Asphaltic Concrete Pavement", and 02526, "Concrete Pavement, Curbs and Sidewalks".

PART 3 - EXECUTION

3.01 EXCAVATION

- A. The CONTRACTOR shall perform all excavation of every description and of whatever substance encountered, to the dimensions, grades and depths shown on the Drawings, or as required for a proper installation. All excavations shall be made by open cut and in accordance with the Trench Safety Act. All existing utilities such as pipes, poles and structures shall be carefully located, supported and protected from injury; in case of damage, they shall be restored at the CONTRACTOR's expense.
- B. Pipe trenches for piping shall be excavated to a width within the limits of the top of the pipe and the trench bottom so as to provide a clearance on each side of the pipe barrel, measured to the face of the excavation, or sheeting if used, of 8 inches to 18 inches as defined on the Drawings. Where the pipe size exceeds 12 inches, the clearance shall be from 12 inches-to-18 inches. All pipe trenches shall be excavated to a level where suitable material is reached, a minimum of 8 inches below the pipe barrel or that will allow for a minimum of 36 inches of covering unless otherwise indicated on the Drawings.
- C. Ladders or steps shall be provided for and used by workmen to enter and leave trenches.

- D. Excavated unsuitable material shall be removed from the site and disposed of by the CONTRACTOR. Materials removed from the trenches shall be stored and in such a manner that will not interfere unduly with traffic on public roadways and sidewalks and shall not be placed on private property. In congested areas, such materials that cannot be stored adjacent to the trench or used immediately as backfill shall be removed to other convenient places of storage acceptable to the OWNER at the CONTRACTOR's expense.
- E. Excavated material that is suitable for use as backfill shall be used in areas where sufficient material is not available from the excavation. Suitable material in excess of backfill requirements shall be disposed off-site at the CONTRACTOR's expense.

3.02 SHEETING AND BRACING

- A. The CONTRACTOR shall furnish, place and maintain sheeting and bracing to support sides of the excavation as necessary to provide safe working conditions in accordance with OSHA requirements, and to protect pipes, structures and other Work from possible damage. Where wood sheeting or certain designs of steel sheeting are used, the sheeting shall be cut off at a level of 2 feet above the top of the installed pipe and that portion below the level shall be left in place. If interlocking steel sheeting is used, it may be removed providing removal can be accomplished without disturbing the bedding, pipe or alignment of the pipe. Any damage to the pipe bedding, pipe or alignment of the constructed utility caused by the removal of sheeting shall be cause for rejection of the affected portion of the work. The OWNER may permit sheeting to be left in place at the request and expense of the CONTRACTOR, or the OWNER may order in writing to leave the sheeting in place, for the prevention of damage to structures or property. Payment for sheeting ordered to remain in place shall be paid for at a negotiated price.
- B. If the ENGINEER is of the opinion that at any point sufficient or proper supports, have not be provided, he may order additional supports put in at the CONTRACTOR's expense. The CONTRACTOR shall be responsible for the adequacy of all sheeting used and for all damage resulting from sheeting and bracing failure or from placing, maintaining and removing it.

3.03 REMOVAL OF WATER

- A. General: It is a basic requirement of these Specifications unless otherwise authorized per Article 3.09 that excavations shall be free from water before pipe or structures are installed.
- B. The CONTRACTOR shall provide pumps, and other appurtenant equipment necessary to remove and maintain water at such a level as to permit construction in a dry condition. The CONTRACTOR shall continue dewatering operations until backfilling has progressed to a sufficient depth over the pipe to prevent flotation or movement of the pipe in the trench or so that it is above the water table. If at any point during the dewatering operation it is determined that fine material is being removed from the excavation sidewalls, the dewatering operation shall be stopped. If any of the subgrade or underlying material is disturbed by movement of groundwater, surface water, or any other reason, it shall be replaced at the CONTRACTOR's expense with crushed stone or gravel.

- C. The CONTRACTOR shall use dewatering systems that include automatic starting devices, and standby pumps that will ensure continuous dewatering in the event of an outage of one or more pumps.
- D. Disposal: Water from the trenches and excavation shall be disposed of in such a manner as will not cause injury to public health, to public or private property, to the Work completed or in progress, to the surface of the streets, cause any interference with the use of the same by the public, or cause pollution of any waterway or stream. The CONTRACTOR shall submit his proposed methods of handling trench water and locations at which the water will be disposed of to the ENGINEER for review and shall receive acceptance before starting the excavation. Disposal to any surface water body will require silt screens to prevent any degradation in the water body. The CONTRACTOR shall have responsibility for acquiring all necessary permits for disposal.

3.04 TRENCH STABILIZATION

- A. No claim for extras, or additional payment will be considered for cost incurred in the stabilization of trench bottoms which are rendered soft or unstable as a result of construction methods, such as improper or inadequate sheeting, dewatering or other causes. In no event shall pipe be installed when such conditions exist and the CONTRACTOR shall correct such conditions so as to provide proper bedding or foundations for the proposed installation at no additional cost to the OWNER before placing the pipe or structures.

3.05 PIPE BEDDING IN DRY TRENCHES

- A. Pipe trenches shall be excavated as described in Article 3.01. The resulting excavation shall be backfilled with acceptable pipe bedding material, up to the level of the centerline of the proposed pipe barrel. This backfill shall be tamped and compacted to provide a proper bedding for the pipe and shall then be shaped to receive the pipe. Bedding shall be provided under the branch of all fittings to furnish adequate support and bearing under the fitting.
- B. Any over excavation below the levels required for installation of the pipe shall be backfilled with acceptable bedding material, tamped, compacted and shaped to provide proper support for the proposed pipe, at the CONTRACTOR's expense.

3.06 BACKFILL

- A. The CONTRACTOR shall not backfill trenches until the piping has been inspected and tested in accordance with Contract Documents.
- B. Pipelines: Pipeline trenches shall be backfilled to a level 12 inches above the top of the pipe with select backfill. When placed in the dry, such material shall be placed in 9-inch layers, each compacted to the densities specified in Article 3.07. Only hand operated mechanical compacting equipment shall be used within six inches of the installed pipe.
- C. After the select backfill has been placed as specified above, and after all excess water has completely drained from the trench, general backfilling of the remainder of the trench may proceed. General backfill shall be placed in horizontal layers, the depth of which shall not exceed the ability of the compaction equipment employed, and in no event shall

exceed a depth of 12 inches. Each layer shall be moistened, tamped, puddled, rolled or compacted to the densities specified in Article 3.07.

- D. Manholes and Vaults: Any excavation below the levels required for the proper construction of manholes or vaults shall be filled with Class B concrete. The use of earth, rock, sand or other materials for this purpose will not be permitted.

3.07 COMPACTION AND DENSITIES

- A. Compaction of backfill shall be 98 percent of the maximum density where the trench is located under structures or paved areas, and 95 percent of the maximum density elsewhere. Methods of control and testing of backfill construction are:
 1. Maximum density of the material in trenches shall be determined by ASTM D 1557.
 2. Field density of the backfill material in place shall be determined by ASTM D 1556 or D 2922.
- B. Density Test Locations for Pipelines: The compacted backfill/fill shall be tested for in-place density at the rate of one test location per 200 lineal feet (or fraction thereof) of trench, or as shown on the Drawings or as directed by the ENGINEER. The density tests shall be taken at the trench bottom and at each location in one-foot intervals beginning from the top of the piping and ending at the final grade. At existing road or pavement crossings, a minimum of two (2) density tests per crossing per lift is required.
- C. Trench backfill which does not comply with the specified densities, as indicated by such tests, shall be reworked and recompacted until the required compaction is secured, at no additional cost to the OWNER. The costs for retesting such Work shall be paid for by the CONTRACTOR.

3.08 ADDITIONAL EXCAVATION AND BACKFILL

- A. Where organic material, such as roots, muck, or other vegetable matter, or other material which, in the opinion of the ENGINEER, will result in unsatisfactory foundation conditions, is encountered below the level of the proposed pipe bedding material, it shall be removed to a depth of two feet below the outside bottom of the pipe or to a greater depths as directed by the ENGINEER and removed from the site. Sheeting shall be installed if necessary, to maintain pipe trenches within the limits identified by the ENGINEER. The resulting excavation shall be backfilled with suitable backfill material, placed in 12-inch layers, tamped and compacted up to the level of the bottom of the proposed pipe bedding material. Sufficient compaction of this material shall be performed to protect the proposed pipe against settlement. Lean concrete may be used in lieu of backfill when pipe installation is in the wet or at the CONTRACTOR's option. Construction shall then proceed in accordance with the provisions of Article 3.05.
- B. Additional excavation (more than two feet below the pipe) shall be performed when ordered by the ENGINEER. Where organic or other material is encountered in the excavation, the CONTRACTOR shall bring the condition to the attention of the ENGINEER and obtain his determination as to whether or not the material will require removal, prior to preparing the pipe bedding. The excavation of material up to a depth of two feet below the outside bottom incidental items of construction and the Work shall be

done at no additional cost to the OWNER. Where ordered by the ENGINEER, excavation greater than two feet below the pipe, backfill and additional sheeting, will be compensated by the OWNER.

3.09 ALTERNATE METHOD OF CONSTRUCTION

- A. Use of This Method: A combination of conditions in the substrate, water table, or method of disposal may be encountered during the course of the work which makes dewatering impossible. When such conditions are encountered, but only after all reasonable means (pumps, well points, etc.) to dewater the excavation have been employed without success, the CONTRACTOR, may request to employ the following Alternate Method of Construction. The concurrence of the ENGINEER shall be obtained in writing and shall limit the use of the alternate method of construction to such specific portions of the Work as the ENGINEER shall determine.
- B. The requirements set forth in other sections of these Specifications shall establish the required standards of construction quality for this work. Use of the alternate method of construction described hereinafter shall in no way be construed as relieving the CONTRACTOR of the work. No additional payment will be made to the CONTRACTOR for excavation, backfill, sheeting or any cost incurred for Work or materials, or any other costs incurred as a result of the use of this alternate method of construction. The prices established in the Proposal shall be for full payment for the various items of work.
- C. Subject to all the requirements stated herein, including written acceptance of the ENGINEER, construction will be permitted in accordance with the following specifications. All requirements of these Specifications shall apply to this construction unless otherwise specifically modified herein.
- D. Removal of Water: The installation of pipe and appurtenances under water will be permitted and the requirements of Article 3.03 will be waived.
- E. Excavation shall be performed in accordance with Article 3.01 to the specified limits. The excavation shall be completely cleaned of silt and other fines.
- F. Pipe Bedding: Pipe bedding shall be placed from the bottom of the excavation to six inches above the top of the pipe. The bedding material shall be screened gravel or crushed stone as specified in Article 2.01. Limerock screenings, sand or other fine organic material shall not be used.
- G. The bedding material shall be placed to the lower third of the pipe barrel and then be shaped to receive the pipe at the intended elevation. Bedding shall be provided under the branch of all fittings to furnish adequate support and bearing under the fitting. After the pipe section is installed and tested if required, the remaining bedding shall be placed to the top of the pipe.
- H. Select backfill material shall be used to backfill from 6 inches above the top of the pipe to a level one foot above standing ground water. The lift shall then be compacted per Article 3.07. General backfill shall then be placed in 8-inch lifts and compacted per Article 3.07.

- I. If the Alternate Method of Construction is used, all backfill material, including specified pipe bedding material, shall be carefully lifted into the trench and not released to fall freely therein until the bucket or container is at or just above water level. Under no circumstances shall backfill material be dumped or pushed into the trenches containing water. Below water level, the bedding and backfill material shall be carefully rammed into place in uniform layers, of equal depth on each side of the pipe, up to one foot above the water level. Above the water level, backfill material shall be placed and compacted for normal backfill as previously specified.

3.10 RESTORATION OF EXISTING SURFACES

- A. Restore all grassed areas disturbed by the trenching operations by resodding in accordance with Section 02934, "Sodding".

- END OF SECTION -

SECTION 02224

EXCAVATION AND BACKFILL FOR STRUCTURES

PART 1 - GENERAL

1.01 THE REQUIREMENT

- A. This Section includes, except as elsewhere provided, excavation, filling and compacting work for the piping installation.

1.02 QUALITY CONTROL

- A. Codes and Standards: Excavation and backfill work shall be performed in compliance with applicable codes, standards and requirements of governing authorities having jurisdiction in the area.
- B. Testing and Inspection Service: An independent testing laboratory shall be retained by the CONTRACTOR as approved by the OWNER/ENGINEER to conduct appropriate soils and other testing in accordance with the Contract Documents.

1.03 JOB CONDITIONS

A. Existing Utilities

1. Locate existing underground utilities in the areas of work. Accurate "As Built" Information describing existing pipelines and underground utilities is not available. Test pits and hand excavation in critical areas will be required prior to initiating work.
2. All existing utilities including piping, electrical conduits, electric duct banks and telephone cables that are shown on the Contract Drawings to be relocated, shall be relocated prior to initiating earth work. Excavation and backfill for relocation of existing utilities shall conform to the requirements of Section 02222, "Excavation and Backfill for Utilities". The CONTRACTOR shall coordinate relocation of utilities with utility companies having jurisdiction in the area. Should unknown or incorrectly identified piping or other utilities be encountered during excavation, the CONTRACTOR shall consult the ENGINEER and the owner of such piping or utility immediately for directions.
3. The CONTRACTOR shall cooperate with the OWNER and utility companies in keeping respective services and facilities in operation.

1.04 PROHIBITION OF BLASTING

- A. The use of explosives for excavation work is strictly prohibited on this project.

1.05 SUBMITTALS

- A. The CONTRACTOR shall submit information and samples to the ENGINEER for review as specified herein in accordance with Section 01300, "Submittals". The information shall include:

1. Detailed description of dewatering method chosen and sequence of dewatering operations if dewatering is necessary.
2. Plans showing the methods and location of dewatering and discharge. The drawings shall include a sufficient number of detailed sections to clearly illustrate the scope of work. The drawings showing all of the above information, including calculations, shall be prepared by a qualified Professional Engineer registered in the state of Florida, and shall bear its seal and signature. If required by regulatory agencies, a copy of the dewatering permit shall be submitted.
3. Lists of materials and equipment to be used. Detailed description of the method(s) of excavation, fill and compaction to be used.
4. Plans of open cut excavations showing side slopes and limits of the excavation at grade where not shown on the Contract Drawings. The traffic lane to be closed and maintained shall be indicated in the submittal.
5. Design computation of sheeting system. Sheeting and shoring plans shall be designed and sealed by a professional Engineer registered in the State of Florida. Submittals shall indicate depth of penetration.
6. The CONTRACTOR shall furnish the ENGINEER, for approval, a representative sample of structural fill material from off-site sources at least ten calendar days prior to the date of anticipated use of such material. The sample shall be delivered to the site at a location determined by the ENGINEER. The submittal shall identify the source of the material.

1.06 PROTECTION OF PROPERTY AND STRUCTURES

- A. The CONTRACTOR shall, at its own expense, sustain in place and protect from direct and indirect injury, its work at all times as well as all pipes, poles, conduits, walls, buildings, and all other structures, utilities and property in the vicinity of its work. Such sustaining shall be done by the CONTRACTOR. The CONTRACTOR shall take all risks attending the presence or proximity of pipes, poles, conduits, walls, buildings and all other structures, utilities, and property in the vicinity of its work. It shall be responsible for all damage, and assume all expenses, for direct or indirect injury and damage, caused by its work, to any such pipes, structures, etc., or to any person or property, by reason of injury to them, whether or not such structures, etc., are shown on the Drawings.
- B. Barriers and lights shall be placed at all excavations in accordance with OSHA requirements.
- C. Safe and suitable ladders for access to trenches shall be provided in accordance with OSHA requirements.

PART 2 – PRODUCTS

2.01 GENERAL

- A. Specific locations/areas of work where these materials shall be utilized are defined on the Drawings.

2.02 STRUCTURAL FILL

- A. Fill material shall be noncohesive, nonplastic, granular mixture of local clean sand or local clean sand and limerock free from vegetation, organic material, muck or deleterious matter. Material shall conform to AASHO-2 gradation with no more than ten (10) percent by weight passing the No. 200 sieve. All rock or hard material shall pass through a 3-inch diameter ring. Broken Portland cement or asphaltic concrete shall not be considered an acceptable fill material. Fill material containing limerock shall have sufficient sand to fill the voids in the limerock. Material placed in the upper 6-inches of all backfills or fills shall not contain any stones or rocks larger than 1-inch in diameter. Limits of excavation and fill shall be as defined on the Drawings. All structural fill materials shall be obtained from off-site sources.

2.03 OTHER MATERIALS

- A. Requirements for any other fill material, if needed, are defined on the Drawings.

PART 3 - EXECUTION

3.01 CONTRACTOR INSPECTIONS

- A. Examine the areas and conditions under which excavating, filling, and grading are to be performed. Do not proceed with the work until unsatisfactory conditions have been corrected.
- B. Examine and accept existing grade of the project site walkways, pavements, etc., prior to commencement of work and report to ENGINEER if elevations of existing subgrade substantially vary from elevations shown on the Drawings.

3.02 EXCAVATION FOR STRUCTURES

- A. Unless otherwise indicated on the Drawings, all excavation shall be made in such a manner, and to such widths, as will give ample room for properly constructing and inspecting the structures they are to contain. Excavation shall be made in accordance with the details shown on the Drawings, and as specified herein. Attention shall be given to the proper handling of storm water runoff. The CONTRACTOR shall intercept and collect surface run off both at the top and bottom of cut slopes. The excavating equipment shall operate in an organized fashion so as to remove silt from one edge of the excavation to the other so as not to trap silt within the undercut area.
- B. Where required on the Drawings, unsuitable material (silt layer) beneath the groundwater encountered at the site shall be removed using equipment, as approved by the ENGINEER. The equipment shall operate in an organized manner so as to remove silt from one edge of the excavation to the other so as not to trap silt within the undercut area. Unsuitable material shall be drained while being removed, removed and disposed

of off-site by the CONTRACTOR. The CONTRACTOR shall clean all roadways impacted by his demucking, hauling, any temporary stockpiling and removal operations at a frequency as determined by the ENGINEER in the field.

- C. In excavating for footings and foundations, the CONTRACTOR shall take care not to disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive concrete.

The CONTRACTOR shall ensure that its excavation work does not adversely affect the bearing capacity of the structural subsurface. Also, the CONTRACTOR shall proceed with foundation work immediately after excavation work and as expeditiously as possible so as to minimize any potential for subsurface disturbance due to environmental factors, adverse weather, etc. The CONTRACTOR shall also take all necessary precautions to protect its work from potential adverse impacts. Where excavated areas are disturbed by subsequent operations or adverse weather, scarify surface reshape, fill as required and compact to required density.

- D. All excavated soil material, removed underground utilities including pipes and fittings, electrical conduits and duct banks, and other undefined materials removed within the limits of the excavation, shall be disposed off-site by the CONTRACTOR.
- E. Refer to the Drawings for additional requirements for excavation for specific locations/areas of work.

3.03 UNAUTHORIZED EXCAVATION

- A. Excavation work carried outside of the work limits required by the Contract Documents shall be at the CONTRACTOR's expense, and shall be backfilled by the CONTRACTOR at its own expense with structural fill, as directed by the ENGINEER. Where, in the judgement of the ENGINEER, such over-excavation requires use of lean concrete or crushed stone, the CONTRACTOR, at its expense, shall furnish and place such materials.

3.04 SHEETING AND BRACING

- A. The term "sheeting" shall represent any type of shoring used to support sides of the excavation. Walls of the excavation shall be kept vertical where open cut is not practical and, if required to protect the safety of workmen, the general public, this or other work or structure, or excavation walls, the excavation shall be properly sheeted and braced for conditions encountered and OSHA requirements. Excavation for the structures shall be sufficient to provide a clearance between their outer surfaces and the face of the excavation, sheeting, or bracing, of not less than two feet, unless otherwise indicated on the Drawings. Materials encountered in the excavation, which have a tendency to slough or flow into the excavation, undermine the bank, weaken the overlying strata, or are otherwise rendered unstable by the excavation operation shall be retained by sheeting, stabilization, grouting or other acceptable methods.
- B. Minimum length of embedment below the deepest part of the excavation shall be 0.3 times the depth of excavation being supported or greater depending on the sheeting.

The design of the sheeting arrangement shall be the responsibility of the CONTRACTOR.

- C. Sheeting shall be removed provided its removal will not jeopardize pipes or structures. Any sheeting left in place shall be cut-off two feet below finished grade, or as directed. The CONTRACTOR will not receive extra compensation for sheeting left in place or the cut off work required.

3.05 REMOVAL OF WATER

A. General

1. The CONTRACTOR shall provide pumps, well points, and other appurtenant equipment necessary to remove and maintain water at such a level as to permit construction in the dry where defined on the Drawings. The ground water level shall be controlled so as to permit the placing and curing of concrete and the maintenance of supporting foundations and adjacent work and structures in the dry.
 2. The CONTRACTOR shall use dewatering systems that include automatic starting devices, and standby pumps that will ensure continuous dewatering in the event of an outage of one or more pumps.
 3. If excavations to be dewatered cannot be maintained dry by the CONTRACTOR's dewatering efforts, then the CONTRACTOR shall provide tremie seals at no additional cost to the OWNER. The placement of tremie seals shall not preclude dewatering operations specified herein. The limits of tremie seals shall be recommended by the CONTRACTOR and reviewed and accepted by the ENGINEER.
 4. Dewatering Permits: If the quantity or nature of water withdrawn requires approval/permits from regulatory agencies, the CONTRACTOR shall procure such permits at its expense and submit copies to the ENGINEER before commencing the work. The CONTRACTOR will not be granted contract time extensions due to dewatering permit processing delays.
- B. Disposal: The CONTRACTOR shall be responsible to dispose of water from the dewatering operation in accordance with the Contract Documents and shall obtain all necessary permits and conform to all local regulations and codes. Water from the excavation shall be disposed of in such a manner as will not cause injury to public health, to public or private property, to the work completed or in progress, to the surface of the streets, will not cause any interference with the use of the same by the public, or will not cause pollution of any waterway or stream. Water from dewatering operation may be disposed at locations directed by the OWNER with the proper installation of siltation screens and operation of the dewatering system in accordance with all local regulations and codes. The CONTRACTOR shall submit its dewatering method and point(s) of discharge to the ENGINEER for review at least twenty (20) days prior to any dewatering activities. The CONTRACTOR shall provide maintenance of canal(s) and drainage ditches to which it discharges. The cost of maintaining drainage ditches and canal(s) shall be included in the bid price. The CONTRACTOR shall remove siltation and haul, and dispose of this material on a regular basis to maintain the original base conditions at all time, so as not to impact drainage in the general area.

3.06 FILL PLACEMENT AND COMPACTION

A. General

1. Fill material (including structural fill and other fill material) shall be placed within the limits of excavations as shown on the Drawings. When placed in the wet, fill material shall be placed in standing groundwater to a level one foot above stabilized groundwater. The material shall be placed at one edge of the excavation and pushed to the other so as to move residuals across the bottom of the excavation. The leading edge of the fill should be cleaned regularly to remove it of the advancing residuals. All residuals shall be disposed at off-site locations shown on the Drawings or specified herein.
2. Once fill materials have been placed one foot above the stabilized groundwater, then the entire lift should be rolled with six passes from an 10-ton roller. The coverages shall be overlapping and shall occur while the compactor operated at a travel speed of not more than two feet per second. If a vibratory compactor is used, it should be operated with the vibrator off so as not to induce capillary moisture into the dry fill soils.
3. Fill materials placed following this initial lift shall be placed in the dry with loose lift thickness of eight inches or less. Each lift shall be compacted to achieve a minimum of 98 percent Modified Proctor maximum dry density in accordance with ASTM D1557. Fill materials shall be placed within two percent of optimum moisture content.

B. Inspection and Testing: The fill placement and compaction shall be observed by the ENGINEER. As a minimum, an in-place density test will be made in each lift of compacted soil for every 2,500 square feet of area. The CONTRACTOR shall coordinate and cooperate with the testing laboratory.

C. Final Grades: Final structure fill grades shall be within 0.1 feet of elevations shown. Where shown on the Drawings, surfaces shall be sloped for drainage or other surfaces.

D. Refer to the Drawings for additional fill and compaction requirements for specific locations/areas of work.

3.07 BACKFILL AGAINST STRUCTURES

- A. Backfill against nonwater holding structures shall not be performed until the concrete has been inspected by the ENGINEER. Backfill against walls shall also be deferred until the structural slab for floors above the top fill line have been placed and attained design strength. Partial backfilling against adequately braced walls may be considered by the ENGINEER on an individual situation basis. Where walls are to be waterproofed, all work shall be completed and membrane materials dried or cured according to the manufacturer's instructions before backfilling.

- END OF SECTION -

SECTION 02225

CONTAMINATED SOILS AND GROUNDWATER

PART 1 - GENERAL

1.01 THE REQUIREMENT

- A. This Section includes, except as elsewhere provided, the work necessary to remove, transport, and properly dispose of contaminated soils and groundwater required for complete construction of structures and underground piping systems and appurtenances as shown on the Drawings and specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Excavation and Backfill for Utilities
- B. Excavation and Backfill for Structures

1.03 QUALITY CONTROL

- A. Codes and Standards: All work associated with dewatering, excavation, removal, transportation and disposal of contaminated soils and groundwater shall be performed in compliance with applicable codes, standards and requirements of governing authorities having jurisdiction in the area.
- B. Testing and Inspection Service: A testing laboratory certified by the Broward County Environmental Protection and Growth Management Department (BCEPGMD) and the State of Florida shall be retained by the CONTRACTOR to conduct appropriate soils and groundwater testing in accordance with regulatory requirements and the Contract Documents.

1.04 SUBMITTALS

- A. The CONTRACTOR shall submit information and samples to the OWNER for review as specified herein in accordance with Section 01300, "Submittals". The information shall include:
 - 1. Detailed description of the proposed methods for temporary stockpiling, transportation, and disposal of all contaminated soils and groundwater.
 - 2. Copies of permits for all disposal facilities.
 - 3. Copies of all manifest and documentation for handling and disposing of all contaminated soil and groundwater in full compliance with local, state and federal requirements. This documentation must be provided prior to requesting payment under this Bid item.
 - 4. Copies of all laboratory analyses required for transportation and disposal of all contaminated soils and groundwater in full compliance with local, state and federal requirements.
 - 5. Names, addresses and contact numbers of all subcontractors.

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

3.01 CONTAMINATED SOILS

- A. The CONTRACTOR shall retain a laboratory certified by the BCEPGM and the State of Florida to sample the groundwater in the excavation, the stored soil and soil samples in the perimeter of the excavated hole for petroleum contamination (EPA Methods 601, 602, 610). The number of samples shall be sufficient to comply with the requirements of the CONTRACTOR's approved Dewatering Plan and all local, state and federal regulations. The results of the tests shall be forwarded to the OWNER.
- B. Excavated materials which are deemed to be contaminated shall be removed, treated and disposed of by the CONTRACTOR in accordance with all applicable regulatory requirements. The soil may be contaminated with petroleum product which may be partly or entirely diesel fuel or gasoline. When such soil conditions are encountered, they shall be brought to the OWNER's attention. The extent of excavation shall be determined in the field by the OWNER. Payment for this work shall be in accordance with the allowance bid item for **Undefined Conditions Allowance**, included in the Bid Schedule.
- C. All contaminated soil which is excavated shall be stockpiled in an area designated for contaminated soils. The CONTRACTOR shall take whatever precautions are necessary to ensure that contaminated soils are not co-mingled with non-contaminated stockpiled soils and/or mucks.
- D. Contaminated soils must be placed on an impermeable barrier when temporarily stockpiled and must be covered with visquine to prevent runoff. All stockpile leachate or runoff must be collected for disposal in accordance with federal, state and local regulations.
- E. Contaminated soils shall be processed and treated at a state licensed facility. These soils shall be transported and disposed of in accordance with federal, state and local regulations.
- F. The CONTRACTOR shall be responsible for testing soil which has been treated to certify treated soil meets applicable federal, state, and local regulations for final disposal.

3.02 CONTAMINATED GROUNDWATER

- A. All water generated, pumped or removed from excavations as a result of excavation dewatering activities shall be collected, containerized, and managed prior to discharge and/or treatment at an approved discharge point in accordance with local, state and federal regulations and the requirements of the Contract Documents. If groundwater contamination is identified at any time during the performance of the Work, CONTRACTOR shall immediately notify the OWNER.
- B. If contaminated groundwater in the dewatering excavation area is encountered, the contaminated groundwater shall be removed, treated and discharged by the CONTRACTOR in accordance with all applicable regulatory requirements. Payment for this work shall be in accordance with the allowance bid item for **Undefined Conditions Allowance**, included in the Proposal Base Bid.

- C. Treatment of contaminated groundwater will include the following options, depending on the magnitude of the contamination in the trench: Granular Activated Carbon (GAC) Treatment vessels, mobile air stripping units, vacuum truck removal and disposal or other method as approved by the OWNER and regulatory agencies with jurisdiction.
- D. If contaminated groundwater is encountered during construction, CONTRACTOR shall provide reference information for the qualified groundwater remediation subcontractor to be utilized, including phone number, contact name, and address. The selected groundwater treatment/recycling facility for hauling contaminated groundwater shall also be identified.
- E. Effluent water from the treatment system will be analyzed by the certified laboratory to confirm that concentrations are below regulatory limits. Effluent water will then be directed to a pre-approved location as determined by local regulatory agencies and/or the OWNER.

3.03 TRANSPORT AND DISPOSAL

- A. Transport Regulations: The CONTRACTOR shall be responsible for the loading, labeling, placarding, marking, weighing, and transporting of all waste materials in accordance with the Florida Department of Transportation Regulations, and U.S. Department of Transportation Regulations. The CONTRACTOR shall use only transporters that are licensed and competent to haul these wastes.

3.04 WASTE CONTAINERS

- A. Each transport container of waste shall be visually inspected by the CONTRACTOR for leaks, drips, or container damage prior to being loaded. Containers which are found to be leaking or damaged shall not be loaded until the damage is repaired. The CONTRACTOR shall prepare the transport container to prevent spillage or contamination. The CONTRACTOR shall notify the OWNER two hours before any loaded transport leaves the site.
- B. All transport containers leaving the site shall be inspected by the CONTRACTOR to ensure that no waste material adheres to the wheels or undercarriage.
- C. All vehicles on which waste is adhering shall be cleaned by sweeping tires and undercarriage or by other dry methods prior to leaving the site.

3.05 SHIPPING RECORDS

- A. The CONTRACTOR shall prepare accurate shipping records for any wastes leaving the site in accordance with applicable federal and state regulations. The CONTRACTOR shall be responsible for providing copies of the records to the OWNER and shall immediately notify the OWNER of any problems in completing shipments and disposal of wastes.
- B. The CONTRACTOR shall:
 - 1. Be responsible for appropriate measurement of unit quantity (weight or volume) of waste material removed from the site.

2. Coordinate vehicle inspection and recording of quantities leaving the site with the OWNER. These quantities shall be compared to recorded quantities received at the treatment or disposal facilities. The CONTRACTOR shall resolve any discrepancies occurring immediately, determining the probable cause for the discrepancy.
 3. Be solely responsible for any and all actions necessary to remedy situations involving waste spiked in transit.
- C. The CONTRACTOR shall ensure that a copy of the manifest is returned to the OWNER by the designated treatment or disposal facility within 14 days of receipt of the material to be disposed.

- END OF SECTION -

SECTION 02240

DEWATERING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All applicable provisions of the Bidding and Contract Requirements and Division 1 - General Requirements shall govern the WORK under this Section.

1.02 WORK INCLUDED

- A. Provide all labor, materials, necessary equipment and services to complete any dewatering required to complete the work as indicated on the DRAWINGS, as specified herein or both, except as for items specifically indicated as "NIC ITEMS".

1.03 RELATED WORK

- A. Section 02220 – Excavation, Backfill and Compaction
- B. Section 02222 - Excavation and Backfill for Utilities.
- C. Section 02224 - Excavation and Backfill for Structures.

PART 2 - PRODUCTS

2.01 EQUIPMENT

- A. Dewatering, where required, may include the use of temporary reservoirs and diking, well points, sump pumps, temporary pipelines for water disposal; discharge testing for petroleum products, metals, pH, turbidity, etc.; rock or gravel placement; and other means. Standby pumping equipment must be maintained on the jobsite and operate within any local noise ordinance limits. All safety requirements, fencing, etc. shall be installed and maintained by the CONTRACTOR.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

- A. The CONTRACTOR shall provide all equipment necessary for dewatering. It shall have on hand, at all times, sufficient pumping equipment and machinery in good working condition and shall have available, at all times, competent workmen for the operation of the pumping equipment. Adequate standby equipment shall be kept available at all times to insure efficient dewatering and maintenance of dewatering operation during power failure.
- B. Dewatering for structures and pipelines shall commence when groundwater is first encountered, and shall be continuous until such times as water can be allowed to rise in accordance with the provisions of this Section or other requirements.
- C. At all times, site grading shall promote drainage. Surface runoff shall be diverted from excavations. Water entering the excavation from surface runoff shall be collected in shallow

ditches around the perimeter of the excavation, drained to sumps, and be pumped or drained by gravity from the excavation to maintain a bottom free from standing water.

- D. Dewatering shall at all times be conducted in such a manner as to preserve the undisturbed bearing capacity of the subgrade soils at proposed bottom of excavation.
- E. If foundation soils are disturbed or loosened by the upward seepage of water or an uncontrolled flow of water, the affected areas shall be excavated and replaced with pea rock at no additional cost to the OWNER.
- F. The CONTRACTOR shall maintain the water level below the bottom of excavation in all work areas where groundwater occurs during excavation construction, and backfilling, up to natural groundwater level.
- G. Flotation shall be prevented by the CONTRACTOR by maintaining a positive and continuous removal of water. The CONTRACTOR shall be fully responsible and liable for all damages which may result from failure to adequately keep excavations dewatered.
- H. If well points or wells are used, they shall be adequately spaced to provide the necessary dewatering and shall be sand-packed and/or other means used to prevent pumping of fine sands or silts from the subsurface. A continual check by the CONTRACTOR shall be maintained to ensure that the subsurface soil is not being removed by the dewatering operation.
- I. The CONTRACTOR shall dispose of water from the WORK in a suitable manner without damage to adjacent property. CONTRACTOR shall be responsible for obtaining any permits that may be necessary to dispose of water including water sampling and testing per all regulatory requirements. No water shall be drained into WORK built or under construction without prior consent of the ENGINEER. Water shall be filtered using a silt box or another approved method to remove sand and fine-sized soil particles before disposal into any drainage system. Dewatering disposal points shall be approved by the ENGINEER prior to being used. Storm drains used by the CONTRACTOR for dewatering shall be cleaned by a jet vac or other method approved by the ENGINEER after dewatering is complete.
- J. The release of groundwater to its static level shall be performed in such a manner as to maintain the undisturbed state of the natural foundation soils, prevent disturbance of compacted backfill and prevent flotation or movement of structures, pipelines, and sewers.
- K. Dewatering of trenches, testing, and other excavations shall be considered as incidental to the construction of the WORK and all costs thereof shall be included in the various contract prices in the Bid Forms, unless a separate bid item has been established for dewatering. If the CONTRACTOR chooses to construct a dewatering pit a copy of the land lease shall be submitted to the OWNER. Perimeter berms and chain link fence shall be constructed as necessary for safety.
- L. The CONTRACTOR shall submit a dewatering plan to the CONSULTANT for review. The CONTRACTOR is advised that the SFWMD, FDOT, Broward County Environmental Protection Department. (BCEPD), etc. may require that a dewatering plan, prepared by a State of Florida licensed Professional Engineer or Registered Professional Geologist, be submitted and approved prior to issuance of a dewatering permit. The CONTRACTOR shall

retain a State of Florida Licensed Professional Engineer or Registered Professional Geologist to provide any services required by regulatory agencies regarding dewatering and contaminated sites.

- M. The CONTRACTOR is advised that the Broward County Environmental Protection Department may have identified contaminated sites within ¼ mile radius of the project site. The CONTRACTOR may be required to provide testing and monitoring of the dewatering operations, and to institute dewatering methods and controls, as required by BCEPD, SFWMD, FDOT, etc. The CONTRACTOR will be responsible for all costs associated with means and methods of dewatering which will be set forth by dewatering permits.

3.02 QUALITY CONTROL

- A. It shall be the sole responsibility of the CONTRACTOR to control the rate and effect of the dewatering in such a manner as to avoid all objectionable settlement and subsidence.
- B. All dewatering operations shall be adequate to assure the integrity of the finished project and shall be the responsibility of the CONTRACTOR.
- C. Where critical structures or facilities exist immediately adjacent to areas of proposed dewatering, reference points shall be established and observed at frequent intervals to detect any settlement which may develop. The responsibility for conducting the dewatering operation in a manner which will protect adjacent structures and facilities rests solely with the CONTRACTOR. The cost of repairing any damage to adjacent structures and restoration of facilities shall be the responsibility of the CONTRACTOR.

3.03 CONTRACTOR SUBMITTALS

- A. Prior to commencement of excavation, the CONTRACTOR shall submit a detailed plan and operation schedule for dewatering of excavations. The CONTRACTOR may be required to demonstrate the system proposed and to verify that adequate equipment, personnel, and materials are provided to dewater the excavations at all locations and times. The CONTRACTOR's dewatering plan is subject to review by the ENGINEER and regulatory agencies.

3.04 MEASUREMENT AND PAYMENT

- A. There shall be no special measurement or payment for the WORK under this section, it shall be included in the appropriate unit price bid.

END OF SECTION 02240

SECTION 02260

FINISH GRADING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. The CONTRACTOR shall, under this Section, supply, place, compact and roll finish grade materials prior to landscaping work.
- B. Finish grade sub-soil.
- C. Cut out areas to receive stabilizing base course materials for paving and sidewalks.
- D. Place, finish grade and compact topsoil.

1.02 RELATED WORK

- A. Site Grading.
- B. Excavation and Backfill for Structures.
- C. Sodding.

1.03 PROTECTION

- A. The CONTRACTOR shall prevent damage to existing fencing, trees, landscaping, natural features, bench marks, pavement, utility lines, and sprinkler system. Correct damage at no cost to the OWNER.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Topsoil shall be friable loam free from subsoil, roots, grass, excessive amount of weeds, stones and foreign matter; acidity range (pH) of 5.5 to 7.5; containing a minimum of 4% and a maximum of 25% organic matter.

2.02 CRUSHED STONE

- A. Crushed stone for general grading purposes shall be hard, durable, subangular particles of proper size and gradation, and shall be free from organic materials, wood, trash, sand, loam, chalk, excess fines and other deleterious materials. Maximum aggregate size shall be $\frac{3}{4}$ inches.

PART 3 - EXECUTION

3.01 SUBSOIL PREPARATION

- A. Rough grade subsoil systematically to allow for a maximum amount of natural settlement and compaction. Eliminate uneven areas and low spots. Remove debris, roots, branches, stones, etc., in excess of 2 inches in size. Remove sub-soil which has been contaminated with petroleum products.
- B. Cut out areas, to subgrade elevation, which are to receive stabilizing base for paving and sidewalks.
- C. Bring subsoil to required levels, profiles and contours. Make changes in grade gradual. Blend slopes in to level areas.
- D. Slope grade away from building minimum 4 inches in 10 feet (unless indicated otherwise on Drawings).

3.02 PLACING TOPSOIL

- A. Place topsoil in area where seeding, sodding and planting is to be performed. Place to 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. Use topsoil in relatively dry state. Place during dry weather.
- C. Fine grade topsoil eliminating rough and low areas to ensure positive drainage. Maintain levels, profiles and contours of subgrade.
- D. Remove stones, roots, grass, weeds, debris and other foreign material while spreading.
- E. Manually spread topsoil around trees, plants, buildings and other structures to prevent damage which may be caused by grading equipment.
- F. Lightly compact placed topsoil.

3.03 SURPLUS MATERIAL

- A. Remove surplus sub-soil and topsoil from site.
- B. Leave stockpile areas and entire job site clean and raked, ready to receive landscaping and or sodding.

- END OF SECTION -

SECTION 02510

ASPHALTIC CONCRETE PAVEMENT

PART 1 - GENERAL

1.01 SCOPE

- A. Construct asphaltic concrete pavement in accordance with the lines, grades and typical sections as indicated on the Drawings, specified herein and as required for a complete installation.

1.02 SUBMITTALS

- A. The CONTRACTOR shall submit his proposed formulae for the asphaltic concrete paving for review in accordance with Section 01300 - Submittals.

1.03 QUALITY CONTROL

- A. The phrase "DOT Specifications" shall refer to the Florida Department of Transportation Standard Specifications for Road and Bridge Construction. The DOT Specifications, are referred to herein and are hereby made a part of this Contract to the extent of such references, and shall be as binding upon the Contract as though reproduced herein in their entirety.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Limerock Base: The limerock base shall consist of two courses of Miami Oolite limerock in accordance with Sections 200 and 911 of the DOT Specifications.
- B. Prime Coat: The material used for the prime coat shall be in accordance with Sections 300 and 916, Florida Department of Transportation Standard Specifications for Road and Bridge Construction, Latest Edition.
- C. Asphaltic Concrete: The materials and construction of the asphaltic concrete patch and surface courses shall be Type SP-9.5 Superpave Asphaltic Concrete conforming to Sections 330, 334, and 916 of the DOT Specifications.
- D. Reclaimed Asphalt: Reclaimed asphalt shall be utilized.
- E. Tack Coat: The material used for the tack coat shall be emulsified asphalt conforming to DOT Sections 300 and 916.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Subgrade: Roadway subgrades shall be stabilized to the minimum depth shown on the Drawings to a Limerock Bearing Ratio (LBR) of 40 or as required by the Authority Having

Jurisdiction. Stabilizing shall be as defined in Section 160 of the DOT specifications. The stabilizing material shall be applied in such quantity that, after mixing and blending, the subgrade will have the required LBR. Stabilizing material shall be mixed or blended in the subgrade material by plowing, scarifying, disking, harrowing, blading and mixing with rotary tillers until the mixed materials are of uniform bearing value throughout the width and depth of the layer being processed. The minimum acceptable density at any location will be 98% of maximum dry density as determined by AASHTO T-180.

- B. At least three density determinations shall be made on each day's final compaction operations on each course, and the density determinations shall be made at more frequent intervals if deemed necessary by the ENGINEER.
- C. Limerock Base: The limerock base shall be constructed in accordance with Section 200 of the DOT Specifications, to the thickness and width indicated on the Drawings. Pavement base shall be constructed in two lifts.
- D. After spreading of the base material is completed, the entire surface shall be scarified and shaped so as to produce the exact grade and cross section after compaction. For double course base, this scarifying shall extend a depth sufficient to penetrate slightly the surface of the first course. The maximum depth of each lift shall be 6-inches.
- E. When the material does not have the proper moisture content to ensure the required density, wetting or drying shall be required. If the material is deficient in moisture, water will be added and uniformly mixed in by disking the base course to its full depth. If the material contains an excess of moisture, it shall be allowed to dry before being compacted. Wetting and drying operations shall involve manipulation of the entire width and depth of the base as a unit. As soon as proper conditions of moisture are attained, the material shall be compacted to an average density not less than 98% of maximum dry density as determined by AASHTO T-180. Where the base is being constructed in more than one course, the density shall be obtained in each lift of the base.
- F. During final compacting operations, if blading of any areas is necessary to obtain the true grade and cross section, the compacting operations for such areas shall be completed prior to making the density determination on the finished base.
- G. Unless otherwise directed by the ENGINEER, the surface shall be "hard-planed" with a blade grader immediately prior to the application of the prime coat to remove the thin glaze or cemented surface and to allow free penetration of the prime material. The materials planed from the base shall be removed from the base area.
- H. If cracks or checks appear in the base, either before or after priming, which in the opinion of the ENGINEER, would impair the structural efficiency of the base course, the CONTRACTOR shall remove such cracks or checks by reclarifying, reshaping, adding base material where necessary and recompacting, at no additional cost to the OWNER.
- I. Mixing Base and Subgrade: If at any time the subgrade material shall become mixed with the base course material, the CONTRACTOR shall, without additional compensation, dig out and remove the mixture, reshape and compact the subgrade and replace the materials removed with clean base material, which shall be shaped and compacted as specified above.

- J. Prime Coat: The prime coat shall be applied in accordance with Section 300 of the DOT Specifications.
- K. Asphaltic Concrete: The spreading, compacting and jointing the wearing surface shall be in accordance with Sections 330 and 334 of the DOT Specifications to the thickness indicated on the Drawings.
- L. Tack Coat: Apply tack coat at a rate between 0.02 and 0.10 gallons per square yard, and perform the Work in accordance with Section 300 of the DOT Specifications.

3.02 PAVEMENT REPAIR

- A. All damage to pavement as a result of work under this Contract shall be repaired in a manner satisfactory to the ENGINEER and at no additional cost to the OWNER. The repair shall include the preparation of the subgrade, the placing and compacting of the limerock base, the priming of the base, the placing and maintaining of the surface treatment, all as specified herein.
- B. The width of all repairs shall extend at least 12 inches beyond the limit of the damage. 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.

- END OF SECTION -

SECTION 02526

CONCRETE PAVEMENT, CURB AND WALKWAYS

PART 1 - GENERAL

1.01 THE REQUIREMENT

- A. Concrete pavement, curbs and sidewalk shall be constructed to the lines and grades and dimensions required for a complete installation as shown on the Drawings and specified herein.

1.02 SUBMITTALS

- A. Shop drawings for reinforcing, joint material and mix designs shall be submitted for review in accordance with the Section 01300.

PART 2 - PRODUCTS

2.01 CONCRETE

- A. Concrete shall comply with the FDOT Specifications, unless noted or specified otherwise.

2.02 REINFORCING AND WELDED WIRE FABRIC

- A. Joint reinforcing and welded wire fabric shall conform to the FDOT Specifications.

2.03 JOINT SEALER FOR PAVEMENT

- A. Joint sealer shall be a one- or two-part polysulfide base self leveling sealant for horizontal surfaces that has been developed for foot and vehicular traffic. The sealant shall conform to the requirements of the Contract Documents.

2.04 PREFORMED JOINT FILLER

- A. Preformed joint filler shall be sponge rubber and conform to the requirements of AASHTO Designated M148, Type 1.

PART 3 - EXECUTION

3.01 SUBGRADE CONDITION

- A. The finished subgrade shall be maintained in a smooth, compact condition and any areas which are disturbed prior to placing of the concrete shall be restored at the CONTRACTOR'S expense. The subgrade shall be moist at the time the concrete is placed. Water shall be uniformly applied ahead of the paving operations as directed by the ENGINEER. If the CONTRACTOR does not maintain the subgrade in the required moist condition, a vapor barrier sheet will be required between the subgrade and the concrete.

- B. The subgrade shall be accurately trimmed to the required elevation with a 1/4-inch tolerance. High areas shall be trimmed to proper elevation. Low areas may be filled with suitable material and compacted to the specified density or filled with concrete integrally with the placing of the pavement.

3.02 SETTING FORMS

- A. The forms shall be accurately set to line and grade and such that they rest firmly, throughout their entire length, upon the compacted subgrade surface. Forms shall be joined neatly and tightly and braces to test the pressure of the concrete and the finishing operations. The alignment and grade of all forms shall be approved before and immediately prior to the placing of concrete.

3.03 MIXING CONCRETE

- A. Concrete shall be mixed in accordance with the manufacturer's instructions.

3.04 PLACING CONCRETE

- A. The concrete shall be distributed on the subgrade to such depth, that, when it is consolidated and finished, the slab thickness required by the Drawings will be obtained at all points and the surface will at no point be below the grade specified for the finished surface, after application of the allowable tolerance. The concrete shall be deposited on the subgrade in a manner which will require as little rehandling as possible.
- B. Fabric reinforcement shall be placed at mid slab depth, and the fabric shall be maintained at this location during the placing and finishing operations.
- C. Concrete shall be thoroughly consolidated against and along the faces of all forms, by means of hand-operated, spud-type vibrators. Vibrators shall not be permitted to come in contact with the subgrade or a side form. Vibration at any one location shall not continue so long as to produce puddling or the accumulation of excessive grout on the surface. In no case shall the vibrator be operated longer than 15 seconds in any one location.

3.05 STRIKING-OFF, CONSOLIDATING AND FINISHING CONCRETE

- A. Immediately after the placing, the concrete shall be struck off, consolidated and finished, to produce a finished pavement conforming to the cross section, width and surface. Sequence of operations shall be as follows: strike-off; vibratory consolidation; screeding; floating; removal of laitance; straight-edging; and final surface finish.

3.06 STRAIGHTEDGING AND SURFACE CORRECTIONS

- A. After floating has been completed and the excess water removed, but while the concrete is still in a plastic state, the surface of the concrete shall be tested for trueness with an accurate 10-foot straightedge. The straightedge shall be furnished by the CONTRACTOR. The straightedge shall be held in successive positions parallel to the road center line, in contact with the surface, and the whole area tested from one side of the slab to the other as necessary. any depressions shall be immediately filled with

freshly mixed concrete and struck-off; consolidated and refinished. High areas shall be cut down and refinished. Straightedge testing and surface correction shall continue until the entire surface appears to conform to the required grade and cross section.

3.07 FINAL FINISH

- A. As soon as the water sheen has disappeared from the surface of the pavement and just before the concrete becomes nonplastic, a light broom finish shall be given to the surface.

3.08 EDGING

- A. After the final finish has been applied, but before the concrete has become nonplastic, the edges of the pavement along each side of the strip being placed, on each side of construction joints and along any structure extending into the pavement, shall be carefully rounded to a 1/4-inch radius except as otherwise indicated. A well-defined and continuous radius shall be produced and a smoother, dense mortar finish obtained. All concrete shall be completely removed from the top of the joint filler.
- B. All joints shall be checked with a straightedge before the concrete has become nonplastic and, if one side of the joint is higher than the other or the entire joint is higher or lower than the adjacent slabs, corrections shall be made as necessary.

3.09 JOINTS

A. Construction Joints

- 1. Construction joints shall be located as shown on the Drawings and/or as directed by the ENGINEER.

B. Expansion Joints Around Structures

- 1. Expansion joints shall be formed by placing premolded expansion joint material about all structures and features projecting through, into or against the pavement. Unless otherwise indicated, such joints shall be 1/2 inch in width.

C. Transverse Expansion Joints

- 1. Open type transverse expansion joints shall be provided at all sidewalk returns and at 50 feet intervals and wherever indicated on the Drawings. Open type joints shall be formed by staking a 1/4-inch-thick metal bulkhead in place and placing concrete on both sides. After the concrete has set sufficiently to preserve the width and shape of the joint, the bulkhead shall be removed. After the sidewalk has been finished over the joint, the slot shall be opened and edged with a tool having a 1/2-inch radius. Transverse expansion joints shall be cleaned and filled with joint filler strips 1/4-inch-thick conforming to the requirements of AASHTO M-153.

D. Scored Joints

1. Scored joints shall be either formed or sawed at 5-foot intervals and shall extend to a depth of at least one fourth of the sidewalk slab thickness.

3.10 CURING

- A. After the finishing operations have been completed and as soon as the concrete has hardened sufficiently that marring of the surface will not occur, the entire surface and the edges of the newly placed concrete shall be covered and cured with membrane curing compound.
- B. Curing compound shall be uniformly applied to the surfaces to be cured, in a single coat, continuous film, at the rate of one gallon to not more than 200 square feet, by a mechanical sprayer.
- C. Curing compound shall not be applied during periods of rainfall. Curing compound shall not be applied to the inside faces of joints to be sealed. Should the film become damaged from any cause within the required curing period, the damaged portions shall be repaired immediately with additional compound. Upon removal of side forms, the sides of the slabs exposed shall immediately be coated to provide a curing treatment equal to that provided for the surface.

3.11 CURB AND SIDEWALK CONSTRUCTION

- A. The concrete curbs and sidewalks shall be constructed on a prepared smooth subgrade of uniform density. Large boulders and other obstructions shall be removed to a minimum depth of 6 inches below the finished subgrade elevation and the space shall be backfilled with sand, base course material or other suitable material which shall be thoroughly compacted by rolling or tamping. The CONTRACTOR shall furnish a template and shall thoroughly check the subgrade prior to depositing concrete.
- B. Concrete for curbs, and sidewalks shall be formed, mixed, placed and finished in conformance with the requirements of Division 3, except as modified herein. Concrete shall be cured with a clear membrane curing compound which shall be applied at a uniform rate of one gallon per 200 square feet in accordance with the requirements specified herein. Sidewalks shall be given a light broom finish.

3.12 CURBS

- A. Curbs shall be constructed in uniform sections ten feet in length except where shorter sections are necessary for closures or arcs. The sections shall be separated by sheet metal templates set perpendicular to the face and tip of the curve and not less than 2 inches longer than the depth of the curb. The templates shall be held firmly during the placing of the concrete and shall be allowed to remain in place until the concrete has set sufficiently to hold its shape, but shall be removed while the forms are still in place.
- B. After the concrete has sufficiently set for a minimum of 12 hours, the CONTRACTOR shall remove the forms and backfill the spaces on each side. The earth shall be compacted in satisfactory manner without damage to the concrete Work. Minor defects

shall be filled with a mortar composed of one-part portland cement and two parts fine aggregate.

3.13 PAVEMENT CURB AND SIDEWALK REPAIR

- A. All damage to pavement, curb or sidewalk as a result of work under this Contract shall be repaired in a manner satisfactory to the ENGINEER and at no additional cost to the OWNER. The repair shall include all work as specified herein.
- B. The width of all repairs shall extend at least 12 inches beyond the limit of the damage. The edge of the pavement curb or sidewalk 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.

- END OF SECTION -

SECTION 02580

PAVEMENT MARKING AND TRAFFIC SIGNS

PART 1 - GENERAL

1.01 THE REQUIREMENT

- A. This section consists of striping pavement, traffic signs and parking stall wheel stops as indicated on the Drawings, specified herein and as required for a complete installation.

1.02 SUBMITTALS

- A. The CONTRACTOR shall submit shop drawings and other information to the ENGINEER for review in accordance with Section 01300.
- B. The CONTRACTOR shall furnish the manufacturer's certification that all signs furnished conform to these specifications and shall replace or repair at its expense all signs that fail to meet this requirement.

1.03 QUALITY CONTROL

- A. The phrase "DOT Specifications" shall refer to the Florida Department of Transportation Standard Specifications for Road and Bridge Construction. The DOT Specifications, are referred to herein and are hereby made a part of this Contract to the extent of such references, and shall be as binding upon the Contract as though reproduced herein in their entirety.

PART 2 - PRODUCTS

2.01 PAVEMENT MARKING

- A. Paint for pavement strips shall be Sherwin-Williams or Tnemec traffic paint or equal.

PART 3 - EXECUTION

3.01 PAVEMENT MARKING

- A. The surface which is to be painted shall be cleaned, by compressed air or other effective means, immediately before the start of painting, and shall be clean and dry when the paint is applied. Any vegetation or soil shall be removed from the pavement before edge striping is begun.
- B. The traffic stripe shall be of the specified width, with clean, true edges and without sharp breaks in the alignment. A uniform coating of paint shall be obtained and the finished stripe shall contain no light spots or paint skips. Any stripes which do not have a uniform, satisfactory appearance, both day and night, shall be corrected.
- C. All newly painted stripes, including edge stripes, shall be protected until the paint is sufficiently dry to permit vehicles to cross the stripe without damage from the tires. While the center line stripes are being painted, all traffic shall be rouged away from the

painting operations and the newly painted stripe. When necessary, a pilot car shall be used to protect the painting operations from traffic interference.

- D. Any portions of the stripes damaged by passing traffic or from other cause shall be repainted at the CONTRACTOR's expense.
 - 1. Thermoplastic Traffic Stripes and Markings: Thermoplastic pavement markings, including stripes, pavement messages, stop bars, directional arrows, reflective pavement markers and other miscellaneous items, will be replaced as existed before the repair was made. The thermoplastic compound shall be as specified in Section 711 of the D.O.T. Specifications. The thermoplastic compound shall be extruded or sprayed onto the pavement surface in a molten state by mechanical means, with surface application of glass spheres, when required, and upon cooling to ambient pavement temperature shall produce an adherent pavement marking of specified thickness and width and capable of resisting deformation.
- E. The portion of the pavement surface or thermoplastic marking to which the marker is attached by the adhesive shall be cleaned of dirt, curing compound, grease, oil, moisture, loose or unsound pavement and any other material which would adversely affect the adhesive. Reflective markers shall be installed in such a manner that the reflective face of the marker is perpendicular to a line parallel to the roadway centerline. No markers shall be installed over longitudinal or transverse joints of the pavement surface. The adhesive shall be spread on the bonding surface (not the marker) so that 100 percent of the bonding area of the marker will be covered. The adhesive application shall be of sufficient thickness so that when the marker is pressed into the adhesive, excess adhesive shall be forced out around the entire perimeter of the marker. All excessive adhesive shall be removed from in front of the reflective faces, If any adhesive or foreign matter adheres to the reflective face of the marker, the marker shall be replaced. The ENGINEER shall determine the minimum time necessary to cure the adhesive for sufficient set to bear traffic.

- END OF SECTION -

SECTION 02934

SODDING

PART 1 - GENERAL

1.01 SCOPE

- A. Provide all labor, materials and equipment necessary for complete sodding of areas affected by construction. This shall include, but not be limited to: liming, fertilizing, sodding, necessary barriers, tests and all incidentals to make the work complete.

1.02 WORK INCLUDED

- A. Testing of topsoil.
- B. Raking and leveling topsoil as required for sodding.
- C. Liming and fertilizing of topsoil.
- D. Laying and rolling of sod.
- E. Maintaining sod.

1.03 SUBMITTALS

- A. Submit product source and information sheets in accordance with Section 01300, "Submittals".

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Fertilizer
 - 1. Fertilizer shall be commercial fertilizer, as manufactured by International Chemical Company or equal.
 - 2. Said fertilizer shall have a 10-20-6 N.P.K. content and contain a minimum of 60% of organic material.
 - 3. It shall be delivered at the site in the original sealed containers.
- B. Sod
 - 1. Sod from right-of-way swales within the work area shall be Bahia sod or replaced in-kind, whichever is finer quality.
 - 2. Sod shall be first quality Bahia sod of firm texture having a compacted growth and good root development.

3. Sod shall be absolutely true to varietal type, live, fresh and free from weeds or objectionable vegetation, fungus, insects and disease of any kind. Sod shall be kept moist from the time it is field cut until it is laid at the proposed site.
4. The sod shall be as grown by a certified turf nursery and CONTRACTOR shall inform ENGINEER as to the source of the sod to be utilized prior to ordering and delivery of sod.
5. Sod shall be furnished and installed in rectangular sod strips measuring 12 to 16-inches in width of standard lengths of not less than 2 feet and delivered on pallets.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. These areas shall be fine graded to achieve the finished subgrade after compaction which shall be obtained by rolling, dragging or by an approved method which obtains an equivalent compaction to that produced by a hand roller weighing from 75 to 100 pounds per foot of width. All depressions caused by settlement or rolling shall be filled with additional existing or furnished topsoil and regraded and prepared as specified above until it presents a reasonably smooth and even finish at the required sod sub-grade.
- B. All sod furnished shall be living sod containing at least 70% of thickly matter grasses as specified and free from noxious weeds. All sod shall be certified free of fire ants.
- C. No broken pads or torn or uneven ends will be accepted. Standard size sections of sod shall be strong enough to support own weight and retain their size and shape when suspended vertically with a firm grasp on the upper 10% of the section. Sod shall not be harvested when its moisture content (excessively wet or dry) may adversely affect its survival.
- D. Sod shall be harvested, delivered, and installed within a period of 24 hours. Sod not installed within this time period shall be subject to inspection and rejection by ENGINEER, and shall be removed from the site and a fresh sod supply shall be furnished at no extra cost to OWNER.
- E. The topsoil shall not be moist at time of installation; however, it shall contain sufficient moisture so as not be powdery or dusty, both as determined by the supplier's representative.
- F. The overlapping of existing lawn with new sod along limit of work lines will not be permitted. Sod shall be laid in strips, edge to edge, with the lateral joints staggered. All minor or unavoidable openings in the sod shall be closed with sod plugs or with topsoil, as directed by ENGINEER. However, sod laid with joints determined to be too large shall be lifted and re-laid as specified herein at no extra cost to OWNER.
- G. Immediately after the sod is laid, the sod shall be watered thoroughly by hand or mechanical sprinkling until the sod and at least 2-inch of the top soil bed have been thoroughly moistened.

- H. CONTRACTOR shall be responsible to furnish his own supply of water to the site at no extra cost. If possible, OWNER shall furnish CONTRACTOR, upon request, with a source and supply of water. CONTRACTOR shall apply for temporary meter and pay for water used at current utility billing rates. However, if OWNER is not able to furnish a source of water, CONTRACTOR shall be responsible to furnish adequate supplies at his own cost. All work injured or damaged due to the lack of, or the use of too much water, shall be CONTRACTOR's responsibility to correct.

3.02 MAINTENANCE

- A. Maintain the entire sodded areas at least a 30-day period or until final acceptance at the completion of the Contract, whichever is longer. Maintenance shall include watering as specified, weeding and removal of stones which may appear. All bare or dead spots which become apparent shall be properly prepared, limed and fertilized, and resodded at CONTRACTOR's expense as many times as necessary to secure a good growth. In the event that the sod installation is not accepted by ENGINEER, the entire area shall be maintained and cut by CONTRACTOR until final acceptance of the sod installation.
- B. Take whatever measures are necessary to protect the sod while it is developing. These measures shall include furnishing of warning signs, barriers, or any other necessary measures of protection.

- END OF SECTION -