

Craig A. Smith & Associates

**CITY OF MOORE
HAVEN**

**DOWNTOWN
IMPROVEMENTS**

**CONTRACT DOCUMENTS AND
SPECIFICATIONS**

CAS PROJECT No. 22-2277

JUNE 2023



21045 Commercial Trail
Boca Raton, FL 33486
(561) 314-4445

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- A. Itemized below are the Contract Drawings for Craig A. Smith and Associates, Inc.
Project Number **22-2277, City of Moore Haven Downtown Improvements**

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INVITATION TO BID

Sealed BIDS will be received by **CITY OF MOORE HAVEN** (hereinafter referred to as Owner), **at 299 Riverside Drive, MOORE HAVEN, FLORIDA 33471** until **2:00 PM** on **July 14, 2023** at which time they will be publicly opened by the City Clerk or designee and read aloud. Any BIDS received after the time specified will not be accepted.

The BIDS shall be based on providing all materials, equipment and labor for the construction of the **City of Moore Haven Downtown Improvements**. The Contractor shall be responsible for providing all materials, equipment and labor necessary for **the stormwater and roadway improvements within the downtown area** as necessary to complete the project per the plans and specifications. Drawings, specifications and other contract documents may be obtained/downloaded from the City of Moore Haven's website at <https://moorehaven.org/documents/RFP> or via demandstar.com or emailed request to acole@craigasmith.com to request OneDrive link (561) 314 4445.

BIDDERS shall confine their BIDS to the project in its entirety. Partial BIDS will not be considered. Each BIDDER shall submit with this BID evidence that he is licensed to perform the work and services or qualified by examination to be so licensed.

Each BID shall be accompanied by a certified check or by an acceptable BID BOND in an amount equal to at least five (5) percent of the amount of the BID payable to **City of Moore Haven**, as a guarantee that if the BID is accepted the BIDDER will execute the CONTRACT and file acceptable PERFORMANCE AND PAYMENT SURETY BONDS equal to one hundred percent (100%) of the contract price within ten (10) days after written notice of the AWARD OF CONTRACT. No bidder may withdraw his BID for a period of ninety (90) days after date set for opening of the BIDS.

City of Moore Haven reserves the right to: waive informalities in any BID, delete any portion of the project; extend the project within the limits of the work involved. The Owner has the right to accept or reject any or all bids.

BIDS must be sealed and the outside of the envelope MUST be marked: **"RE-BID – CITY OF MOORE HAVEN DOWNTOWN IMPROVEMENTS (CAS Project No. 22-2277).**

City Clerk
Moore Haven, Florida

Publish: June 14, 2023
Independent News Media, Inc.
(Lake Okeechobee News)

END OF SECTION

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INSTRUCTIONS TO BIDDERS

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1. FORMAT

The Contract Documents are divided into parts, divisions, and sections in keeping with accepted industry practice to separate categories of subject matter for convenient reference thereto. Generally, there has been no attempt to divide the specification sections into work performed by the various building trades, work by separate subcontractors, or work required for separate facilities in the project.

2. SPECIFICATION LANGUAGE

"Command" type sentences are used in the Contract Documents. These refer to and are directed to the Contractor.

3. GENERAL DESCRIPTION OF THE PROJECT

A general description of the work to be done is contained in the Invitation to Bid. The scope is indicated on the plans and is specified in applicable parts of these Contract Documents. Bidders shall rely on the drawings, specifications, contract documents and addenda in preparing their proposal.

4. QUALIFICATION OF CONTRACTORS

The prospective bidders must meet the statutorily prescribed requirements before Award of Contract by **City of Moore Haven**.

5. DOCUMENT INTERPRETATION

The Contract Drawings governing the work proposed herein consist of the Drawings and all material bound herewith. These Contract Documents are intended to be mutually cooperative and to provide all details reasonably required for the execution of the proposed work. Any person contemplating the submission of a proposal shall have thoroughly examined all of the various parts of these documents, and should there be any doubt as to the meaning or intent of said Contract Documents, the Bidder should request the Engineer, in writing, (at least 7 calendar days prior to bid opening) an interpretation thereof. Any interpretation or change in said Contract Documents will be made only in writing, in the form of Addenda to the Documents which will be furnished to all Bidders receiving a set of the Documents. Bidders shall submit with their proposals, or indicate receipt of, all Addenda. Neither Owner nor Engineer will be responsible for any other explanation or interpretations of said Documents not issued in writing by Addendum.

6. BIDDER'S UNDERSTANDING

Each Bidder must inform himself of the conditions relating to the execution of the work and it is assumed that he will inspect the site and make himself thoroughly familiar with all the Contract Documents. Failure to do so will not relieve the

successful Bidder of his obligation to enter into a Contract and complete the contemplated work in strict accordance with the Contract Documents. It shall be the Bidder's obligation to verify for himself and to his complete satisfaction all information concerning site and subsurface conditions.

Information derived from inspection of Drawings showing location of utilities and structures will not in any way relieve the Contractor from any risk, or from properly examining the sites and making such additional investigations as he may elect, or from properly fulfilling all the terms of the Contract Documents.

Each Bidder shall inform himself of, and the Bidder awarded a Contract shall comply with, Federal, State and local laws, statutes, and ordinances relative to the execution of the work. This requirement includes, but is not limited to, applicable regulations concerning minimum wage rates, nondiscrimination in the employment of labor, protection of public and employee safety and health, environmental protection, the protection of natural resources, fire protection, burning and non-burning requirements, permits, fees, and similar subjects.

7. DRAWINGS

No return of Drawings is required and no refund of the Drawing purchase price will be made.

8. TYPE OF PROPOSAL

When the Proposal for the work is to be submitted on a unit price basis, unit price Proposals will be accepted on all items of work set forth in the Proposal, except those designated to be paid for as a lump sum. The estimate of quantities of work to be done is tabulated in the Proposal and, although stated with as much accuracy as possible, is approximate only and is assumed solely for the basis of calculation upon which the award of Contract shall be made. Payment to the Contractor will be made on the measurement of the work actually performed by the Contractor as specified in the Contract Documents. The Owner reserves the right to increase or decrease the amount of any class of work as may be deemed necessary, unless otherwise specified in the Supplementary Conditions.

When the proposal for the work is to be submitted on a lump sum basis, the lump sum price shall include all labor, materials, and equipment to complete the work described in the bid item included in the bid schedule. The bid items are intended to be general in nature and are not meant to be exhaustive in detail. Payment for all portions of the work associated with and necessary for the completion of a bid item shall be included in the lump sum price for that item whether or not it is mentioned specifically in the bid item description. All work described in the plans and specifications shall be accomplished and paid for as a part of one or more bid items. If the Contractor believes that a portion of the work as described in the plans and specifications has not been included in any bid item, he shall bring this fact to the attention of the Engineer at least one week before the bids are to be

received. Otherwise, it shall be assumed that the Contractor's proposal includes reimbursement for all work described in the plans and specifications.

9. PREPARATION OF PROPOSALS

Bidders must complete and return only the following:

- Bid - Section 00410
- Bid Bond - Section 00433
- Acknowledgment Of Conformance With O.S.H.A. Standards - Section 00457
- Bidder's Affidavit In Compliance With Florida Trench Safety Act - Section 00458
- Drug Free Work Place Form - Section 00459
- Disadvantaged Business Enterprise Form - Section 00452
- Contractor's Qualifications Form – Section 00451

Bidders must submit bid prices for all items. All blank spaces in the Proposal form must be filled in, preferably in black ink, in both words and figures where required. No changes shall be made in the phraseology of the forms. Written amount shall govern in case of discrepancy between the amounts stated in writing and the amounts stated in figures. In case of discrepancy between unit prices and totals, unit prices will prevail. Bidders must complete all forms included with the Bid Documents accompanied by such certificates and forms as specified elsewhere herein.

Any proposal shall be deemed non-responsive which contains materials omissions, or irregularities, or in which any of the prices are obviously unbalanced, or which in any manner shall fail to conform to the conditions of the published Invitation to Bid.

Only one bid from any individual, firm, partnership, or corporation, under the same or different names, will be considered. Should it appear to the Owner that any Bidder is interested in more than one bid for work contemplated, all bids in which such a Bidder is interested will be rejected.

The bidder shall sign his Proposal in the blank space provided therefore. If the Bidder is a corporation, the legal name of the corporation shall be set forth above, together with the signature of the officer or officers authorized to sign Contracts on behalf of the corporation. If Bidder is a partnership, the true name of the firm shall be set forth above, together with the signature of the partner or partners authorized to sign Contracts in behalf of the partnership. If signature is by an agent, other than an officer of a corporation or a member of a partnership, a notarized power-of-attorney must be on file with the Owner prior to opening of proposals or submitted with the Proposal.

10. CHANGES IN QUANTITIES

The Owner reserves the right to increase or decrease the amount of any class of unit price work that may be deemed necessary, except that such increases or decreases in amounts shall not be more than the percent (defined the General Conditions Section 00700.11.3.1 Changes of Contract Price) of the quantities shown on the Drawings, and Specifications without a negotiated Change Order.

11. STATE AND LOCAL SALES AND USE TAXES

Unless Supplementary Conditions contains a statement that the Owner is exempt from State sales tax on materials incorporated into the work due to the qualification of the work under this Contract, all State and local sales and use taxes, as required by the laws and statutes of the State and its political subdivisions, shall be paid by the Contractor. Prices quoted in the Proposal shall include all nonexempt sales and use taxes, unless provision is made in the proposal form to separately itemize the tax.

12. SUBMISSION OF PROPOSALS

All Proposals must be received not later than the time prescribed, at the place, and in the manner set forth in the Invitation to Bid. Proposals must be made on the Proposal Forms provided herein.

Each Proposal must be submitted in a sealed envelope, marked **"BID - CITY OF MOORE HAVEN DOWNTOWN IMPROVEMENTS (CAS Project No. 22-2277)**.

If forwarded by mail, the sealed envelope containing the BID must be enclosed in another envelope addressed to **CITY OF MOORE HAVE, 299 RIVERSIDE DRIVE, MOORE HAVEN, FL 33472.**

13. TELEGRAPHIC OR WRITTEN MODIFICATION OF PROPOSAL

Any Bidder may modify his bid by telegraphic or written communication at any time prior to the scheduled closing time for receipt of bids, provided such communication is received by the Owner prior to the closing time. The telegraphic or written communication should not reveal the bid price; it should, however, state the addition or subtraction or modification so that the final prices or terms will not be known by the Owner until the sealed bid is opened.

14. WITHDRAWAL OF PROPOSAL

Any Proposal may be withdrawn prior to the scheduled time for the opening of proposals either by telegraphic or written request, or in person. No proposal may be withdrawn after the time scheduled for opening of proposals, for a period of 90 days.

15. BID SECURITY

Proposals must be accompanied by cash, a certified check, or cashier's check drawn on a local bank in good standing, or a bid bond issued by a Surety authorized to issue such bonds in the State of Florida, in the amount of 5 percent of the total amount of the Proposal submitted. This bid security shall be given as guarantee that the Bidder will not withdraw or modify his Proposal for a period of 90 days after bid opening, and that if awarded the Contract, the successful bidder will execute the attached Contract and furnish properly executed Performance and Payment Bonds, each in the amount of 100 percent of the Contract price within the time specified.

The Attorney-in-Fact (Resident Agent) who executes this bond in behalf of the Surety must attach a notarized copy of his power-of-attorney as evidence of his authority to bind the Surety on the date of execution of the bond.

If the Bidder elects to furnish a Bid Bond, he shall use the Bid Bond form found bound herewith, or one conforming substantially thereto in form and content.

16. RETURN OF BID SECURITY

Within 15 days after the award of the Contract, the Owner will return the Bid securities to all Bidders whose Proposals are not to be further considered in awarding the Contract. Retained bid securities will be held until the Contract has been finally executed, after which all bid securities, other than Bidders' bonds and any guarantees which have been forfeited, will be returned to the respective bidders whose proposals they accompanied.

17. AWARD OF CONTRACT

Within 30 calendar days after the opening of Proposals, unless otherwise stated in the Invitation to Bid or Supplementary Conditions of these Documents, the Owner will accept one of the Proposals or will act in accordance with BASIS OF AWARD, below. The acceptance of the Proposal will be by written notice of award, mailed or delivered to the office designated in the Proposal. In the event of failure of the lower responsible and responsive qualified Bidder to sign and return the Contract with acceptable Performance and Payment bonds, as prescribed herein, the Owner may award the Contract to the next lowest responsible and responsive qualified Bidder. Such award, if made, will be made within 60 days after the opening of proposals.

18. BASIS OF AWARD

The Contract will be awarded to the responsive, responsible Bidder submitting the lowest acceptable Proposal. Responsive Bidder shall be defined as any person, firm or corporation submitting a bid for the work contemplated whose Bid Form is complete and regular, free of exclusions or special conditions and has no

alternative bids for any items unless requested in the technical specifications. Responsible Bidder shall be defined as any person, firm, or corporation submitting a bid for the work contemplated who maintains a permanent place of business, has adequate plant equipment to do the work properly and within the time limit that is established, and has adequate status to meet his obligations contingent to the work. The Owner reserves the right to award the Contract as best serves the interests of the Owner.

If, at the time this Contract is to be awarded, the total of the lowest acceptable Proposal exceeds the funds then estimated by the Owner as available, the Owner may reject all bids or take such other action as best serves the Owner's interests.

The Owner reserves the right to reject any and all Proposals for any reason where the Owner deems rejection to be in its best interest, or to reject any proposal not in compliance with the Contract Documents. The Owner reserves the right to waive any informalities and irregularities in said Proposals.

19. EXECUTION OF CONTRACT

The successful Bidder shall, within 7 calendar days after receiving notice of award, sign and deliver to the Owner the Contract hereto attached together with the acceptable bonds as required in these Documents. Within 7 calendar days after receiving the signed Contract with acceptable bonds from the successful Bidder, the Owner's authorized agent will sign the Contract. Signature by both parties constitutes execution of the Contract.

20. PLANS FOR CONSTRUCTION

The successful Bidder will be furnished four sets of Contract Documents without charge. Any additional copies required will be furnished to the Bidder at reproduction cost.

21. PERFORMANCE AND PAYMENT BOND

The successful Bidder shall file with the Owner a Performance Bond and a Payment Bond on the forms bound herewith, each in the amount of 100 percent of the Contract Price in accordance with the requirement of Florida Statutes Section 255.05 or 713.23, as applicable, as security for the faithful performance of the Contract and the payment of all persons supplying labor and materials for the construction of the work, and to cover all guarantees against defective workmanship or materials for the construction of the work, and to cover all guarantees against defective workmanship or materials, or both, for a period of 1 year after the day of final acceptance of the work by the Owner. The Surety furnishing this bond shall have a sound financial standing and a record of service satisfactory to the Owner, shall be authorized to do business in the State of Florida, and shall be listed on the current U.S. Department of Treasury Circular Number 570, or amendments thereto in the Federal Register, of acceptable

Sureties for Federal projects. The attorney-in-fact (Resident Agent) who executes this Performance and Payment Bond in behalf of the Surety must attach a notarized copy of his power-of-attorney as evidence of his authority to bind the Surety on the date of execution of the Bond.

All Contracts, Performance and Payment Bonds, and respective powers-of-attorney will have the same date.

22. FAILURE TO EXECUTE CONTRACT AND FURNISH BOND

The Bidder who has a Contract awarded to him and who fails to promptly and properly execute the Contract and furnish the Performance and Payment Bond shall forfeit the bid security that accompanied his bid, and the bid security shall be retained as liquidated damages by the Owner, and it is agreed that this sum is a fair estimate of the amount of damages the Owner will sustain in case the Bidder fails to enter into a Contract and furnish the bond as hereinbefore provided. Bid security deposited in the form of cash, a certified check, or cashier's check drawn on a local bank in good standing shall be subject to the same requirements as a Bid Bond.

23. TIME OF COMPLETION

The time of completion of the work to be performed under this Contract is in the essence of the Contract. Delays and extensions of time may be allowed only in accordance with the provisions stated in the appropriate section of the General Conditions. The time allowed for the completion of the work shall be stated in the proposal.

24. SWORN STATEMENT - PUBLIC ENTITY CRIMES

No public entity shall accept any bid from, award any contract to, or transact any business with any person or affiliate in excess of the threshold for Category II (presently \$15,000) in 287.017, Florida Statutes for a period of 36 months from the date the person or affiliate was placed on the convicted vendors list. This applies to contractors, suppliers, subcontractors and consultants.

END OF SECTION

SECTION 00320
GEOTECHNICAL DATA

PART 1 GENERAL

1.01 SUMMARY

- A. The OWNER has obtained soil boring data and a report for this project.**
- B. The report is to be used as a guideline to show the subsurface conditions at the project site.**
- C. Attached to the end of this section is the report for this project.**

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

January 9, 2023

Craig A. Smith & Associates
21045 Commercial Trail
Boca Raton, Florida 33486

Attention: Mr. Al Caruso
Phone: 561-314-4454
Email: acaruso@craigasmith.com

**RE: Geotechnical Engineering Services Report
City of Moore Haven Downtown Improvements
Glades County, Florida
RADISE Project No: 02-22-164**

Dear Mr. Caruso,

RADISE International, L.C. (RADISE) is pleased to submit this *Geotechnical Engineering Services Report* for the above referenced project. The purpose of the proposed Geotechnical Engineering Services is to determine the subsurface soil conditions of the soils within the project limits. This report describes the field exploration and laboratory testing performed, presents the data obtained and provides our evaluation and recommendations regarding the geotechnical aspects of the proposed project.

The study was performed in general accordance with our proposal dated September 15, 2022, and the current Florida Department of Transportation Soils and Foundation Handbook.

We appreciate the opportunity to work with Craig A. Smith and Associates on this project and trust that the information herein is clearly presented. Should you have any questions, please contact us at (561) 841-0103.

Sincerely,
RADISE International, L.C.
Florida Certificate of Authorization No. 8901



Fouad Masri
Vice President

*Akash Bissoon, State of Florida, Professional Engineer, License No. 74582.
This document has been digitally signed and sealed by Akash Bissoon, P.E.
on the date indicated here.*

*Printed copies of this document are not considered signed and sealed and
the signature must be verified on any electronic copies.*

Akash Bissoon, P.E.
Senior Project Engineer
Florida Registration No. 74582



561.841.0103



4152 W. Blue Heron Blvd. Suite 1114,
Riviera Beach, FL 33404



www.RADISE.com

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- Sheet 2: Boring Location Plan
- Sheets 3A to 3C: Subsurface Profiles
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APPENDIX A

- Table A-1: Summary of Laboratory Test Results
- Grain Size Distribution



1.0 INTRODUCTION

This report has been prepared to provide geotechnical guidance for the stormwater and roadway improvements project located in the City of Moore Haven, Florida. This report includes the results of the geotechnical field exploration and testing data, subsurface groundwater information, laboratory testing data, construction considerations and other site-specific geotechnical information that may be of a value to this project.

The information presented in this report is based upon our interpretation of the subsurface information revealed by the test borings. The report does not reflect variations in subsurface conditions that may exist between or beyond these borings. Variations in soil and groundwater conditions should be expected, the nature and extent of which might not become evident until construction is undertaken. If variations are encountered, and/or if the scope of the project altered, we should be consulted for additional or revised recommendations.

2.0 PROJECT DESCRIPTION

It is our understanding that the project will include stormwater and roadway improvements within the downtown area of Moore Haven. Avenue J is planned to be redesigned with parking spaces on the north and south sides of a one-way drive. Avenue J is also planned to include drainage structures and pipes approximately 4 to 6 feet deep. Riverside Drive is proposed to include drainage improvements with a deep control structure approximately 8 to 10 feet deep and an outfall pipe to the Caloosahatchee Canal. Improvements to Avenue K will include drainage structures and pipes approximately 4 to 6 feet deep and roadway restoration. Roadway improvements are proposed for 1st Street. The location of the project is shown on the attached *Vicinity Map*, Sheet 1.

3.0 PURPOSE AND SCOPE OF WORK

The purpose of this study was to perform a limited exploration of the subsurface conditions within the project alignment in order to determine the subsurface soil conditions and hydraulic conductivity of the soils within the project limits. More specifically, the purpose of the work included the following:

- Development of the anticipated soil profile and the anticipated subsurface conditions within the depth of the proposed roadway and drainage improvements.
- Assess site preparation requirements and engineering criteria for placement and compaction of approved fill materials.
- Identification of appropriate design and/or construction considerations based on the soil and groundwater conditions encountered in the borings.



RADISE performed the following services in accordance with the proposed scope of work:

1. Visited the project site to observe existing site conditions and to field mark planned boring and test locations.
2. Contacted Sunshine 811 to request the field location of underground utilities in the area of the borings as per Florida Statutes, and coordinated the clearance of underground utilities at the boring and test locations for performance of the field activities.
3. Mobilized drilling and testing equipment, as well as Temporary Traffic Control (TTC) to the site.
4. Performed five (5) pavement cores to determine the nature and thickness of the pavement and base layers.
5. Drilled a total of five (5) Standard Penetration Test (SPT) borings to depths of 16 feet below the existing pavement surface in the pavement core holes. Samples of the soils encountered were obtained and the depth to the groundwater level was measured and recorded for each of the borings. Following completion of the drilling and testing, the boreholes were backfilled with grout and the pavement core holes filled with asphalt cold patch.
6. Drilled five (5) Hand Auger borings to depths of 10 feet below the existing grades near the edge of pavement. Following completion of the testing, the boreholes were backfilled with soil cuttings.
7. Visually classified the soil samples retrieved from the borings using the Unified Soil Classification System (USCS) in general accordance with the American Society of Testing and Materials (ASTM) test method D 2488 (ASTM D 2488).
8. Performed laboratory testing for soil index property determinations on selected samples to aid in the final classification process (ASTM D 2487).
9. Prepared this geotechnical report to summarize the field exploration and laboratory testing results, and present our preliminary evaluation and design recommendations.

4.0 FIELD EXPLORATION

RADISE personnel visited the project site prior to drilling to observe and mark the locations of the planned soil borings. Sunshine 811 was then contacted for field location of underground utilities in the area of the planned borings as per Florida Statutes. The boring locations were determined in the field by RADISE after the underground utility locations were determined. The boring locations are depicted on the attached *Boring Location Plan*, Sheet 2. TTC was used in the vicinity of our field work efforts to protect our field crew and the general public from damage or injury. The TTC system and components was designed and set up in accordance with the FDOT Standard Plans.

On November 15 and December 27 of 2022, RADISE performed the following:

- Five (5) pavement cores to determine the thickness of the asphalt and base material.
- Five (5) SPT borings to depths of 16 feet in the pavement core holes.
- Five (5) hand auger boring near the edge of the roadway pavement.

4.1 Pavement Cores

The asphalt pavement was cored at five locations, B-1 to B-5, using a 6-inch diameter diamond tipped core drill bit. Upon removal of the asphalt core, a hand-held power auger and a hand operated bucket-type auger were used to loosen the base course material and to clean out the borehole. Subsequent down-hole field measurements were made using a surveyor's tape to document the approximate thickness and composition of the encountered pavement base course materials. Representative samples of the base course, obtained from the hand bucket-type auger, were placed in moisture proof bags and transported to our laboratory. The samples were then examined by a geotechnical engineer in the lab to confirm the field classifications. Photographs of the asphalt cores and base materials are included on the attached *Pavement Core Photographs*, Sheets 4A to 4C. The following *Pavement Coring Data*, Table 1, presents a summary of the measured asphalt section thickness, the base thickness and composition, and estimated existing structural numbers (SN_E) for the asphalt and base.

Table 1 – Pavement Coring Data

Core No.	Core Location Latitude & Longitude	Asphalt			Base Course			Base Course Composition
		Thickness (in.)	Layer Coefficient	SN _E	Thickness (in.)	Layer Coefficient	SN _E	
B-1	26.8327° -81.0911°	2.25	0.15	0.34	5.0	0.10	0.50	Brown, shelly sand, with limerock
B-2	26.8326° -81.0901°	1.75	0.15	0.26	9.0	0.10	0.90	Brown, shelly sand, with limerock
B-3	26.8323° -81.0898°	1.0	0.15	0.15	5.0	0.09	0.50	Brown, fine sand, with limerock fragments
B-4	26.8318° -81.0909°	1.5	0.15	0.23	7.0	0.12	0.84	Gray, limerock
B-5	26.8322° -81.0915°	1.5	0.15	0.23	6.0	0.11	0.66	Light brown, sandy limerock

4.2 SPT BORINGS

The field exploration program to evaluate subsurface conditions for this report consisted of five (5) SPT borings to depths of 16 feet below the existing pavement surface. The approximate locations of the SPT borings are depicted on the attached Sheet 2, *Boring Location Plan*.

The SPT boring location information including latitude and longitude information were measured by the drilling crew and are presented on the following Table 2 and on the attached Sheets 3A and 3B, *Subsurface Profiles*.

Table 2 – Listing of Boring Locations and Depths

Boring No.	Latitude	Longitude	Depth (feet)
B-1	26.8327°	-81.0911°	16
B-2	26.8326°	-81.0901°	16
B-3	26.8323°	-81.0898°	16
B-4	26.8318°	-81.0909°	16
B-5	26.8322°	-81.0915°	16

The SPT boring procedures were conducted in general conformance with ASTM D 1586. The SPT borings were drilled using a CME-45 drilling rig equipped with an automatic hammer. SPT boring samples of the in-place materials were obtained at frequent vertical intervals using a standard split-barrel sampler driven with a 140-pound hammer freely falling 30 inches. After seating the SPT sampler 6 inches, the number of successive blows required to drive the sampler an additional 12 inches in the soil, constitutes the SPT test result, which is referred to as the SPT N-value. The N-value has been empirically correlated with various soil properties and is considered to be indicative of the denseness of cohesionless soils and the consistency of cohesive soils. Continuous SPT's were performed to the boring termination depths of 16 feet. The field SPT "N"-values should be corrected for hammer efficiency in accordance with the recommended relationship presented in the FDOT Soils and Foundations Handbook ($N_{safety} = 1.24 * N_{automatic}$). The N-value has been empirically correlated with various soil properties and is considered to be indicative of the denseness of cohesionless soils and the consistency of cohesive soils.

The depth at which groundwater was encountered in each boring was measured and recorded. Each borehole was grout sealed to the ground surface after the completion of drilling and sampling operations, and the asphalt surface patched.

4.3 Hand Auger Borings

Hand auger borings were advanced to depths of 10 feet below the existing ground surface at each location to determine the subsurface conditions. The auger borings were performed in general accordance with ASTM D 1452, "Standard Practice for Soil Exploration and Sampling by Auger Borings".

The hand auger boring location information including latitude and longitude information were measured and are presented on the following Table 3 and on the attached Sheet 3C, *Subsurface Profiles*.

Table 3 – Summary of Hand Auger Borings

Hand Auger Boring Number	Boring Depth (ft)	Latitude	Longitude
AB-1	10.0	26.8327°	-81.0912°
AB-2	10.0	26.8326°	-81.0899°
AB-3	10.0	26.8322°	-81.0901°
AB-4	10.0	26.8317°	-81.0909°
AB-5	10.0	26.8323°	-81.0916°

4.4 Groundwater Level Measurements

After completion of the borings and after a short stabilization period, groundwater levels were recorded. Groundwater levels were countered in the borings between approximately 5.0 and 7.0 feet below the existing ground surface on the dates of drilling. Please see the individual boring logs on the attached Sheets 3A to 3C, *Subsurface Profiles* for more detailed groundwater information.

5.0 LABORATORY TESTING

5.1 General

Representative soils samples collected from the soil borings were visually reviewed in the laboratory by a Geotechnical Engineer to confirm field classifications. The samples were classified in general accordance with the *Unified Soil Classification System* (ASTM D 2488). The classifications were based on visual observations supplemented by laboratory test results performed on selected representative samples (ASTM D 2487). Laboratory index tests consisting of grain size analyses, natural moisture content tests, fine content and organic content tests were performed on selected samples.

5.2 Laboratory Tests and Results

The following list summarizes the laboratory tests performed by RADISE. The list includes the type and number of tests.

- Thirteen (13) moisture content tests (ASTM D 2216)
- Three (3) grain size analysis (ASTM D 422)
- Seven (7) Percent of material passing through No.200 Sieve tests (ASTM D 1140)
- Nine (9) organic content tests (ASTM D 2974)

All of the lab results are presented on the attached Sheets 3A to 3C, *Subsurface Profiles*, and on Table A-1: *Summary of Laboratory Test Results* in Appendix A.

6.0 SURFACE AND SUBSURFACE CONDITIONS

6.1 Stratigraphy

Stratification of the explored soils is based on visual examination of the recovered soil samples, laboratory classification and index testing, and interpretation of the field boring logs by a geotechnical engineer. Subsurface profiles showing the soil stratification at the boring locations were developed and are presented on the attached Sheets 3A to 3C, *Subsurface Profiles*. Stratification lines represent approximate boundaries between soil types, but the actual transition between layers may be gradual. Additionally, soil and groundwater conditions will vary between boring locations.

A generalized stratigraphy of the subsurface deposits was developed based on the information obtained from the field exploration and our laboratory testing program. The following Table 4 presents a generalized description of the site soil stratigraphy.

Table 4 – Generalized Soil Profile for Roadway

Stratum No.	Description	USCS Soil Classification
1	Asphalt	-
2	Brown, sand, with varying amounts of silt, shell and limerock fragments (Base)	SM, GP-GM
3	Gray and brown, fine sand, occasionally with traces of silt and organics	SP, SP-SM
4	Dark brown, fine sand, with silt and organics	SP-SM
5	Dark brown, organic, silty sand	SM

Detailed graphical logs of the hand auger and SPT borings, including SPT N-values, the soil profile, and the observed groundwater depth, are provided on the attached *Subsurface Profiles*, Sheets 3A through 3C.

6.2 Groundwater

After a short stabilization period, the depth to the groundwater was measured from the existing ground surface at each boring location and is plotted adjacent to the soil profiles on the attached *Subsurface Profiles*, Sheets 3A to 3C. Groundwater levels will fluctuate with the seasons and variations of precipitation. **Groundwater levels are also expected to be influenced by the adjacent Caloosahatchee Canal.**

7.0 DISCUSSIONS AND RECOMMENDATIONS

Based on the findings of our site exploration and our evaluation of the encountered subsurface conditions, we conclude that the sands encountered in the SPT borings and most of the hand auger

borings are suitable for the proposed infrastructure improvements. However, unsuitable organic and silt material was encountered in hand auger boring AB-5. The following sections present our preliminary recommendations for the site preparation and related construction. The recommendations discussed herein are based on our interpretation and understanding of the project needs, site conditions, and on the results of our engineering analyses. If subsurface conditions encountered during the construction differ from those disclosed by the borings, we should be notified immediately, so that we can review our recommendations.

Project construction may cause vibration and noise impacts to the adjacent businesses. Noise and vibration monitoring will be required during construction; see Section 8.0.

7.1 Soil Design Parameters

Underground structures for this project should be designed to resist pressures exerted by the adjacent soils and hydrostatic head. For walls that are not restrained during backfilling but are free to rotate at the top, active earth pressure should be used in design. Walls that are restrained should be designed assuming at-rest pressures. Recommended soil parameters for the soils encountered at the site are given in the following *Soil Design Parameters*, Tables 5 to 9.

Table 5: Soil Design Parameters (Boring B-1)

Depth (ft – ft)	Average N _{AUTO}	Average N _{ES}	Recommended Values			Earth Pressure Coefficients		
			Friction Angle (Degrees)	Total Unit Weight (pcf)	Submerged Unit Weight (pcf)	Active, K _a	Passive, K _p	At rest, K _o
0 – 2	8	10	30	109	47	0.327	3.059	0.493
2 – 4	2	2	29	105	43	0.352	2.839	0.521
4 – 10	6	7	30	108	45	0.335	2.983	0.502
10 – 16	12	15	32	111	49	0.311	3.217	0.474

Table 6: Soil Design Parameters (Boring B-2)

Depth (ft – ft)	Average N _{AUTO}	Average N _{ES}	Recommended Values			Earth Pressure Coefficients		
			Friction Angle (Degrees)	Total Unit Weight (pcf)	Submerged Unit Weight (pcf)	Active, K _a	Passive, K _p	At rest, K _o
0 – 2	13	16	32	112	50	0.307	3.259	0.470
2 – 6	6	7	30	108	45	0.335	2.983	0.502
6 – 16	13	16	32	112	50	0.307	3.259	0.470

Table 7: Soil Design Parameters (Boring B-3)

Depth (ft – ft)	Average N _{AUTO}	Average N _{ES}	Recommended Values			Earth Pressure Coefficients		
			Friction Angle (Degrees)	Total Unit Weight (pcf)	Submerged Unit Weight (pcf)	Active, K _a	Passive, K _p	At rest, K _o
0 – 2	7	9	30	108	46	0.331	3.021	0.497
2 – 4	5	6	30	107	45	0.339	2.946	0.507
4 – 8	10	12	31	110	48	0.319	3.137	0.483
8 – 14	7	9	30	108	46	0.331	3.021	0.497
14 – 16	9	11	31	110	47	0.323	3.097	0.488

Table 8: Soil Design Parameters (Boring B-4)

Depth (ft – ft)	Average N _{AUTO}	Average N _{ES}	Recommended Values			Earth Pressure Coefficients		
			Friction Angle (Degrees)	Total Unit Weight (pcf)	Submerged Unit Weight (pcf)	Active, K _a	Passive, K _p	At rest, K _o
0 – 6	7	9	30	108	46	0.331	3.021	0.497
6 – 12	6	7	30	108	45	0.335	2.983	0.502
12 – 16	15	19	33	113	51	0.299	3.343	0.460

Table 9: Soil Design Parameters (Boring B-5)

Depth (ft – ft)	Average N _{AUTO}	Average N _{ES}	Recommended Values			Earth Pressure Coefficients		
			Friction Angle (Degrees)	Total Unit Weight (pcf)	Submerged Unit Weight (pcf)	Active, K _a	Passive, K _p	At rest, K _o
0 – 8	11	14	31	111	48	0.315	3.177	0.479
8 – 10	7	9	30	108	46	0.331	3.021	0.497
10 – 16	11	14	31	111	48	0.315	3.177	0.479

7.2 Pavement Design Considerations

The pavement thicknesses at the pavement cores ranged between 1.0 and 2.25 inches. The encountered base course material thickness ranged between 5.0 and 9.0 inches at the pavement core locations and typically consisted of brown, shelly sand, with limerock fragments. Based solely on visual inspection, we estimate that the Limerock Bearing Ratio (LBR) value of the existing base material is less than 100. LBR field sampling and laboratory testing was not included in the initial scope of work for this project, but may be conducted if full depth roadway reconstruction is proposed.

The existing pavement was observed to be in poor condition. Cracking, surface deterioration, holes, and weathering were observed on the pavement surface in several areas.

The pavement cracking is suspected to be caused by poor base and subgrade layers. Surface deterioration is believed to be caused by atmospheric weathering.

Typical roadway pavement standards for new construction include the following:

1. 12 inches of Type B stabilized subgrade (LBR 40 or Structural Number (SN) 0.96)
2. Optional Base Group 7 (SN of at least 1.5).
3. 1.5 inches of Type SP structural course (Traffic C) asphalt (SN 0.66).
4. 1 inch of friction course FC-9.5 asphalt (SN 0.44).
5. Total SN should be at least 3.56

Typical roadway pavement standards for widening projects include the following:

1. Optional Base Group 13 (SN ranging between 2.35 and 2.45).
2. 1.5 inches of Type SP structural course (Traffic C) asphalt (SN 0.66).
3. 1 inch of friction course FC-9.5 asphalt (SN 0.44).
4. Total SN should be at least 3.50

The measured asphalt thickness ranged from 1.0 to 2.25 inches. Which is not acceptable when compared to the typical Flexible Pavement standards for roadways.

The base course is a brown, shelly sand, with varying amounts limerock fragments; approximately 5.0 to 9.0 inches thick. The existing base course does not appear to meet the requirements for baserock material thickness.

The subbase (prepared subgrade) material was determined to be comprised of a brown fine sand, occasionally with traces shell fragments and organics. As previously discussed, LBR was not conducted; however, it may be conducted if full depth roadway reconstruction is proposed. The FDOT pavement design criteria require a minimum LBR of 40 for prepared subgrade.

Based on the existing conditions, we would overall recommend reconstruction of this pavement since the asphalt and base course material does not appear to meet the typical pavement design requirements. Additionally, the present asphalt pavement condition is observed to be distressed by weathering in many areas. If a complete pavement re-construction option is pursued, it would be suggested that the existing shelly sand base material be roto-tilled into the upper subgrade soils and the mixed soils then be used as the prepared subgrade for the pavement re-construction effort.

If only a milling and resurfacing program is desired, we recommend that the roadway surface be inspected as the milling work is performed to determine if it is necessary to deepen the milling depth considering the presence of scabs, gaps, etc. As with any milling effort, since the asphalt is not removed in its entirety and the remaining layer(s) are cracked, the cracks are likely to help form similar cracks in the new asphalt layer referred to as reflective cracking. Therefore, close inspection of the milled surface could help identify areas that will very likely result in reflective cracks in the new pavement in which case additional milling and replacement of asphalt would be prudent to reduce the possibility of reflective cracking. Upon removal of a thickness of the asphalt, major cracks in the underlying asphalt need to be cleared of debris and then filled with a sealant

(selected based on temperature extremes and the intended purpose, such as a Craftco PN No. 34521 Polyflex Type 3) before installing the replacement layer of asphalt.

These recommendations are based solely on the data obtained from the pavement coring and SPT borings and the observed conditions of the existing pavements in the field. Traffic loadings and frequencies were not provided nor taken into account when preparing this report. Such loadings and frequencies will need to be taken into account and addressed by the roadway designer during the final decision process whether to repair or replace the pavement as well as during preparation of roadway pavement sections during the final pavement design process.

7.3 Clearing and Grubbing

Clearing and grubbing if required in some of the proposed construction areas should include the complete removal and disposal of surficial grasses, associated root systems, topsoil, rubbish, debris, any demolition material/pavement and all other obstructions resting on or protruding through the surface of the existing ground and the surface of excavated areas.

7.4 Replacement of Silt and Organic Soils

Generally speaking, the silt and organic soils encountered in hand auger boring AB-5 are not suitable for the support of the proposed drainage pipes, manholes, and pavement without a high risk of adverse settlement effects. We recommend to remove all silt and organic soils and replace them with suitable engineered fill material (i.e, de-mucking).

The silt and organic soils should be excavated from beneath and beyond the edges of the proposed drainage pipes, manholes and pavement area. The excavations are to be maintained dewatered, if needed, to allow the placement and compaction of the backfill. The resulting excavations may then be backfilled with granular fill or aggregate placed in uniform layers, not exceeding 12 inches in loose thickness, individually compacted with a vibratory compactor. The granular fill should be uniformly compacted to a density of not less than 95 percent of the maximum dry density in accordance with ASTM D 1557, the Modified Proctor Method. The aggregate should be uniformly compacted and probed to confirm that it has been well compacted.

7.5 Underground Utilities

Existing underground utilities and structures are present in the proposed construction areas. These utilities need to be properly identified, and located and/or relocated as necessary for the proposed roadway improvements. The excavation bottoms of any relocated or replacement utilities should be cleaned of any undesirable materials prior to placing any engineered backfill.

7.6 Excavations

The project construction Contractor is solely responsible for making any and all utility or other excavations in a safe manner and to provide appropriate measures to retain side slopes to ensure that persons working in or near the excavation are protected from injury. Any temporary structural retaining walls or excavation bracing systems shall be designed and sealed by a structural engineer registered in the State of Florida working under the auspices of the construction Contractor.

Excavations shall comply with Occupational Health and Safety Administration (OHSA) stipulations for Trench Excavation Safety including all temporary design and safety requirements. The use of temporary sheeting, shoring or sliding trench boxes should be evaluated by the Contractor.

7.7 Dewatering

At the time of the field exploration (November and December of 2022), the groundwater was encountered at depths ranging between 5.0 and 7.0 feet. In-the-dry construction of deeper underground utilities may potentially require groundwater lowering and control of groundwater seepage depending on the excavation depths. Dewatering of the excavations may necessitate the use of sumps, wells, well points or combinations thereof. Control of groundwater should be accomplished in a manner that preserves the integrity of the in-situ soils and does not cause instability of the excavation sidewalls. The dewatering system employed should be capable of maintaining a pre-drained groundwater surface a minimum of 24 inches below the excavation bottoms. Dewatering permitting may be required through appropriate regulatory agencies including the City, SFWMD and the FDEP.

7.8 Pipe Bedding

The sands encountered in the borings are expected to provide good support for utility pipelines without the need for additional bedding when the invert elevations are at least 24 inches above the groundwater level (natural or pre-drained by dewatering). Should organics or other deleterious materials be encountered at or below the pipe invert, such soils shall be considered compressible and unsuitable for pipe support. These soils should be over-excavated and replaced with compacted clean sand or FDOT No. 57 coarse aggregate.

The bedding surface should be uniformly compacted to a density of not less than 95 percent of the maximum dry density in accordance with ASTM D 1557, the Modified Proctor Method.

7.9 Trench Backfill and Compaction

Soils used to backfill utility excavations should consist of clean sands having no materials larger than two-inches in size, not more than ten (10) percent passing the U.S. Standard No. 200 sieve, and not more than three (3) percent organics or other deleterious materials by weight. Some of the subsurface soils encountered in the project site meet these criteria.

Granular backfill should be placed at a moisture content within three (3) percent of its ASTM D 1557 determined optimum moisture and in level lifts whose thickness does not exceed eight (8) inches. Each fill lift should be stable, unyielding and uniformly compacted to at least 95 percent of the maximum dry density in accordance with ASTM D 1557, Modified Proctor Method. We recommend the use of only relatively light, hand-held compaction equipment in the densification operations around utilities to limit the potential damage to the pipelines and buried structures.

7.10 Select Fill Composition, Placement and Compaction

Site structural and pavement subgrade fill and backfill required for construction, should consist of clean, granular materials that are free of debris, cinders, combustibles and organic matter. The fines content (i.e., material passing U.S. Standard No. 200 sieve) should not be more than ten (10) percent by weight, no particle sizes larger than two (2) inches in any direction and the organic content should not exceed three (3) percent by dry weight.

The granular fill should be placed at a moisture content within three (3) percent of its Modified Proctor (ASTM D 1557) determined optimum in level lifts whose loose thickness does not exceed twelve (12) inches. In areas where heavy equipment cannot be operated for compaction, the fill should be placed in six (6) inch thick level lifts. Each fill lift should be stable, unyielding and uniformly compacted to 95 percent of the ASTM D 1557 maximum dry density, as verified by the designated site construction inspecting representative.

Select fill soils will require moisture conditioning to near the optimum moisture content prior to initiating the densification operations. Similar to the subgrade preparation, the fill densification should normally be accomplished using a self-propelled vibratory compactor which imparts a dynamic drum force of not less than 44,000 pounds. However, in developed areas, the use of such heavy vibratory compaction equipment may prove problematic and disruptive or even damaging to existing/adjacent properties. In such cases, the compaction will need to be performed and achieved with lighter weight, less vibration generation capable equipment such as walk behind (e.g. Whacker type) ground pounder or smaller weight vibratory rolling equipment.

7.11 Observation and Testing

It is recommended that a qualified and trained engineer be retained to provide soil engineering inspection and testing services during the construction excavation phase of the project. This is to observe compliance with the design concept, specifications and recommendations, and to allow design changes in the event subsurface conditions differ from those anticipated. In addition, an inspection and testing representative of a geotechnical engineer should be periodically present to provide monitoring and testing of both fill and asphalt placement during construction phase of the project.

8.0 MONITORING OF EXISTING STRUCTURES

“Section 108, Monitor Existing Structures” Division II Construction Details: General Construction Operations of the current FDOT Standard Specifications for Road and Bridge Construction requires Inspection and Settlement Monitoring during the construction of foundations for miscellaneous structures such as signs or lighting, and during embankment and asphalt compaction. We have identified no structures which would require Inspection and Settlement Monitoring or Vibration Monitoring other than those included in the Standard Specs section 108-2.

Work resulting in noise, vibrations or dust tending to disturb the people or the properties within the vicinity will be required to follow local ordinances and codes. Typically, the local ordinances and codes requires such work not begin until 7:00 a.m. and end at 7:00 p.m., Monday through

Friday, and shall be limited to between the hours of 8:00 a.m. and 8:00 p.m., Saturday and Sunday. Construction noise should also be controlled in accordance with the FHWA Highway Construction Noise Handbook.

9.0 LIMITATIONS

RADISE warrants that this geotechnical exploration has been performed, findings obtained, and recommendations prepared in accordance with recognized practices and the discipline of soil mechanics, foundation engineering, and engineering geology at this time and location. No other warranties are expressed or implied. RADISE is not responsible for any independent conclusions, interpretation, opinions or recommendations made by others based on the data contained in this report.

-oOo-

RADISE appreciates the opportunity to be of service to you. Please feel free to contact us at 561-841-0103 if you have any questions or comments regarding this report.

**Respectfully submitted
RADISE International, L.C.**

ATTACHMENTS

SHEET 1: VICINITY MAP

SHEET 2: BORING LOCATION PLAN

SHEETS 3A AND 3B: SUBSURFACE PROFILES

SHEETS 4A TO 4C: PAVEMENT CORE PHOTOGRAPHS



NOT TO SCALE



REVISIONS

Date.	By	Descriptions	Date.	By	Descriptions

Names	Dates
Drawn by AM	11/28/2022
Checked by NK	11/28/2022
Designed by AB	11/28/2022
Checked by AB	11/28/2022
Approved by	



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CITY OF MOORE HAVEN	
COUNTY	CLIENT
GLADES	CRAIG A. SMITH

SCALE:
 VERTICAL
 N.T.S.
 SCALE:
 HORIZONTAL
 N.T.S.

SHEET TITLE:
VICINITY MAP
 PROJECT NAME:
CITY OF MOORE HAVEN DOWNTOWN IMPROVEMENTS

SHEET NO.
1
 RADISE PROJECT NO:
02-22-164



LEGEND :
 16 FEET DEEP SPT BORING LOCATION
 10 FEET DEEP AUGER BORING LOCATION

REVISIONS			
Date.	By	Descriptions	

Names	Dates
AM	11/28/2022
NK	11/28/2022
AB	11/28/2022
AB	11/28/2022



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CITY OF MOORE HAVEN	
COUNTY	CLIENT
GLADES	CRAIG A. SMITH

SCALE:
 VERTICAL
 N.T.S.
 SCALE:
 HORIZONTAL
 N.T.S.

SHEET TITLE: **BORING LOCATION PLAN**
 PROJECT NAME:
CITY OF MOORE HAVEN DOWNTOWN IMPROVEMENTS

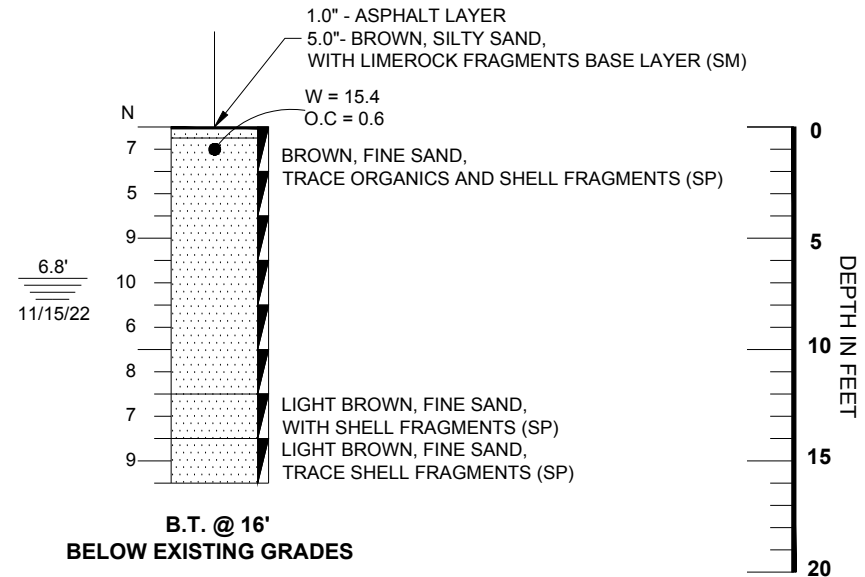
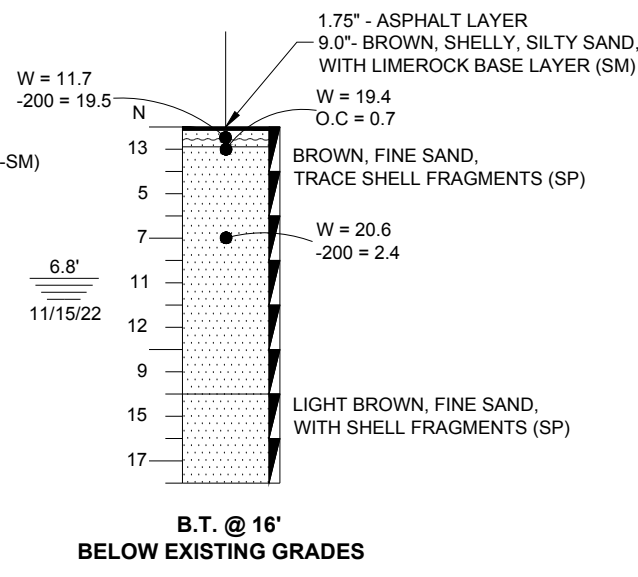
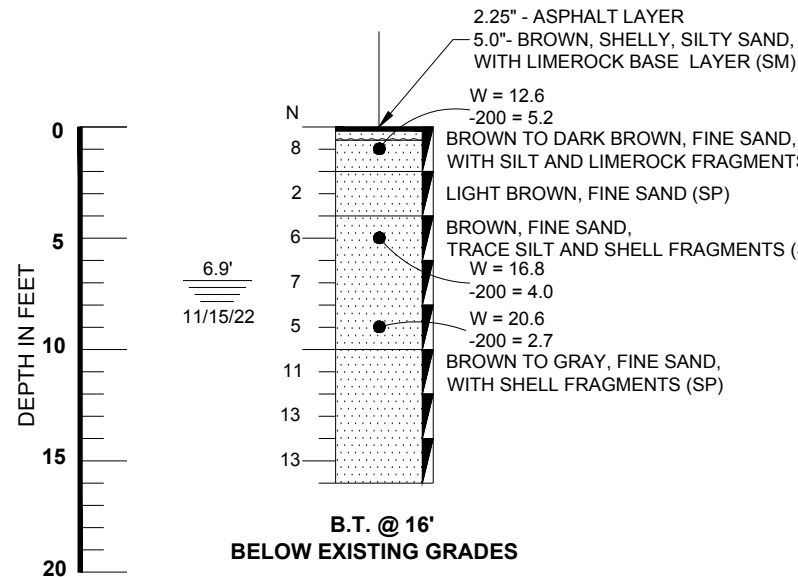
SHEET NO. **2**
 RADISE PROJECT NO:
02-22-164

BORING NO.
LONGITUDE:
LATITUDE:
RIG:
HAMMER:
DRILLER:
DATE:

B-1
W -81.0911°
N 26.8327°
CME 45
AUTO
RAVI
11/15/2022

B-2
W -81.0901°
N 26.8326°
CME 45
AUTO
RAVI
11/15/2022

B-3
W -81.0898°
N 26.8323°
CME 45
AUTO
RAVI
11/15/2022



LEGEND

- SAND (SP, SP-SM)
- ASPHALT LAYER
- SHELLY SAND (SP)
- LIMEROCK BASE LAYER

B.T @ 16' BORING TERMINATED AT 16 FEET BELOW THE EXISTING GROUND SURFACE
B-1 STANDARD PENETRATION TEST (SPT) BORING AND NUMBER
N STANDARD PENETRATION RESISTANCE-BLOWS PER FOOT USING AUTOMATIC HAMMER

- SAMPLING INTERVAL
- 6.9' G.W. ELEVATION IN FEET NAVD AND DRILLING DATE 11/15/22
- W** MOISTURE CONTENT (%)
- OC** ORGANIC CONTENT (%)
- 200** AMOUNT PASSING US STANDARD 200 SIEVE (%)
- SP, SP-SM** UNIFIED SOIL CLASSIFICATION SYSTEM GROUP SYMBOL (ASTM D 2487)

- NOTES:**
- BORINGS WAS DRILLED ON 11/15/2022. SPT BORINGS WERE PERFORMED USING A CME-45C AUTOMATIC HAMMER DRILLING RIG (ASTM D1586)
 - STRATA BOUNDARIES ARE APPROXIMATE AND REPRESENT SOIL STRATA AT EACH TEST HOLE LOCATION ONLY. SOIL TRANSITIONS MAY BE MORE GRADUAL THAN IMPLIED.
 - GROUNDWATER LEVELS SHOWN ON THE SUBSURFACE PROFILES REPRESENT GROUNDWATER SURFACES ON THE DATES SHOWN. GROUNDWATER LEVEL FLUCTUATIONS SHOULD BE ANTICIPATED THROUGHOUT THE YEAR.
 - AFTER COMPLETION OF DRILLING, BOREHOLES WERE BACKFILLED WITH GROUT.

STANDARD PENETRATION TEST DATA *

SPOON INSIDE DIA.	1.375 INCH
SPOON OUTSIDE DIA.	2 INCHES
AVG. HAMMER DROP	30 INCHES
HAMMER WEIGHT	140 POUNDS
GRANULAR MATERIALS	AUTOMATIC HAMMER
	SPT N - VALUE
RELATIVE DENSITY	BLOWS/FOOT
VERY LOOSE	LESS THAN 3
LOOSE	3 - 8
MEDIUM	8 - 24
DENSE	24 - 40
VERY DENSE	GREATER THAN 40
SILTS AND CLAYS	AUTOMATIC HAMMER
	SPT N - VALUE
CONSISTENCY	BLOWS/FOOT
VERY SOFT	LESS THAN 1
SOFT	1 - 3
FIRM	3 - 6
STIFF	6 - 12
VERY STIFF	12 - 24
HARD	GREATER THAN 24

*FDOT SOILS AND FOUNDATIONS HANDBOOK 2022

REVISIONS

Date.	By	Descriptions	Date.	By	Descriptions

RADISE INTERNATIONAL
 ENGINEER OF RECORD
 ANDREW NIXON (P.E.No. - 71458)
 RADISE International
 4152 West Blue Heron Boulevard, Suite 1114
 Riviera Beach, Florida, 33404
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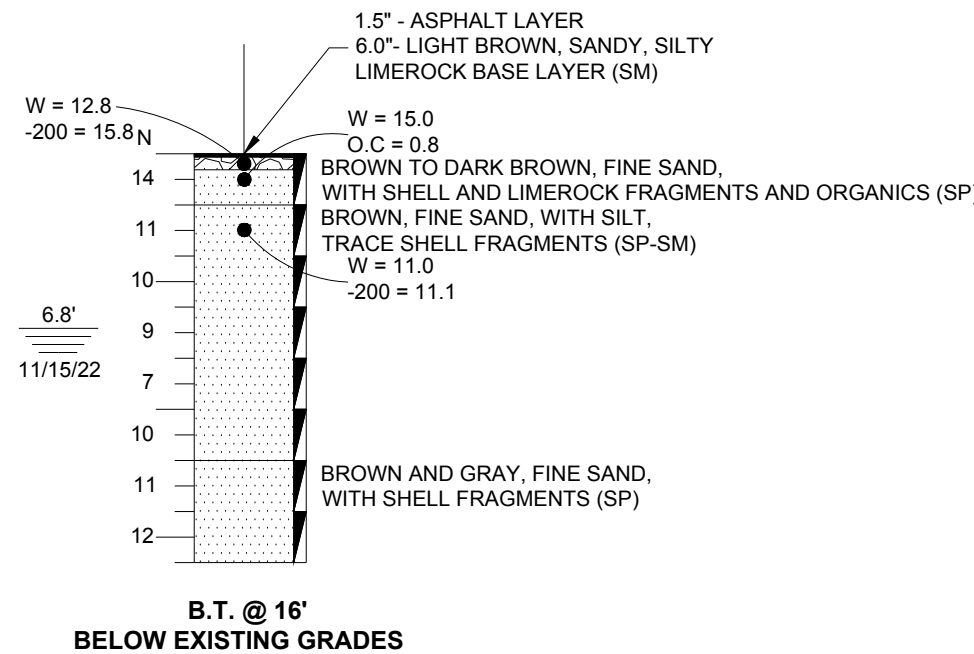
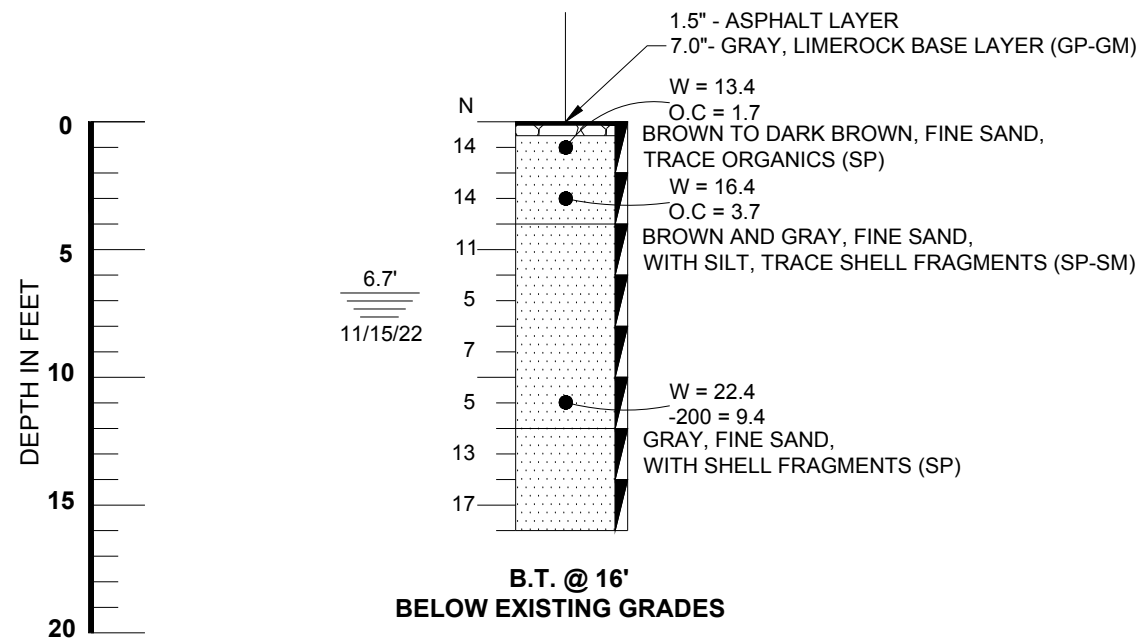
CITY OF MOORE HAVEN		SCALE: VERTICAL N.T.S.
COUNTY	CLIENT	SCALE: HORIZONTAL N.T.S.
GLADES	CRAIG A. SMITH	

SHEET TITLE: SUBSURFACE PROFILES	SHEET NO. 3A
PROJECT NAME: CITY OF MOORE HAVEN DOWNTOWN IMPROVEMENTS	RADISE PROJECT NO: 02-22-164

BORING NO.
LONGITUDE:
LATITUDE:
RIG:
HAMMER:
DRILLER:
DATE:

B-4
W -81.0909°
N 26.8318°
CME 45
AUTO
RAVI
11/15/2022

B-5
W -81.0915°
N 26.8322°
CME 45
AUTO
RAVI
11/15/2022



LEGEND

- SAND (SP, SP-SM)
- ASPHALT LAYER
- SHELLY SAND (SP)
- LIMEROCK BASE LAYER

- B.T @ 16' BORING TERMINATED AT 16 FEET BELOW THE EXISTING GROUND SURFACE
- B-1 STANDARD PENETRATION TEST (SPT) BORING AND NUMBER
- N STANDARD PENETRATION RESISTANCE-BLOWS PER FOOT USING AUTOMATIC HAMMER

SAMPLING INTERVAL

6.9'
 11/15/22 GROUNDWATER ELEVATION IN FEET NAVD AND DRILLING DATE

- W MOISTURE CONTENT (%)
- OC ORGANIC CONTENT (%)
- 200 AMOUNT PASSING US STANDARD 200 SIEVE (%)
- SP, SP-SM UNIFIED SOIL CLASSIFICATION SYSTEM GROUP SYMBOL (ASTM D 2487)

NOTES:

1. BORINGS WAS DRILLED ON 11/15/2022. SPT BORINGS WERE PERFORMED USING A CME-45C AUTOMATIC HAMMER DRILLING RIG (ASTM D1586)
2. STRATA BOUNDARIES ARE APPROXIMATE AND REPRESENT SOIL STRATA AT EACH TEST HOLE LOCATION ONLY. SOIL TRANSITIONS MAY BE MORE GRADUAL THAN IMPLIED.
3. GROUNDWATER LEVELS SHOWN ON THE SUBSURFACE PROFILES REPRESENT GROUNDWATER SURFACES ON THE DATES SHOWN. GROUNDWATER LEVEL FLUCTUATIONS SHOULD BE ANTICIPATED THROUGHOUT THE YEAR.
4. AFTER COMPLETION OF DRILLING, BOREHOLES WERE BACKFILLED WITH GROUT.

STANDARD PENETRATION TEST DATA *

SPOON INSIDE DIA.	1.375 INCH
SPOON OUTSIDE DIA.	2 INCHES
AVG. HAMMER DROP	30 INCHES
HAMMER WEIGHT	140 POUNDS
GRANULAR MATERIALS	AUTOMATIC HAMMER
	SPT N - VALUE
RELATIVE DENSITY	BLOWS/FOOT
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VERY DENSE	GREATER THAN 40
SILTS AND CLAYS	AUTOMATIC HAMMER
	SPT N - VALUE
CONSISTENCY	BLOWS/FOOT
VERY SOFT	LESS THAN 1
SOFT	1 - 3
FIRM	3 - 6
STIFF	6 - 12
VERY STIFF	12 - 24
HARD	GREATER THAN 24

*FDOT SOILS AND FOUNDATIONS HANDBOOK 2022

REVISIONS

Date.	By	Descriptions	Date.	By	Descriptions



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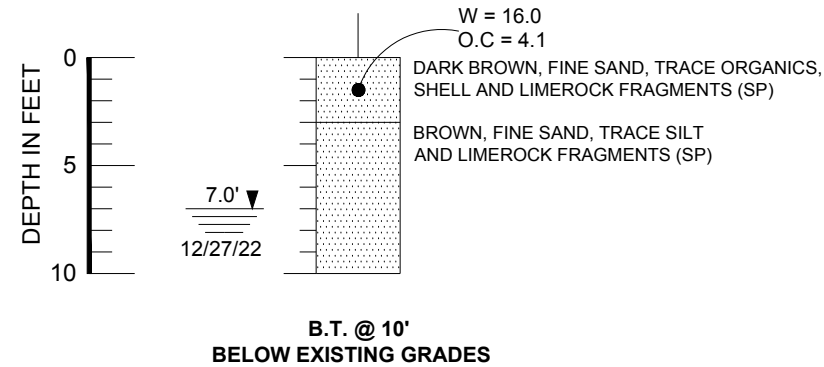
CITY OF MOORE HAVEN	
COUNTY	CLIENT
GLADES	CRAIG A. SMITH

SCALE:
 VERTICAL
 N.T.S.
 SCALE:
 HORIZONTAL
 N.T.S.

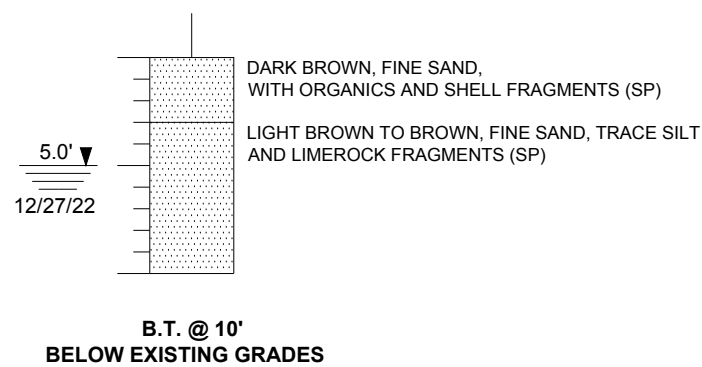
SHEET TITLE:
SUBSURFACE PROFILES
 PROJECT NAME:
CITY OF MOORE HAVEN DOWNTOWN IMPROVEMENTS

SHEET NO.
3B
 RADISE PROJECT NO:
02-22-164

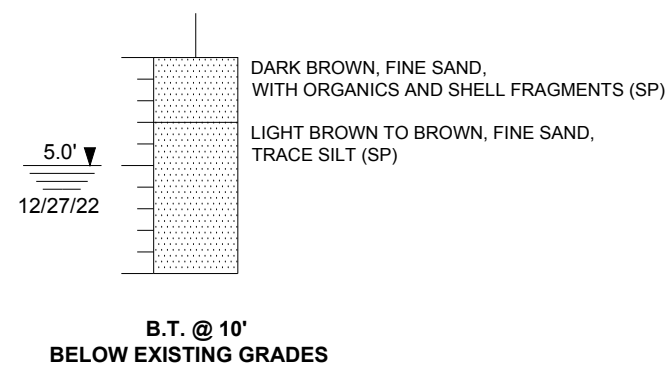
BORING NO. AB-1
LONGITUDE: W -81.0912°
LATITUDE: N 26.8327°
RIG: HAND AUGER
HAMMER: N/A
DRILLER: L. FINELLI
DATE: 12/27/2022



BORING NO. AB-2
LONGITUDE: W -81.0899°
LATITUDE: N 26.8326°
RIG: HAND AUGER
HAMMER: N/A
DRILLER: L. FINELLI
DATE: 12/27/2022



BORING NO. AB-3
LONGITUDE: W -81.0901°
LATITUDE: N 26.8322°
RIG: HAND AUGER
HAMMER: N/A
DRILLER: L. FINELLI
DATE: 12/27/2022



LEGEND

- SAND (SP, SP-SM)
- ORGANIC, SILTY SAND (SM)

B.T @ 10' BORING TERMINATED AT 6 FEET BELOW THE EXISTING GROUND SURFACE

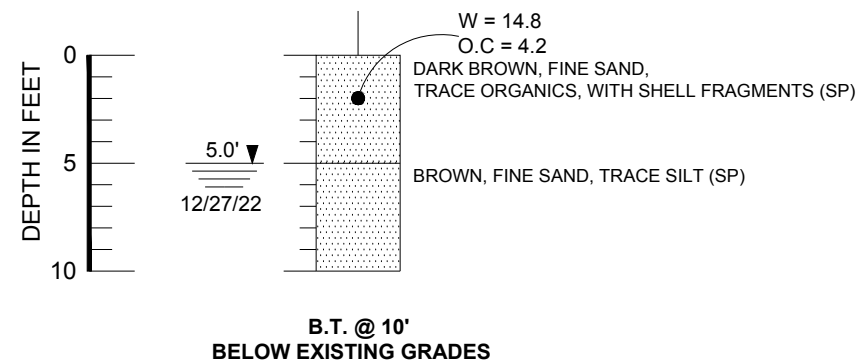
7.0' 12/27/22 GROUNDWATER LEVEL IN FEET AND DRILLING DATE

- W MOISTURE CONTENT (%)
- OC ORGANIC CONTENT (%)
- 200 FINES CONTENT (%)
- PI PLASTICITY INDEX (NP - NON PLASTIC)
- SP, SP-SM UNIFIED SOIL CLASSIFICATION SYSTEM GROUP SYMBOL (ASTM D2487)

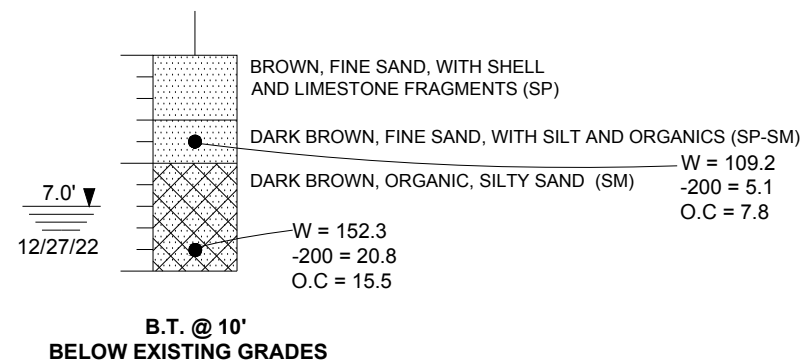
NOTES:

1. BORINGS WERE DRILLED ON 12/27/2022. BORINGS WERE PERFORMED USING HAND AUGER DRILLING EQUIPMENT (ASTM D4152).
2. STRATA BOUNDARIES ARE APPROXIMATE AND REPRESENT SOIL STRATA AT EACH TEST HOLE LOCATION ONLY. SOIL TRANSITIONS MAY BE MORE GRADUAL THAN IMPLIED.
3. GROUNDWATER LEVELS SHOWN ON THE SUBSURFACE PROFILES REPRESENT GROUNDWATER SURFACES ON THE DATES SHOWN. GROUNDWATER LEVEL FLUCTUATIONS SHOULD BE ANTICIPATED THROUGHOUT THE YEAR.
4. AFTER COMPLETION OF DRILLING, BOREHOLES WERE BACKFILLED WITH SOIL CUTTINGS.

BORING NO. AB-4
LONGITUDE: W -81.0909°
LATITUDE: N 26.8317°
RIG: HAND AUGER
HAMMER: N/A
DRILLER: L. FINELLI
DATE: 12/27/2022



BORING NO. AB-5
LONGITUDE: W -81.0916°
LATITUDE: N 26.8323°
RIG: HAND AUGER
HAMMER: N/A
DRILLER: L. FINELLI
DATE: 12/27/2022



REVISIONS

Date	By	Descriptions	Date	By	Descriptions

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LICENSE NO. - 8901

CITY OF MOORE HAVEN		SCALE: VERTICAL N.T.S.
COUNTY	CLIENT	SCALE: HORIZONTAL N.T.S.
GLADES	CRAIG A. SMITH	

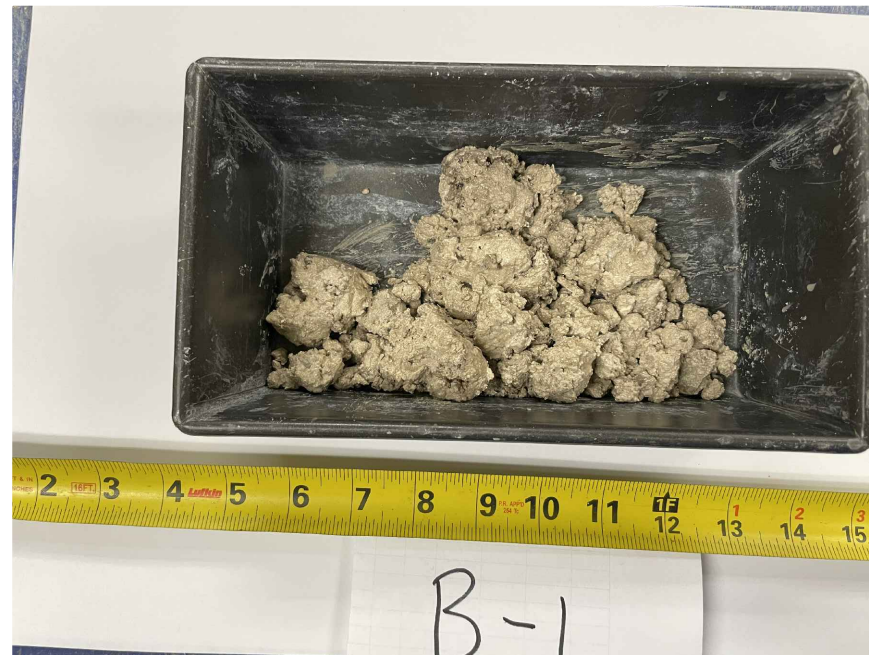
SHEET TITLE: AUGER BORINGS SUBSURFACE PROFILES	SHEET NO. 3C
PROJECT NAME: CITY OF MOORE HAVEN DOWNTOWN IMPROVEMENTS	RADISE PROJECT NO: 02-22-164



B-1: 2.25 INCHES THICK ASPHALT




B-2: 1.75 INCHES THICK ASPHALT



B-1: 5.0 INCHES THICK BASE



B-2: 9.0 INCHES THICK BASE

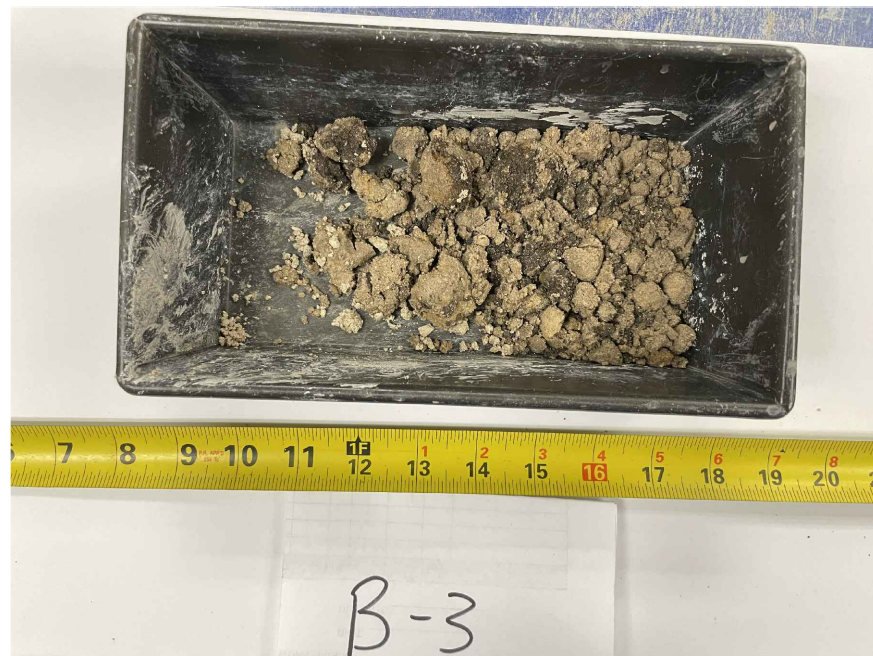
REVISIONS				Names		Dates		 <small>ENGINEER OF RECORD ANDREW NIXON (P.E.No. - 71458) RADISE International 4152 West Blue Heron Boulevard, Suite 1114 Riviera Beach, Florida, 33404 TEL 561-841-0103 FAX 561-841-0104 URL : http:// www.radise.net</small>	CITY OF MOORE HAVEN		SCALE: VERTICAL N.T.S.	SHEET TITLE: PAVEMENT CORE PHOTOS	SHEET NO. 4A
Date.	By	Descriptions	Date.	By	Descriptions	Drawn by	Checked by		COUNTY	CLIENT	SCALE: HORIZONTAL N.T.S.	PROJECT NAME: CITY OF MOORE HAVEN DOWNTOWN IMPROVEMENTS	RADISE PROJECT NO: 02-22-164
						AM	NK	11/28/2022					
						AB	AB	11/28/2022					
						AB	AB	11/28/2022					
						Approved by							



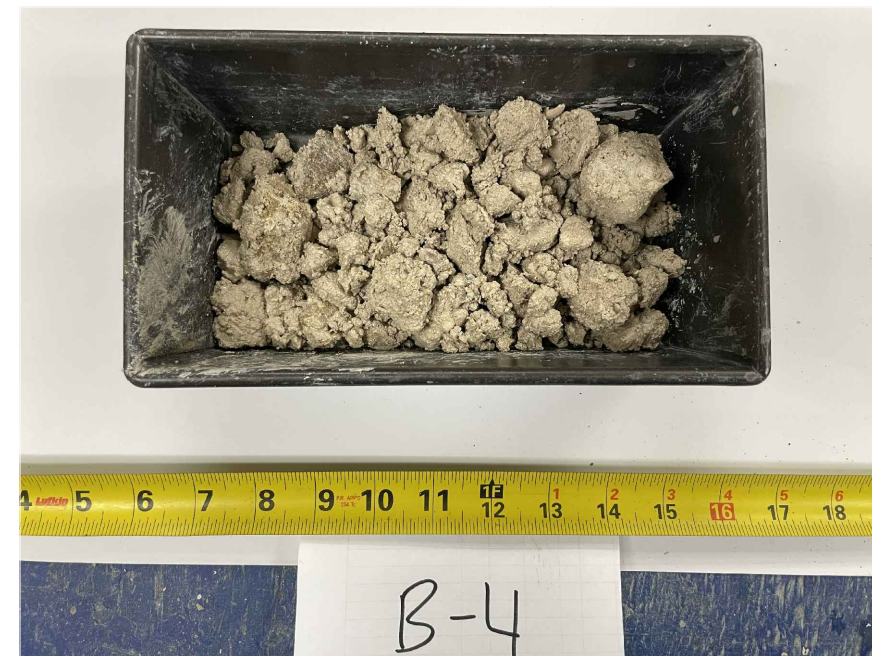
B-3: 1.0 INCHES THICK ASPHALT



B-4: 1.5 INCHES THICK ASPHALT



B-3: 5.0 INCHES THICK BASE



B-4: 7.0 INCHES THICK BASE

REVISIONS

Date.	By	Descriptions	Date.	By	Descriptions

Names	Dates
Drawn by AM	11/28/2022
Checked by NK	11/28/2022
Designed by AB	11/28/2022
Checked by AB	11/28/2022
Approved by	



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CITY OF MOORE HAVEN	
COUNTY	CLIENT
GLADES	CRAIG A. SMITH

SCALE:
VERTICAL
N.T.S.
SCALE:
HORIZONTAL
N.T.S.

SHEET TITLE: PAVEMENT CORE PHOTOS
PROJECT NAME: CITY OF MOORE HAVEN DOWNTOWN IMPROVEMENTS

SHEET NO. 4B
RADISE PROJECT NO: 02-22-164



P-5: 1.5 INCHES THICK ASPHALT



P-5: 6.0 INCHES THICK BASE

REVISIONS

Date.	By	Descriptions	Date.	By	Descriptions

Names	Dates
AM	11/28/2022
NK	11/28/2022
AB	11/28/2022
AB	11/28/2022
Approved by	

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LICENSE NO. - 8901

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CITY OF MOORE HAVEN	
COUNTY	CLIENT
GLADES	CRAIG A. SMITH

SCALE:
VERTICAL
N.T.S.
SCALE:
HORIZONTAL
N.T.S.

SHEET TITLE: PAVEMENT CORE PHOTOS
PROJECT NAME: CITY OF MOORE HAVEN DOWNTOWN IMPROVEMENTS

SHEET NO. 4C
RADISE PROJECT NO: 02-22-164

APPENDIX A

TABLE A-1: SUMMARY OF LABORATORY TEST RESULTS GRAIN SIZE DISTRIBUTION



Table A-1: Summary of Laboratory Test

Project Name: City of Moore Haven Downtown Improvements

Project ID: 02-22-164

Boring No	Sample Depth	Soil Classification	Moisture Content (%)	Organic Content (%)	ATTERBERG LIMITS				GRAIN SIZE ANALYSIS												
					-200	LL (%)	PL (%)	PI	U.S STANDARD SIEVE SIZE (% Passing)												
									3"	1.5"	3/4"	3/8"	#4	#10	#20	#40	#50	#60	#100	#140	#200
B-1	0-2'	SP-SM	12.6	-	5.2	-	-	-	100	100	100	100	78.4	71.5	-	58.2	43.8	33.3	12.5	-	5.2
B-1	8-10'	SP	20.6	-	2.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
B-2	0-2'	SP	19.4	0.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
B-2	4-6'	SP	20.6	-	2.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
B-1	4-6'	SP	16.8	-	4.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
B-3	0-2'	SP	15.4	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
B-4	0-2'	SP	13.4	1.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
B-4	2-4'	SP	16.4	3.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
B-4	10-12'	SP-SM	22.4	-	9.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
B-5	0-2'	SP	15	0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
B-5	2-4'	SP-SM	11	-	11.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
B-2	0.15-0.9'	SM	11.7	-	19.5	-	-	-	100	100	100	100	82.4	68.6	57.6	47.9	41.1	36.7	26.8	22.1	19.5
B-5	0.13-0.63'	SM	12.8	-	15.8	-	-	-	100	100	100	100	72.5	59.6	49.4	40.5	34.3	31.2	22.1	18.0	15.8
AB-1	0-3'	SP	16	4.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AB-4	0-4'	SP	14.8	4.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AB-5	3-5'	SP-SM	109.2	7.8	5.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AB-5	8-10'	SM	152.3	15.5	20.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:
 Moisture Content tested in accordance ASTM-D2216,
 Organic Content tests are performed with furnace temperature @450 Celsius and tested accordance ASTM-D2974,
 Soil Classification tested with accordance to ASTM-D2487,
 Grain Size Analysis was tested in general accordance with ASTM-D6913,
 Fines Content (Passing No. 200 Sieve) was tested in general accordance with ASTM D 1140.

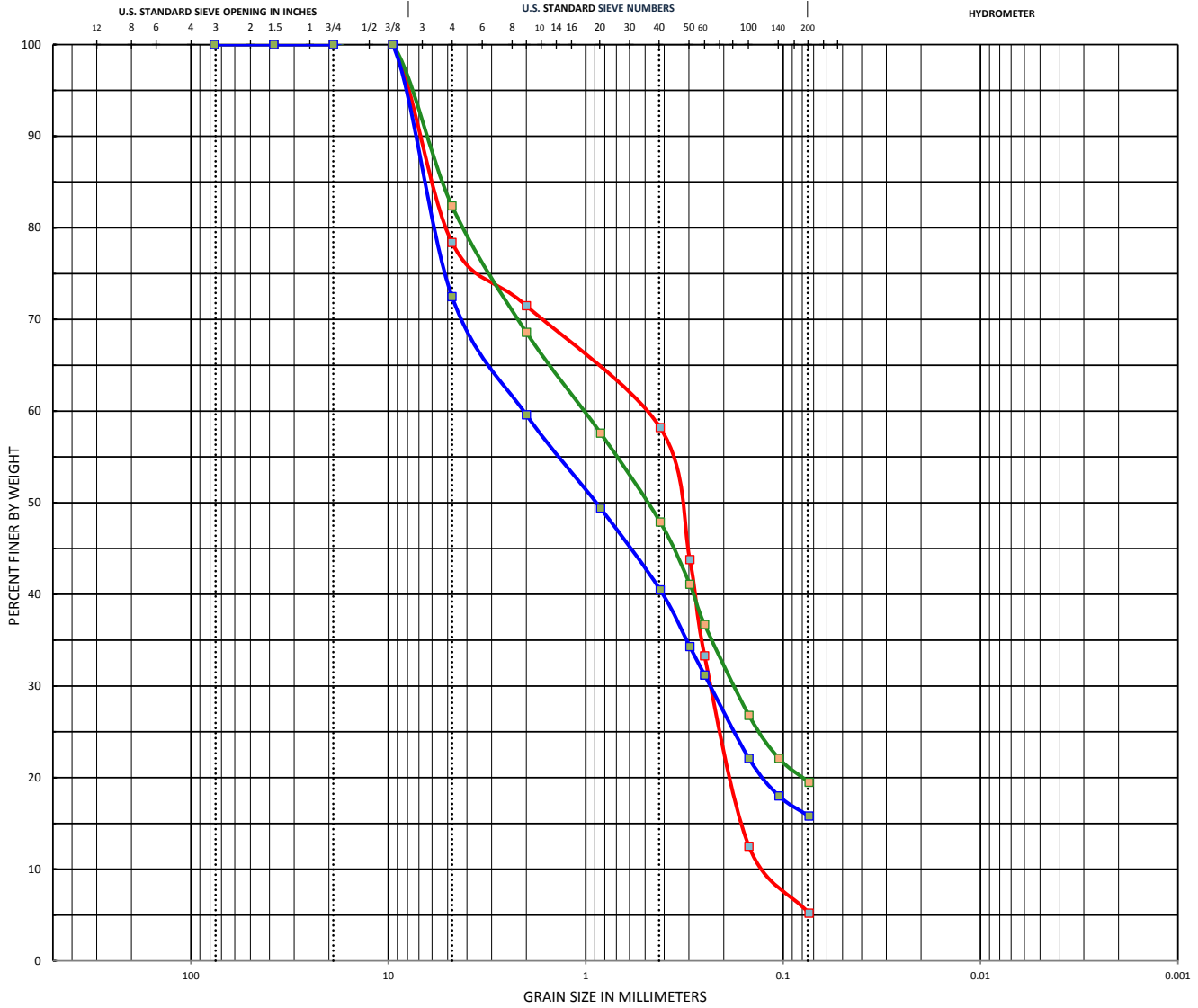


GRAIN SIZE DISTRIBUTION

CLIENT NAME Craig A. Smith & Associates

PROJECT NAME City of Moore Haven Downtown Improvements

PROJECT NUMBER 02-22-164



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring No, Depth	Classification	LL	PL	PI	Cc	Cu
B-1, 0-2'	Poorly-graded sand with silt and gravel (SP-SM)				0.7	5.11
B-2, 0.15-0.9'	Silty sand with gravel (SM)				0	0
B-5, 0.13-0.63'	Silty sand with gravel (SM)				0	0

Boring No, Depth	D100	D60	D30	D10	% Cobble	%Gravel	%Sand	%Silt	%Clay
B-1, 0-2'	9.51	0.63	0.23	0.12	0	21.6	73.2	5.2	
B-2, 0.15-0.9'	9.51	1.09	0.18	0	0	17.6	62.9	19.5	
B-5, 0.13-0.63'	9.51	2.09	0.24	0	0	27.5	56.7	15.8	

SECTION 00330

EXISTING CONDITIONS

PART 1 GENERAL

1.01 SUMMARY

- A. Site visit is mandatory prior to submittal of a proposal to verify the existing conditions and evaluate the suitability for project improvements.**

1.02 RELATED SECTIONS

- A. General Conditions - Bidding and Contract Requirement
- B. General Requirements - Division 1
- C. Construction Photographs and Video Recording - Division 1

1.03 SITE INVESTIGATION AND REPRESENTATION

- A. CONTRACTOR acknowledges the nature and location of the Work, the general and local conditions, particularly those bearing upon availability of transportation, disposal, handling and storage of materials, availability of labor, water, electric power, roads, uncertainties of weather or similar physical conditions of the ground, the character of equipment and facilities needed preliminary to and during execution of the work and matters which can affect the work or the cost thereof under this contract.
- B. The CONTRACTOR further acknowledges that he has satisfied himself as to the character, quality and quantity of surface and subsurface materials to be encountered from inspecting the site and from evaluating information derived from exploratory work that may have been done by the OWNER or included in these Contract Documents.
- C. Failure by the CONTRACTOR to acquaint himself with the available information will not relieve him from responsibility for properly estimating the difficulty or cost of successfully performing the work.

1.04 INFORMATION ON SITE CONDITIONS

- A. Information obtained by the OWNER regarding site conditions, topography, subsurface information, groundwater elevations, existing construction of site facilities as applicable and similar data will be available for inspection at the office of the ENGINEER upon request.

1. This information is offered as supplementary information only.
2. Neither the ENGINEER nor the OWNER assumes responsibility for the completeness or for the CONTRACTOR's interpretation of this supplementary information.

1.05 SUBSURFACE INFORMATION

- A. Information regarding the subsurface at the project site that the OWNER has obtained, may be examined by prospective bidders prior to the receipt of proposals.

1.06 BIDDER'S SUBSURFACE INVESTIGATION

- A. Bidders are invited, at their own expense, to make additional subsurface investigation by boring or test pit excavation as may be desired, provided however, that this work be scheduled by appointment with the ENGINEER.

1.07 DIFFERING SUBSURFACE CONDITIONS

- A. In the event subsurface or latent physical conditions are found materially different from those indicated in these Documents and differing materially from those ordinarily encountered and generally recognized as inherent in the character of work covered in these Contract Documents, promptly and before these conditions are disturbed, notify the ENGINEER in writing of these changed conditions.
- B. The ENGINEER will investigate these conditions promptly and following this investigation, the CONTRACTOR shall proceed with the work unless otherwise instructed by the ENGINEER.
 1. If the ENGINEER finds that these conditions do so materially differ and cause an increase or decrease in the cost of, or in the time required for performing the work, the ENGINEER will recommend to the OWNER the amount of adjustment in cost and time he considers reasonable.
 2. The OWNER will make the final decision on Change Orders to the Contract regarding adjustment in cost or time for completion.

1.08 EXISTING UTILITIES

- A. Known utilities and structures adjacent to or encountered in the work are shown in the Drawings.

1. The locations shown are taken from existing records and the best information available from existing utility plans; however, it is expected that there may be some discrepancies and omissions in the locations and quantities of utilities and structures shown.
 2. Those shown are for the convenience of the CONTRACTOR only, and no responsibility is assumed by either the OWNER or the ENGINEER for their accuracy or completeness.
- B. Additional costs incurred for idle time of equipment or labor as a result of uncovering unknown utilities shall be for the CONTRACTOR's account.
- C. Notify the ENGINEER of conflict between existing utilities and work to be performed.

1.09 CONTRACTOR'S RESPONSIBILITY FOR UTILITY, PROPERTY, AND SERVICE

- A. Make arrangements for protection of utilities, properties, and services such as railway, telegraph, television, power, oil, gas, water, sewer, or irrigation systems.
- B. Notify utility offices affected by construction operation at least forty-eight (48) hours in advance.
1. Under no circumstance shall utilities be exposed without first obtaining permission from the appropriate agency.
 2. Once permission has been granted, the existing underground utilities may be located, exposed and temporary support of these utilities shall be provided.
- C. CONTRACTOR is responsible to the owner and operators of these properties for damage, injury, expense, loss, inconvenience, delay, suits, actions, or claims of character brought because of injuries or damage which may result from the construction operations under this Contract.
- D. Neither the OWNER nor its officers or agents shall be responsible to the CONTRACTOR for damages as a result of the CONTRACTOR's failure to protect utilities encountered in the work.
- E. In the event of interruption to domestic water, sewer, storm drain or other utility services as a result of accidental breakage due to construction operations, promptly notify the owner of the utility and cooperate with the owner in restoration of service as promptly as possible and bear costs of repair.
1. In no event shall interruption of utility service be allowed outside working hours unless granted by the owner of the utility.

- F. With prior approval by owner of utility and at CONTRACTOR's expense interfering water service lines may be cut, dug through restored with similar approved materials.
- G. Replace other existing utilities or structures removed or damaged during construction, at CONTRACTOR's expense, unless otherwise provided for in the Contract Documents.

1.10 INTERFERING STRUCTURES

- A. Take necessary precautions to prevent damage to existing structures whether on the surface, above ground, or underground.
 - 1. An attempt has been made to show major structures in the Drawings.
 - 2. While the information has been compiled from the best available sources, its completeness and accuracy cannot be guaranteed, and it is presented as a guide to avoid possible difficulties.
- B. Protect existing structures from damage, whether or not they lie within the limits of the easements obtained by the OWNER.
 - 1. Where existing fences, gates, barns, sheds, buildings, or other structure must be removed to properly carry out the work or are damaged during the work, they shall be restored at the CONTRACTOR's expense to their original condition and to the satisfaction of the property owner.
- C. Without additional compensation, the CONTRACTOR may remove and replace, in a condition as good as or better than original, small structures such as fences, mailboxes, and signposts that interfere with the CONTRACTOR's operations.

1.11 FIELD RELOCATIONS

- A. Relocations shall be made only by direction of the ENGINEER.
- B. If existing structures are encountered that will prevent construction as shown, notify the ENGINEER before continuing with the work in order that the ENGINEER may make these field revisions to avoid conflict with the existing structures.
- C. If the CONTRACTOR fails to notify the ENGINEER when an existing structure is encountered and proceeds with the work despite this interference, he shall do so at his own risk.

1.12 EASEMENTS

- A. Work will be located on County or City owned or leased land, easements, and permits have been provided by the OWNER.
 - 1. Easements will provide for the use of property for construction purposes only to the extent indicated on the easements.
 - 2. It shall be the CONTRACTOR's responsibility to determine the adequacy of the easement obtained in every case and abide by requirements and provisions of the easement.
 - 3. Confine contract construction operations to within the easement limits or make special arrangements with the OWNER for the additional area required.
 - 4. Damage to property, either inside or outside the limits of the easements provided by the OWNER, shall be the responsibility of the CONTRACTOR.

1.13 SURVEYS

- A. Verify accuracy of survey or existing site information shown in the Drawings or in specifications.
 - 1. Notify the ENGINEER immediately upon finding errors, inaccuracies or omissions in the survey data.
 - 2. The commencing of the work by the CONTRACTOR shall be held as acceptance by the CONTRACTOR of the survey data, after which the CONTRACTOR shall have no claim against the OWNER resulting from alleged errors, inaccuracies, or omissions in the survey data.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 00410

BID FORM

**CITY OF MOORE HAVEN
DOWNTOWN IMPROVEMENTS
CAS PROJECT No. 22-2277**

THIS BID IS SUBMITTED TO:

**CITY OF MOORE HAVEN
299 RIVERSIDE DRIVE
MOORE HAVEN, FLORIDA 33472**

1. The undersigned BIDDER proposes and agrees, if this Bid is accepted, to enter into an agreement with OWNER in the form included in the Contract Documents to perform and furnish all Work as specified or indicated in the Contract Documents for the Contract Price and within the Contract Time indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.
2. BIDDER accepts all of the terms and conditions of the Advertisement or Invitation to Bid and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 90 days after the day of Bid opening. BIDDER will sign and submit the Agreement with the Bonds and other documents required by the Bidding Requirements within ten days after the date of OWNER's Notice of Award.
3. In submitting this Bid, BIDDER represents, as more fully set forth in the Agreement, that:
 - (a) BIDDER has examined copies of all the Bidding Documents and of the following Addenda (receipt of all which is hereby acknowledged.)

Addendum No: _____ Dated: _____

Addendum No: _____ Dated: _____

Addendum No: _____ Dated: _____

Addendum No: _____ Dated: _____

Addendum No: _____ Dated: _____

- (b) BIDDER has familiarized itself with the nature and extent of the Contract Documents, Work, site, locality, and all local conditions and Law and Regulations that in any manner may affect cost, progress, performance or furnishing of the Work.
- (c) BIDDER has studied carefully all reports and drawings of subsurface conditions and drawings of physical conditions.
- (d) BIDDER has obtained and carefully studied (or assumes responsibility for obtaining and carefully studying) all such examinations, investigations, explorations, tests and studies (in addition to or to supplement those referred to in (c) above) which pertain to the subsurface or physical conditions at the site or otherwise may affect the cost, progress performance or furnishing of the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents, and no additional examinations, investigations, explorations, tests, reports or similar information or data are or will be required by BIDDER for such purposes.
- (e) BIDDER has reviewed and checked all information and data shown or indicated on the Contract Documents with respect to existing Underground Facilities at or contiguous to the site and assumes responsibility for the accurate location of said Underground Facilities. No additional examinations, investigations, explorations, tests, reports or similar information or data in respect of said Underground Facilities are or will be required by BIDDER in order to perform and furnish the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents.
- (f) BIDDER has correlated the results of all such observations, examinations, investigations, explorations, tests, reports and studies with the terms and conditions of the Contract Documents.
- (g) BIDDER has given ENGINEER written notice of all conflicts, errors, discrepancies that it has discovered in the Contract Documents and the written resolution thereof by ENGINEER is acceptable to BIDDER.
- (h) This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization, or corporation; BIDDER has not directly or indirectly induced or solicited any other BIDDER to submit a false or sham Bid; BIDDER has not solicited or induced any person, firm or corporation to refrain from bidding; and BIDDER has not sought by collusion to obtain for itself any advantage over any other BIDDER or over the OWNER.

Bidders Name _____

4. BIDDER will complete the work for the following price:

Bid Total \$ _____

(Written Total Amount)

5. BIDDER agrees that the work will be complete within 210 calendar days after the date stipulated in the Notice to Proceed.

6. Communications concerning this Bid shall be addressed to:

BIDDER:

Address:

Attention:

7. The terms used in this Bid which are defined in the General Conditions of the Construction Contract included as part of the Contract documents have the meanings assigned to them in the General Conditions.

SUBMITTED on _____, 20 _____.

If BIDDER is:

An Individual

By: _____ (SEAL)
(Individual's Name)

doing business as: _____

Business address: _____

Phone No: _____

Bidders Name _____

A Partnership

By: _____ (SEAL)
(Firm's Name)

(General Partner)

Business address: _____

Phone No: _____

A Corporation

By: _____ (SEAL)
(Corporation Name)

(State of Incorporation)

By: _____
(Name of Person Authorized to Sign)

(Title)

Attest _____
(President)

Business address: _____

Phone No: _____

Bidders Name _____

A Joint Venture

By: _____
(Name)

(Address)

By: _____
(Name)

(Address)

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

QUESTIONNAIRE

Questionnaire sheet to be filled in by BIDDER.

The undersigned guarantees the truth and accuracy of all statements and answers herein contained:

1. How many years has your organization been in business as a general contractor?

2. List any public works contracts you have performed with any governmental agency having a value in excess of \$25,000 within the last 10 years:

3. Were all contracts listed in No. 2 above completed within the time period without extensions?

4. Were liquidated damages incurred by the contractor for non-timely completion and, the extent to which additional time extensions were granted on all contracts that were not so timely completed.

Bidders Name _____

5. Was the Surety on any Public Works Section 255.05 Bond ever notified that the BIDDER was in default in the performance of such contracts? And if such default notice was so given, please indicate in detail how much claim default was resolved:

6. Indicate the number of times in which arbitration or litigation ensued from any said Public Works contract within the last 10 years as well as the result of such arbitration of litigation (i.e. whether the same was settled or resolved by trial and who prevailed between the BIDDER and the governmental agency involved.):

7. Please provide a history of similar projects you have completed, other than those listed in No. 2 above. Including Project Name, Owner (phone number), Value of Work Performed, Percentage Completed.

8. What is the last project of this nature that you have completed? Provide Owner's name and phone.

9. Have you ever failed to complete work awarded to you? If so, where and why?

10. The following are named as three corporations or individuals for which you have performed work and to which you refer.

11. Have you personally inspected the proposed work and have you a complete plan for its performance?

12. Will you sublet any part of this work? If so, give details.

Bidders Name _____

State the true, exact, correct and complete name of the partnership, corporation or trade name under which you do business, and the address of the place of business. If a corporation, state the name of the president and secretary. If a partnership, state the names of all partners. If a trade name, state the names of the individuals who do business under the trade name). It is absolutely necessary that this information be furnished.

(Correct Name of BIDDER)

(a) The business is a _____

(b) The address of principal place of business is:

(c) The names of the corporate officers, or partners, or individuals doing business under a trade name are as follows:

(BIDDER)

**CITY OF MOORE HAVEN
DOWNTOWN IMPROVEMENTS PROJECT
CAS PROJECT NUMBER 22-2277**

1. BIDDER AGREES TO PERFORM ALL THE WORK DESCRIBED IN THE CONTRACT DOCUMENTS TO PROVIDE A COMPLETE PROJECT AS SHOWN ON THE PLANS AND SPECIFICATIONS UNDER THE FOLLOWING LUMP SUM AND/OR UNIT PRICES.
2. THE OWNER RESERVES THE RIGHT TO SUBSTITUTE AND/OR DELETE ITEMS AS NECESSARY TO MEET THE FUNDING BUDGET.
3. BIDS SHALL INCLUDE SALES TAX AND ALL OTHER APPLICABLE TAXES AND FEES.
4. BIDDER UNDERSTANDS THAT THE EXTENDED TOTAL FOR EACH AND EVERY ITEM IS THE RESULT OF MULTIPLYING THE QUANTITY TIMES THAT UNIT COST AS STATED IN THE FIGURES.
5. IN THE CASE OF A DISCREPANCY BETWEEN THE UNIT COST AND THE TOTAL, THE DISCREPANCY SHALL FAVOR THE OWNER (LOWER RESULTING TOTAL COST).

BID ITEMS

GENERAL CONDITIONS (ITEMS 1-6)

THE LUMP SUM (LS) PRICES FOR ITEMS 1-6 SHALL BE FOR WORK DONE IN ACCORDANCE WITH THE CONTRACT DOCUMENTS AND SPECIFICATIONS AND ALL APPLICABLE FEDERAL, STATE, AND LOCAL REQUIREMENTS.

DESCRIPTION	QTY.	UNIT	UNIT COST	TOTAL
1 Mobilization Includes Mobilization, Demobilization, Bonds and General Conditions. This lump sum amount shall include preparatory and closing work, operations in mobilizing for beginning and completing the work at the end of the project, including, but not limited to: all required permits; operations necessary for the movement of personnel, equipment, materials, supplies and incidentals to and from the project site; temporary utilities and other facilities; cleanup and disposal of debris, asphalt and surplus excavation; preconstruction investigations and tests; costs for maintaining current all performance, payment and maintenance bonds; all required insurances; and any other costs, incidental or necessary, as required by these Specifications, State and local laws/regulations needed to initiate and terminate construction shall be included in this bid item (exclude work related to any other Bid Item listed below).	1	LS	_____	_____
2 Maintenance of Traffic Maintenance of Traffic (M.O.T.) in accordance with the Florida Department of Transportation (FDOT) Standard Specifications for Road & Bridge Construction Latest edition and the Roadway & Traffic design standards Index Number 600 to 655 latest Edition. The contractor's proposed maintenance of traffic plan is to be submitted to and approved by the Engineer. Lump sum shall include the costs of barricades, lighting, flagman, off duty policeman and any other work needed to control traffic and minimize inconveniences to the public.	1	LS	_____	_____
3 Survey Stakeout and As-Builts Includes construction survey, stake out, and preparation of As- Built record drawings signed and sealed by a state licensed surveyor. All survey is to be done in conformance with the drawings, specifications , and permit requirements.	1	LS	_____	_____
4 Density Testing Provide density tests as required in the plans and specifications.	1	LS	_____	_____
5 Pre- and Post- Construction Video Documentation Record pre- and post- construction conditions of all areas of work and provide a copy of the video to the Engineer prior to beginning work.	1	LS	_____	_____
6 Erosion Control/ SWPPP and NPDES Permitting Furnish and Install perimeter silt fence, turbidity screen and any other BMP'S necessary for sediment and erosion control. The SWPPP plan and NPDES permit will be submitted by the Contractor at the pre-construction meeting. The Contractor is to assume full responsibility for all conditions for the duration of the project pertaining to sediment and erosion control.	1	LS	_____	_____

DEMOLITION (ITEMS 7-17)

THE UNIT PRICE FOR EACH DEMOLITION WORK ITEM SHALL INCLUDE BUT NOT BE LIMITED TO ALL LABOR, EQUIPMENT AND MATERIALS NECESSARY TO REMOVE THESE ITEMS IN ACCORDANCE WITH THE CONTRACT DOCUMENTS AND CITY SPECIFICATIONS INCLUDING BUT NOT LIMITED TO THE FOLLOWING: ASPHALT, BASE MATERIAL, DRAINAGE, SOD AND CONCRETE REMOVAL AND DISPOSAL, SURFACE CLEARING AND GRUBBING, GRADING AND LEVELING, PERMITTING, TESTING, INSPECTIONS AND ANY OTHER DEMOLITION WORK AND APPURTENANCES REQUIRED FOR PREPARATION OF THE SITE PRIOR TO INSTALLATION OF THE IMPROVEMENTS, AS SHOWN ON THE PLANS. NO ADDITIONAL COMPENSATION SHALL BE MADE FOR CHANGES IN ALIGNMENT OR GRADE.

DESCRIPTION	QTY.	UNIT	UNIT COST	TOTAL
7 Remove Existing Asphalt Material	6450	SY	_____	_____
8 Remove Existing Base/Sub-base Material	7040	SY	_____	_____
9 Remove Existing Concrete Sidewalk	760	SY	_____	_____
10 Remove Existing Conc. Curb & Gutter/ Conc. Curb	3350	LF	_____	_____
11 Remove Existing Base Material (1st Street SW Crosswalk Areas)	370	SY	_____	_____
12 Remove Existing Storm Inlets	6	EA	_____	_____
13 Remove Existing P-Top Inlets	2	EA	_____	_____
14 Remove Existing Drainage Pipe	700	LF	_____	_____
15 Remove Existing Concrete Flumes	2	EA	_____	_____
16 Remove Existing Stairs/Handrail	1	LS	_____	_____
17 Remove Existing Sod	1450	SY	_____	_____

ROADWAY IMPROVEMENTS (ITEMS 18-38)

THE UNIT PRICE FOR EACH ROAD IMPROVEMENTS ITEM SHALL INCLUDE BUT NOT BE LIMITED TO ALL LABOR, EQUIPMENT AND MATERIALS NECESSARY TO INSTALL AND CONSTRUCT THESE ITEMS IN ACCORDANCE WITH THE CONTRACT DOCUMENTS AND CITY SPECIFICATIONS INCLUDING BUT NOT LIMITED TO THE FOLLOWING: SAW CUTTING, ASPHALT REMOVAL AND DISPOSAL, SURFACE CLEARING AND ROAD SCARIFICATION, BACKFILL LIMEROCK BASE MATERIAL, COMPACTION, MATERIAL TO BE RESTORED TO SAME ELEVATION AS EXISTING ASPHALT (GRADE TO SLOPE), GRADING AND LEVELING, PRIME AND TACK COAT, DRIVEWAY HARMONIZATION AND RESTORATION, PERMITTING, TESTING, INSPECTIONS AND ANY OTHER MISCELLANEOUS WORK AND APPURTENANCES REQUIRED TO RESTORE THE AREA OF WORK BACK TO IT'S ORIGINAL CONDITION AFTER INSTALLATION OF THE IMPROVEMENTS, AS SHOWN ON THE PLANS. NO ADDITIONAL COMPENSATION SHALL BE MADE FOR CHANGES IN ALIGNMENT OR GRADE.

DESCRIPTION	QTY.	UNIT	UNIT COST	TOTAL
18 2-inch Polymer Modified Asphalt Pavement	6550	SY	_____	_____
19 Mill Existing Asphalt Surface (1-inch average depth)	1500	SY	_____	_____
20 1 1/4-inch Polymer Modified Asphalt Pavement	1500	SY	_____	_____
21 8-inch Compacted Shellrock Base (LBR 100)	7250	SY	_____	_____
22 12-inch Compacted Sub-base (LBR 40)	7990	SY	_____	_____
23 Tensar Triax-TX140 Geogrid	6550	SY	_____	_____
24 Brick Pavers at Crosswalks	710	SY	_____	_____
25 Concrete Sidewalk	1360	SY	_____	_____
26 2-foot Concrete Curb & Gutter	1770	LF	_____	_____
27 Type 'D' Concrete Curb	1030	LF	_____	_____
28 Regrade Swale Area	220	SY	_____	_____
29 6' x 4' Control Structure	1	EA	_____	_____
30 6-foot Dia. Water Quality Structure	2	EA	_____	_____
31 Type 'M-6' Inlet w/ USF 4155	1	EA	_____	_____
32 Type 'M-4' Inlet w/ USF 4155	10	EA	_____	_____
33 Type 'M-4' Storm Curb Inlet w/ USF 5155	4	EA	_____	_____
34 Type 'M-4' Manhole w/ USF 580	3	EA	_____	_____
35 24-inch PVC Drain Basin	1	EA	_____	_____
36 24-inch A2000 PVC	320	LF	_____	_____
37 18-inch A2000 PVC	1255	LF	_____	_____
38 15-inch A2000 PVC	50	LF	_____	_____

STRIPING AND SIGNAGE IMPROVEMENTS (ITEMS 39-55)

THE UNIT PRICE FOR EACH PAVEMENT MARKING AND SIGNAGE ITEM SHALL INCLUDE BUT NOT BE LIMITED TO ALL LABOR, EQUIPMENT AND MATERIALS NECESSARY TO INSTALL AND CONSTRUCT THESE ITEMS IN ACCORDANCE WITH THE CONTRACT DOCUMENTS AND CITY SPECIFICATIONS INCLUDING BUT NOT LIMITED TO THE FOLLOWING: ALL SURFACE PREPARATION, CLEANING, REMOVAL OF EXISTING STRIPING AND SIGNAGE, TIE-INS TO MATCH EXISTING MATERIAL, TESTING, INSPECTIONS AND ANY OTHER MISCELLANEOUS WORK AND APPURTENANCES REQUIRED TO RESTORE THE AREA OF WORK BACK TO IT'S ORIGINAL CONDITION AFTER INSTALLATION OF THE IMPROVEMENTS, AS SHOWN ON THE PLANS. NO ADDITIONAL COMPENSATION SHALL BE MADE FOR CHANGES IN ALIGNMENT OR GRADE.

DESCRIPTION	QTY.	UNIT	UNIT COST	TOTAL
39 Relocate existing R1-1 sign	3	EA	_____	_____
40 Install new R1-1 signs w/ posts	6	EA	_____	_____
41 Install new R5-1 signs w/ posts	2	EA	_____	_____
42 Install new R6-1R signs w/ posts	2	EA	_____	_____
43 Install new D9-5 ADA signs w/ posts	13	EA	_____	_____
44 24-inch White Stop Bar (Thermoplastic)	140	LF	_____	_____
45 12-inch White Crosswalk (Thermoplastic)	895	LF	_____	_____
46 6-inch Double Yellow Stripe (Thermoplastic)	210	LF	_____	_____
47 4-inch White (Parallel Parking) (Thermoplastic)	23	EA	_____	_____
48 4-inch White (60-Degree Parking) (Thermoplastic)	56	EA	_____	_____
49 4-inch Blue (ADA Spaces w/Access Aisle-Parallel Parking) (Thermoplastic)	2	EA	_____	_____
50 4-inch Blue (ADA Spaces w/Access Aisle-60-Degree Parking) (Thermoplastic)	11	EA	_____	_____
51 White Directional Arrow (Thermoplastic)	3	EA	_____	_____
52 Blue ADA Symbol (Thermoplastic)	13	EA	_____	_____
53 Install new R6-1R signs w/ posts	2	EA	_____	_____
54 Reflective Pavement Markers (Yellow/Yellow)	32	EA	_____	_____
55 Reflective Pavement Markers (Blue)	2	EA	_____	_____

MISCELLANEOUS (ITEMS 56-66)

THE UNIT PRICE FOR EACH MISCELLANEOUS ITEM SHALL INCLUDE BUT NOT BE LIMITED TO ALL LABOR, EQUIPMENT AND MATERIALS NECESSARY TO INSTALL AND CONSTRUCT THESE ITEMS IN ACCORDANCE WITH THE CONTRACT DOCUMENTS AND CITY SPECIFICATIONS INCLUDING BUT NOT LIMITED TO THE FOLLOWING: ALL SURFACE PREPARATION, COMPACTION, LEVELING AND GRADING, HARMONIZATION TO EXISTING GRADE, TESTING, INSPECTIONS AND ANY OTHER MISCELLANEOUS WORK AND APPURTENANCES REQUIRED TO RESTORE THE AREA OF WORK BACK TO IT'S ORIGINAL CONDITION AFTER INSTALLATION OF THE IMPROVEMENTS, AS SHOWN ON THE PLANS. NO ADDITIONAL COMPENSATION SHALL BE MADE FOR CHANGES IN ALIGNMENT OR GRADE.

DESCRIPTION	QTY.	UNIT	UNIT COST	TOTAL
56 Handicap Ramp w/ Truncated Dome	40	EA	_____	_____
57 Raise Existing Sanitary Manhole	5	EA	_____	_____
58 Raise Existing Gate Valve	1	EA	_____	_____
59 Relocate Existing Fire Hydrant	1	EA	_____	_____
60 Relocate Existing Light Pole	2	EA	_____	_____
61 Relocate Existing Light Pole and Electrical Box	1	EA	_____	_____
62 Relocate Existing Wood Power Pole	1	EA	_____	_____
63 Crafto PN No. 34521 Polyflex Type 3 Sealant (or equal)	520	LF	_____	_____
64 Asphalt Aprons	5	EA	_____	_____
65 Water Main Deflections	2	EA	_____	_____
66 Bahia Sod Restoration	1750	SY	_____	_____
BID TOTAL (ITEMS 1 - 66)		\$	_____	_____

(Written Total Dollar Amount)

Bidders Name _____

**IN THE CASE OF A DISCREPANCY BETWEEN THE UNIT COST AND THE TOTAL, THE DISCREPANCY SHALL FAVOR THE OWNER .
(LOWER RESULTING TOTAL COST)**

Completion Time: The work will be substantially complete within One Hundred and Eighty (180) days after the date when the Contract Times commence to run, and completed and ready for final payment within Two Hundred and Ten (210) days after the date when the Contract Times commence to run. The project will be considered substantially complete when all portions of the new lines have been tested and approved by the Engineer, the lines are ready to be placed into service, and all restoration and roadway paving have been completed. The project will be considered complete and ready for final payment when, following substantial completion, the ENGINEER on behalf of the OWNER confirms in writing that the CONTRACTOR has completed the Work in accordance with the contract, including completion of all punch list items, clean-up work and delivery of all required guarantees, warranties, licenses, record drawings, releases and other required deliverables.

Bidder: _____

By: _____

Title: _____

Signature: _____

Attest: _____ (CORPORATE SEAL)

END OF SECTION

SECTION 00433

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, _____

as Principal and Contractor, and _____

hereinafter called Surety, are held and firmly bound unto Owner, a political entity of the State of Florida, and represented by its Chairman called Owner, in the sum of five percent (5%) of the total amount bid of:

(Written Dollar Amount)

dollars (\$_____) lawful money of the United States of America, for the payment of which well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally by these presents.

WHEREAS, the Principal contemplates submitting or has submitted, a bid to the Owner for the furnishing of all labor, materials, equipment, machinery, tools, apparatus, means of transportation for, and the performance of the work covered in the Proposal and the detailed Drawings and Specifications, entitled:

**CITY OF MOORE HAVEN
DOWNTOWN IMPROVEMENTS
CAS PROJECT No. 22-2277**

WHEREAS, it was a condition precedent to the submission of said bid that a cashier's check, certified check, or bid bond in the amount of 5 percent of the Base Bid be submitted with said bid as a guarantee that the Bidder would, if awarded the Contract, enter into a written Contract with the Owner for the performance of said Contract, within 10 consecutive calendar days after written notice having been given of the award of the Contract.

NOW, THEREFORE, the conditions of this obligation are such that if the Principal within 10 consecutive calendar days after written notice of such acceptance, enters into a written Contract with Owner and furnishes the Performance and Payment Bonds, each in an amount equal to 100 percent of the Awarded Bid, satisfactory to the Owner, then this obligation shall be void; otherwise the sum herein stated shall be due and payable to Owner and the Surety herein agrees to pay said sum immediately upon demand of the Owner in good and lawful money of the United States of America, as liquidated damages for failure thereof of said Principal.

IN WITNESS WHEREOF, the said _____
as Principal herein, has caused these presents to be signed in its name by
its _____ and
attested by its _____
under its corporate seal, and the said _____

as Surety herein, has caused these presents to be signed in its name by
its _____
and attested in its name by its _____
under its corporate seal, this _____ day of _____ A.D., 20__.

Signed, sealed and delivered PRINCIPAL: _____

in the presence of:

_____ BY: _____

_____ NAME: _____

As to Principal

Surety

BY: _____
Attorney-in-Fact
(Power-of-Attorney to be attached)

_____ BY: _____
Resident Agent

As to Surety

END OF SECTION

SECTION 00451

CONTRACTOR'S QUALIFICATIONS FORM

CITY OF MOORE HAVEN:

We, _____, hereby attest and
(Prime Contractor)

swear that as CONTRACTORS for **CITY OF MOORE HAVEN DOWNTOWN IMPROVEMENTS (CAS Project No. 22-2277)**, that

(Underground Contractor's Names)

is the Florida Licensed Underground Contractor for this project and that this Underground Contractor fully complies with Florida regulation governing Underground Contractors and that:

Prime Contractor

Signature: _____

Printed Name: _____

Title: _____

Company _____

License No. _____

Expiration _____

Date _____

Underground Contractor

Signature: _____

Printed Name: _____

Title: _____

Company _____

License No. _____

Expiration _____

Date _____

SWORN to and subscribed before me this _____ day of _____, 20__.

Signature of NOTARY PUBLIC, State of Florida at Large

(Notary Seal)

My Commission expires: _____

END OF SECTION

SECTION 00452

DISADVANTAGED BUSINESS ENTERPRISE FORM

VENDOR REPRESENTS THAT HE/SHE IS A:

Black Minority Business Enterprise ()
Hispanic Minority Business Enterprise ()
Other Minority Business Enterprise () Specify: _____
Woman's Business Enterprise ()
Non-minority Vendor ()

NAME OF FIRM: _____

BY: _____
(Signature) (Title)

ADDRESS: _____

TELEPHONE NO: _____ STATE LICENSE #: _____
(if applicable)

COUNTY LICENSE #: _____
(if applicable)

CERT. OF INSURANCE ENCLOSED? YES _____ NO _____

AUTHORIZED NAME TYPED: _____ TITLE: _____

AUTHORIZED SIGNATURE: _____ DATE: _____

END OF SECTION

SWORN STATEMENT
ON PUBLIC ENTITY CRIMES
UNDER FLORIDA STATUTES CHAPTER 287.133(3)(a).

THIS FORM MUST BE SIGNED IN THE PRESENCE OF A NOTARY PUBLIC OR OTHER OFFICER AUTHORIZED TO ADMINISTER OATHS.

1. This sworn statement is submitted with Bid, Proposal or Contract No. _____ for _____.

2. This sworn statement is submitted by _____ (name of entity submitting sworn statement) whose business address is _____ and _____

(if applicable) its Federal Employer Identification Number (FEIN) is _____.
(If the entity has no FEIN, include the Social Security Number of the individual signing this sworn statement: _____.)

3. My name is _____ and my
(Please print name of individual signing)

relationship to the entity named above is _____.

4. I understand that a "public entity crime" as defined in Paragraph 287.133(1)(g), Florida Statutes, means a violation of any state or federal law by a person with respect to and directly related to the transaction of business with any public entity or with an agency or political subdivision of any other state or with the United States, including, but not limited to, any bid or contract for goods or services to be provided to any public entity or an agency or political subdivision of any other state or of the United States and involving antitrust, fraud, theft, bribery, collusion, racketeering, conspiracy, or material misrepresentation.

5. I understand that a "convicted" or "conviction" as defined in Paragraph 287.133(1)(b), Florida Statutes, means a finding of guilt or a conviction of a public entity crime, with or without an adjudication of guilt, in any federal or state trial court of record relating to charges brought by indictment or information after July 1, 1989, as a result of a jury verdict, nonjury trial, or entry of a plea of guilty or nolo contendere.

6. I understand that an "affiliate" as defined in Paragraph 287.133(1)(a), Florida Statutes, and means:
1. A predecessor or successor of a person convicted of a public entity crime:
or
 2. An entity under the control of any natural person who is active in the management of the entity and who has been convicted of a public entity crime. The term "affiliate" includes those officers, directors, executives, partners, shareholders, employees, members, and agents who are active in the management of an affiliate. The ownership by one person of shares constituting a controlling interest in another person, or a pooling of equipment or income among persons when not for fair market value under an arm's length agreement, shall be a prima facie case that one person controls another person. A person who knowingly enters into a joint venture with a person who has been convicted of a public entity crime in Florida during the preceding 36 months shall be considered an affiliate.
7. I understand that a "person" as defined in Paragraph 287.133(1)(e), Florida Statutes, means any natural person or entity organized under the laws of any state or of the United States with the legal power to enter into a binding contract and which bids or applies to bid on contracts for the provision of goods or services let by a public entity, or which otherwise transacts or applies to transact business with a public entity. The term "person" includes those officers, directors, executives, partners, shareholders, employees, members, and agents who are active in management of an entity.
8. Based on information and belief, the statement, which I have marked below, is true in relation to the entity submitting this sworn statement. (Please indicate which statement applies.)

Neither the entity submitting this sworn statement, nor any officers, directors, executives, partners, shareholders, employees, members, or agents who are active in management of the entity, nor any affiliate of the entity have been charged with and convicted of a public entity crime subsequent to July 1, 1989.

The entity submitting this sworn statement, or one or more of the officers, directors, executives, partners, shareholders, employees, members, or agents who are active in management of the entity, or an affiliate of the entity has been charged with and convicted of a public entity crime subsequent to July 1, 1989, AND (Please indicate which additional statement applies.)

SECTION 00457

ACKNOWLEDGEMENT OF CONFORMANCE
WITH O.S.H.A. STANDARDS

TO: **CITY OF MOORE HAVEN:**

We, _____, hereby acknowledge and
(Prime Contractor)

agree that as CONTRACTORS for **THE CITY OF MOORE HAVEN DOWNTOWN IMPROVEMENTS** as specified have the sole responsibility for compliance with all the requirements of the Federal Occupational Safety and Health Act of 1970, and all State and local safety and health regulations, and agree to indemnify and hold harmless **CITY OF MOORE HAVEN** and Craig A. Smith & Associates against any and all liability, claims, damages, losses and expenses they may incur due to the failure of

(Subcontractor's Names)

to comply with such act or regulation.

CONTRACTOR

ATTEST

BY: _____

ATTEST

DATE

END OF SECTION

SECTION 00458

BIDDER'S AFFIDAVIT IN COMPLIANCE WITH
FLORIDA TRENCH SAFETY ACT (CHAPTER 553.60-553.64, FLORIDA STATUTES)

STATE OF FLORIDA)
)ss.
CITY OF MOORE HAVEN)

BEFORE ME, the undersigned authority, personally appeared

_____, who being duly sworn deposes and says as follows:

That he/she is duly authorized representative of

_____ and
such
(Owner) (Partner) (President or other Corporate Officer)

has full authority to execute this Bidder's Affidavit.

1. The full legal name and business address of the person or entity submitting this bid:

2. By submission of this bid and subsequent execution of this Contract, the undersigned Bidder certifies that as successful Bidder (Contractor) all trench excavation done within his control (by his own forces or by his Subcontractors) shall be accomplished in strict adherence with OSHA trench safety standards contained in 29 C.F.R., s. 1926.650, Subpart P, including all subsequent revisions or updates to these standards as adopted by the Department of Labor and Employment Security.
3. The undersigned Bidder certifies that as successful Bidder (Contractor) he has obtained or will obtain identical certification from his proposed Subcontractors that will perform trench excavation prior to award of the subcontracts and that he will retain such certifications in his files for a period of not less than three years following final acceptance.

4. The Bidder acknowledges that included in the various items listed in the Schedule of Prices Bid and in the Total Amount Bid are costs for complying with the Florida Trench Safety Act (Chapter 553.60-553.64, Florida Statutes). The bidder further identifies the costs to be summarized below*:

	Trench Safety Measure	Units of Measure	Unit Quantity	Unit Cost	Extended Cost
A.	_____	_____	_____	_____	
B.	_____	_____	_____	_____	
C.	_____	_____	_____	_____	
D.	_____	_____	_____	_____	
				TOTAL:	

Method of Compliance (Specify) _____

Date: _____, 19__

 NAME OF AFFIANT

SWORN to and subscribed before me this

_____ day of _____, 20__.

 NOTARY PUBLIC, State of Florida at Large

(Notary Seal)

My Commission expires: _____

*Bidders: Add extra sheet(s), if needed.

If Bidder fails to complete and execute this sworn statement/affidavit, his Bid may be declared non-responsive and rejected by **CITY OF MOORE HAVEN**

END OF SECTION

SECTION 00459

DRUG FREE WORK PLACE FORM

The undersigned vendor in accordance with Florida Statute 287-087 hereby certifies that _____ does:

1. Publish a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the workplace and specifying the actions that will be taken against employees for violations of such prohibition.
2. Inform employees about the dangers of drug abuse in the workplace, the business's policy of maintaining a drug-free workplace, any available drug counseling, rehabilitation, and employee assistance programs, and the penalties that may be imposed upon employees for drug abuse violations.
3. Give each employee engaged in providing the commodities or contractual services that are proposed a copy of the statement specified in subsection (1).
4. In the statement specified in subsection (1), notify the employees that, as a condition of working on the commodities or contractual services that are under bid, the employee will abide by the terms of the statement and will notify the employer of any conviction of, or plea of guilty or nolo contendere to, any violation of Chapter 893 or of any controlled substance law of the United States or any state, for a violation occurring in the workplace no later than five (5) days after such conviction.
5. Impose a sanction on, or require the satisfactory participation in a drug abuse assistance or rehabilitation program if such is available in the employee's community, by any employee who is so convicted.
6. Make a good faith effort to continue to maintain a drug-free workplace through implementation of this section.

As the person authorized to sign the statement, I certify that this firm complies fully with the above requirements.

Proposer's Signature

END OF SECTION

MEMORANDUM

CRAIG A. SMITH AND ASSOCIATES
21045 COMMERCIAL TRAIL
BOCA RATON, FL 33486
TEL (561) 314-4445
FAX (561) 314-4458

To: Bidders

From: Craig A. Smith & Associates

Date:

Project:

Subject: ADDENDUM NO. ___

Bidders are required to acknowledge receipt of this ADDENDUM on Page 00410-1 of the Contract Documents and by returning the acknowledgment on Page 00490-2 of the Contract Documents to our office immediately via fax. Failure to do so may cause the bid to be considered informal or irregular and subject to rejection.

The Contract Documents, Specifications and Drawings are hereby amended as follows:

A. CONTRACT DOCUMENTS AND SPECIFICATIONS:

1.

Addendum No. ____

ACKNOWLEDGMENT OF RECEIPT OF ADDENDUM

I hereby acknowledge receipt of Addendum No. to the Contract Documents, Specifications and Drawings (consisting of two pages) for the **CITY OF MOORE HAVEN DOWNTOWN IMPROVEMENTS CAS PROJECT No. 22-2277**

Name of Bidder: _____

By: _____

Title: _____

Date: _____

END OF SECTION

SECTION 00500

AGREEMENT

THIS AGREEMENT, made and entered into on this _____ day of _____, 20__, by and between _____ Party of the First Part, and **City of Moore Haven** (OWNER), Party of the Second Part:

WITNESSETH:

That, the First Party, for the consideration hereinafter fully set out, hereby agrees with the Second Party as follows:

- 1. That the First Party shall furnish all the materials, and perform all of the work in manner and form as provided by the Drawings Identified in Section 00015 List of Drawings, Specifications Identified in Section 00010, and Documents which are attached hereto and made a part hereof, as if fully contained here:
- 2. That the First Party shall commence the work to be performed under this Agreement on a date to be specified in a written order of the Second Party and shall complete all work hereunder within the length of time stipulated in the BID.
- 3. That the Second Party hereby agrees to pay to the First Party for the faithful performance of this Agreement, subject to additions and deductions as provided in the Specifications of Proposal, in lawful money of the United States, the amount of:

(Written Dollar Amount)

dollars (\$_____), based on the estimated quantities and Unit or Lump Sum Prices contained herein.

- 4. That the Second Party shall make monthly partial payments to the First Party on the basis of a duly certified and approved estimate of work performed during each calendar month by the First Party, LESS the retainage provided in the General Conditions, which is to be withheld by the Second Party until work within a particular part has been performed strictly in accordance with this Agreement and until such work has been accepted by the Second Party.
- 5. That upon submission by the First Party of evidence satisfactory to the Second Party that all payrolls, material bills, and other costs incurred by the First Party in

connection with the construction of the work have been paid in full, final payment on account of this Agreement shall be made within 60 days after the completion by the First Party of all work covered by this Agreement and the acceptance of such work by the Second Party.

6. In the event that the Contractor shall fail to complete the work within the time limit or the extended time limit agreed upon, as more particularly set forth in the Contract Documents, liquidated damages shall be paid at the rate of **Three Hundred and 00/100 Dollars (\$300.00)** per day, plus any monies paid by the OWNER to the Engineer for additional engineering and inspection services associated with such delay.
7. It is further mutually agreed between the parties hereto that if, at any time after the execution of this Agreement and the Surety Bond hereto attached for its faithful performance and payment, the Second Party shall deem the Surety or Sureties upon such bond to be unsatisfactory, or if, for any reason such bond ceases to be adequate to cover the performance of the work, the First Party shall, at its expense within 5 days after the receipt of notice from the Second Party so to do, furnish an additional bond or bonds in such form and amount and with such Surety or Sureties as shall be satisfactory to the Second Party. In such event, no further payment to the First Party shall be deemed to be due under this Agreement until such new or additional security for the faithful performance of the work shall be furnished in manner and form satisfactory to the Second Party.
8. No additional work or extras shall be done unless the same shall be duly authorized by appropriate action by the Party of the Second Part.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement on the day and date first above written, in three (3) counterparts, each of which shall, without proof or accounting for the other counterpart be deemed an original Contract.

WITNESSES:

CONTRACTOR:

BY:

NAME:

TITLE:

OWNER:

City of Moore Haven

BY:

NAME:

TITLE:

AUTHENTICATION:

BY:

NAME:

TITLE:

APPROVED AS TO FORM:

BY:

NAME:

TITLE:

END OF SECTION

SECTION 00510
NOTICE OF AWARD

TO:

PROJECT DESCRIPTION: **CITY OF MOORE HAVEN DOWNTOWN IMPROVEMENTS (CAS PROJECT NO. 22-2277)** in accordance with PLANS and CONTRACT DOCUMENTS as prepared by Craig A. Smith & Associates.

CITY OF MOORE HAVEN (Owner) has considered the BID submitted by you for the above described WORK in response to its ADVERTISEMENT FOR BIDS and INSTRUCTIONS TO BIDDERS.

You are hereby notified that your BID has been accepted for the construction of in the amount of \$_____.

You are required by the INSTRUCTIONS TO BIDDERS to execute the AGREEMENT and furnish the required CONTRACTOR'S PERFORMANCE BOND, PAYMENT BOND and certificates of insurance within seven (7) days from the date of this NOTICE to you.

If you fail to execute said AGREEMENT and to furnish said BONDS within seven (7) days from the date of this NOTICE, said Owner will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this NOTICE OF AWARD to the Owner.

Dated this _____ day of _____, 20__.

BY: _____

TITLE: _____

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE OF AWARD is hereby acknowledged by

this the _____ day of _____, 20____

BY: _____

TITLE: _____

END OF SECTION

SECTION 00550

NOTICE TO PROCEED

TO: _____

DATE: _____

PROJECT DESCRIPTION: **CITY OF MOORE HAVEN DOWNTOWN IMPROVEMENTS (CAS PROJECT NO. 22-2277)** in accordance with PLANS and CONTRACT DOCUMENTS as prepared by Craig A. Smith & Associates.

You are hereby notified to commence WORK in accordance with the AGREEMENT dated _____, on or before _____, and you are to complete the WORK within _____ calendar days thereafter. The date of completion of all WORK is therefore _____.

BY: _____

TITLE: _____

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO PROCEED

is hereby acknowledged by _____

_____ day of _____ 20____

BY: _____

TITLE: _____

END OF SECTION

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS, that we, _____

as Principal and Contractor, and _____
hereinafter called Surety, are held and firmly bound unto

CITY OF MOORE HAVEN

a political entity of the State of Florida, and represented by its **CHAIRMAN**, in the sum of

(Written Dollar Amount)

dollars (\$_____), lawful money of the United States of America, for the payment of which well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, by these present.

WHEREAS, the above named Principal has entered into a Contract with **CITY OF MOORE HAVEN** (Owner), dated this ___ day of _____, 20__ to furnish at his own cost, charges, and expense all the necessary materials, equipment, and/or labor in strict and express accordance with said Contract **CITY OF MOORE HAVEN DOWNTOWN IMPROVEMNTS (CAS PROJECT NO. 22-2277)** and the Plans, Drawings and Specifications prepared by Craig A. Smith & Associates, all of which is made a part of said contract by certain terms and conditions in said Contract more particularly mentioned, which Contract, consisting of the various Contract Documents specifically mentioned herein and relative thereto, is made a part of this Bond as fully and completely as if said Contract Documents were set forth herein;

NOW THEREFORE, the conditions of this obligation are such that if the above bonded Principal shall in all respects comply with the terms and conditions of said Contract and his obligation thereunder, including the Contract Documents (which include the Plans, Drawings, Specifications and Conditions as prepared by said Consulting Engineers, Invitation to Bid, Instruction to Bidders, the Contractor's Bid as accepted by the Owner, the Bid and the Contract Performance and Payment Bonds, and all Addenda, if any, issued prior to the opening of bids), and further that if said Principal shall promptly perform and provide the guarantee of all work and materials furnished under the Contract Documents within the time specified in the Contract Documents, pays Owner for, and indemnifies and holds harmless Owner against and from all costs, expenses, damages, attorneys fees, including appellate proceedings, injury, or loss to which said Owner may be subject by reason of any wrongdoing, misconduct, want of care or skill, negligence, failure to petition within the prescribed time, or default, including patent infringements, on the part of said Principal, his agents or employees, in the execution or performance of said Contract; then this obligation shall be void; otherwise, to remain in full force and effect for the term of said Contract,

including any and all guarantee periods as specifically mentioned in said Contract Documents;

AND, the said Surety for Value received, hereby stipulates and agrees that no change involving any extension of time, or addition to the terms of the Contract or to the work to be performed, or materials to be furnished thereunder, or in the Plans, Drawings and Specifications accompanying the said contract shall affect said obligation of said Surety on this Bond, that the penal sum limit of liability by Surety shall match the amount of the Contract Price as adjusted by change orders or directives, and the said Surety does hereby waive notice of any such changes, extension of time, alterations, or additions of the terms of the Contract, or to the work, or to the Drawings and Specifications. Claimant shall give written notice to the Contractor and to the Surety as required by Florida Statutes, Section 255.05 or Section 713.23. Any actions against the Contractor or the Surety shall be brought within the time specified by Section 255.05 or Section 713.23.

IN WITNESS WHEREOF, said _____, as Principal and Contractor hereunder has caused these presents to be assigned in three (3) original counterparts in his name, and witnessed by two attesting and subscribing witnesses and the said _____, as Surety, has caused these presents to be signed in three (3) original counterparts in its name by its _____ under its corporate seal, this _____ day of _____ 20__

Signed, sealed and delivered
in the presence of:

PRINCIPAL-CONTRACTOR

BY: _____

TITLE: _____

AS TO PRINCIPAL

SURETY

BY: _____
ATTORNEY-IN-FACT
(POWER-OF-ATTORNEY
TO BE ATTACHED)

AS TO SURETY

BY: _____
RESIDENT AGENT

END OF SECTION

SECTION 00615

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS, that we, _____,
as Principal and Contractor, AND _____

hereinafter called Surety, are held and firmly bound unto

CITY OF MOORE HAVEN

a political entity of the State of Florida, and represented by its CHAIRMAN, in the sum of

(Written Dollar Amount)

dollars (\$ _____), lawful money of the United State of America, for the payment of which well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, by these present.

WHEREAS, the above named Principal has entered into a Contract with the Owner, dated this ___ day of _____, 20__ to furnish at his own cost, charges and expense all the necessary materials, equipment, and/or labor in strict and express accordance with said Contract **CITY OF MOORE HAVEN DOWNTOWN IMPROVEMENTS (CAS PROJECT NO. 22-2277** and the Plans, Drawings and Specifications prepared by Craig A. Smith & Associates of which is made a part of said contract by certain terms and conditions in said Contract more particularly mentioned, which Contract, consisting of the various Contract Documents specifically mentioned herein and relative thereto, is made a part of this Bond as fully and completely as if said Contract Documents were set forth herein;

NOW THEREFORE, the conditions of this obligation are such that if the above bounded Principal shall in all respects comply with the terms and conditions of said Contract and his obligation thereunder, including the Contract Documents (which include the Plans, Drawings, Specifications and Conditions as prepared by said Consulting Engineers, Invitation to Bid, Instructions to Bidders, the Contractor's bid as accepted by the Owner, the Bid and the Contract Performance and Payment Bonds, and all Addenda, if any, issued prior to the opening of bids), and further that if said Principal shall promptly make all payments to all persons supplying materials, equipment, and/or labor used directly or indirectly by said Contractor or subcontractors in the prosecution of the work provided for in said Contract in accordance with Florida Statutes, Section 255.05 or Section 713.23; then this obligation shall be void; otherwise, to remain in full force and effect for the term of said Contract, including any and all guarantee periods as specifically mentioned in said Contract Documents;

AND, the said Surety for Value received, hereby stipulates and agrees that no change involving any extension of time, or addition to the terms of the Contract or to the work to be performed, or materials to be furnished thereunder, or in the Plans, Drawings, and Specifications accompanying the said contract shall affect said obligation of said Surety on this Bond, and the said Surety on this Bond, and the said Surety does hereby waive notice of any such changes, extension of time, alterations, or additions of the terms of the Contract, or to the work, or to the Drawings and Specifications. Claimant shall give written notice to the Contractor and to the Surety as required by Florida Statutes, Section 255.05 of Section 713.23.

IN WITNESS WHEREOF, said _____, as Principal and Contractor hereunder has caused these presents to be assigned in three (3) original counterparts in his name, and witnessed by two attesting and subscribing witnesses and the said _____ as Surety, has caused these presents to be signed in three (3) original counterparts in its name by its _____ under its corporate seal, this ____ day of _____ 20__

Signed, sealed and delivered
in the presence of:

PRINCIPAL-CONTRACTOR

BY: _____

TITLE: _____

AS TO PRINCIPAL

SURETY

BY: _____
ATTORNEY-IN-FACT
(POWER-OF-ATTORNEY
TO BE ATTACHED)

AS TO SURETY

BY: _____
RESIDENT AGENT

END OF SECTION

SECTION 00700

GENERAL CONDITIONS

ARTICLE 1 - DEFINITIONS

Wherever used in these General Conditions or in the other Contract Documents, the following terms shall have the meanings indicated which shall be applicable to both the singular and plural thereof:

Acceptance: By the OWNER of the Work as being fully complete in accordance with the Contract Documents subject to waiver of claims.

Agreement: The written agreement between the OWNER and the CONTRACTOR covering the Work to be performed; the Contract Documents are attached to and made a part of the Agreement. Also designated as the Contract.

Addenda: Written or graphic instruments issued prior to the execution of the Agreement which modify or interpret the Contract Documents, Drawings and Specifications, by addition, deletions, clarifications or corrections.

Application for Payment: The form furnished by the ENGINEER which is to be used by the CONTRACTOR in requesting progress payments theretofore received from the OWNER on account of the Work have been applied by the CONTRACTOR to discharge in full all of the CONTRACTOR'S obligations stated in prior applications for payment.

Approved: Means approved by the ENGINEER of Record.

Bid: The offer or proposal of the Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

Bidder: Any person, firm or corporation submitting a BID for Work.

Bonds: Bid, performance and payment bonds and other instruments of security, furnished by the CONTRACTOR and his surety in accordance with the Contract Documents and in accordance with the law of the place of the project.

Change Order: A written order to the CONTRACTOR signed by the OWNER authorizing an addition, deletion or revision in the Work, or an adjustment in the Contract Price or the Contract Time issued after execution of the Agreement.

Contract Documents: The Agreement, Addenda, Instructions to Bidders, CONTRACTOR'S Bid, the Bonds, the Notice of Award, these General Conditions, Special Conditions, the Specifications, Drawings and Modifications, Notice to Proceed, Invitation to Bid, Acknowledgment of Conformance with OSHA Standards.

Contract Price: The total monies payable to the CONTRACTOR under the Contract Documents.

Contract Time: The number of calendar days stated in the Agreement for the completion of the Work.

CONTRACTING OFFICER: The owner (Grantee) - The individual who is authorized to sign the contract documents on behalf of the owner's governing body.

CONTRACTOR: The person, firm or corporation with whom the OWNER has executed the Agreement.

Day: A calendar day of twenty-four hours measured from midnight to the next midnight.

Drawings: The drawings which show the character and scope of the Work to be performed and which have been prepared or approved by the ENGINEER and are referred to in the Contract Documents.

ENGINEER: Craig A. Smith & Associates, 21045 Commercial Trail, Boca Raton, FL 33486 (561) 314 4445.

Field Order: A written order issued by the ENGINEER which clarifies or interprets the Contract Documents in accordance with paragraph 9.3 or orders minor changes in the Work in accordance with paragraph 10.2.

Modification: (a) A written amendment of the Contract Documents signed by both parties, (b) a Change Order, (c) a written clarification or interpretation issued by the ENGINEER in accordance with paragraph 9.3 or (d) a written order for minor change or alteration in the Work issued by the ENGINEER pursuant to paragraph 10.2. A modification may only be issued after execution of the Agreement.

Notice of Award: The written notice by OWNER to the apparent successful Bidder stating that upon compliance with the conditions precedent to be fulfilled by him within the time specified, OWNER will execute and deliver the Agreement to him.

Notice to Proceed: A written notice given by OWNER to CONTRACTOR (with copy to ENGINEER) fixing the date on which the Contract Time will commence to run and on which CONTRACTOR shall start to perform his obligations under the Contract Documents.

OWNER: **CITY OF MOORE HAVEN, 299 RIVERSIDE DRIVE, Moore Haven, Florida 33471.**

Project: The entire construction to be performed as provided in the Contract Documents.

Construction Observer: An authorized representative of the ENGINEER assigned to observe the Work performed and materials furnished by the CONTRACTOR or such other person as may be appointed by the OWNER as his representative. The CONTRACTOR shall be notified in writing of the identity of this representative.

Shop Drawings: All drawings, diagrams, illustrations, brochures, schedules and other data which are prepared by the CONTRACTOR, a subcontractor, manufacturer, supplier, or distributor, and which illustrate the equipment, material, or some portion of the Work and as required by the Contract Documents.

Samples: Physical examples which illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

Specifications: Those portions of the Contract Documents consisting of written technical descriptions of materials, equipment, construction systems, standards and workmanship as applied to the Work.

Subcontractor: An individual, firm or corporation having a direct contract with CONTRACTOR or with any other Subcontractor for the performance of a part of the Work at the site.

Substantial Completion: The date as certified by the ENGINEER when the construction of the Project or a specified part thereof is sufficiently completed, in accordance with the Contract Documents, so that the Project or specified part can be utilized for the purposes for which it was intended; or if there be no such certification, the date when final payment is due in accordance with paragraph 14.11.

Supplier: Any person or organization who supplies materials or equipment for the work, including that fabricated to a special design, but who does not perform labor at the site.

Surety: The corporate body which is bound with the CONTRACTOR and which engages to be responsible for the CONTRACTOR and his acceptable performance of the Work.

Work: Any and all obligations, duties and responsibilities necessary to the successful completion of the Project assigned to or undertaken by CONTRACTOR under the Contract Documents, including all labor, materials, equipment and other incidentals, and the furnishing thereof.

Written Notice: The term "Notice" as used herein shall mean and include all written notices, demands, instructions, claims, approvals, and disapprovals required to obtain compliance with Contract requirements. Written notice shall be deemed to have been duly served if delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or to an authorized representative or such individual, firm, or corporation, or if delivered at or sent by registered mail to the last business address known to him who gives the notice. Unless otherwise stated in writing,

any notice to or demand upon the OWNER under this Contract shall be delivered to the OWNER through the ENGINEER.

ARTICLE 2 - PRELIMINARY MATTERS

Award:

2.1 The OWNER reserves the right to reject any and all Bids and is not bound by law to accept the lowest Bid. Bids are awarded by the OWNER and its decision is final. No Notice of Award will be given until the OWNER has concluded such investigations as it deems necessary to establish the responsibility, qualifications and financial ability of the Bidders to do the Work in accordance with the Contract Documents to the satisfaction of the OWNER within the time prescribed. The OWNER reserves the right to reject the Bid of any Bidder who does not pass such investigation to the OWNER'S satisfaction. In analyzing Bids, the OWNER may take into consideration alternates and unit prices, if requested by the Bid forms. If the Contract is awarded, the OWNER will issue the Notice of Award and give the successful Bidder a contract for execution within sixty days after opening of Bids.

Execution of Agreement:

2.2 At least four counterparts of the Agreement and such other Contract Documents as practicable will be executed and delivered by CONTRACTOR to the OWNER within 10 calendar days of receipt from the OWNER .

Forfeiture of Bid Security:

2.3 Failure of the successful Bidder to execute and deliver the Agreement and deliver the required bonds as stipulated in paragraph 2.2 shall be cause for the OWNER to annul the Notice of Award and declare the Bid and any security therefore forfeited.

Contractor's Pre-Start Representations:

2.4 CONTRACTOR represents that he has familiarized himself with, and assumes full responsibility for having familiarized himself with the nature and extent of the Contract Documents, work, locality, and with all local conditions and federal, state and local laws, ordinances, rules and regulations that may in any manner affect performance of the Work, and represents that he has correlated his study and observations with the requirements of the Contract Documents. CONTRACTOR also represents that he has studied all surveys and investigation reports of subsurface and latent physical conditions referred to in the specifications and made such additional surveys and investigations as he deems necessary for the performance of the Work at the Contract Documents and that he has correlated the results of all such data with the requirements of the Contract Documents.

Commencement of Contract Time:

2.5 The Contract Time will commence to run on the date stated in the Notice to Proceed.

Starting the Project:

2.6 CONTRACTOR shall start to perform his obligations under the Contract Documents on the date when the Contract Time commences to run. No Work shall be done at the site prior to the date on which the Contract Time commences to run, except with the written consent of the OWNER.

Before Starting Construction:

2.7 Before undertaking each part of the Work, CONTRACTOR shall carefully study and compare the Contract Documents and check and verify pertinent figures shown thereon and all applicable field measurements. He shall at once report in writing to ENGINEER any conflict, error, or discrepancy which he may discover; however, he shall not be liable to OWNER, or ENGINEER for his failure to discover any conflict, error, or discrepancy in the Drawings or Specifications.

Schedule of Completion:

2.8 Within ten days after delivery of the Notice to Proceed by OWNER to CONTRACTOR, CONTRACTOR shall submit to ENGINEER for approval, an estimated progress schedule with earnings indicating the starting and completion dates of the various stages of the Work, and a preliminary schedule of Shop Drawing submissions. See paragraph 6.23. The ENGINEER shall approve this schedule or require revisions thereto within 14 days of its submittal.

If there is more than one CONTRACTOR involved in a Project the responsibility for coordinating the Work of all CONTRACTORS shall be as provided in the Special Conditions and Contract Documents.

Preconstruction Conference:

2.9 Within twenty days after delivery of the executed Agreement by OWNER to CONTRACTOR, but before starting the Work at the site, a preconstruction conference will be held to review the above schedules, to establish procedures for handling Shop Drawings and other submissions, and for processing Applications for Payment, and to establish a working understanding between the parties as to the Project. Present at the conference will be the OWNER or his representative, ENGINEER, Resident Project Representatives, CONTRACTOR and his Superintendent.

Qualification of Subcontractors, Materialmen and Suppliers:

2.10 Within ten working days after bid opening, the CONTRACTOR will submit to the OWNER and the ENGINEER for acceptance a list of the names of subcontractors and such other persons and organizations (including those who are to furnish principal items of materials or equipment) proposed for those portions of the Work as to which the identity of the Subcontractors and other persons and organizations must be submitted as specified in the Contract Documents. Within thirty working days after receiving the list, the ENGINEER will notify the CONTRACTOR in writing if either the OWNER or the ENGINEER, after due investigation, has reasonable objection to any Subcontractor, person, or organization on such list. The failure of the OWNER or the ENGINEER to make objection to any Subcontractor, person or organization on the list within thirty days of receipt shall constitute an acceptance of such Subcontractor, person or organization. Acceptance of any such Subcontractor, person or organization shall not constitute a waiver of any right of the OWNER or the ENGINEER to reject defective Work, material or equipment, or work, material or equipment not in conformance with the requirements of the Contract Documents.

Rejection of Subcontractor:

2.11 If, prior to the Notice of Award, the OWNER or the ENGINEER has reasonable objection to and refuses to accept any Subcontractor, person or organization listed, the apparent low Bidder may, prior to Notice of Award either (i) submit an acceptable substitute without an increase in his bid price or (ii) withdraw his Bid without forfeiting his Bid security.

ARTICLE 3 - CORRELATION, INTERPRETATION AND INTENT OF CONTRACT DOCUMENTS

3.1 It is the intent of the Specifications and Drawings to describe a complete Project to be constructed in accordance with the Contract Documents. The Contract Documents comprise the entire Agreement between the OWNER and the CONTRACTOR. They may be altered only by a Modification.

3.2 The Contract Documents are complementary; what is called for by one is as binding as if called for by all. If CONTRACTOR finds a conflict, error or discrepancy in the Contract Documents, he shall call it to the ENGINEER's attention in writing at once and before proceeding with the Work affected thereby; however, he shall not be liable to OWNER or ENGINEER for his failure to discover any conflict, error or discrepancy in the Specifications or Drawings. The various Contract Documents shall be given precedence in case of conflict, error or discrepancy, as follows: Supplemental General Conditions, Agreement Modifications, Addenda, Special Conditions, Instructions to Bidders, General Conditions, Specifications and Drawings. If the requirements of other Contract Documents are more stringent than those of the Supplemental General Conditions, the more stringent requirements shall apply.

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

3.4 Miscellaneous items and accessories which are not specifically mentioned, but which are essential to produce a complete and properly operating installation, or usable structure or plant, providing the indicated function, shall be furnished and installed without change in the Contract Price. Such miscellaneous items and accessories shall be of the same quality standards, including material, style, finish, strength, class, weight and other applicable characteristics, as specified for the major component of which the miscellaneous item or accessory is an essential part, and shall be approved by the ENGINEER before installation. The above requirement is not intended to include major components not covered by or inferable from the Drawings and Specifications.

3.5 The Work of all trades under this Contract shall be coordinated by the CONTRACTOR in such a manner as to obtain the best workmanship possible for the entire Project, and all components of the Work shall be installed or erected in accordance with the best practices of the particular trade.

3.6 The CONTRACTOR shall be responsible for making the construction of habitable structures under this Contract rainproof, and for making equipment and utility installations properly perform the specified function.

If he is prevented from so doing by any limitations of the Drawings or Specifications, the CONTRACTOR shall immediately notify the ENGINEER in writing of such limitations before proceeding with construction in the area where the problem or limitation exists.

3.7 Manufacturer's literature, when referenced, shall be dated and numbered and is intended to establish the minimum requirements acceptable. Whenever reference is given to codes, or standard specifications or other data published by regulating agencies or accepted organizations, including but not limited to National Electrical Code, applicable State Building Code, Federal Specifications, ASTM Specifications, various institute specifications, and the like, it shall be understood that such reference is to the latest edition including addenda in effect on the date of the Bid.

3.8 Brand names where used in the technical specifications, are intended to denote the standard or quality required for the particular material or product. The term "equal" or "equivalent", when used in connection with brand names, shall be interpreted to mean a material or product that is similar and equal in type, quality, size, capacity, composition, finish, color and other applicable characteristics to the material or product specified by trade name, and that is suitable for the same use and capable of performing the same function, in the opinion of the ENGINEER, as the material or product so specified. Proposed equivalent items must be approved

by ENGINEER before they are purchased or incorporated in the Work. (When a brand name, catalog number, model number, or other identification, is used without the phrase "or equal", the CONTRACTOR shall use the brand specified).

ARTICLE 4 - AVAILABILITY OF LANDS, SUBSURFACE CONDITIONS, REFERENCE POINTS:

Availability of Lands:

4.1 The OWNER will furnish, as indicated in Contract Documents, the lands upon which the Work is to be done, rights-of-way for access thereto, and such other lands which are designated for the use of the CONTRACTOR. Easements for permanent structures or permanent changes in existing facilities will be obtained and paid for by the OWNER, unless otherwise specified in the Contract Documents. Other access to such lands or rights-of-way for the CONTRACTOR'S convenience shall be the responsibility of the CONTRACTOR.

The CONTRACTOR will provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of material and equipment.

Bidder's Furnished Copy of Surveys:

4.2 The OWNER will, upon request, furnish to the BIDDERS copies of all available boundary surveys.

Subsurface Conditions:

4.3 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, river 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, including all exploratory work done by the OWNER/ENGINEER on the site or any contiguous site, as well as from information presented by the Drawings and Specifications made 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/ENGINEER.

Differing Site Conditions:

4.4 (a) The CONTRACTOR shall promptly, and before such conditions are disturbed, notify the OWNER and ENGINEER 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 in this contract. The OWNER shall 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.

(b) No claim of the CONTRACTOR under this clause shall be allowed unless the CONTRACTOR has given the notice required in (a) above; provided, however, the time prescribed therefore may be extended by the OWNER.

(c) No claim by the CONTRACTOR for an equitable adjustment hereunder shall be allowed if asserted after final payment under this contract.

ARTICLE 5 - INSURANCE

Contractor's Liability Insurance:

5.1 The CONTRACTOR will, at his own expense, purchase and maintain such insurance as will protect the OWNER and the CONTRACTOR from claims under Workmen's Compensation laws, disability benefit laws or other similar employee benefits laws; from claims for damages because of bodily injury, occupational sickness or disease, or death of his employees, and claims insured by usual personal injury liability coverage; from claims for damages because of bodily injury, sickness or disease or death of any person other than his employees including claims insured by usual personal bodily injury liability coverage; and from claims for injury to or destruction of tangible property, including loss of use resulting therefrom - any or all of which may arise out of or result from the Contractor's operations under the Contract Documents whether such operations be by any Subcontractor or anyone directly or indirectly employed by any of them or for whose acts any of them may be legally liable. This insurance shall be written for not less than \$500,000.00 as to claims of any one person and \$1,000,000.00 for total claims for any one occurrence for bodily injury and \$250,000.00 for property damage, or as required by law, whichever is greater, and shall include contractual liability insurance. Before starting the work, the CONTRACTOR will file with the OWNER and ENGINEER certificates of such insurance, acceptable to the

OWNER; these certificates shall contain a provision that the coverage afforded under the policies will not be cancelled or materially changed until at least 30 days prior written notice has been given to the OWNER and ENGINEER by certified mail. The certificate of insurance shall show the amount of employee's liability coverage that is being carried by the CONTRACTOR under Workmen's Compensation.

Subcontractor's Liability Insurance:

5.2 The CONTRACTOR agrees that if any part of the Work under the Contract is sublet, he will require the Subcontractor(s) to carry insurance as required, and that he will require the Subcontractor(s) to furnish to him insurance certificates similar to those required by the OWNER in 5.1 above.

OWNER's Liability Insurance:

5.3 The OWNER will be responsible for purchasing and maintaining its own liability insurance and, at its option, may purchase and maintain such insurance as will protect it against claims which may arise from operations under the Contract Documents.

Fire and Extended Coverage Insurance (Builders' Risk):

5.4 The CONTRACTOR shall maintain, as applicable, in an Insurance Company or Insurance Companies acceptable to the OWNER, Fire, Extended Coverage and Vandalism & Malicious Mischief Insurance on buildings and structures, while in the course of construction, including foundations, additions, attachments and all permanent fixtures belonging to and constituting a part of said buildings or structures. The policy or policies shall also cover machinery, if the cost of machinery is included in the Contract. The amount of insurance must at all times be at least equal to the actual cash value of the insured property.

The policy shall be in the name of the OWNER and the CONTRACTOR, as their interests may appear, and shall also cover the interests of all Subcontractors performing work.

Proof of Insurance:

5.5 The CONTRACTOR shall provide the OWNER with satisfactory evidence certifying that the foregoing insurance is in force; and such evidence shall include provisions that the insurance shall not be cancelled, allowed to expire or be materially changed without giving the OWNER advance notice by registered mail.

Cancellation and Re-Insurance:

5.6 If any insurance should be cancelled or changed by the insurance company or should any insurance expire during the period of this contract, the CONTRACTOR shall be responsible for securing other acceptable insurance to provide the coverage specified in this section to maintain coverage during the life of this Contract.

ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES

Supervision and Superintendent:

6.1 The CONTRACTOR will supervise and direct the Work. He will be solely responsible for the means, methods, techniques, sequences and procedures of construction. The CONTRACTOR will employ and maintain a qualified supervisor or superintendent at the work site who shall have been designated in writing by the CONTRACTOR as the CONTRACTOR'S representative at the site. The supervisor shall have full authority to act on behalf of the CONTRACTOR and all communications given to the supervisor shall be as binding as if given to the CONTRACTOR. The supervisors shall be present on each site at all times as required to perform adequate supervision and coordination of the work. (Copies of written communications given to the Superintendent shall be mailed to the Contractor's home office).

Labor, Materials and Equipment:

6.2 The CONTRACTOR will provide competent, suitably qualified personnel to lay out the Work and perform construction as required by the Contract Documents. He will at all times maintain good discipline and order at the site.

Contractor Furnishes All Materials:

6.3 The CONTRACTOR will furnish all materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, local telephone, water and sanitary facilities and all other facilities and incidentals necessary for the execution, testing, initial operation and completion of the Work.

Type of Material:

6.4 All materials and equipment will be new, except as otherwise provided in the Contract Documents. When special makes or grades of material which are normally packaged by the supplier or manufacturer are specified or approved, such materials shall be delivered to the site in their original packages or container with seals unbroken and labels intact.

Installation Instructions:

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

Materials, Equipment, Products and Substitutions:

6.6 Materials, equipment and products incorporated in the work must be approved for use before being purchased by the CONTRACTOR. The CONTRACTOR shall submit to the ENGINEER a list of proposed materials, equipment or products, together with such samples as may be necessary for him to determine their acceptability and obtain his approval, within ninety calendar days after award of Contract unless otherwise stipulated in the Special Conditions. No request for payment for "or equal" equipment will be approved until this list has been received and approved by the ENGINEER.

6.6.1 Whenever a material, article or piece of equipment is identified on the Drawings or Specifications by reference to brand name or catalog number, it shall be understood that this is referenced for the purpose of defining the performance of other salient requirements, and that other products of equal capacities, quality and function shall be considered. The CONTRACTOR may recommend the substitution of a material, article, or piece of equipment of equal substance and function for those referred to in the Contract Documents by reference to brand name or catalog number, and if, in the opinion of the ENGINEER, such material, article, or piece of equipment is of equal substance and function to that specified, the ENGINEER may approve its substitution and use by the CONTRACTOR. Incidental changes or extra component parts required to accommodate the substitute will be made by the CONTRACTOR without a change in the Contract Price or Contract time.

6.6.2 No substitute shall be ordered or installed without the written approval of the ENGINEER who shall be the judge of equality.

6.6.3 Delay caused by obtaining approvals for substitute materials will not be considered justifiable grounds for an extension of construction time.

6.6.4 Should any work or materials, equipment or products not conform with requirements of the Drawings and Specifications or become damaged during the progress of the Work, such Work or materials shall be removed and replaced, together with any Work disarranged by such alterations, at any time before completion and acceptance of the Project. All such work shall be done at the expense of the CONTRACTOR. See paragraph 7.10.

6.6.5 No materials or supplies for the Work shall be purchased by the CONTRACTOR or by any Subcontractor subject to any chattel mortgage or

under a conditional sale or other agreement by which an interest is retained by the Seller. The CONTRACTOR warrants that he has good title to all materials and supplies used by him in the Work.

Concerning Subcontractors:

6.7 The CONTRACTOR will not employ any subcontractor, other person or organization of the types referred to in paragraph 2.10 (whether initially or as a substitute) against whom the OWNER or the ENGINEER may have reasonable objection, nor will the CONTRACTOR be required to employ any Subcontractor who has been accepted by the OWNER and the ENGINEER, unless the ENGINEER determines that there is good cause for doing so.

Contractor Responsibilities:

6.8 The CONTRACTOR shall be fully responsible for all acts and omissions of his Subcontractors and of persons and organizations directly or indirectly employed by them and of persons and organizations for whose acts any of them may be liable to the same extent that he is responsible for the acts and omissions of persons directly employed by him. Nothing in the Contract Documents shall create any contractual relationship between OWNER or ENGINEER and any Subcontractor or other person or organization having a direct contract with CONTRACTOR, nor shall it create any obligation on the part of OWNER or ENGINEER to pay or to see to the payment of any persons due any Subcontractor or other person or organization, except as may otherwise be required by law. OWNER or ENGINEER may furnish to any Subcontractor or other person or organization, to the extent practicable, evidence of amounts paid to CONTRACTOR on account of specific Work done in accordance with the schedule of values.

Identification of Drawings:

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

Subcontractor's Terms:

6.10 The CONTRACTOR agrees to bind specifically every Subcontractor to the applicable terms and conditions of the Contract Documents for the benefit of the OWNER.

Subcontractor's Agreement:

6.11 All Work performed for the CONTRACTOR by a Subcontractor shall be pursuant to an appropriate agreement between the CONTRACTOR and the Subcontractor.

Subcontractor's Provisions:

6.12 The CONTRACTOR shall be responsible for the coordination of the trades, Subcontractors and materialmen engaged upon his Work.

6.12.1 The CONTRACTOR shall cause appropriate provisions to be inserted in all subcontracts relative to the Work to bind Subcontractors to the CONTRACTOR by the terms of these General Conditions and other Contract Documents insofar as applicable to the Work of Subcontractors, and give the CONTRACTOR the same power as regards to terminating any subcontract that the OWNER may exercise over the CONTRACTOR under any provisions of the Contract Documents.

6.12.2 The OWNER or ENGINEER will not undertake to settle any differences between the CONTRACTOR and his Subcontractors or between Subcontractors.

6.12.3 If in the opinion of the ENGINEER, any subcontractor on the Project proves to be incompetent or otherwise unsatisfactory, he shall be replaced if and when directed by the ENGINEER in writing.

Patent Fees and Royalties:

6.13 The CONTRACTOR will pay all license fees and royalties and assume all costs incident to the use of any invention, design, process or device which is the subject of patent rights or copyrights held by others. He will indemnify and hold harmless the OWNER and the ENGINEER and anyone directly or indirectly employed by either of them from and against all claims, damages, losses and expenses (including attorneys' fees) arising out of any infringement of such rights during or after completion of the Work, and shall defend all such claims in connection with any alleged infringement of such rights.

Determining Application:

6.14 The CONTRACTOR shall be responsible for determining the application of patent rights and royalties on materials, appliances, articles or systems prior to bidding. However, he shall not be responsible for such determination on systems which do not involve purchase by him of materials, appliances and articles.

Permits

6.15 The CONTRACTOR will secure and pay for all construction permits and licenses and will pay for all governmental charges and inspection fees necessary for the prosecution of the Work, which are applicable at the time of his Bid.

When such charges are normally made by the OWNER and when so stated in the SPECIAL CONDITIONS, there will be no charges to the CONTRACTOR. The OWNER shall assist the CONTRACTOR, when necessary, in obtaining such permits and licenses. The CONTRACTOR will also pay all public utility charges.

Electric Power and Lighting:

6.16 Electrical power required during construction shall be provided by each prime contractor as required by him. This service shall be installed by a qualified electrical contractor approved by the ENGINEER. Lighting shall be provided by the General CONTRACTOR in all spaces at all times where necessary for good and proper workmanship, for inspection or for safety. No temporary power shall be used off temporary lighting lines without specific approval of the General CONTRACTOR.

Laws and Regulations:

6.17 The CONTRACTOR will give all notices and comply with all laws, ordinances, rules and regulations applicable to the Work. If the CONTRACTOR observes that the Specifications or Drawings are at variance therewith, he will give the ENGINEER prompt written notice thereof, and any necessary changes shall be adjusted by an appropriate modification. If the CONTRACTOR performs any Work knowing it to be contrary to such laws, ordinances, rules and regulations, and without such notice to the ENGINEER, he will bear all costs arising therefrom; however, it shall not be his primary responsibility to make certain that the Drawings and Specifications are in accordance with such laws, ordinances, rules and regulations.

Taxes:

6.18 Cost of all sales and other taxes for which the CONTRACTOR is liable under the Contract shall be included in the Contract Price stated by the CONTRACTOR.

Record Drawings:

6.19 The CONTRACTOR will keep one record copy of all Specifications, Drawings, Addenda, Modifications and Shop Drawings at the site in good order and annotated to show all changes made during the construction process. The CONTRACTOR must provide complete RECORD DRAWINGS signed and sealed by a Registered Surveyor in the State of Florida for all underground utilities (water and sewer).

Safety and Protection:

6.20 The CONTRACTOR will be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. He

will take all necessary precautions for the safety of, and will provide the necessary protection to prevent damage, injury or loss to:

6.20.1 All employees on the Work and other persons who may be affected thereby,

6.20.2 All the Work and all materials or equipment to be incorporated therein, whether in storage on or off the site, and

6.30.3 Other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

Prevention of Accidents:

6.21 The CONTRACTOR will designate a responsible member of his organization at the site whose duty shall be the prevention of accidents. This person shall be the CONTRACTOR'S superintendent unless otherwise designated in writing by the CONTRACTOR to the OWNER.

Emergencies:

6.22 In emergencies affecting the safety of persons or the Work or property at the site or adjacent thereto, the CONTRACTOR, without special instruction or authorization from the ENGINEER or OWNER, is obligated to act, at his discretion, to prevent threatened damage, injury or loss. He will give the ENGINEER prompt written notice of any significant changes in the Work or deviations from the Contract Documents caused thereby, and a Change Order shall thereupon be issued covering the changes and deviations involved. If the CONTRACTOR believes that additional work done by him in an emergency which arose from causes beyond his control entitles him to an increase in the Contract Price or an extension of the Contract Time, he may make a claim therefore as provided in Articles 11 and 12.

Shop Drawings and Samples:

6.23 After checking and verifying all field measurements, the CONTRACTOR will submit to the ENGINEER for review, in accordance with the accepted schedule of shop drawing submissions (see paragraph 2.8) six copies (or at the ENGINEER'S option, one reproducible copy) of all Shop Drawings, which shall have been checked by and stamped with the approval of the CONTRACTOR and identified as the ENGINEER may require. The data shown on the Shop Drawings will be complete with respect to dimensions, design criteria, materials of construction and the like to enable the ENGINEER to review the information as required.

Samples Required by Contractor:

6.24 The CONTRACTOR will also submit to the ENGINEER for review, with such promptness as to cause no delay in Work, all samples required by the Contract Documents.

All samples will have been checked by and stamped with the approval of the CONTRACTOR, identified clearly as to material, manufacturer, any pertinent catalog numbers and the use for which intended.

Deviations in Shop Drawings:

6.25 At the time of each submission, the CONTRACTOR will in writing call the ENGINEER'S attention to any deviations that the Shop Drawings or sample may have from the requirements of the Contract Documents.

Review of Shop Drawings:

6.26 The ENGINEER will review with responsible promptness Shop Drawings and samples, but his review shall be only for conformance with the design concept of the Project and for compliance with the information given in the Contract Documents. The review of a separate item as such will not indicate review of the assembly in which the item functions. The CONTRACTOR will make any corrections required by the ENGINEER and will return the required number of corrected copies of Shop Drawings and resubmit new samples until the review is satisfactory to the ENGINEER. The CONTRACTOR shall direct specific attention in writing or on resubmitted Shop drawings to revisions other than the corrections called for by the ENGINEER on previous submissions. The CONTRACTOR'S stamp of approval on any Shop Drawing or sample shall constitute representation to the OWNER and the ENGINEER that the CONTRACTOR has either determined and verified all quantities, dimensions, field construction criteria, materials, catalog numbers and similar data or he assumes full responsibility for doing so, and that he has reviewed or coordinated each Shop Drawing or sample with the requirements of the Work and the Contract Documents.

Commencing Work:

6.27 No work requiring a Shop Drawing or sample submission shall be commenced until the submission has been reviewed by the ENGINEER. A copy of each Shop Drawing and each approved sample shall be kept in good order by the CONTRACTOR at the site and shall be available to the ENGINEER.

Deviations in Work:

6.28 The ENGINEER'S review of Shop Drawings or samples shall not relieve the CONTRACTOR from his responsibility for any deviations from the requirements of

the Contract Documents unless the CONTRACTOR has in writing called the ENGINEER'S attention to each deviation at the time of submission and the ENGINEER has given written approval to the specific deviation, nor shall any review by the ENGINEER relieve the CONTRACTOR from responsibility for errors or omissions in the Shop Drawings.

Cleaning Up Site:

6.29 The CONTRACTOR shall clean up behind the Work as much as is reasonably possible as the work progresses. Upon completion of the Work, and before acceptance of final payment for the Project by the OWNER, the CONTRACTOR shall remove all his surplus and discarded materials, excavated material and rubbish from the roadways, sidewalks, parking areas, lawn and all adjacent property; shall clean his portion of Work involved in any building under this Contract, so that no further cleaning by the OWNER is necessary prior to his occupancy; shall restore all property, both public and private, which has been disturbed or damaged during the prosecution of the Work; and shall leave the whole in a neat and presentable condition.

Cleaning Up General:

6.30 In case of dispute, the OWNER may remove the rubbish and charge the cost to the CONTRACTOR as the ENGINEER shall determine to be just.

Public Convenience and Safety:

6.31 The CONTRACTOR shall, at all times, conduct the Work in such manner as to insure the least practicable obstruction to public travel. The convenience of the general public and of the residents along and adjacent to the area of Work shall be provided for in a satisfactory manner, consistent with the operation and local conditions. "Street Closed" signs shall be placed immediately adjacent to the Work, in a conspicuous position, at such locations as traffic demands. At any time that streets are required to be closed, the CONTRACTOR shall notify law enforcement agencies vehicles before the street is closed and again as soon as it is opened. Access to fire hydrants and other fire extinguishing equipment shall be provided and maintained at all times.

Sanitary Provisions:

6.32 The General CONTRACTOR shall provide on-site office, and necessary toilet conveniences, secluded from public observation, for use of all personnel on the Work, whether or not in his employ. They shall be kept in a clean and sanitary condition and shall comply with the requirements and regulations of the Public Authorities having jurisdiction. He shall commit no public nuisance. Temporary field office and sanitary facilities shall be removed upon completion of the Work and the premises shall be left clean.

Indemnification:

6.33 In consideration of twenty-five dollars (\$25.00) and other valuable consideration, the CONTRACTOR shall indemnify and save harmless the OWNER and ENGINEER, their officers, agents and employees, from or on account of any injuries or damages, received or sustained by any person or persons during or on account of any operations connected with the construction of this Project; or by or in consequence of any negligence (excluding negligence of OWNER and ENGINEER), in connection with the same; or by use of any improper materials or by or on account of any act or omission of the said CONTRACTOR or his Subcontractor, agents, servants or employees. The CONTRACTOR will indemnify and hold harmless the OWNER and the ENGINEER and their agents and employees from and against all claims, damages, losses and expenses including attorneys' fees arising out of or resulting from the performance of the Work, provided that any such claim, damage, loss or expense (a) is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than Work itself) including the loss of use resulting therefrom and (b) is caused in whole or in part by any negligent act or omission of the CONTRACTOR, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder.

Claims:

6.34 In any and all claims against the OWNER or the ENGINEER or any of their agents or employees, by any employee of the CONTRACTOR, any Subcontractor, anyone for whose acts any of them may be liable, the indemnification obligation under paragraph 6.33 shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the CONTRACTOR or any Subcontractor under workman's compensation acts, disability acts or other employee benefit acts.

Liability of Engineer:

6.35 The obligations of the CONTRACTOR under paragraph 6.33 shall not extend to the liability of the ENGINEER, his agents or employees arising out of (a) the preparation or approval of maps, drawings, opinions, reports, surveys, Change Orders, designs or specifications or (b) the giving of or the failure to give directions or instructions by the ENGINEER, his agents or employees provided such giving or failure to give is the primary cause of injury or damage.

Responsibility for Connection to Existing Work:

6.36 It shall be the express responsibility of the CONTRACTOR to connect his Work to each part of the existing work or work previously installed as required by the Drawings and Specifications to provide a complete installation.

Work in Street, Highway and Other Rights-of-Way:

6.37 Excavation, grading, fill, storm drainage, paving and any other construction or installations in rights-of-way of streets, highways, public carrier lines, utility lines (either aerial, surface or subsurface), etc., shall be done in accordance with requirements of the special conditions. The OWNER will be responsible for obtaining all permits necessary for the Work. Upon completion of the Work, the CONTRACTOR shall present to the ENGINEER certificates, in triplicate, from the proper authorities stating that the Work has been done in accordance with their requirements.

6.37.1 The OWNER will cooperate with the CONTRACTOR in obtaining action from any utilities or public authorities involved in the above requirements.

6.37.2 The CONTRACTOR shall be responsible for obtaining elevations of curbs and gutters, pavement, storm drainage structures, and other items as soon as grading operations are begun on the site and, in any case, sufficiently early in the construction period to prevent any adverse affect on the Project.

Cooperation with Governmental Departments Public Utilities, Etc.:

6.38 The CONTRACTOR shall be responsible for making all necessary arrangements with governmental departments, public utilities, public carriers, service companies and corporations owning or controlling roadways, railways, water, sewer, gas, electrical, telephone, and telegraph facilities such as pavements, tracks, piping, wires, cables, conduits, poles, guys, etc., including incidental structures connected therewith, that are encountered in the Work in order that such items may be properly shored, supported and protected, or the CONTRACTOR may relocate them if he so desires. The CONTRACTOR shall give all proper notices, shall comply with requirements of such parties in the performance of his Work, shall permit entrance of such parties on the project in order that they may perform their necessary work, and shall pay all charges and fees made by such parties for this Work.

6.38.1 The CONTRACTOR'S attention is called to the fact that there may be delays on the Project due to Work to be done by governmental departments, public utilities, and others in repairing or moving poles, conduits, etc. The CONTRACTOR shall cooperate with the above parties

in every way possible, so that the construction can be completed in the least possible time.

6.38.2 The CONTRACTOR shall have made himself familiar with all codes, laws, ordinances, and regulations which in any manner affect those engaged or employed in the Work, or materials and equipment used in or upon the Work, or in any way affect the conduct of the Work, and no plea of misunderstanding will be considered on account of his ignorance thereof.

Use of Premises:

6.39 CONTRACTOR shall confine his apparatus, storage of materials, and operations of his workmen to the limits indicated by law, ordinances, permits and directions of ENGINEER and OWNER, and shall not unnecessarily encumber any part of the site.

6.39.1 CONTRACTOR shall not overload or permit any part of any structure to be loaded with such weight as will endanger its safety, nor shall he subject any part of the work to stresses or pressures that will endanger it.

6.39.2 CONTRACTOR shall enforce ENGINEER'S and OWNER'S instructions in connection with signs, advertisements, fires and smoking.

6.39.3 CONTRACTOR shall arrange and cooperate with OWNER in routing and parking of automobiles of his employees, subcontractors and other personnel, and in routine material delivery trucks and other vehicles to the Project site.

6.39.4 The CONTRACTOR shall furnish, install and maintain adequate construction office facilities for all workmen employed by him or by his Subcontractors. Temporary offices shall be provided and located where directed and approved by the ENGINEER. All such facilities shall be furnished in strict accordance with existing governing regulations. Field offices shall include telephone facilities.

Protection of Existing Property Improvements:

6.40 The locations of existing utilities within the work areas shown on the plan **are approximate** and are not guaranteed to be complete. Any existing surface or subsurface improvements, such as pavements, curbs, sidewalks, pipes or utilities, footings, or structures (including portions thereof), trees and shrubbery, not indicated on the Drawings or noted in the Specifications as being removed or altered shall be protected from damage during construction of the Project. Any such improvements damaged during construction of the Project shall be restored

at the expense of the CONTRACTOR to a condition equal to that existing at the time of award of Contract.

Explosives:

6.41 When the use of explosives is necessary in the prosecution of the Work, the CONTRACTOR shall be charged with the utmost care in the handling and usage of such explosives to the protection of life and property. When directed by the ENGINEER, the number and size of charges shall be reduced. All explosives shall be stored in a safe manner and storage places shall be clearly marked "Danger - Explosives", and placed in the care of competent watchmen. When such use of explosives becomes necessary, the CONTRACTOR shall furnish to the ENGINEER competent proof of coverage adequately providing public liability and property damage insurance, as a rider attached to his regular policies unless otherwise included.

ARTICLE 7 - WORK BY OTHERS

7.1 The OWNER may perform additional work related to the Project by himself, or he may let other direct contracts therefore which shall contain General Conditions similar to these.

The CONTRACTOR will afford the other contractors who are parties to such direct contracts (or the OWNER, if he is performing the additional Work himself), reasonable opportunity for the introduction and storage of materials and equipment and the execution of Work, and shall properly connect and coordinate his Work with theirs.

7.2 If any part of the CONTRACTOR'S Work depends for proper execution or results upon the Work of any such other CONTRACTOR (or the OWNER), the CONTRACTOR will promptly report to the ENGINEER in writing any defects or deficiencies in such Work that render it unsuitable for such proper execution and results.

7.3 The CONTRACTOR will do all cutting, fitting 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 will not endanger any work of others by cutting, excavating or otherwise altering their work and will only cut or alter their work with the written consent of the ENGINEER and of the other Contractors whose work will be affected.

7.4 If the performance of additional work by other contractors or the OWNER is not noted in the Contract Documents prior to the execution of the Contract, written notice thereof shall be given to the CONTRACTOR prior to starting any such additional work. If the CONTRACTOR believes that the performance of such additional work by the OWNER or others involves him in additional expense or

entitles him to an extension of the Contract Time, he may make a claim therefore as provided in Articles 11 and 12.

7.5 Where practicable, the General CONTRACTOR shall build around the work of other separate contractors or shall leave chases, slots and holes as required to receive and to conceal within the general construction work the work of such other separate contractors as directed by them. Where such chases, slots, etc., are impracticable, the work shall require specific approval of the ENGINEER.

7.6 Necessary chases, slots, and holes not built or left by the General CONTRACTOR shall be cut by the separate contractor requiring such alterations after approval of the General CONTRACTOR. The General CONTRACTOR shall do all patching and finishing of his Work where cut by other contractors at the expense of such other contractors.

7.7 Cooperation is required in the use of site facilities and in the detailed execution of the Work. Each CONTRACTOR shall coordinate his operations with those of the other contractors for the best interest of the Work in order to prevent delay in the execution thereof.

7.8 Each CONTRACTOR shall keep himself informed of the progress of the Work of other contractors. Should lack of progress or defective workmanship on the part of other contractors interfere with his operations, the CONTRACTOR shall notify the ENGINEER immediately. Lack of such notice to the ENGINEER will be construed as acceptance by the CONTRACTOR of the status of the work of other contractors as being satisfactory for proper coordination of his own Work.

7.9 Each CONTRACTOR shall give notices of the progress of his work so as to allow other contractors adequate work. The General CONTRACTOR shall give notices of the progress of his Work so that work of other contractors, when required to be concealed, may be placed before the general construction Work. All such notices shall be submitted to the ENGINEER with copies of other prime contractors on the Project sufficiently ahead of job progress to permit adequate time for the other prime contractors to coordinate their work.

7.10 The cost of extra work resulting from lack of notices, untimely notices, failure to respond to notices, defective work or lack of coordination shall be borne by the CONTRACTOR responsible for such lack of notices, etc.

ARTICLE 8 - OWNER'S RESPONSIBILITIES

8.1 The OWNER will issue all communications to the CONTRACTOR through the ENGINEER.

8.2 In case of termination of employment of the ENGINEER, the OWNER will appoint an engineer against whom the CONTRACTOR makes no reasonable

objection, whose status under the Contract Documents shall be that of the former ENGINEER.

8.3 The OWNER will furnish the data required of him under the Contract Documents promptly and shall make payments to the CONTRACTOR promptly after they are due as provided in paragraph 14.4.

8.4 The OWNER's duties with respect to providing lands and easements and providing engineering surveys to establish reference points are set forth in paragraphs 4.1 and 4.2. The OWNER shall provide sufficient survey staking to set up horizontal and vertical controls. All re-staking or additional staking required by CONTRACTOR shall be by the OWNER'S surveyor at the CONTRACTOR'S expense. Paragraph 4.2 refers to the OWNER'S identifying and making available to the CONTRACTOR copies of surveys and investigation reports of subsurface and latent physical conditions at the site or otherwise affecting performance of the Work which have been relied upon by the ENGINEER in preparing the Drawings and Specifications.

8.5 The OWNER'S responsibilities in respect of liability and property insurance are set forth in paragraph 5.3.

8.6 In addition to his rights to request changes in the Work in accordance with Article 10, the OWNER (especially in certain instances as provided in paragraph 10.4) will be obligated to execute Change Orders.

8.7 In connection with the OWNER'S right to stop Work or suspend Work, see paragraph 15.1. Paragraph 15.3 deals with the OWNER'S right to terminate services of the CONTRACTOR under certain circumstances.

8.8 The OWNER shall have the right to take possession of and use any completed or partially completed portions of the Work, notwithstanding the fact that the time for completing the entire Work or any portion thereof may not have expired; but such taking possession and use shall not be deemed an acceptance of any Work not completed in accordance with the Contract Documents. If such prior use increases the cost of or delays the Work, the CONTRACTOR shall be entitled to such extra compensation or extension of time or both, except by prior agreement, as the ENGINEER may determine. See paragraph 14.11.

ARTICLE 9 - ENGINEER'S STATUS DURING CONSTRUCTION

Owner's Representative:

9.1 The ENGINEER shall be the OWNER'S representative during the construction period. The duties and responsibilities and the limitations of authority of the ENGINEER as the

OWNER'S representative during construction are set forth in Articles 1 through 16 of these General Conditions and shall not be extended without written consent of the OWNER and the ENGINEER.

9.1.1 The ENGINEER'S decision, in matters relating to aesthetics, shall be final, if within the terms of the Contract Documents.

9.1.2 Except as may be otherwise provided in this contract, all claims, counterclaims, disputes and other matters in question between the OWNER and the CONTRACTOR arising out of or relating to this agreement or the breach thereof will be decided in a court of competent jurisdiction within the State in which the OWNER is located.

Visits to Site:

9.2 The ENGINEER will provide an inspector to make periodic visits to the site to observe the progress and quality of the executed work and to determine, in general, if the work is proceeding in accordance with the Contract Documents. His efforts will be directed toward providing assurance for the OWNER that the completed Project will conform to the requirements of the Contract Documents. On the basis of these on-site observations as an experienced and qualified design professional, he will keep the OWNER informed of the progress of the work and will endeavor to guard the OWNER against defects and deficiencies in the work of contractors.

Clarifications and Interpretations:

9.3 The ENGINEER will issue with reasonable promptness such written clarifications or interpretations of the Contract Documents (in the form of Drawings or otherwise) as he may determine necessary, which shall be consistent with or reasonably inferable from the overall intent of the Contract Documents. If the CONTRACTOR believes that a written clarification and interpretation entitles him to an increase in the Contract Price or extension of Contract Time, he may make a claim therefore as provided in Articles 11 and 12.

Measurement of Quantities:

9.4 All work completed under the Contract will be measured by the ENGINEER according to the United States Standard Measures. All linear surface measurements will be made horizontally or vertically as required by the item measured.

Rejecting Defective Work:

9.5 The ENGINEER will have authority to disapprove or reject Work which is "defective" (which term is hereinafter used to describe Work that is unsatisfactory,

faulty or defective, or does not conform to the requirements of the Contract Documents or does not meet the requirements of any inspection, test or approval referred to in the Special Condition, or has been damaged prior to final acceptance). He will also have authority to require special inspection or testing of the Work as provided in the Special Conditions whether or not the Work is fabricated, installed or completed.

Shop Drawings, Change Orders and Payments:

9.6 In connection with the ENGINEER'S responsibility as to Shop Drawings and samples, see paragraphs 6.25 through 6.28, inclusive.

Responsibility for Change Orders:

9.7 In connection with the ENGINEER'S responsibility for Change Orders, see Articles 10, 11, and 12.

Application of Payments:

9.8 In connection with the ENGINEER'S responsibilities in respect of Application of Payment, etc., see Article 14.

Resident Project Representative:

9.9 The ENGINEER will provide construction observation and inspection sufficient to confirm to the OWNER and all applicable regulatory agencies that construction is in compliance with the Construction Drawings and the contract specifications.

Decisions on Disagreements:

9.10 The ENGINEER will be the interpreter of the terms and conditions of the Contract Documents and the judge of the performance thereunder. In his capacity as interpreter and judge he will exercise his best efforts to insure faithful performance by both the OWNER and the CONTRACTOR. He will not show partiality to either and shall not be liable for the result of any interpretation or decision rendered in good faith. Claims, disputes and other matters relating to the execution and progress of the Work or the interpretation of a performance under the Contract Documents shall be referred to the ENGINEER for decision, which he shall render in writing within ten days of the time that such claim has been presented to him in writing.

Limitations on Engineer's Responsibilities:

9.11.1 Neither the ENGINEER'S authority to act under this Article 9 nor any decision made by him in good faith either to exercise or not exercise such authority shall give rise to any duty or responsibility of the ENGINEER to the

CONTRACTOR, any Subcontractor, any of their agents or employees or any other person performing any of the Work.

9.11.2 The ENGINEER will not be responsible for the construction means, methods, techniques, sequences or procedures, or the safety precautions and programs incident thereto, and he will not be responsible for the CONTRACTOR'S failure to perform the Work in accordance with the Contract Documents.

9.11.3 The ENGINEER will not be responsible for the acts or omissions of the CONTRACTOR, or any Subcontractors, or any of his or their agents or employees, or any other persons performing any of the work.

ARTICLE 10 - CHANGES IN THE WORK

10.1 Without invalidating the Agreement, the OWNER may, at any time or from time to time, order additions, deletions or revisions in the Work; these shall be authorized by Change Orders. Upon receipt of a Change Order, the CONTRACTOR will proceed with the Work involved. All such Work shall be executed under the applicable conditions of the Contract Documents. If any Change Order causes an increase or decrease in the Contract Price or an extension or shortening of the Contract Time, an equitable adjustment will be made as provided in Article 11 or Article 12. A Change Order signed by the CONTRACTOR indicates his agreement therewith.

10.2 The ENGINEER may authorize minor changes or alterations in the Work not involving extra cost and not inconsistent with the overall intent of the Contract Documents. These may be accomplished by a Field Order. If the CONTRACTOR believes that any minor change or alteration authorized by the ENGINEER entitles him to an increase in the Contract Price or extension of Contract Time, he may make a claim therefor as provided in Articles 11 and 12.

10.3 Additional Work performed by the CONTRACTOR without authorization of a Change Order will not entitle him to an increase in the Contract Price or an extension of the Contract Time, except in the case of an emergency as provided in paragraph 6.22 and except as provided in paragraph 10.2.

10.4 The OWNER will execute appropriate Change Orders prepared by the ENGINEER covering changes in the Work, to be performed as provided in paragraph 4.4, and Work performed in an emergency as provided in paragraph 6.22 and any other claim of the CONTRACTOR for a change in the Contract Time or the Contract Price which is approved by the ENGINEER.

10.5 It is the CONTRACTOR'S responsibility to notify his surety of any changes affecting the general scope of the

Work or change in the Contract Price and the amount of the applicable bonds shall be adjusted accordingly. The CONTRACTOR will furnish proof of such an adjustment to the OWNER.

ARTICLE 11 - CHANGE OF CONTRACT PRICE

11.1 The Contract Price constitutes the total compensation payable to the CONTRACTOR for performing the work. All duties, responsibilities and obligations assigned to or undertaken by the CONTRACTOR shall be at his expense without changing the Contract Price.

11.2 (a) The OWNER may, at any time, without written notice to the sureties, by written order designated or indicated to be a change order, make any change in the Work within the general scope of the Contract, including but not limited to changes:

(1) in the specifications (including drawings and designs);

(2) in the method or manner of performance of the work.

(3) in the OWNER-furnished facilities, equipment, materials, services, or site; or

(4) directing acceleration in the performance of the work.

(b) Any other written order or an oral order (which terms as used in this paragraph (b) shall include direction, instruction, interpretation or determination) from the OWNER, which causes any such change, shall be treated as a change order under this clause, provided that the CONTRACTOR gives the OWNER written notice stating the date, circumstances, and source of the order and that the CONTRACTOR regards the order as a change order.

(c) Except as herein provided, no order, statement, or conduct of the OWNER shall be treated as a change under this clause or entitle the CONTRACTOR to an equitable adjustment hereunder.

(d) If any change order under this clause causes an increase or decrease in the CONTRACTOR'S cost of, or the time required for, the performance of any part of the work, under this contract, whether or not changed by any order, an equitable adjustment shall be made and the contract modified in writing accordingly: Provided, however, that except for claims based on defective specifications, no claim for any change order under (b) above shall be allowed for any costs incurred more than 20 days before the CONTRACTOR gives written notice as therein required: and provided further, that in the case of defective specifications for which the OWNER is

responsible, the equitable adjustment shall include any increased cost reasonably incurred by the CONTRACTOR in attempting to comply with such defective specifications.

(e) If the CONTRACTOR intends to assert a claim for an equitable adjustment under this clause, he must, within 30 days after receipt of a written change order under (a) above or the furnishing of a written notice under (b) above, submit to the OWNER a written statement setting forth the general nature and monetary extent of such claim, unless this period is extended by the OWNER. The statement of claim hereunder may be included in the notice under (b) above.

(f) No claim by the CONTRACTOR for an equitable adjustment hereunder shall be allowed if asserted after final payment under this contract.

11.3 The value of any Work covered by a Change Order or of any claim for an increase or decrease in the Contract Price shall be determined in one of the following ways:

11.3.1 Where the Work involved is covered by unit prices contained in the Contract Documents, by application of unit prices to the quantities of the items involved. Should the Work (by quantity) be increased or decreased by 25 percent from that stipulated in the Contract Documents, the OWNER and the CONTRACTOR may request adjustment of the unit prices by negotiation.

11.3.2 By negotiated lump sum.

11.3.3 The actual cost for labor, direct overhead, materials, supplies, equipment, and other services necessary to complete the work plus a fixed amount to be agreed upon to cover the cost of general overhead and profit to be negotiated.

11.4 The term Cost of the Work means the sum of all costs necessarily incurred and paid by the CONTRACTOR in the proper performance of the Work.

Except as otherwise may be agreed to in writing by OWNER, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items and shall not include any of the costs itemized in paragraph 11.5.

11.4.1 Payroll costs for employees in the direct employ of CONTRACTOR in the performance of the Work under schedules of job classifications agreed upon by OWNER and CONTRACTOR. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited

to, salaries and wages plus the costs of fringe benefits which shall include social security contributions, unemployment, excise and payroll taxes, workmen's compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. Such employees shall include superintendents and foremen at the site. The expenses of performing work after regular working hours, on Sunday or legal holidays shall be include in the above to the extent authorized by OWNER.

11.4.2 Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and manufacturers' field services required in connection therewith. All cash discounts shall accrue to CONTRACTOR unless OWNER deposits funds with CONTRACTOR with which to make payments in which case the cash discounts shall accrue to OWNER. All trade discounts, rebates and refunds, and all returns from sale of surplus materials and equipment shall accrue to OWNER, and CONTRACTOR shall make provisions so that they may be obtained.

11.4.3 Payments made by CONTRACTOR to the Subcontractors for Work performed by Subcontractors. If required by OWNER, CONTRACTOR shall obtain competitive bids from Subcontractors acceptable to him and shall deliver such bids to OWNER who will then determine with the advice of ENGINEER, which Bids will be accepted. If a subcontract provides that the Subcontractor is to be paid on the basis of Cost of Work plus a fee, the cost of the Work shall be determined in accordance with paragraphs 11.4 and 11.5. All subcontracts shall be subject to the other provisions of the Contract Documents insofar as applicable.

11.4.4 Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, lawyers and accountants) employed for services specifically related to the Work.

11.4.5 Supplemental costs including the following:

11.4.5.1 The proportion of necessary transportation, traveling and subsistence expenses of CONTRACTORS' employees incurred in discharge of duties connected with the Work.

11.4.5.2 Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office and temporary facilities at the site and hand tools not owned by the Workmen, which are consumed in the performance of the Work, and cost less market value of such items used but not consumed which remains the property of CONTRACTOR.

11.4.5.3 Rentals of all construction equipment and machinery and the parts thereof whether rented from CONTRACTOR or others in accordance with rental agreements approved by OWNER with the advise of ENGINEER, and the costs of transportation, loading, unloading, installation, dismantling and removal thereof - all in accordance with terms of said rental agreements. The rental of any such equipment, machinery or parts shall cease when the use thereof is no longer necessary for the Work.

11.4.5.4 Sales, use or similar taxes related to the Work, and for which CONTRACTOR is liable, imposed by any governmental authority.

11.4.5.5 Deposits lost for causes other than CONTRACTOR'S negligence, royalty payments and fees for permits and licenses. Costs for permits and licenses must be shown as a separate item.

11.4.5.6 Losses, damages and expenses, not compensated by insurance or otherwise sustained by CONTRACTOR in connection with the execution of, and to, the Work, provided they have resulted from causes other than the negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of OWNER. No such losses, damages and expenses shall be included in the Cost of the Work for the purpose of determining CONTRACTOR'S fee. If, however, any such loss or damage requires reconstruction and CONTRACTOR is placed in charge thereof, he shall be paid for his services a fee proportionate to that stated in paragraph 11.6.2.

11.4.5.7 The cost of utilities, fuel and sanitary facilities at the site.

11.4.5.8 Minor expenses such as telegrams, long distance telephone calls, telephone service at the site, expressage and similar petty cash items in connection with the Work.

11.4.5.9 Cost of premiums for additional Bonds and Insurance be required because of changes in the Work.

11.5 The term Cost of the Work shall not include any of the following:

11.5.1 Payroll costs and other compensation of CONTRACTOR'S officers, executives, principal (of partnership and sole proprietorships), general managers, engineers, architects, estimators, lawyers, agents, expeditors, timekeepers, clerks and other personnel employed by CONTRACTOR

whether at the site or in his principal or a branch office for general administration of the Work and not specifically included in the schedule referred to in subparagraph 11.4.1 - all of which are to be considered administrative costs covered by the CONTRACTOR'S fee.

11.5.2 Expenses of CONTRACTOR'S principal and branch offices other than his office at the site.

11.5.3 Any part of CONTRACTOR'S capital expenses, including interest on CONTRACTOR'S capital employed for the Work and charges against CONTRACTOR for delinquent payments.

11.5.4 Cost of premiums for all bonds and for all insurance policies whether or not CONTRACTOR is required by the Contract Documents to purchase and maintain the same (except as otherwise provided in subparagraph 11.4.5.9).

11.5.5 Costs due to the negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective work, disposal of materials or equipment wrongly supplied and making good any damage to property.

11.5.6 Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in paragraph 11.4.

11.6 The CONTRACTOR'S fee which shall be allowed to CONTRACTOR for his overhead and profit shall be determined as follows:

11.6.1 A mutually acceptable firm fixed price; or if none can be agreed upon,

11.6.2 A mutually acceptable fixed fee based on the estimate of the various portions of the Cost of the Work.

11.7 The amount of credit to be allowed by CONTRACTOR to OWNER for any such change which results in a net decrease in cost, will be the amount of the actual net decrease. When both additions and credits are involved in any one change, the net shall be computed to include overhead and profit, identified separately, for both additions and credits.

11.8 Whenever cost of any Work is to be determined pursuant to paragraphs 11.4 and 11.5, CONTRACTOR will submit in form prescribed by ENGINEER an itemized cost breakdown together with supporting data.

11.9 Allowances: It is understood that the CONTRACTOR has included in the Contract Price all allowances so named in the Contract Documents and shall

cause the Work so covered to be done by such materialmen, suppliers or Subcontractors and for such sums within the limit of the allowances as the ENGINEER may approve. Upon final payment, the Contract Price shall be adjusted as required and an appropriate Change Order issued. The CONTRACTOR agrees that the original Contract Price includes such sums as he deems proper for costs and profit on account of cash allowances. No demand for additional cost or profit in connection therewith will be allowed.

11.9.1 These allowances shall cover the cost to the CONTRACTOR, less any applicable trade discount, of the materials and equipment required by the allowance delivered at the site, and all applicable taxes.

11.9.2 The CONTRACTOR'S costs for unloading and handling on the site, labor, installation costs, overhead, profit and other expenses contemplated for the original allowance shall be included in the Contract Price and not in the allowance.

11.9.3 Whenever the cost, as described in 11.9.1 above, is more than or less than the allowance, the Contract Price shall be adjusted accordingly by Change Order. The amount of the Change Order will recognize changes, if any, in handling costs on the site, labor, installation costs, overhead, profit and other expenses, except that whenever unit price allowances are stipulated for Work, the Change Order will not include any cost as described in 11.5 above.

ARTICLE 12 - TIME FOR COMPLETION, LIQUIDATED DAMAGES AND CHANGE OF THE CONTRACT TIME

12.1 The date of beginning and the time for completion of the Work are essential conditions of the CONTRACT DOCUMENTS and the Work embraced shall be commenced on a date specified in the NOTICE TO PROCEED.

12.2 The CONTRACTOR will proceed with the Work at such rate of progress to insure full completion within the CONTRACT TIME. It is expressly understood and agreed, by and between the CONTRACTOR and the OWNER, that the CONTRACT TIME for the completion of the Work described herein is a reasonable time, taking into consideration the average climatic and economic conditions and other factors prevailing in the locality of the WORK.

12.3 If the CONTRACTOR shall fail to complete the Work within the CONTRACT TIME, or extension of time granted by the OWNER, then the CONTRACTOR will pay to the OWNER the amount for liquidated damages as specified in the BID for each calendar day that the CONTRACTOR shall be default after the time stipulated in the CONTRACT DOCUMENTS.

12.4 The CONTRACT TIME may only be changed by a Change Order. Any claim for an extension in the CONTRACT TIME shall be based on written notice delivered to the OWNER and ENGINEER within ten days of the occurrence of the event giving rise to the claim.

Notice of the extent of the claim with supporting data shall be delivered within forty-five days of such occurrence unless ENGINEER allows an additional period of time to ascertain more accurate data. All claims for adjustment in the CONTRACT TIME shall be determined by ENGINEER if OWNER and CONTRACTOR cannot otherwise agree. Any change in the CONTRACT TIME resulting from any such claim shall be incorporated in a Change Order.

12.5 The Contract Time will be extended in an amount equal to time lost due to delays beyond the control of CONTRACTOR if he makes a claim therefore as provided in paragraph 12.4 Such delays shall include, but not be restricted to, acts or neglect by any separate contractor employed by OWNER, fires, floods, labor disputes, epidemics, abnormal weather conditions, or acts of God.

12.6 All time limits stated in the Contract Documents are of The essence of the Agreement. The provisions of this Article 12 shall not exclude recovery for damages (including compensation for additional professional services) for delay by either party.

12.7 No claim for delay shall be allowed because of failure to furnish Drawings until two weeks after demand for such Drawings and not then unless such claim be reasonable.

12.8 This article does not exclude the recovery of damages for delay by either party under other provisions in the Contract Documents.

12.9 No claim for extension of time will be considered because of unusual weather conditions, and no reparation shall be made to the CONTRACTOR for damages to the Work resulting therefrom, except as stipulated in paragraph 15.2 and as follows. The ENGINEER shall be responsible for determining the extent of extension of time, and shall notify the OWNER and CONTRACTOR in writing thereof within seven days after CONTRACTOR has been notified to resume work. Such extension shall be covered by a Change Order adjusting the Contract Time.

ARTICLE 13 - GUARANTEE

13.1 The CONTRACTOR shall guarantee all materials and equipment furnished and Work performed for a period of one (1) year from the date of SUBSTANTIAL COMPLETION. The CONTRACTOR warrants and guarantees for a period of one (1) year from the date of SUBSTANTIAL COMPLETION of the system that the completed system is free from all defects due to faulty materials or workmanship and the CONTRACTOR shall promptly make such corrections as may be

necessary by reason of such defects including the repairs of any damage to other parts of the system resulting from such defects. The OWNER will give notice of observed defects with reasonable promptness. In the event that the CONTRACTOR should fail to make such repairs, adjustments, or the Work that may be made necessary by such defects, the OWNER may do so and charge the CONTRACTOR the cost thereby incurred. The performance BOND shall remain in full force and effect through the guarantee period.

ARTICLE 14 - PAYMENTS AND COMPLETION

Payments to Contractor:

14.1 At least ten (10) days before each progress payment falls due (but not more often than once a month), the CONTRACTOR will submit to the ENGINEER a partial payment estimate filled out and signed by the CONTRACTOR covering the WORK performed during the period covered by the partial payment estimate and supported by such data as the ENGINEER may reasonably require.

If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at or near site, the partial payment estimate shall also be accompanied by such supporting data, satisfactory to the OWNER, as will establish the OWNER'S title to the material and equipment and protect his interest therein, including applicable insurance. The CONTRACTOR shall replace at his expense any stored materials paid for which are either damaged or stolen before installation. The ENGINEER will, within ten (10) days after receipt of each partial payment estimate, either indicate in writing his approval of payment and present the partial payment estimate to the OWNER, or return the partial payment estimate to the CONTRACTOR indicating in writing his reasons for refusing to approve payment. In the latter case, the CONTRACTOR may make the necessary corrections and resubmit the partial payment estimate. The OWNER, will within thirty (30) days of presentation to him of any approved partial payment estimate, pay the CONTRACTOR a progress payment on the basis of the approved partial payment estimate. Except as State law otherwise provides, the OWNER may retain ten (10) percent of the amount of each payment until final completion and acceptance of all work covered by the Contract Documents. The OWNER at any time, however, after fifty (50) percent of the Work has been completed, if he finds that satisfactory progress is being made, may reduce retainage on the current and remaining estimates upon recommendation by the ENGINEER. When the work is substantially complete (operational or beneficial occupancy), the retained amount may be further reduced to only that amount necessary to assure completion upon recommendation by the ENGINEER. On completion and acceptance of a part of the Work on which the price is stated separately in the Contract Documents, payment may be made in full, including retained percentages, less authorized deductions. The OWNER may reinstate up to 10 percent withholding if the OWNER determines, at its discretion, that the

CONTRACTOR is not making satisfactory progress or there is other specific cause for such withholding.

Final Release of Lien:

14.2 The OWNER shall have the right to demand and receive from the CONTRACTOR, before he shall receive final payment, final releases of lien executed by all persons, firms or corporations who have performed or furnished labor, services or materials, directly or indirectly, used in the Work. Likewise, as a condition to receiving any progress payment, the OWNER may require the CONTRACTOR to furnish partial releases of lien executed by all persons, firms and corporations who have furnished labor, services or materials incorporated into the Work during the period of time for which the progress payment is due, releasing such lien rights as those persons, firms or corporations may have for that period.

Contractor's Warranty of Title:

14.3 The CONTRACTOR warrants and guarantees that title to all Work, materials and equipment covered by an Application for Payment, whether incorporated in the Project or not, will have passed to the OWNER prior to the making of the Application for Payment, free and clear of all liens, claims, security interests and encumbrances (hereafter in these General Conditions referred to as "Liens"); and that no work, materials or equipment covered by an Application for Payment will have been acquired by the CONTRACTOR or by any other person performing the Work at the site or furnishing materials and equipment for the Project, subject to an agreement under which an interest therein or encumbrance thereon is retained by the seller or otherwise imposed by the CONTRACTOR or such other person.

Approval of Payments:

14.4 The ENGINEER will, within ten days after receipt of each Application for Payment, either indicate in writing his approval of payment and present the Application to the OWNER, or return the Application to the CONTRACTOR indicating in writing his reasons for refusing to approve payment. In the latter case, the CONTRACTOR may make necessary corrections and resubmit the application. The OWNER will, within thirty days of presentation to him of an approved Application for Payment, pay the CONTRACTOR the amount approved by the ENGINEER.

Representation:

14.5 The ENGINEER'S approval of any payment requested in an Application for Payment shall constitute a representation by him to the OWNER, based on the ENGINEER'S on-site observations of the Work in progress as an experienced and qualified design professional and on his review of the Application for Payment and

the supporting data, that the Work has progressed to the point indicated; that, to the best of his knowledge, information and belief, the quality of the Work is in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning Project upon substantial completion, to the results of any subsequent tests called for in the Contract Documents and any qualifications stated in his approval); and that the CONTRACTOR is entitled to payment of the amount approved. However, by approving any such payment the ENGINEER shall not thereby be deemed to have represented that he made exhaustive or continuous on-site observations to check the quality or the quantity of the Work, or that he has reviewed the means, methods, techniques, sequences and procedures of construction or that he has made any examination to ascertain how or for what purpose the CONTRACTOR has used the moneys paid or to be paid to him on account of the Contract Price, or that title to any Work, materials, or equipment has passed to the OWNER free and clear of any liens.

Certification on Request:

14.6 The CONTRACTOR shall make the following certification on each request for payment: "I hereby certify that the labor and materials listed on this request for payment have been used in the construction of this work or that all materials included in this request for payment and not yet incorporated into the construction are now on the site or stored at an approved location; and payment received from the last request for payment has been used to make payments to all first tier subcontractors and suppliers except as listed below".

Final Payment:

14.7 The ENGINEER'S approval of final payment shall constitute an additional representation by him to the OWNER that the conditions precedent to the CONTRACTOR'S being entitled to final payment as set forth in paragraph 14.13 have been fulfilled.

Refusal to Pay:

14.8 The ENGINEER may refuse to approve the whole or any part of any payment if, in his opinion, he is unable to make such representations to the OWNER. He may also refuse to approve any such payment, or because of subsequently discovered evidence or the results of subsequent inspection or tests, nullify any such payment previously approved, to such extent as may be necessary in his opinion to protect the OWNER from loss because:

14.8.1 The Work is defective, or completed Work has been damaged requiring correction or replacement,

14.8.2 The Work for which payment is requested cannot be verified,

14.8.3 Claims or Liens have been filed or there is reasonable evidence indicating the probable filing thereof,

14.8.4 The Contract Price has been reduced because of modifications,

14.8.5 The OWNER has been required to correct defective Work or complete the Work in accordance with Article 13.

14.8.6 Of unsatisfactory prosecution of the Work, including failure to clean up as required by paragraphs 6.29 and 6.30,

14.8.7 Of persistent failure to cooperate with other contractors on the Project and persistent failure to carry out the Work in accordance with the Contract Documents,

14.8.8 Of liquidated damages payable by the CONTRACTOR, or

14.8.9 Of any other violation of, or failure to comply with, the provisions of the Contract Documents.

Substantial Completion:

14.9 Prior to Substantial Completion, the OWNER, with the approval of the ENGINEER and with the concurrence of the CONTRACTOR, may use any completed or substantially completed portions of the Work. Such use shall not constitute an acceptance of such portions of the Work.

Entering Premises:

14.10 The OWNER shall have the right to enter the premises for the purpose of doing work not covered by the Contract Documents. This provision shall not be construed as relieving the CONTRACTOR of the sole responsibility for the care and protection of the Work, or the restoration of any damaged Work except such as may be caused by agents or employees of the OWNER.

Engineer's Certificate:

14.11 Upon completion and acceptance of the Work the ENGINEER shall issue a certificate attached to the final payment request that the Work has been accepted by him under the conditions of the Contract Documents. The entire balance found to be due the CONTRACTOR, including the retained percentages, but except such sums as may be lawfully retained by the OWNER, shall be paid to the CONTRACTOR within thirty (30) days of completion and acceptance of the Work.

Indemnification:

14.12 The CONTRACTOR will indemnify and save the OWNER or the OWNER'S agents harmless from all claims growing out of the lawful demands of Subcontractors, laborers, workmen, mechanics, materialmen, and furnishers of machinery and parts thereof, equipment, tools, and all supplies, incurred in the furtherance of the performance of the Work. The CONTRACTOR shall, at the OWNER'S request, furnish satisfactory evidence that all obligations of the nature designated above have been paid, discharged, or waived. If the CONTRACTOR fails to do so the OWNER may, after having notified the CONTRACTOR, either pay unpaid bills or withhold from the CONTRACTOR'S unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged whereupon payment to the CONTRACTOR shall be resumed, in accordance with the terms of the Contract Documents, but in no event shall the provisions of this sentence be construed to impose any obligations upon the OWNER to either the CONTRACTOR, his Surety, or any third party. In paying unpaid bills of the CONTRACTOR, any payment so made by the OWNER shall be considered as a payment made under the Contract Documents by the OWNER to the CONTRACTOR and the OWNER shall not be liable to the CONTRACTOR for any such payments made in good faith.

Acceptance of Final Payment as Release:

14.13 The acceptance by the CONTRACTOR of final payment shall be and shall operate as a release to the OWNER of all claims and all liability to the CONTRACTOR other than claims in stated amounts as may be specifically excepted by the CONTRACTOR for all things done or furnished in connection with this Work and for every act and neglect of the OWNER and others relating to or arising out of this Work. Any payment, however, final or otherwise, shall not release the CONTRACTOR or his sureties from any obligations under the Contract Documents or the Performance Bond and Payment Bonds.

ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION

OWNER May Suspend Work:

15.1 The OWNER may, at any time and without cause, suspend the Work or any portion thereof for a period of not more than ninety days by notice in writing to the CONTRACTOR and the ENGINEER which shall fix the date on which Work shall be resumed. The CONTRACTOR will resume the Work on the date so fixed. The CONTRACTOR will be allowed an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to any suspension if he makes a claim therefor as provided in Articles 11 and 12.

Work During Inclement Weather:

15.2 No work shall be done under these specifications except by permission of the ENGINEER when the weather is unfit for good and careful work to be performed. Should the severity of the weather continue, the CONTRACTOR, upon the direction of the ENGINEER, shall suspend all work until instructed to resume operations by the ENGINEER and the Contract Time shall be extended to cover the duration of the order. Work damaged during periods of suspension due to inclement weather shall be repaired and/or replaced by the CONTRACTOR. Any compensation for repairs or replacements shall be subject to approval of the OWNER.

OWNER May Terminate:

15.3 If the CONTRACTOR is adjudged bankrupt or insolvent, or if he makes a general assignment for the benefit of his creditors, or if a trustee or receiver is appointed for the CONTRACTOR or for any of his property, or if he files a petition to take advantage of any debtor's act, or to reorganize under the bankruptcy or similar laws, or if he repeatedly fails to supply sufficient skilled workmen or suitable materials or equipment, or if he repeatedly fails to make prompt payments to Subcontractors or for labor, materials or equipment or he disregards laws, ordinances, rules, regulations or orders of any public body having jurisdiction, or if he disregards the authority of the ENGINEER, or if he otherwise violates any provision of, the Contract Documents, then the OWNER may, without prejudice to any other right or remedy and after giving the CONTRACTOR and his surety seven days' written notice, terminate the services of the CONTRACTOR and take possession of the Project and of all materials, equipment, tools, construction equipment and machinery thereon owned by the CONTRACTOR, and finish the Work by whatever method he may deem expedient. In such case the CONTRACTOR shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds the direct and indirect costs of completing the Project, including compensation for additional professional services, such excess shall be paid to the CONTRACTOR. If such costs exceed such unpaid balance, the CONTRACTOR will pay the difference to the OWNER. Such costs incurred by the OWNER will be determined by the ENGINEER and incorporated in a Change Order.

Contractor Termination:

15.4 Where the CONTRACTOR'S services have been so terminated by the OWNER, said terminations shall not affect any rights of the OWNER against the CONTRACTOR then existing or which may thereafter accrue. Any retention or payment of moneys by the OWNER due the CONTRACTOR will not release the CONTRACTOR from liability.

Seven Days Notice:

15.5 Upon seven days' written notice to the CONTRACTOR and the ENGINEER, the OWNER may, without cause and without prejudice to any other right or remedy, elect to abandon the Project and terminate the Agreement. In such case, the CONTRACTOR shall be paid for all Work executed and any expense sustained plus a reasonable profit.

Removal of Equipment::

15.6 In the case of termination of this Contract before completion for any cause whatever, the CONTRACTOR, if notified to do so by the OWNER, shall promptly remove any part or all of his equipment and supplies from the property of the OWNER. Should the CONTRACTOR not remove such equipment and supplies, the OWNER shall have the right to remove them at the expense of the CONTRACTOR. Equipment and supplies shall not be construed to include such items for which the CONTRACTOR has been paid in whole or in part.

Contractor May Stop Work or Terminate:

15.7 If, through no act or fault of the CONTRACTOR, the Work is suspended for a period of more than ninety days by the OWNER or under an order of court or other public authority, or the ENGINEER fails to act on any Application for Payment within thirty days after it is submitted, or the OWNER fails to pay the CONTRACTOR any sum approved by the ENGINEER, within thirty days of its approval and presentation, then the CONTRACTOR may, upon seven days' written notice to the OWNER and the ENGINEER, terminate the Agreement and recover from the OWNER payment for all Work executed and any expense sustained plus a reasonable profit. In addition and in lieu of terminating the Agreement, if the ENGINEER has failed to act on an Application for Payment or the OWNER has failed to make any payment as aforesaid, the CONTRACTOR may upon seven days' notice to the OWNER and the ENGINEER stop the Work until he has been paid all amounts then due.

OWNER Furnished Equipment:

15.8 In case the OWNER furnishes equipment to the CONTRACTOR to install, but fails to deliver it to the CONTRACTOR as required by SUPPLEMENTARY CONDITIONS or SPECIAL CONDITIONS, and in case such failure causes the CONTRACTOR additional expense or need for extension of time, the CONTRACTOR may make such claims upon the OWNER and obtain adjustments as provided herein.

ARTICLE 16 - MISCELLANEOUS

16.1 Whenever any provision of the Contract Documents requires the giving of written notice it shall be deemed to have been validly given if delivered in person to the individual or to a member of the firm or to an officer of the corporation for

whom it is intended, or if delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to him who gives the notice.

16.2 All Specifications, Drawings and copies thereof furnished by the ENGINEER shall remain his property. They shall not be used on another Project, and with the exception of those sets which have been signed in connection with the execution of the Agreement, shall be returned to him on request upon completion of the Project.

16.3 The duties and obligations imposed by these General Conditions, Special Conditions and Supplemental Conditions and the rights and remedies available hereunder, and, in particular but without limitation, the warranties, guarantees and obligations imposed upon CONTRACTOR by paragraphs 6.36 and 14.3 and those in the Special Conditions and the rights and remedies available to the OWNER and ENGINEER thereunder, shall be in addition to, and shall not be construed in any way as a limitation of, any rights and remedies available by law, by special guarantee or by other provisions of the Contract Documents.

16.4 Should the OWNER or the CONTRACTOR suffer injury or damage to its person or property because of any error, omission, or act of the other or of any of his employees or agents or others for whose acts he is legally liable, claim shall be made in writing to the other party within a reasonable time of the first observance of such injury or damage.

END OF SECTION

SECTION 00800

SPECIAL CONDITIONS AND SUPPLEMENTARY CONDITIONS

ENGINEER is as follows:

CRAIG A. SMITH & ASSOCIATES
21045 Commercial Trail, Boca Raton, FL 33486
(561) 314 4445

SPECIAL CONDITIONS

1. **Normal work hours for this project are 7:00 a.m. to 6:00 p.m. Monday through Saturday. Any work done outside these hours shall require permission from the OWNER.**
2. **All work done by the CONTRACTOR or any subcontractor shall be done with minimal disturbance to the existing operating facilities.**
3. **The OWNER and/or ENGINEER shall be present during all necessary testing. The CONTRACTOR shall pay for the cost of any required test.**
4. **The Project Plans and Drawings have provided vertical control for the layout of the work in the forms of benchmarks located adjacent to the work. From these benchmarks and from horizontal controls provided by the Project Plans and Drawings, the CONTRACTOR shall develop and make all detailed surveys needed for construction and shall establish all working points, lines and elevations necessary to perform the work. A Professional Surveyor currently registered in the State of Florida shall supervise this surveying work.**

It is the sole responsibility of the CONTRACTOR to confirm and verify the accuracy of horizontal and vertical controls prior to commencement of construction. The CONTRACTOR shall not be allowed additional payments on the basis of incorrect horizontal and vertical control.

END OF SECTION

SECTION 00890

PERMITS

PART 1 GENERAL

1.01 SUMMARY

- A. City permits are not required for **City of Moore Haven Downtown Improvements**.
- B. Prior to beginning work contact the Sunshine/One-Call utility mark out agency. Obtain from Sunshine a number and immediately report same to the Engineer.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 00931
CHANGE ORDER

DATE OF ISSUANCE: -

No. #

PROJECT: **XXXX**

OWNER: **XXXX**

CONTRACTOR:

ENGINEER: CRAIG A. SMITH & ASSOCIATES

CONTRACT FOR:

YOU ARE DIRECTED TO MAKE THE FOLLOWING CHANGES IN THE CONTRACT DOCUMENTS.

DESCRIPTION:

ATTACHMENTS:

CHANGE IN CONTRACT PRICE:	CHANGE IN CONTRACT TIME:
Original Contract Price \$	Original Contract Time Days
Previous Change Orders	Net change from previous Change Orders
Contract Price prior to this Change Order \$	Contract Time prior to this Change Order Days
Net increase/decrease of this Change	Net Increase/decrease of this Change

Order	Order
\$	Days
Contract Price with all approved Change Orders	Contract Time with all approved Change Orders
\$	Days

RECOMMENDED :

By _____
 CRAIG A. SMITH & ASSOCIATES

ACCEPTED :

By _____
 CONTRACTOR

APPROVED :

By _____
 OWNER

END OF SECTION

SECTION 01110

SUMMARY OF THE WORK

PART 1 GENERAL

1.01 SUMMARY

- A. Detailed requirements and work extent are stated in applicable specification sections of these and as shown in the Drawings as prepared by Craig A. Smith and Associates, **CAS Project No. 22-2277**.
- B. Provide and pay for labor, materials, equipment, tools, construction equipment, applicable taxes, other facilities, and services necessary for the execution, testing, and completion of the Work under this Contract.
- C. Perform work not mentioned in the Specifications but shown in the Drawings or Work not shown in the Drawings but included in the Specifications, or items not specifically called out in the Contract Documents, which are necessary or normally required to make each installation satisfactory and legally operable, as incidental work without extra cost to the OWNER and include this expense in the applicable lump sum bid for the work.

1.02 CONTRACT DOCUMENTS

- A. Contract Documents include the Bidding Requirements, Contract Forms, Conditions of Contract, General Conditions, Supplemental General Conditions, Specifications, Drawings, Addenda, and requirements and provisions incorporated therein by specific reference thereto.
- B. Contract Documents are intended to be self explanatory and complimentary and to describe and provide for the complete work.
- C. Bidders are required to familiarize themselves with the provisions of the Contract Documents and make available to prospective suppliers and subcontractors appropriate information from the Contract Documents.

1.03 SPECIFICATIONS

- A. Specifications included in these Contract Documents establish the performance and quality requirements for materials and equipment and the minimum standards for the quality of workmanship and appearance.
- B. No attempt has been made to separate the Specification Sections into groups of work of separate subcontractors or for work to be performed by the various trades.

- C. Questions regarding the interpretation of a Specification should be directed to the ENGINEER prior to the submittal of a proposal for, or execution of, the work under this Contract.

1.04 DESCRIPTION OF WORK

- A. Work to be performed under this Contract consists of furnishing materials, equipment, and labor for the construction of the **City of Moore Haven Downtown Improvements** as shown in the Drawings and described in the Specifications.
- B. The project shall consist of but is not limited to:
 - 1. **The construction of stormwater and roadway improvements to the city downtown area including Avenue K SW, Avenue J SW, 1st Street SW and Riverside Drive.**
 - 2. Provide for the ENGINEER's approval complete and accurate survey of as-built new structures, new piping, and existing underground utilities uncovered during the course of the project showing elevations and location
- C. Work under this Contract shall be constructed in accordance with the lines and grades shown on the Contract Drawings or as directed by the ENGINEER.
- D. Elevations of existing ground, structures, and appurtenances, size, and location of existing piping are believed to be reasonably correct but are not guaranteed to be absolute and therefore are presented only as an approximation.
- E. Errors or discrepancies in the data shown or omissions of data required for accurately accomplishing the stakeout survey shall be referred immediately to the ENGINEER for interpretation or correction.
- F. Survey work for construction control processes shall be made by the CONTRACTOR at his expense.

1.05 WORK BY OTHERS

- A. Conduct operations to cause a minimum of interference with the work of other CONTRACTORS.

PART 2 PRODUCTS

2.01 BUY AMERICAN PRODUCTS

- A. In accordance with the Buy American Provision in Public Law 95217 (Section 215 of Public Law 92-500, as amended) the CONTRACTOR agrees that preference will be given to domestic equipment and construction material by CONTRACTOR, subcontractors and suppliers in the performance of this Contract.

PART 3 EXECUTION

3.01 TIME FOR COMPLETION

- A. Work shall be commenced at the time stipulated in the written Notice to Proceed and shall be completed within the time stipulated in the Notice to Proceed.

3.02 LIQUIDATED DAMAGES

- A. Liquidated damages for the work specified herein shall be as described in **Page 00500-2**.
- B. Work must be completed within the time specified in the Contract Documents.
 - 1. It is understood and agreed that deductions at the rates stipulated shall be made from the total contract price for each and every calendar day after and exclusive of the day within which completion was required, and up to and including the date of completion and acceptance by the OWNER.
 - 2. Completion of the work, as mentioned above, shall include startup and testing of portions of the project, unless explicitly excluded.
- C. The amount as set forth as liquidated damages is understood and agreed not to be a penalty; the said sum being specifically agreed upon in advance as the measure of damage to the OWNER resulting from the delay in completion of the work.
 - 1. The expiration of the time stipulated without the work having been completed shall in itself constitute a default without the necessity of any notice being given by the OWNER to the CONTRACTOR.
 - 2. The CONTRACTOR agrees and consents that the Contract price reduced by the aggregate of the entire damages so deducted shall be accepted by the CONTRACTOR in full satisfaction for work done under the Contract.

END OF SECTION

SECTION 01140

WORK RESTRICTIONS

PART 1 GENERAL

1.01 SUMMARY

- A. Work under this contract shall not reduce **utility** services provided to the residents of the **City of Moore Haven** nor dramatically impact the vehicular traffic in the area of this project.
- B. Submit to the OWNER and ENGINEER a construction schedule explaining shut down procedures in detail.
 - 1. Submit written notification 48 hours in advance of requested shut down.

1.02 CONNECTION TO EXISTING SYSTEMS

- A. Connections to existing systems shall be performed with no damage and no interruption to the existing installation.
 - 1. Damage caused to existing installations shall be repaired or replaced by the CONTRACTOR at no additional cost to the OWNER.
- B. CONTRACTOR must contain and properly dispose of wastewater and sludge drained from existing pipelines and structures during construction.

1.03 COORDINATION WITH UTILITY PERSONNEL

- A. Before commencing work involving removing or placing in operation existing or new facilities, notify the OWNER at least twenty (20) days in advance in writing.
 - 1. The OWNER shall be responsible for removing facilities from operation.

1.04 PROTECTION OF PROPERTY

- A. Protect property that may be affected by construction work or operations.
 - 1. The location and extent of underground and covered facilities are not guaranteed.
 - 2. Proceed with care in order to prevent the undermining or damage to existing structures, piping, or facilities.
- B. Protect new and existing mechanical equipment from dust and debris.

1. Protective measures shall be furnished, installed, lighted, maintained, and removed at the CONTRACTOR's own cost.
- C. When potable water is being used, the supply source shall be protected against contamination in accordance with existing codes and regulations.
- D. Repair property damaged during construction.

1.05 WEATHER CONDITIONS

- A. Work that may be affected by inclement weather shall be suspended until proper conditions prevail.
 1. In the event of impending storms, take necessary precautions to protect work, materials and equipment from exposure.
 2. 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 components of the project.
 3. Do not claim compensation for precautionary measures so ordered, nor claim compensation from the OWNER for damage to the work from the elements of weather.
- B. Provide, within 15 days of contract signing, a hurricane preparedness plan to be enacted in the event of hurricane conditions during construction.**

1.06 FIRE PROTECTION

- A. Prevent fires at or adjacent to the Work.
- B. Provide adequate fire extinguishers and hose line stations.

1.07 SAFETY AND HEALTH REQUIREMENTS

- A. Comply with Federal, State, and Local safety and health regulations.
- B. Provide barricades and flashing lights or other devices to warn pedestrians and area traffic.
- C. Immunize personnel working in contact with sewage and sewage sludge.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01290

PAYMENT PROCEDURE

PART 1 GENERAL

1.01 SUMMARY

- A. Payments to the CONTRACTOR shall be made on the basis of the Proposal Bid Forms as full and complete payment for furnishing materials, labor, tools and equipment, and for performing operations necessary to complete the Work included in the Contract Documents.
1. This compensation shall also include payments for loss or damages arising directly or indirectly from the work, or from discrepancies between the actual quantities of work and those shown in the Contract Documents, or from unforeseen difficulties, which may be encountered during the execution of the work until final acceptance by the OWNER.
- B. The prices stated in the Proposal include costs and expenses for taxes, labor, equipment, materials, commissions, transportation charges and expenses, patent fees and royalties, labor for handling materials during inspection, other costs and expenses for performing and completing the work as shown on the details and specified herein.
1. The Basis of Payment for an item at the price shown in the Proposal Bid Form shall be in accordance with its description of the item in this Section and as related to the work specified.
 2. Unit prices will be applied to the actual quantities furnished and installed in conformance with the Contract Documents.
- C. Quotations for the various items of work are intended to establish a total price for completing the work in its entirety.
1. Should the CONTRACTOR feel that the cost for an item of work has not been established in the Proposal Bid Form or this Section, the cost for that Work shall be included in some other applicable Bid Item, so that the Proposal for the project reflects the total price for completing the work in its entirety.

1.02 MEASUREMENT

- A. The quantities for payment under the Contract shall be full compensation determined by actual measurement of the completed items in place, ready for service and accepted by the OWNER, unless otherwise specified.

1. The OWNER will witness field measurements.
- B. When depth of cuts are indicated in the bid items, they shall be measured vertically from the existing grade, paved or unpaved, to the pipe invert.
- C. Linear measurements (such as pipe Items) and area measurements (such as surface restoration Items) shall be made in the horizontal plane, only.

1.03 LUMP SUM WORK

- A. Items for which quantities are indicated "Lump Sum", "L.S.", or "Job", shall be paid for at the price indicated in the Bid.
 1. This payment shall be full compensation for the items of work and work appurtenant thereto.
- B. When requested by the ENGINEER, submit to the ENGINEER, within 15 days after award of CONTRACTOR, a detailed schedule in triplicate, to be used only as a basis for determining progress payments on a lump sum contract or designated lump sum bid item.
 1. This schedule shall equal the lump sum bid and shall be in the form and sufficiently detailed as to satisfy the ENGINEER that it correctly represents a reasonable apportionment of the lump sum.

1.04 PAYMENT

- A. The quantities listed in the Bid schedule will not govern final payment.
 1. Payment to the CONTRACTOR will be made only for actual quantities of Contract items constructed in accordance with the Drawings and Specifications.
 2. Upon completion of construction, if the actual quantities show either an increase or decrease from the quantities given in the Bid schedule, an adjustment in payment will be made.
 3. This adjustment will be based upon the increase or decrease in quantity and the Contract Unit Price.
- B. Payment will not be made for excess material placed, materials wasted or disposed of in a manner not called for under the Contract.
 1. This includes rejected material not unloaded from vehicles, material rejected after it has been placed, and material placed outside of the plan or payment limit lines.

2. No compensation will be allowed for disposing of rejected or excess material.

PART 2 PRODUCTS

A. The OWNER will not provide space or place to store materials for this Project.

1. No payment will be made for stored materials.

B. It is intended that work required to complete this Contract will be included in the various bid items as described in the following paragraphs:

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01291

SCHEDULE OF VALUES

PART 1 GENERAL

1.01 SUMMARY

- A. Submit to the ENGINEER a Schedule of Values allocated to the various portions of the Work, within fifteen (15) workdays after Notice of Award.
- B. Upon request of the ENGINEER, support the values with data that will substantiate their correctness.
- C. The Schedule of Values shall be used as the basis for the CONTRACTOR's Applications for Payment.

1.02 RELATED REQUIREMENTS

- A. Conditions of the Contract - Division 0.
- B. Applications and Certification for Payment - Division 1.

1.03 FORM AND CONTENT OF SCHEDULE OF VALUES

- A. Type schedule on an 8-1/2 inches by 11 inches or 8-1/2 inches by 14 inches white paper; CONTRACTOR's standard forms and automated printout will be considered for approval by the ENGINEER upon CONTRACTOR's request.
- B. Identify schedule with:
 - 1. Title of Project and location
 - 2. ENGINEER and Project number
 - 3. Name and Address of CONTRACTOR
 - 4. Contract designation
 - 5. Date of submission
- C. Schedule shall list the installed value of the component parts to include excavation, piping, paving, of the Work (as required) in sufficient detail to serve as a basis for computing values for progress payments during construction.

D. For the various portions of the Work:

1. Each item shall include a directly proportional amount of the CONTRACTOR's overhead and profit.

E. The sum of values listed in the schedule shall equal the total Contract Sum.

F. Schedules are subject to ENGINEER's approval wherein additional line item detail may be required.

G. Submit current revision of the Schedule of Values with Application for Payment.

PART 2 PRODUCTS (Not Used)

PART 3 PRODUCTS (Not Used)

END OF SECTION

SECTION 01293

APPLICATIONS FOR PAYMENT

PART 1 GENERAL

1.01 SUMMARY

- A. Submit Applications for Payment to the ENGINEER in accordance with the schedule established by Conditions of the Contract and Agreement Between OWNER and CONTRACTOR.

1.02 RELATED REQUIREMENTS

- A. Agreement between OWNER and CONTRACTOR consisting of an approved payment schedule by the OWNER.
- B. Conditions of the Contract: Progress Payments, Retainages, Final Payment, schedule of values, and Record Documents.

1.03 FORMAT AND DATA REQUIRED

- A. Submit applications typed on forms provided by the OWNER, Application for Payment, with itemized data typed on 8½ inches by 14 inches white paper and continuation sheets.
- B. Payment forms shall show significant detail to substantiate request.
 - 1. Additional details may be required by the ENGINEER.

1.04 PREPARATION OF APPLICATION FOR EACH PROGRESS PAYMENT

- A. Application Form:
 - 1. Fill in required information, including that for Change Orders executed prior to date of submittal of application.
 - 2. Fill in summary of dollar value to agree with respective totals indicated on continuation sheets.
 - 3. Execute certification with signature of a responsible officer of CONTRACTOR's firm.
- B. Continuation Sheets:
 - 1. Fill in total list of scheduled component items of work, with item number and scheduled dollar value for each item.

2. Fill in dollar value in each column for each scheduled line item when work has been performed or products stored.
 - a. Round off values to nearest dollar, or as specified.
3. List each Change Order Number, and description, as for an original component item or work.
 - a. List by Change Order Number, and description, as for an original component item or work.
4. Payment for Material and Equipment stored, but not yet incorporated into the Work, will not be allowed.

1.05 SUBSTANTIATING DATA FOR PROGRESS PAYMENTS

- A. When the OWNER or the ENGINEER requires substantiating data, CONTRACTOR shall submit suitable information, with a cover letter identifying:
 1. Project
 2. Application number and date
 3. Detailed list of enclosures
- B. Submit one copy of data cover letter for each copy of application.
- C. As a prerequisite for payment, submit a "Surety Acknowledgment of Payment Request" letter showing amount of progress payment that the CONTRACTOR is requesting.
- D. Maintain an updated set of Project Drawings to be used as certified "As-Built" drawings in accordance with Division 1.
 1. As a prerequisite for monthly progress payments, submit the updated as-built drawings for review by the ENGINEER per Division 1.
- E. As a prerequisite for payment, submit monthly construction photographs in accordance with Division 1.
- F. As a prerequisite for payment, submit monthly Construction Schedule in accordance with Division 1.
- G. As a prerequisite for payment, submit monthly current Revision of the Schedule of Values in accordance with Division 1.

1.06 PREPARATION OF APPLICATION FOR FINAL PAYMENT

- A. Fill in Application form as specified for progress payments.
- B. Use continuation sheet for presenting the final statement of accounting as specified in Division 1 - Contract Closeout.
- C. Submit final record drawings.

1.07 SUBMITTAL PROCEDURE

- A. Submit Applications for Payment to the ENGINEER at the times stipulated in the Agreement.
- B. Number: Four (4) copies of each Application.
- C. When the ENGINEER finds Application properly completed and correct, he will transmit certificate of payment to OWNER, with copy to CONTRACTOR.

PART 2 PRODUCTS (Not Used).

PART 3 EXECUTION (Not Used).

END OF SECTION

SECTION 01312

PROJECT MEETINGS

PART 1 GENERAL

1.01 SUMMARY

- A. The ENGINEER shall schedule and administer pre-construction meetings, periodic progress meetings, and specially called meetings throughout the progress of work.
- B. For these meetings the ENGINEER shall:
 - 1. Prepare agenda for meetings.
 - 2. Make physical arrangements for meetings.
 - 3. Preside at meetings.
 - 4. Record the minutes; include significant proceedings and decisions.
 - 5. Reproduce and distribute copies of minutes within five (5) working days after each meeting.
 - a. To participants in the meeting.
 - b. To parties affected by decisions made at the meeting.
- C. Representatives of CONTRACTOR, subcontractors, and suppliers attending meetings shall be qualified and authorized to act on behalf of the entity each represents.
- D. The CONTRACTOR shall attend meetings to ascertain that work is executed consistent with Contract Documents and construction schedules.

1.02 RELATED SECTIONS

- A. Instructions to Bidders - Division 0.
- B. Scheduling of Construction - Division 1.
- C. Shop Drawings, Working Drawings, and Samples - Division 1.
- D. Project Record Documents - Division 1.

1.03 PRECONSTRUCTION MEETING

- A. Schedule a pre-construction meeting no later than fifteen (15) days after date of Notice of Award.
- B. Location: A central site, convenient for parties designated by the OWNER.
- C. Attendance:
 - 1. OWNER's Representative.
 - 2. ENGINEER and his Professional Consultants.
 - 3. Resident Project Representative.
 - 4. CONTRACTOR's Superintendent.
 - 5. Major Subcontractors.
 - 6. Major Suppliers.
 - 7. Utilities.
 - 8. Others as appropriate.
- D. Suggested Agenda:
 - 1. Distribution and discussion of:
 - a. List of major subcontractors and suppliers.
 - b. Projected Construction Schedule.
 - 2. Critical work sequencing/critical path scheduling.
 - 3. Major equipment deliveries and priorities.
 - 4. Project Coordination.
 - a. Designation of responsible personnel.
 - 5. Procedures and processing of:
 - a. Field decisions.
 - b. Proposal requests.

- c. Submittals.
 - d. Change Orders.
 - e. Applications for Payments.
- 6. Adequacy of Distribution of Contract Documents.
 - 7. Procedures for maintaining Record Documents.
 - 8. Use of Premises:
 - a. Office, Work, and Storage Areas.
 - b. OWNER's Requirements.
 - 9. Construction facilities, controls, and construction aids.
 - 10. Temporary Utilities.
 - 11. Maintenance of Traffic (MOT)

1.04 PROGRESS MEETINGS

- A. Schedule regular periodic meetings.
- B. The progress meetings will be held as required by progress of the work.
- C. Hold called meetings as required by progress of the work.
- D. Location of the meetings: Project field office of the CONTRACTOR or ENGINEER.
- E. Attendance:
 - 1. ENGINEER, and his professional consultants as needed.
 - 2. CONTRACTOR's Superintendent.
 - 3. Subcontractors as appropriate to the agenda.
 - 4. Suppliers as appropriate to the agenda.
 - 5. Others as appropriate.
 - 6. OWNER's Representative

F. Suggested Agenda:

1. Review, approval of minutes of previous meeting.
2. Review of work progress since previous meeting.
3. Field observations, problems, conflicts.
4. Problems which impede Construction Schedule.
5. Review of off site fabrication, delivery schedule.
6. Corrective measures and procedures to regain projected schedule.
7. Revisions to Construction Schedule.
8. Progress, schedule, during succeeding work period.
9. Coordination of schedules.
10. Review submittal schedules; expedite as required.
11. Maintenance of quality standards.
12. Pending changes and substitutions.
13. Review proposed changes for:
 - a. Effect on Construction Schedule and on a completion date.
 - b. Effect on other contracts of the Project.
14. Other business.
15. Construction schedule.
16. Critical/long lead items.

G. The CONTRACTOR is to study previous meeting minutes and current agenda items, in order to be prepared to discuss pertinent topics such as deliveries of materials and equipment and progress of work.

H. The CONTRACTOR is to provide a current submittal log at each progress meeting in accordance with Division 1.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01321

CONSTRUCTION PHOTOGRAPHS AND VIDEO RECORDING

PART 1 GENERAL

1.01 SUMMARY

- A. Employ competent photographer to take construction record photographs for preconstruction conditions, periodically during course of Work, and post-construction.
- B. Employ competent video recording professional to take pre-construction, existing conditions video record.
- C. In the event a gravity sanitary pipe evaluation is included in the scope of work, employ a competent video recording professional to perform inspection video recording.

1.02 RELATED SECTIONS

- A. Application for Payment - Division 1.
- B. Project Record Documents - Division 1.

1.03 PHOTOGRAPHY REQUIRED

- A. Provide photographs taken on cutoff date for each scheduled Application for Payment.
- B. View and Quantities Required:
 - 1. Take a minimum of 12 exposures of the site and adjacent property at pre-construction, monthly, and post-construction.
 - 2. Aerial photography shall be acceptable.
- C. Negatives:
 - 1. Remain property of photographer.
 - 2. Requires that photographer maintain negatives for a period of two years from Date of Completion of entire project.
 - 3. Photographer shall agree to furnish additional prints to OWNER and the ENGINEER at commercial rates applicable at time of purchase.

1.04 COSTS OF PHOTOGRAPHER

A. The CONTRACTOR to pay all costs for specified photography and prints.

1. Parties requiring additional photography or prints will pay photographer directly.

1.05 VIDEO REQUIRED

A. Prior to work commencement, provide continuous color audio-video disc recording taken along the entire length of the individual project work sites to serve as a record of pre-construction conditions.

1. The purpose of creating this record is to be able to fairly establish the prework condition that the CONTRACTOR must protect or restore after the facilities are installed.
2. It is in the CONTRACTOR's interest that this record be as inclusive as possible, to protect the CONTRACTOR and the OWNER from spurious claims of private and public property damaged by the CONTRACTOR's operations.
3. No construction shall begin prior to review and approval of the DVDs covering the construction area by the ENGINEER.
4. The ENGINEER shall have the authority to reject DVD recordings not conforming to the specifications and order that it be redone at no additional charge.
5. Reschedule unacceptable coverage within five (5) days after being notified.
6. The ENGINEER shall designate those areas, if any, to be omitted from or added to the audio-video coverage.
7. DVD recordings shall not be made more than thirty (30) days prior to construction in any area.
8. The recorded discs and written records shall become the property of the OWNER.

PART 2 PRODUCTS

2.01 PHOTOGRAPHIC PRINTS

A. Color:

1. Paper: Single weight, color print paper
2. Finish: Smooth surface, glossy
3. Size: 8-inch by 10-inch for aerial photographs
4-inch by 6-inch for site photographs

B. Identify each print on back, listing:

1. Name of Project
2. Orientation of View
3. Date and time of exposure
4. Name and address of photographer
5. Photographer's numbered identification of exposure.

2.02 VIDEO EQUIPMENT

- A. Furnish equipment, accessories, materials and labor to perform this service.
- B. Provide bright, sharp, clear pictures with accurate colors and shall be free from distortion, rolls or any other form of imperfection.
 1. The audio portion of the recording shall reproduce the commentary of the camera operator with proper volume, clarity and be free from distortion and interruptions.
- C. The color video camcorder used in the recording system shall be DVD format with the ability to view recorded site conditions directly by use of a conventional DVD (without intermediate transferring).

2.03 VIDEO MEASUREMENT AND PAYMENT

- A. Payment for the work in this section shall be included as part of the appropriate lump sum bid prices stated in the Proposal Bid Form.

2.04 VIDEO DISCS

- A. DVD-R with a minimum of 4.7 GB storage capacity shall be used for all site condition taping.
 1. Recording shall be performed at a minimum 420p.

2. Video discs shall become the property of the OWNER.

PART 3 EXECUTION

3.01 TECHNIQUE

- A. Factual presentation
- B. Correct exposure and focus
 1. High resolution and sharpness
 2. Maximum depth-of-field
 3. Minimum distortion

3.02 PHOTOGRAPHIC VIEWS REQUIRED

- A. Photograph from locations to adequately illustrate condition of construction and state of progress.
 1. At successive periods of photography, take at least one photograph from the same overall view as previously.
 2. Consult with the ENGINEER at each period of photography for instructions concerning views required.

3.03 DELIVERY OF PRINTS

- A. Deliver two (2) sets of prints to the ENGINEER to accompany each Application for payment.

3.04 RECORDED INFORMATION - AUDIO

- A. The audio track shall consist of an original live recording of the narrative commentary of the person recording the work sites.
 1. The recording shall begin with the current date, project name, and municipality and each section of the disc will have the general location, i.e. Construction Work Section, name of street, house address, viewing side, and direction of progress for each individual work site.

3.05 RECORDED INFORMATION - VIDEO

- A. The video track shall consist of recording the pre-construction surface conditions of each individual work site for the project.
 - 1. The video recording shall show the full extents of the surface conditions from close-up and in the distance, both directly along the route of the work and the conditions to the sides of the work zones (i.e.; curbs, sidewalks, ditches and culverts, utility features, fences, bushes, trees and other landscaped features in and near yards, structures which could be impacted by the work).
 - 2. The person video recording the site conditions shall use good photographic procedures and practices, such as steady handling of the video camcorder, recording with their back to the position of the sun, refraining from taping in poor lighting, rain or other adverse weather conditions or moving the camcorder too quickly.

3.06 SUBMITTAL OF DISCS

- A. Audio-visual disc recordings of the pre-construction surface conditions of each individual work site shall be submitted to the ENGINEER.
 - 1. Acceptable discs will be turned over to the OWNER by the ENGINEER.
 - 2. Acceptance of a video disc record by the ENGINEER will not relieve the CONTRACTOR of any liability he may incur by his failure to document a pre-work fault or defect that he may later be accused of causing.

END OF SECTION

SECTION 01327

SCHEDULING OF CONSTRUCTION

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Submit to the ENGINEER for approval, within fifteen (15) days after Notice of Award the estimated construction progress schedules for the work, with subschedules of related activities which are essential to its progress.**
- B. Submit revised progress schedules on a monthly basis.**
- C. No partial payments shall be approved by the ENGINEER until there is an approved construction progress schedule on hand.
- D. An authorized representative of the CONTRACTOR's firm shall be designate and responsible for development and maintenance of the schedule and of progress and payment reports.
 - 1. This representative of the CONTRACTOR shall have direct project control and complete authority to act on behalf of the CONTRACTOR's schedule.

1.02 RELATED REQUIREMENTS

- A. Existing Conditions - Division 0
- B. Summary of the Work - Division 1
- C. Project Meetings - Division 1
- D. Shop Drawings, Product Data, and Samples - Division 1
- E. Work Restrictions - Division 1

1.03 FORM OF SCHEDULES

- A. Prepare schedules in the form of a horizontal bar chart.
 - 1. Provide separate horizontal bar for each trade or operation within each structure or item.
 - 2. Horizontal time scale: In weeks from start of construction and identify the first workday of each month.

3. Scale and spacing: To allow space for notations and future revisions.
 4. Minimum sheet size: 11 inches x 17 inches.
- B. Format of listings: The chronological order of the start of each item of work.
- C. Identification of listings: By major specification section numbers as applicable and structure.
- D. Illustrate the expected progress payment for each month.

1.04 CONTENT OF SCHEDULES

A. Construction Progress Schedule:

1. Show the complete sequence of construction by activity.
2. Show the dates for the beginning of, and completion of, each major element of construction in no more than a two week increment scale.
3. At a minimum, Specifically list:
 - a. Site Clearing
 - b. Demucking
 - c. Excavation
 - d. Pipeline Work
 - e. Structure Construction
 - f. Electrical Construction
 - g. Mechanical Construction
 - h. Testing
 - i. Start-up
 - j. Restoration
 - k. As-built Drawings
4. Show projected percentage of completion for each item, as of the first of each month.
5. Show projected dollar cash flow requirements for each month of construction.

B. Submittals Schedule for Shop Drawings, and Samples in accordance Division 1.

1. Show:

- a. The dates for CONTRACTOR's submittals.
- b. The dates submittals will be required for OWNER furnished products, if applicable.
- c. The dates approved submittals will be required from the ENGINEER.

C. Provide a list of long lead items (equipment and materials).

1.05 PROGRESS REVISIONS

A. Indicate progress of each activity to date of submission.

B. Show changes occurring since previous submission of schedule:

1. Major changes in scope.
2. Activities modified since previous submission.
3. Revised projections of progress and completion.
4. Other identifiable changes.

C. Provide a narrative report as needed to define:

1. Problem area, anticipated delays, and the impact on the schedule.
2. Corrective action recommended, and its effect.
3. The effect of changes on schedules of other prime CONTRACTORS.

1.06 SUBMISSIONS

A. Submit initial schedules to the ENGINEER within fifteen (15) days after the effective date of the Agreement.

- 1. The ENGINEER will review schedules and return review copy within twenty-one (21) days after receipt.**
- 2. If required, resubmit within seven (7) days after return of review copy.**

B. Submit 4 copies of revised monthly progress schedules with that month's application for payment.

1.07 DISTRIBUTION

A. Distribute copies of reviewed schedules to:

1. ENGINEER (Two Copies)
2. Job Site File
3. Subcontractors
4. Other Concerned Parties
5. OWNER (Two copies)

B. Instruct recipients to report promptly to the CONTRACTOR, in writing, any problems anticipated by the projections shown in the schedule.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01330

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. Prepare and submit documentation to support material, equipment, and work as required by the Contract Documents.
- B. Individual specification sections in these Contract Documents may contain additional and special submittal requirements.
 - 1. The OWNER reserves the right to direct and modify the procedures and requirements for submittals as necessary to accomplish the specific purpose of each submittal.
 - 2. Should the CONTRACTOR be in doubt as to the procedure, purpose, or extent of submittal, he should direct his inquiry to the ENGINEER.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.01 HEADWAY

- A. Unless otherwise specified or instructed, submittals under this contract shall be directed to the ENGINEER.

3.02 ADMINISTRATIVE SUBMITTALS

- A. Provide submittals specified in The Bid Documents, the General Conditions, as may be specifically required in other parts of the Contract Documents, and as requested by the ENGINEER.

3.03 TECHNICAL SUBMITTALS

A. Miscellaneous

- 1. Requirements in this section are in addition to specific requirements for submittals specified in other Divisions and Sections of these Contract Documents.

2. Submitted data shall be fully sufficient in detail for determination of compliance with the Contract Documents.
3. Review, acceptance of substitutions, schedules, shop drawings, lists of materials, and procedures submitted or requested by the CONTRACTOR shall not add to the contract amount and additional costs which may result therefrom shall be solely the obligation of the CONTRACTOR.
4. The OWNER is not precluded, by virtue of review, acceptance, or approval from obtaining a credit for construction savings resulting from allowed concessions in the work or supply of equipment and materials.
5. The OWNER shall have no responsibility for the provision of engineering or other services to protect the CONTRACTOR from additional costs accruing from approvals or submittals.
6. No equipment or material for which listings, drawings, or descriptive material is required shall be purchased, fabricated, or installed until the ENGINEER has, on hand, copies of approved lists, and the appropriately stamped final shop drawings.
7. Submittals will be acted upon by the ENGINEER as promptly as possible and returned to the CONTRACTOR not later than the time allowed for review in the Shop Drawing Submittal Procedure.
8. Delays caused by the need for resubmittals shall not constitute reason for extension of the contract time.

3.04 SHOP DRAWING SUBMITTAL PROCEDURE

- A. The Contract Documents outlines general guidelines regarding submittal and approval of shop drawings.
 1. This section is intended to furnish details of the contents, identification, and final record requirements of shop drawings.
- B. Shop Drawing Requirements
 1. Shop drawings as referred to herein, shall include shop drawings and other submittals for both shop and field-fabricated items.
 2. Submit, as applicable, the following for prefabricated or manufactured structural, mechanical, electrical, and plumbing equipment and materials:
 - a. Shop drawings or Equipment drawings including dimensions, size and location of connections and weight of equipment.

- b. Catalog information and cuts.
 - 1) Each separate catalog, brochure, or single page submitted shall have identification noted herein.
 - 2) Catalogs or brochures submitted containing multiple items for approval, need the identification only on the exterior.
 - 3) In these cases the identification shall include the page and catalog item numbers.
- c. Setting plans or installation drawings for equipment, drives, and bases.
- d. Supporting calculations for equipment and associated supports, or hangers required or specified to be designed by equipment manufacturers.
- e. Complete manufacturer's specifications, including materials description and paint system.
- f. List of materials and supplies furnished with the equipment.
- g. Special handling instructions.
- h. Requirements for storage and protection prior to installation.
- i. Requirements for routine maintenance required prior to start up.
- j. List of requested exceptions to the Contract Documents.

C. Identification Data:

- 1. Submittals for approval shall have the following identification data, as applicable, contained thereon or permanently adhered thereto:
 - a. Project name and location.
 - b. Job number.
 - c. Subcontractor's vendor's and/or manufacturer's name and address.
 - d. Product identification.
 - e. Shop drawing title, drawing number, revision number, date of drawing and revision.
 - f. Applicable contract drawings and specification section numbers.

g. Vacant space 6 inches by 4 inches shall be provided to receive the ENGINEER's review stamp.

2. Catalog data ("cut sheets")

a. Each separate catalog, brochure, or single page submitted shall have the identification required hereinbefore.

b. Catalogs or brochures submitted containing multiple items for approval needs the identification only on the exterior.

c. In these instances the identification shall include page and catalog item numbers.

D. CONTRACTOR's Responsibility

1. Submittal of shop drawing or catalog data, bearing the CONTRACTOR's approval stamp, represents that the CONTRACTOR has determined and verified field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data, or will do so, and that he has checked and coordinated each item with other applicable approved shop drawings and the contract requirements.

a. Shop drawings and catalog data submitted without the CONTRACTOR's stamp of approval will be returned to the CONTRACTOR without review.

2. Approval of shop drawings, samples, or catalog data by the ENGINEER shall not authorize deviation from the requirement of the Contract Documents nor shall this approval relieve the CONTRACTOR from responsibility for errors or omissions therein.

E. Shop Drawing Review

1. The ENGINEER shall have ten (10) working days to review shop drawings.

a. In this case, working days shall be defined as days in which the ENGINEER's office is open for regular business.

3.05 FINAL SHOP DRAWINGS TO BE SUBMITTED TO OWNER

A. Complete sets of reproducible final shop drawings shall be submitted to the ENGINEER before, or at the time of, delivery of equipment to the site.

3.06 RECORD DRAWINGS

A. The CONTRACTOR will prepare a set of record drawings for the project, which will include the changes made in materials, equipment locations, and dimensions of the work.

- 1. Each month, or as otherwise agreed, submit to the ENGINEER a current listing and description of each change incorporated into the work since the preceding submittal.**
- 2. At the end of the project, submit to the ENGINEER one (1) complete set of Contract Documents showing required as-built information and deviations from the Drawings and Specifications as required in Project Closeout - Division 1.**

END OF SECTION

SECTION 01334

SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

PART 1 GENERAL

1.01 SUMMARY

- A. Submit to the ENGINEER for review, such working drawings, shop drawings, test reports and data on materials and equipment (hereinafter in this article called data), and material samples (hereinafter in this article called samples) as are required for the proper control of work, including but not limited to those working drawings, shop drawings, data and samples for materials and equipment specified elsewhere in the Specifications and in the Contract Drawings.
- B. Submit five (5) copies of shop drawings or other data to the ENGINEER.**
- C. Submit to the ENGINEER a complete list of preliminary data for which shop drawings are to be submitted.
- 1. Submit within thirty (30) calendar days after the effective date of the Notice to Proceed.**
 - Included in this list shall be the names of proposed manufacturers furnishing specific items.
- D. Review of this list by the ENGINEER shall in no way expressed or implied relieve the CONTRACTOR from submitting complete shop drawings and providing materials, equipment, fully in accordance with the Specifications.
- E. Maintain an accurate updated submittal log and bring this log to each scheduled progress meeting with the OWNER and ENGINEER.
- This log should include the following items:
 - Submittal-Description and Number assigned.
 - Date to ENGINEER.
 - Date returned to CONTRACTOR (from ENGINEER).
 - Status of Submittal (Approved/Resubmit/Rejected).
 - Date of Re-submittal and Return (as applicable).

- f. Date material released (for fabrication).
 - g. Projected date of fabrication.
 - h. Projected date of delivery to site.
 - i. Status of O & M submittal.
- F. Designate in the construction schedule, or in a separate coordinated schedule, the dates for submission and the dates that reviewed shop drawings, Working Drawings and Samples will be needed.

1.02 RELATED SECTIONS

- 1. Standard General Conditions of the Construction Contract - Division 0.
- 2. Scheduling of Construction - Division 1.
- 3. Material and Equipment - Division 1.
- 4. Project Record Documents - Division 1.
- 5. Operating and Maintenance Data - Division 1.

1.03 CONTRACTOR'S RESPONSIBILITY

- A. Check drawings, data and samples prepared by or for him before submitting them to the ENGINEER for review.
- 1. The drawings and data sheets shall bear CONTRACTOR's stamp.
 - a. The CONTRACTOR's un-stamped or improperly stamped drawings and data sheets will be returned to the CONTRACTOR for conformance with this requirement.
 - 2. Shop drawings shall indicate deviations in the submittal from requirements of the Contract Documents.
- B. Determine and verify:
- 1. Field measurements
 - 2. Field construction criteria
 - 3. Catalog numbers and similar data
 - 4. Conformance and Specifications

- C. Furnish the ENGINEER a schedule of shop drawing submittals fixing the respective dates for the submission of shop and working drawings, the beginning of manufacture, testing and installation of materials, supplies and equipment.
 - 1. This schedule shall indicate those that are critical to the progress schedule.
- D. Begin no work covered by a drawing, data, or a sample returned for correction until a revision or correction thereof has been reviewed and returned to him, by the ENGINEER approved.
- E. Submit to the ENGINEER drawings and schedules sufficiently in advance of construction requirements to provide no less than twenty-one (21) calendar days for checking and appropriate action from the time the ENGINEER receives them.
- F. Submit five (5) copies of descriptive or product data submittals to complement shop drawings for the ENGINEER plus the number of copies which the CONTRACTOR requires.
 - 1. Blueprint shop drawings shall be submitted with one (1) set of reproducible and four (4) sets of print.
 - 2. The ENGINEER will review the drawings and return to the CONTRACTOR the set of marked-up drawings with appropriate review comments.
- G. Accept responsibility for and bear cost of damages, which may result from the ordering of material or from proceeding with part of work prior to the review by ENGINEER of the necessary shop drawings.

1.04 ENGINEER'S REVIEW OF SHOP DRAWINGS

- A. The ENGINEER's review of drawings, data and samples submitted by the CONTRACTOR will cover only general conformity to the Specifications, external connections, and dimensions that affect the installation.
 - 1. The ENGINEER's review will not constitute an approval of dimensions, quantities, and details of the material, equipment, device, or item shown.
- B. The review of drawings and schedules will be general, and shall not be construed:
 - 1. As permitting departure from the Contract requirements.
 - 2. As relieving the CONTRACTOR of responsibility for errors, including details, dimensions, and materials.

3. As approving departures from details furnished by the ENGINEER, except as otherwise provided herein.
- C. If the drawings or schedule as submitted describe variations and show a departure from the Contract requirements, in which the ENGINEER finds to be in the interest of the OWNER and to be minor as not to involve a change in the Contract Price or time for performance, the ENGINEER may return the reviewed drawings without noting an exception.
- D. When reviewed by the ENGINEER, each of the shop drawings will be identified as having received such review being so stamped and dated.
 1. Shop drawings stamped "REJECTED" and with required corrections shown will be returned to the CONTRACTOR for correction and re-submittal.
- E. Resubmittals will be handled in the same manner as the first submittals.
 1. On resubmittals, direct specific attention, in writing or on resubmitted shop drawings, to revisions other than the corrections requested by the ENGINEER on previous submissions.
 2. Make corrections required by the ENGINEER.
- F. If the CONTRACTOR considers correction indicated on the drawings to constitute a change to the Contract Drawings or Specifications, give written notice thereof to the ENGINEER.
- G. The ENGINEER will review a submittal/re-submittal a maximum of three (3) times after which cost of review will be borne by the CONTRACTOR.
 1. The cost of engineering shall be equal to the ENGINEER's charges to the OWNER under the terms of the ENGINEER's agreement with the OWNER.
- H. When the shop drawings have been approved, carry out the construction in accordance therewith and make no further changes therein except upon written instructions from the ENGINEER.
- I. No partial submittals will be reviewed.
 1. Submittals not complete will be returned to the CONTRACTOR, and will not be considered "Rejected" until resubmitted.

1.05 SHOP DRAWINGS

- A. When used in the Contract Documents, the term "shop drawings" shall be considered to mean CONTRACTOR's plans for material and equipment, which become an integral part of the Project.

1. These drawings shall be complete and detailed.
 2. Shop drawings shall consist of fabrication, erection and setting drawings and schedule drawings, manufacturer's scale drawings, and wiring and control diagrams.
 3. Cuts, catalogs, pamphlets, descriptive literature, and performance and test data, shall be considered only as supportive to required Shop.
- B. Drawings and schedules shall be checked and coordinated with work of trades involved, before they are submitted for review by the ENGINEER and shall bear the CONTRACTOR's stamp of approval as evidence of such checking and coordination.
1. Drawings or schedules submitted without this stamp of approval shall be returned to the CONTRACTOR for resubmission.
- C. Each shop drawing, shall have a blank area 4 inches by 4 inches, located adjacent to the title block.
1. The title block shall display the following:
 - a. Number and title of the drawing.
 - b. Date of drawing or revision.
 - c. Name of project building or facility.
 - d. Name of CONTRACTOR and subcontractor submitting drawing.
 - e. Clear identification of contents and location of work.
 - f. Specification title and number.
- D. If drawings show variations from Contract requirements because of standard shop practice or for other reasons, describe such variations in his letter of transmittal.
1. If acceptable, proper adjustment in the Contract shall be implemented where appropriate.
 2. If the CONTRACTOR fails to describe such variations he shall not be relieved of the responsibility for executing the work in accordance with the Contract, even though such drawings have been reviewed.

- E. Data on materials and equipment include, without limitation, materials and equipment lists, catalog data sheets, cuts, performance curves, diagrams, materials of construction and similar descriptive material.
 - 1. Materials and equipment lists shall give, for each item thereon, the name and location of the supplier or manufacturer, trade name, catalog reference, size, finish and other pertinent data.

- F. For mechanical and electrical equipment furnished, provide a list including the equipment name, address and telephone number of the manufacturer's representative and service company so that service and spare parts can be readily obtained.
 - 1. Submit along with each shop drawing submittal a maintenance and lubrication schedule for each piece of equipment.

- G. Manufacturers or equipment supplier who propose to furnish equipment or products under Divisions 1, 12, 13, 14, 15 and 16 shall submit an installation list to the ENGINEER along with the required shop drawings.
 - 1. The installation list shall include at least five installations where identical equipment has been installed and has been in operation for a period of at least one (1) year.

- H. Only the ENGINEER will utilize the color "red" in marking shop drawing submittals.

- I. Before final payment is made, furnish to ENGINEER two (2) sets of record shop drawings clearly revised, complete and up to date showing the permanent construction as actually made for reinforcing and structural steel, miscellaneous metals, process and mechanical equipment, yard piping, electrical system and instrumentation system.

1.06 WORKING DRAWINGS

- A. When used in the Contract Documents, the term "working drawings" shall be considered to mean the CONTRACTOR's plans for temporary structures such as temporary bulkheads, support of open cut excavation, support of utilities, ground water control systems, forming and false-work; for underpinning; and for such other work as may be required for construction, but does not become an integral part of the project.

- B. Submit copies of working drawings to the ENGINEER where required by the Contract Documents or requested by the ENGINEER.
 - 1. Submit at least thirty (30) calendar days (unless otherwise specified by the ENGINEER) in advance of their being required for work.

- C. Working drawings shall be signed by a Registered Professional ENGINEER, currently licensed to practice in the State of Florida and shall convey, or be accompanied by, calculation or other sufficient information to completely explain the structure, machine, or system described and its intended manner of use.
1. Prior to commencing such work, working drawings must have been reviewed without specific exceptions by the ENGINEER, which review will be for general conformance and will not relieve the CONTRACTOR in way from his responsibility with regard to the fulfillment of the terms of the Contract.
 2. Risks of error are assumed by the CONTRACTOR; the OWNER and ENGINEER shall have no responsibility therefore.

1.07 SAMPLES

- A. Furnish, for the approval of the ENGINEER, samples required by the Contract Documents or requested by the ENGINEER.
1. Samples shall be delivered to the ENGINEER as specified or directed.
 2. Prepay shipping charges on samples.
 3. Materials or equipment for which samples are required shall not be used in work until approved by the ENGINEER.
- B. Samples shall be of sufficient size and quantity to clearly illustrate:
1. Functional characteristics of the product, with integrally related parts and attachment devices.
 2. Full range of color, texture and pattern.
 3. A minimum of two samples of each item shall be submitted.
- C. Each sample shall have a label indicating:
1. Name of Project
 2. Name of CONTRACTOR and Subcontractor
 3. Material or Equipment Represented
 4. Place of Origin
 5. Name of Producer and Brand (if any)

6. Location in Project
 7. Samples of finished materials shall have additional marking that will identify them under the finished schedules.
- D. Prepare a transmittal letter in triplicate for each shipment of samples.
1. Enclose a copy of the transmittal letter with the shipment and send a copy of this letter to the ENGINEER.
 2. Approval of a sample shall be only for the characteristics or use named in such approval and shall not be construed to change or modify Contract requirements.
- E. Approved samples not destroyed in testing shall be sent to the ENGINEER or stored at the site of the work.
1. Approved samples of the hardware in good condition will be marked for identification and may be used in the work.
 2. Materials and equipment incorporated in work shall match the approved samples.
 3. Samples, which failed testing or were not approved samples, will be returned to the CONTRACTOR at his expense, if so requested at time of submission.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used).

END OF SECTION

SECTION 01437

CONTRACTOR'S QUALIFICATIONS

PART 1 GENERAL

1.01 SUMMARY

- A. This section defines the minimum qualifications necessary for a contractor to bid the project as defined in Section 01110.
- B. Provide Form 00451 Contractor's Qualification Form, signed and notarized, as part of the bid documentation.

1.02 RELATED SECTIONS

- A. General Conditions
- B. Supplemental General Conditions
- C. Summary of Work - Section 01110

1.03 Quality Assurance

- A. CONTRACTOR attests and swears that the Underground Contractor for this project is:
 - 1. A Florida Licensed Underground Contractor
 - 2. In full compliance with Florida regulations governing Underground Contractors.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01450
QUALITY CONTROL

PART 1 GENERAL

1.01 SUMMARY

- A. This section defines the CONTRACTOR's responsibilities regarding inspection of the work by the ENGINEER and/or third parties, tests on materials supplied for the work and completed portions of the work, schedules to be submitted by the CONTRACTOR including specific instructions covering the beginning and completion of each portion of the work and monthly reports to be submitted by the CONTRACTOR regarding progress to date and adjustments to previously submitted work schedules.

- B. The work and reports set forth in this section shall not be taken to exclude other requirements as specified in other sections of the Contract Documents, as instructed by the ENGINEER or other incidentals necessary to complete the work in accordance with the plans and schedules.

1.02 RELATED SECTIONS

- A. General Conditions

- B. Supplemental General Conditions

- C. Technical Specifications.

- D. Submittal Procedure - division 1.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.01 INSPECTIONS

- A. Provide continuous safe access to the work for the OWNER, ENGINEER, and their authorized representatives.

- B. If the specifications, the ENGINEER's instructions, laws, ordinances, or public authority require work to be specially tested or approved, give timely notice of its readiness for inspection.
 - 1. Inspections to be conducted by the ENGINEER will be made promptly and where practicable, at the source of supply.
 - 2. If work should be covered up without approval or consent of the ENGINEER, it shall if required by the ENGINEER, be uncovered for examination at the CONTRACTOR's expense.
- C. Reexamination of questioned work may be ordered by the ENGINEER, and if so ordered, the work shall be uncovered by the CONTRACTOR.
 - 1. If this work is found to be in accordance with the Contract Documents, the OWNER will pay the cost of reexamination and replacement.
 - 2. If this work is found not to be in accordance with the Contract Documents, correct the defective work and the cost of reexamination and correction of the defective work shall be paid by the CONTRACTOR.
- D. When the CONTRACTOR's work requires inspection or test, notify the ENGINEER twenty-four (24) hours in advance of required tests or inspections.**
 - 1. Cooperate with the testing laboratory's representatives by giving ample notice of time, location and extent of work to be inspected or tested, by performing concrete slump tests, preparing concrete and other samples as instructed and by providing necessary facilities at the project site or in the shop for the testing agency.

3.02 TESTS

- A. Furnish, without extra charge, the necessary test pieces and samples, including facilities and labor for obtaining the same, as requested by the ENGINEER.
 - 1. When required, Furnish certificates of tests of materials and equipment made at the point of manufacture by a recognized testing laboratory.
- B. Give the ENGINEER ample advance notice of appropriate times for tests.
 - 1. Specified tests will be approved and supervised by the ENGINEER.
 - 2. When specific inspections or tests are required, the work involved shall not proceed beyond that point until the ENGINEER has made or waived inspections or tests.

3.03 EXECUTION

- A. Time is of the essence for the time of beginning, rate of progress, and time of completion of the work within this Contract.
 - 1. The work shall be executed as may be required to complete the project as contemplated in the Contract Documents and the approved construction schedule.

- B. Within thirty (30) days after the award of the Contract, submit to the ENGINEER, in triplicate, a listing of subcontractors, manufacturers, and suppliers who will be participating in the construction or who will be supplying materials and/or equipment for the project.
 - 1. The address of each firm shall be listed and type of material furnished or work performed.

END OF SECTION

SECTION 01451

CONTRACTOR'S QUALITY CONTROL

PART 1 GENERAL

1.01 SUMMARY

- A. Furnish personnel and equipment, which will be efficient appropriate and of sufficient quantity to secure a satisfactory quality of work and a rate of progress that will insure the completion of the work within the time stipulated in the Proposal.
 - 1. If at any time such personnel appear to the ENGINEER to be inefficient, inappropriate or insufficient for securing the quality of work required or for producing the rate of progress aforesaid, he may order the CONTRACTOR to increase the efficiency, change the character or increase the personnel and equipment, and the CONTRACTOR shall conform to such order.
 - 2. Failure of the ENGINEER to give such order shall in no way relieve the CONTRACTOR of his obligations to secure the quality of the work and rate of progress required.

1.02 PRIVATE LAND

- A. Do not enter or occupy private land outside of easements, except by written permission of the OWNER.

1.03 PIPE LOCATIONS

- A. Locate pipeline substantially as indicated on the Drawings, but the ENGINEER reserves the right to make such modifications in locations as may be found desirable to avoid interference with existing structures or for other reasons.

1.04 OPEN EXCAVATIONS

- A. Safeguard open excavation by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons and damage to property.
 - 1. Provide safe temporary bridges accommodating travel by pedestrians and workmen.
 - 2. Remove temporary bridges when no longer required.

3. The length of open trench will be controlled by the particular surrounding conditions, but shall always be confined to the limits prescribed by the ENGINEER.
 4. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, the ENGINEER may require special construction procedures such as limiting the length of open trench, prohibiting stacking excavated material in the street, and requiring that the trench shall not remain open overnight.
- B. Take precautions to prevent injury to the public due to open trenches.
1. Trenches, excavated material, equipment, or other obstacles, which could be dangerous to the public, shall be well lighted at night.

1.05 TEST PITS

- A. Test pits for the purpose of locating underground pipeline or structures in advance of the construction shall be excavated and backfilled with no additional cost to OWNER and at the direction of the ENGINEER.
1. Test pits shall be backfilled immediately after their purpose has been satisfied and the surface restored and maintained in a manner satisfactory to the ENGINEER.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 COOPERATION WITHIN THIS CONTRACT

- A. Firms or persons authorized to perform any work under this Contract shall cooperate with the General CONTRACTOR and his subcontractors or trades, and shall assist in incorporating the work of other trades where necessary or required.
- B. Cutting and patching, drilling and fitting shall be carried out where required by the trade or subcontractor having jurisdiction, unless otherwise indicated herein or directed by the ENGINEER.

3.02 PROTECTION OF CONSTRUCTION AND EQUIPMENT

- A. Protect newly constructed work from damage.
1. Reconstruct damaged work at no additional cost to OWNER.
 2. No wheeling, walking, or placing of heavy loads on it shall be allowed.

B. Protect structures in a manner approved by the ENGINEER.

1. Should any of the floors or other parts of the structures become heaved, cracked or otherwise damaged, all such damaged portions of the work shall be completely repaired and made good by the CONTRACTOR at his own expense and to the satisfaction of the ENGINEER.
 2. Special attention is directed to substructure bracing requirements described in Division 2.
 3. If, in the final inspection of the work, any defects, faults or omissions are found, the CONTRACTOR shall cause the same to be repaired or removed and replaced by proper materials and workmanship without extra compensation for the materials and labor required.
 4. Assume responsibility for the satisfactory maintenance and repair of the construction and other work undertaken herein, for at least the guarantee period described in the contract.
- C. Take necessary precaution to prevent damage to any structure due to water pressure during and after construction and until such structure is accepted and taken over by the OWNER.

END OF SECTION

SECTION 01458

TESTING AND TESTING LABORATORY SERVICES

PART 1 GENERAL

1.01 SUMMARY

- A. The CONTRACTOR shall retain the services of an Independent Testing Laboratory to perform materials testing specifically indicated in the Contract Documents and the ENGINEER may at any time elect to have materials and equipment tested for conformity with the Contract Documents.
 - 1. Cooperate with the laboratory to facilitate the execution of its required services.
 - 2. Employment of the laboratory shall in no way relieve CONTRACTOR's obligations to perform the Work of the Contract.

1.02 RELATED REQUIREMENTS

- A. Conditions of the Contract: Inspections and testing required by laws, ordinances, rules, regulations, orders or approvals of public authorities.
- B. Respective sections of specifications: Certification of products.
- C. Each specification section listed: Laboratory tests required and standards for testing.
- D. Testing laboratory inspection, sampling and testing is required for, but not limited to concrete work, rebar, asphalt mix, soil densities and compaction tests.

1.03 LIMITATIONS OF AUTHORITY OF TESTING LABORATORY

- A. Laboratory is not authorized to:
 - 1. Release, revoke, alter or enlarge on requirements of Contract Documents
 - 2. Approve or accept any portion of the Work
 - 3. Perform any duties of the CONTRACTOR

1.04 CONTRACTOR'S RESPONSIBILITIES

- A. Cooperate with laboratory personnel, and provide access to Work and to Manufacturer's operations.

- B. Secure and deliver to the laboratory adequate quantities of representational samples of materials proposed to be used and which require testing.
- C. Provide to the laboratory the preliminary design mix proposed to be used for concrete, and other materials mixes, which require control by the testing laboratory.
- D. Materials and equipment used in the performance of work under this Contract are subject to inspection and testing at the point of manufacture or fabrication.
 - 1. Standard specifications for quality and workmanship are indicated in the Contract Documents.
 - 2. The ENGINEER may require the CONTRACTOR to provide statements or certificates from the manufacturers and fabricators that the materials and equipment provided by them are manufactured or fabricated in full accordance with the standard specifications for quality and workmanship indicated in the CONTRACTOR Documents.
 - 3. Costs of this testing and providing statements and certificates shall be a subsidiary obligation of the CONTRACTOR, and no extra charge to the OWNER shall be allowed on account of such testing and certification.
- E. Furnish incidental labor and facilities:
 - 1. To provide access to Work to be tested
 - 2. To obtain and handle samples at the Project site or at the source of the product to be tested
 - 3. To facilitate inspections and tests
 - 4. For storage and curing of test samples
- F. Notify laboratory sufficiently in advance of operations to allow for laboratory assignment of personnel and scheduling of tests.
 - 1. When tests or inspections cannot be performed after such notice, the CONTRACTOR shall reimburse the laboratory personnel for travel time incurred due to the CONTRACTOR's negligence.
- G. Employ and pay for the services of a qualified independent testing laboratory to perform inspections, sampling, and testing required.

PART 2 PRODUCTS (Not Used)
PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01500

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SUMMARY

- A. The CONTRACTOR shall furnish labor, materials, and equipment and perform functions required for the complete installation and maintenance of the Work covered by this section.
 - 1. This Work shall include but not be limited to project field offices, sanitary facilities, construction utilities, construction consumable, safety and protection devices, storage facilities, security, traffic control and other construction aids and incidentals required for the completion of the Contract in accordance with the Contract Documents.
- B. Construction operations including storage of materials, location of field offices, construction parking and delivery routing shall be limited to the limits of construction indicated or as directed by the Owner.

1.02 RELATED SECTIONS

- A. General Conditions - Division 0.
- B. Supplementary General Conditions - Division 0
- C. Technical Specifications - Divisions 1 through 16
- D. Submittals - Division 1

1.03 REFERENCES

- A. Applicable Standards
 - 1 National Electric Code.
 - 2 Occupational Safety and Health Administration.
 - 3 Florida State Department of Transportation's "Standard Specifications For Road And Bridge Construction" - latest edition.

B. Governmental Agencies

1. Work shall comply with the applicable standards of the appropriate governing body.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 SANITATION FACILITIES

- A. Provide and maintain, for the duration of the Work on the Project, toilet facilities for persons engaged in Work on the Project and provide said toilet facilities with adequate means of locking when workmen are not engaged on the Project.
 1. Temporary toilets shall be chemical or other portable type approved by local health authorities and shall be removed upon completion of construction.

3.02 SAFETY AND PROTECTIVE DEVICES

- A. Protect persons from injury and to avoid property damage.
 1. Adequate barricades, construction signs, torches, red lanterns and guards as required shall be placed and maintained during the progress of the construction work for the protection of the public in compliance with federal, OSHA and local ordinances.
- B. Repair or replace damages to the property or adjacent properties caused in the execution of this Contract.
- C. Take necessary precautions for the safety of his employees on the job and shall comply with applicable provisions of Federal, State, County and Municipal safety laws and regulations to prevent accidents or injury to persons on, about, or adjacent to the premises where the Work is being performed.
 1. The Owner reserves the right to seek restitution from the Contractor for fines incurred by the Owner as a result of the Contractor's non-compliance with said regulations.
- D. In the event the Contractor's tools or materials delivered to the premises are stolen or damaged, the Contractor is responsible for such theft.

1. When the Work has been declared Substantially Complete and has been accepted by the Owner, the Owner will assume the responsibility for theft or damage.
2. Replace or repair stolen or damaged materials as soon as possible as directed by the Owner.

3.03 STORAGE FACILITIES

- A. Maintain this storage facilities on the Project site as necessary for the proper execution of the Work.
 1. These facilities shall be located so as to cause no interference to Work to be performed on the site.
 2. Propose location and other requirements for approval by Owner.
- B. Storage facilities shall provide protection from physical damage due to construction procedures, dampness, water, and excessive temperatures, and shall provide reasonable protection from loss due to fire or theft.
- C. Storage facilities constructed for that sole purpose shall remain the property of the Contractor and shall be removed by him when they are no longer required or when so directed.

END OF SECTION

SECTION 01510

TEMPORARY UTILITIES

PART 1 GENERAL

1.01 SUMMARY

- A. Furnish, install, and maintain temporary utilities required for construction, remove on completion of work.

1.02 RELATED SECTIONS

- A. Summary of Work - Division 1.
- B. Field Offices - Division 1.

1.03 REQUIREMENTS OF REGULATORY AGENCIES

- A. Comply with National Electric Code.
- B. Comply with Federal, State and Local codes and regulations and with utility company requirements.
- C. Comply with County Health Department and Environmental Regulations.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Materials may be new or used, but must be adequate in capacity for the required usage, must not create unsafe conditions, and must not violate requirements of applicable codes and standards.

2.02 TEMPORARY ELECTRICITY AND LIGHTING

- A. Arrange with utility company, provide service required for power and lighting, and pay costs for service and for power used in the construction, testing and trial operation prior to final acceptance of the work by the OWNER.
- B. Install circuit and branch wiring, with the area distribution boxes located so that power and lighting is available throughout the construction by the use of construction type power cords.
- C. Provide adequate artificial lighting for areas of work when natural light is not adequate to work, and areas accessible to the public.

2.03 TEMPORARY WATER

- A. Arrange with the OWNER, as described in the Supplemental Conditions to provide water for construction purposes.
- B. Install branch piping with taps located so that water is available throughout the construction by the use of hoses.
- C. Install at each and every connection to the OWNER water supply a backflow preventer meeting the requirements of ANSI A40.6, latest revision. CONTRACTOR shall be required to meter and pay for water used.

2.04 TEMPORARY SANITARY FACILITIES

- A. Provide sanitary facilities in compliance with laws and regulations.
- B. Service, clean and maintain facilities and enclosures.

2.05 TEMPORARY VENTILATION

- A. Provide temporary ventilation as required to maintain adequate environmental conditions to facilitate progress of the Work, to meet specified minimum conditions for the installation of materials, and to protect materials and finishes from damage due to temperature or humidity.
- B. Provide adequate forced ventilation of enclosed areas for curing of installed materials, to disperse humidity, and to prevent hazardous accumulations of dust, fumes, vapors or gases.
- C. Pay costs of installation, maintenance, operation and removal, and for fuel consumed.
- D. Provide connections to existing facilities, extend and supplement with temporary units as required to comply with requirements. Pay costs of installation, maintenance, operation and removal. OWNER will pay costs of fuel used from the existing system.

2.06 TEMPORARY TELEPHONE SERVICE

- A. Arrange with local telephone service company, provide direct line telephone service at the construction site for the use of personnel and employees. Service required:
 - 1. One direct line instrument in CONTRACTOR's Field Office.
 - 2. One direct line instrument in Field Office of ENGINEER.

3. One direct line facsimile (FAX) machine in CONTRACTOR's Field Office.
 4. Other instruments at the option of the CONTRACTOR, or as required by regulations.
- B. Pay costs for installation, maintenance and removal, and service charges for local calls. Toll charges shall be paid by the party who places the call.

PART 3 EXECUTION

3.01 GENERAL

- A. Comply with applicable requirements specified in Division 15 -Mechanical and in Division 16 - Electrical.
- B. Maintain and operate systems to assure continuous service.
- C. Modify and extend systems as work progress requires.

3.02 REMOVAL

- A. Completely remove temporary materials and equipment when their use is no longer required.
- B. Clean and repair damage caused by temporary installations or use of temporary facilities.
- C. Restore permanent facilities used for temporary services to specified condition.

END OF SECTION

SECTION 01520

CONSTRUCTION FACILITIES

PART 1 GENERAL

1.01 SUMMARY

- A. Furnish, install, and maintain temporary field offices for the Engineering and the CONTRACTOR during entire construction period.
- B. Furnish, install, and maintain storage and work sheds needed for construction.
- C. At completion of work, remove field offices, sheds, and contents.

1.02 RELATED SECTIONS

- A. Division 1 - Summary of Work
- B. Division 1 - Temporary Utilities
- C. Division 1 - Material and Equipment

1.03 OTHER REQUIREMENTS

- A. Prior to installation of offices, consult with the ENGINEER and OWNER on location, access and related facilities.

1.04 REQUIREMENTS FOR FACILITIES

A. Construction:

1. Structurally sound, weather-tight, with floors raised above ground.
2. Temperature transmission resistance: Compatible with occupancy and storage requirements.
3. At CONTRACTOR's option, portable or mobile buildings may be used.
 - a. Mobile trailers, when used, shall be modified for office use.
 - b. Do not use mobile trailers for living quarters.

B. Office for the ENGINEER:

1. A separate space for the sole use of designated occupants, with secure entrance doors and one key per occupant.
2. Area: 150 sq. ft. minimum, with minimum dimension of 8 feet.
3. Air Conditioned
4. 120V, electric outlet
5. Desk & Chair - reference table
6. Plan rack
7. Telephone

C. CONTRACTOR's Office and Facilities:

1. Size: As required for general use and to provide space for project meetings.
2. Lighting and temperature control: As specified for the ENGINEER's office.
3. Telephone: One direct line instrument.
4. Racks and files for Project Record Documents.
5. Other furnishings: CONTRACTOR's option.
6. Sanitary Facilities: to include a sink with running water and drain and a flushable toilet.
7. FAX Machine.
8. Copier Machine (not FAX Machine).

D. Make provisions and pay installations and other costs for the ENGINEER's construction office in order to provide telephone service, power service, exterior lights, and local code and OSHA requirements.

1. With the exception of charges for long distance and toll calls, pay monthly charges for the various services provided to the ENGINEER's office throughout the construction period.

1.05 USE OF PERMANENT FACILITIES

- A. Permanent facilities shall not be used for field offices or for storage.

PART 2 PRODUCTS

2.01 MATERIALS, EQUIPMENT, AND FURNISHINGS

- A. May be new or used, but must be serviceable, adequate for required purpose, and must not violate applicable codes or regulations.

PART 3 EXECUTION

3.01 PREPARATION

- A. Fill and grade sites for temporary structures to provide surface drainage.

3.02 INSTALLATION

- A. Construct temporary field offices on proper foundations, and provide connections for utility service.
 - 1. Secure portable or mobile buildings when used.
 - 2. Provide steps and landings at entrance doors.
- B. Locate construction office facilities at the location approved by the OWNER within the Project.

3.03 MAINTENANCE AND CLEANING

- A. Provide periodic maintenance and no less than weekly cleaning for temporary structures, furnishings, equipment and services.

3.04 REMOVAL

- A. Remove temporary field offices, contents, and services at a time when no longer needed.
- B. Remove foundations and debris; grade site to required elevations and clean the area.

3.05 SAFETY AND PROTECTION DEVICES

- A. Protect persons from injury and to avoid property damage.

1. Place and maintain adequate barricades, construction signs, torches, red lanterns and guards as required during the progress of the construction work for the protection of the public in compliance with federal, OSHA, and local ordinances.
- B. Repair or replace damages to the property or adjacent properties caused in the execution of this Contract, at CONTRACTOR's expense.
- C. Take necessary precautions for the safety of CONTRACTOR's employees on the job and comply with applicable provisions of Federal, State, County, and Municipal safety laws and regulations to prevent accidents or injury to persons on, about, or adjacent to the premises where the work is being performed.
1. The OWNER reserves the right to seek restitution from the CONTRACTOR for fines incurred by the OWNER as a result of the CONTRACTOR's non-compliance with said regulations.
- D. In the event the CONTRACTOR's tools or materials delivered to the premises are stolen or damaged, the CONTRACTOR is responsible for such theft.
1. When the work, or portion thereof, has been declared substantially complete and has been accepted by the OWNER, the OWNER will assume the responsibility for theft or damage.
 2. Replace or repair stolen or damaged materials as soon as possible as directed by the OWNER.

3.06 STORAGE FACILITIES

- A. Maintain storage facilities on the project site as necessary for the proper execution of the work.
1. Locate these facilities to cause no interference to work to be performed on the site.
 2. Propose location and other requirements for approval by OWNER.
- B. Provide storage facilities to protect stored goods from physical damage due to construction procedures, dampness, water, excessive temperatures and loss due to fire or theft.
- C. Storage facilities constructed for that sole purpose shall remain the property of the CONTRACTOR and shall be removed by him when they are no longer required or when so directed.

END OF SECTION

SECTION 01540
CONSTRUCTION AIDS

PART 1 GENERAL

1.01 SUMMARY

- A. Furnish, install, and maintain required construction aids, remove on completion of Work.

1.02 RELATED SECTIONS

- A. Summary of Work - Division 1

PART 2 PRODUCTS

2.01 MATERIALS, GENERAL

- A. Materials may be new or used, suitable for the intended purpose, but must not violate requirements of applicable codes and standards.

2.02 CONSTRUCTION AIDS

- A. Provide construction aids and equipment required by personnel and to facilitate execution of the Work.

- 1. Scaffolds, staging, ladders, stairs, ramps, runways, platforms, railings, hoists, cranes, chutes, and other facilities and equipment.
- 2. Refer to respective sections for particular requirements for each trade.

- B. Maintain facilities and equipment in first-class condition.

2.03 TEMPORARY ENCLOSURES

- A. Provide temporary weather-tight enclosure of exterior walls for storage of materials as work progresses, as necessary to, provide weather protection for materials, and to prevent entry of unauthorized persons.

- 1. Provide temporary exterior doors with self-closing hardware and padlocks.
- 2. Other enclosures shall be removable as necessary for work and for handling of materials.

PART 3 EXECUTION

3.01 PREPARATION

- A. Consult with the ENGINEER, review site conditions and factors that affect construction procedures and construction aids. Including adjacent properties and public facilities, which may be affected by execution of the Work.

3.02 GENERAL

- A. Comply with applicable requirements specified in sections of Divisions 2 through 16.
- B. Relocate construction aids as required by progress of construction, by storage or work requirements, and to accommodate legitimate requirements of OWNER and other CONTRACTOR's employed at the site.

3.03 REMOVAL

- A. Completely remove temporary materials, equipment and services:
 - 1. When construction needs can be met by use of permanent construction.
 - 2. At completion of Work.
- B. Clean and repair damage caused by installations for construction aids.
 - 1. Remove foundations and underground installations for construction aids.
 - 2. Grade areas of site affected by temporary installations to required elevations and slopes, and clean the area.
- C. Restore permanent facilities used for temporary purposes to specified condition or in kind if not specified.

END OF SECTION

SECTION 01550

TRAFFIC CONTROL

PART 1 GENERAL

1.01 SUMMARY

- A. The CONTRACTOR shall maintain traffic on existing roads affected by the construction and protect the traveling public from damage to person and property for the duration of the contract.
1. Abide by applicable laws, regulations, and codes thereof pertaining to Maintenance of Traffic (MOT) on public streets, detour of traffic, traffic control and other provisions as may be required for this Project.
 2. Comply fully with the MOT provisions contained in the permits.
 3. Work shall be in accordance with Florida Department of Transportation (FDOT) "Standard Specifications for Road and Bridge Construction", latest edition, and the "Roadway and Traffic Design Standards" Index Nos. 600 to 651, latest edition, including preparation of a proposed Maintenance of Traffic Plan.
- B. The CONTRACTOR shall assume responsibility for MOT on public streets, detour of traffic (including furnishing and maintaining regulatory and informative signs along the detour route), traffic control, and other provisions, throughout the Project, as required by the local Department of Public Works, Roads Department, or FDOT, as applicable.
1. Maintain traffic over a reasonably smooth traveled way which shall be so marked by signs, delineators, guiding devices, and other methods that a person who has no knowledge of conditions may safely and with a minimum of discomfort and inconvenience ride, drive, or walk, day or night, over the roadway where traffic is to be maintained.
 2. Work shall conform to the drawings and to the requirements of the local Department of Public Works, Roads Department, or FDOT, as applicable.

1.02 RELATED SECTIONS

- A. General Conditions
- B. Supplementary General Conditions
- C. Technical Specifications.
- D. Submittals - Division 1

E. Permits - Division 1

1.03 STANDARDS AND REGULATIONS

A. Applicable Standards

1. Occupational Safety and Health Administration.
2. FDOT "Standard Specifications for Road and Bridge Construction", latest edition, and the "Roadway and Traffic Design Standards" Index Nos. 600 to 651, latest edition, including preparation of a proposed Maintenance of Traffic Plan.

B. Governmental Agencies

1. Work shall comply with the applicable standards of the appropriate governing body.

1.04 Roadway Physical Conditions

A. Surface

1. Maintain the surface condition of the traveled way so it is consistent with the appropriate speed limits.

B. Drainage

1. Maintain the drainage facilities and other highway elements, old or new including detours.

C. Temporary Roads

1. Provide temporary relocated roads to maintain the required right-of-way.

D. Intersecting Roads

1. Provide ingress and egress to and from intersecting roads, buildings, and other facilities.

E. Haul Roads

1. Repair damage from CONTRACTOR's hauling operations along existing roads, and such operations shall be conducted with minimum interference to public traffic, as directed by the local Department of Public Works, Roads Department, or FDOT, as applicable.

F. Dust Control and Spillage

1. Control dust and keep the traveled way free from material spilled from hauling equipment.
2. This shall also apply to dust control and spilled material resulting from the CONTRACTOR's operations in the areas outside the contract limits.

G. Flagmen

1. Provide the necessary repairs to existing pavement and Flagmen for adequate traffic control on the traveled way.
2. Sign paddles are required.

H. Delineation and Guiding Devices

1. Provide and maintain delineation and guiding devices which shall include delineators, drums, cones, railing, temporary curb and other similar materials or methods indicated or directed.
2. The installation or moving of delineators or guiding devices together with removal of existing pavement markings shall be included in the work.

I. Project Site Patrol

1. Provide personnel to patrol the contract area as necessary to ensure that conditions on the site are adequate for public safety and convenience.

J. Construction Sign Barriers, Construction Barricades, and Lighting for Construction Barricades

1. Furnish, install, move, and maintain construction signs, barriers, construction barricades with warning lights, necessary arrow boards and signs, to warn motorists of the work throughout the Project.
2. Erected and maintained adequate approved devices to detour traffic away from the project during work.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.01 CONSTRUCTION

- A. Notify the local Department of Public Works, Roads Department, or FDOT, as applicable, 48 hours in advance of the construction date.
- B. Pavement markings damaged during construction shall be remarked promptly by the CONTRACTOR as required by the local Department of Public Works, Roads Department, or FDOT, as applicable.

3.01 DRAINAGE

- A. Keep drainage facilities fully operative.
 - 1. Provide ditches to adequately drain the traveled way and the remainder of the right-of-way.

3.02 INGRESS AND EGRESS

- A. Provide and maintain safe and adequate ingress and egress for intersecting points.

3.03 EXISTING PAVEMENT MARKINGS

- A. Remove, as soon as practical, existing pavement markings, as required by local Department of Public Works, Roads Department, or FDOT, as applicable.

3.04 QUALITY CONTROL

- A. Establish and maintain quality control for operations under this section to assure compliance with contract requirements and maintain records of his quality control for materials, equipment, and construction operations, including but not limited to the following:
 - 1. Scheduling and traffic control.
 - 2. Temporary pavement and drainage provisions.
 - 3. Traffic control devices.
 - 4. Maintaining traveled way.
 - 5. Maintaining drainage.

END OF SECTION

SECTION 01560

TREE AND PLANT PROTECTION

PART 1 GENERAL

1.01 SUMMARY

- A. Remove trees as noted in the Drawings.
- B. Abide by requirements and conditions of the governing authority.
- C. Assume full responsible for maintaining, in good condition, cultivated grass plots, trees, and shrubs.
 - 1. Where maintained shrubbery, grass strips or area must be removed or destroyed incident to the construction operation, replace or restore to the original condition destroyed or damaged shrubbery or grass areas.
 - 2. Tree limbs, which interfere with equipment operation and are approved for pruning, shall be neatly trimmed and the tree cut coated with a tree paint.
- D. Grass areas shall be solid sodded with sod to match the existing grass and shall first be leveled, and debris, rocks and other matter removed.
- E. The sod shall be placed with closely abutting joints, and shall completely cover the areas shown in the Drawings to be grassed.
 - 1. The top of the new sod shall coincide with the top of pavement and sidewalk, both existing and proposed.
 - 2. The sod shall be covered with a light top dressing of topsoil and shall then be thoroughly watered.
- F. Weeded areas need not be replaced with grass sod, but shall be restored to a "green" area by dressing the area with a layer of top soil, and sowing a variety of permanent type grass seed, over the area as approved by the ENGINEER.
 - 1. Water and maintain the seeded area until the ENGINEER is assured a good grass growth has developed, but not to exceed a maximum period of 60 days.

1.02 STANDARDS AND REGULATIONS

A. Work shall conform to the applicable standard.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01568
SECURITY MEASURES

PART 1 GENERAL

1.01 SUMMARY

- A. Security Program
- B. Entry Control
- C. Personnel Identification
- D. Miscellaneous Restrictions

1.02 RELATED SECTIONS

- A. Summary of Work - Division 1
- B. Temporary Utilities - Division 1

1.03 SECURITY PROGRAM

- A. Protect Work, existing premises and OWNER's operations from theft, vandalism and unauthorized entry.
- B. Initiate program in coordination with OWNER's existing security system at job mobilization.
- C. Maintain program throughout construction period until OWNER occupancy as directed by ENGINEER.

1.04 ENTRY CONTROL

- A. Restrict entrance of persons and vehicles into project site and existing facilities.
- B. Allow entrance only to authorized persons with proper identification.
- C. Maintain log of workmen and visitors, make available to OWNER on request.
- D. Coordinate access of OWNER's personnel to site in coordination with OWNER's security forces.

1.05 PERSONNEL IDENTIFICATION

A. Become familiar with OWNER and ENGINEER representatives.

B. Restrict access to job site to these representatives.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01600

EQUIPMENT AND MATERIALS

PART 1 GENERAL

1.01 SUMMARY

- A. Incorporate new and unused equipment, materials, instruments, or devices in this project, unless indicated otherwise in the Contract Documents.
- B. Deliver equipment and materials to be incorporated in the work sufficiently in advance of their installation and use to prevent delay in the execution of the work, and in order as required for reasonable executing the work.
- C. Prevent deterioration and damage to equipment and materials.
 - 1. Prevent warping, twisting, bending, breaking, chipping, rusting, damage, or theft of the equipment and materials handled and stored by the manufacturer, fabricator supplier, and CONTRACTOR before, during, and after shipment.
 - 2. Removed and replaced warped, twisted, bent, broken, chipped, rusted, damaged equipment at the CONTRACTOR's expense for both labor and materials.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01610

BASIC PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

A. Material and equipment incorporated into the Work:

1. Conform to applicable specifications and standards.
2. Comply with size, make, type and quality specified, or as specifically approved in writing by the ENGINEER.
3. Manufactured and Fabricated products:
 - a. Design, fabricate and assemble in accord with the best engineering and shop practices.
 - b. Manufacture like part of duplicate units to standard sizes and gauges, to be interchangeable.
 - c. Two or more items of the same kind shall be identical, by the same manufacturer.
 - d. Products shall be suitable for service conditions.
 - e. Equipment capacities, sizes and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.
4. Do not use material or equipment for purposes other than that for which it is designed or is specified.

1.02 RELATED REQUIREMENTS

- A. General Conditions - Division 0
- B. Summary of Work - Division 1
- C. Special Project Procedures - Division 1
- D. Shop Drawings, Working Drawings and Samples - Division 1
- E. Project Record Documents - Division 1

F. Operating & Maintenance Data - Division 1

G. Warranties and Bonds - Division 1

H. Installation - Division 1

I. Product Delivery Requirements - Division 1

J. Product Storage and Handling - Division 1

K. Product Substitution Requirements - Division 1

1.03 APPROVAL OF MATERIALS

A. Only new materials and equipment shall be incorporated in the work.

1. Materials and equipment furnished are subject to the inspection and approval of the ENGINEER.
2. No material shall be delivered to the work without prior approval of the ENGINEER.

B. Within 30 days after the effective date of the Agreement, submit to the ENGINEER, data relating to materials and equipment he proposes to furnish for the work.

1. Data shall be in sufficient detail to enable the ENGINEER to identify the particular product and to form an opinion as to its conformity to the specifications.
2. The data shall comply with product submittals.

C. Furnish facilities and labor for handling and inspection of materials and equipment.

1. Prior to beginning or during progress of the work, submit samples of materials for such special tests as required by the ENGINEER to demonstrate that they conform to the specifications.
2. Samples shall be furnished, stored, packed, and shipped as directed at the CONTRACTOR's expense.
3. Except as otherwise noted, the OWNER will make arrangements for and pay for the tests.

D. Submit data and samples sufficiently early to permit consideration and approval before materials are necessary for incorporation in the work.

1. Delay of approval resulting from the CONTRACTOR's failure to submit samples or data promptly shall not be used as a basis of claim against the OWNER or the ENGINEER.
- E. Provide samples of workmanship or finish as may be required.
- F. The materials and equipment used on the work shall correspond to the approved samples or other data.

1.04 MANUFACTURER'S INSTRUCTIONS FOR INSTALLATION

- A. Provide manufacturer's printed instruction, obtain and distribute copies of such instructions to parties involved in the installation, including copies to the ENGINEER.
 1. Maintain one set of complete instructions at the job site during installation and until completion.
- B. Handle, install, connect, clean, and adjust products in strict accord with such instructions and in conformity with specified requirements.
 1. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with ENGINEER for further instructions.
 2. Do not proceed with work without clear instructions.
- C. Perform work in accord with manufacturer's instructions.
 1. Do not omit preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.

1.05 TRANSPORTATION AND HANDLING

- A. Arrange deliveries of products in accord with construction schedules. Coordinate to avoid conflict with work and conditions at the site.
- B. Deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.
 1. Immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and approved submittals, and that products are properly protected and undamaged.
- C. Provide equipment and personnel to handle products by methods to prevent soiling or damage to products or packaging.

1.06 STORAGE AND PROTECTION

- A. Furnish a covered, weather-protected storage structure providing a clean, dry, non-corrosive environment for mechanical equipment, valves, electrical and instrumentation equipment, and special equipment to be incorporated into this project.
 - 1. Storage of equipment shall be performed to allow easy access and be in strict accordance with the "instructions for storage" of each equipment supplier and manufacturer including weather/humidity protection, connection of heaters, placing of storage lubricants in equipment, blocking, or skid storage.
 - 2. Replace corroded, damaged, or deteriorated equipment and parts before acceptance of the project.
- B. Store products in accord with manufacturer's instructions, with seals and labels intact and legible.
 - 1. Store products subject to damage by the elements in weather-tight enclosures.
 - 2. Maintain temperature and humidity within the ranges required by manufacturer's instructions.
 - 3. Store fabricated products above the ground on blocking or skids to prevent soiling or staining.
 - 4. Cover products which are subject to deterioration with impervious sheet coverings, provide adequate ventilation to avoid condensation.
 - 5. Store loose granular materials in a well-drained area on solid surfaces to prevent mixing with foreign matter.
- C. Materials and equipment to be incorporated in the work shall be handled and stored by the CONTRACTOR before, during, and after shipment in a manner to prevent warping, twisting, bending, breaking, chipping, rusting, and injury, theft or damage to the material or equipment.
- D. Store cement, sand, and lime under a roof and off the ground and keep completely dry.
- E. Store structural and miscellaneous steel, and reinforcing steel off the ground or otherwise to prevent accumulations of dirt or grease, and to minimize rusting.

- F. Store and handle brick, block, and similar masonry products in a manner to reduce breakage, chipping, and cracking.
- G. Moving parts shall be rotated, no less than weekly, to insure proper lubrications and to avoid metal-to-metal "welding".
- H. Upon installation of the equipment, start the equipment, at least half load, weekly for an adequate period of time to insure that the equipment does not deteriorate from lack of use.
- I. Materials, which in the opinion of the ENGINEER have become so damaged as to be unfit for the use intended or specified, shall be promptly removed from the site of the work, and receive no compensation for the damaged material or its removal.
- J. Arrange storage in a manner to provide easy access for inspection.
 - 1. Make periodic inspections of stored products to assure that products are maintained under specific conditions, and free from damage or deterioration.
- K. Protection After Installation:
 - 1. Provide substantial coverings as necessary to protect installed products from damage from traffic and subsequent construction operations.
 - 2. Remove on completion.
- I. Assume responsibility for materials, equipment, and supplies sold and delivered to the OWNER under this Contract until final inspection of the work and acceptance thereof by the OWNER.
 - 1. In the event material, equipment, and supplies are lost, stolen, damaged, or destroyed prior to final inspection and acceptance, replace same without additional cost to the OWNER.
- M. Should the CONTRACTOR fail to take proper action on storage and handling of equipment supplied under this Contract within seven days after written notice to do so has been given, the OWNER retains the right to correct deficiencies noted in previously transmitted written notice and deduct the cost associated with these corrections from the CONTRACTOR's Contract.
 - 1. These costs may be comprised of expenditures for labor, equipment usage, administrative, clerical, engineering, and other costs associated with making the necessary corrections.

1.07 SPECIAL TOOLS

- A. Furnish special tools (including grease guns or other lubricating devices) required for normal adjustment, operations and maintenance, together with instructions for their use.
- B. Preserve and deliver to the OWNER these tools and instructions in good order no later than upon completion of the Contract.

1.08 WARRANTY

- A. For major pieces of equipment, submit a warranty from the equipment manufacturer.

1.09 SPARE PARTS

- A. Spare parts for certain equipment provided under Division 11 through 16 have been specified in the pertinent sections of the Specifications.
 - 1. Collect and store spare parts as recommended by the manufacturer in a safe location.
 - 2. Provide an inventory listing spare parts, the equipment they are associated with, the name and address of the supplier, and the delivered cost of each item.
 - 3. Provide copies of actual invoices for each item furnished to substantiate the delivered cost.

1.10 GREASE, OIL, AND FUEL

- A. Furnish grease, oil, and fuel required for testing of equipment with the respective equipment.
 - 1. Furnish the OWNER a one (1) year supply of required lubricants including grease and oil of the type recommended by the manufacturer with each item of the equipment supplied under Division 11 through 16.
- B. Assume responsibility for changing the oil in drives and intermediate drives of each mechanical equipment after initial break-in of the equipment, which in no event shall be longer than three weeks of operation.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01630

PRODUCT SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. Materials or equipment specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular manufacturer, fabricator, supplier, or distributor; the naming of the item is intended to establish the type, function and quality of the item.
- B. Materials or equipment of other manufacturers, fabricators, suppliers, or distributors may be accepted by the ENGINEER, provided that sufficient information is submitted by the CONTRACTOR to allow the ENGINEER to determine its equivalency.
- C. No substitution is permitted if specifically identified that no substitution is permitted for that product or item.

1.02 CONDITIONS FOR REVIEW OF ALTERNATES

- A. Requests for review of substitute items of material and equipment will not be accepted by the ENGINEER from anyone other than the CONTRACTOR.
 - 1. If the CONTRACTOR wishes to furnish or use a substitute item of material or equipment, make a written application to the ENGINEER for acceptance thereof, certifying that the proposed substitute will adequately perform the functions and achieve the results required and be suitable for the same use as the material or equipment specified.
 - 2. The application shall state that the evaluation and acceptance of the proposed substitute will not affect the CONTRACTOR's time of completion, whether or not acceptance of the substitute for use in the work required a change in the Contract Documents to adapt the substitute into the design or whether or not substitution in connection with the work is subject to payment of royalty or licensing fee.
- B. Variations of the proposed substitute from that specified shall be identified in the application. Available maintenance, repair and replacement services shall be included.

1. The application shall also contain a statement that the CONTRACTOR agrees to pay direct and indirect costs, resulting from acceptance of the substitute, including redesign and claims of other CONTRACTORS affected by the resulting change.
 2. The ENGINEER may require additional data, at the CONTRACTOR's expense for proper evaluation of the proposed substitute.
- C. The ENGINEER will be allowed reasonable time for the evaluation of proposed substitution and the Engineer's decision regarding acceptability will be final.
1. No substitute shall be ordered or installed prior to the Engineer's written acceptance.
- D. The OWNER may require the CONTRACTOR, at the CONTRACTOR's expense, to supply a specific performance guarantee or other surety covering the substitution.
- E. The ENGINEER will record time required by the ENGINEER or required Consultants in evaluating proposed substitutes by the CONTRACTOR as well as costs required for modification of the Contract Documents as a result thereof.
1. Reimburse the OWNER for costs of ENGINEER services associated with evaluating proposed substitute that does not meet the requirements of the Contract Documents.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.01 SUBSTITUTIONS

- A. Submit requests for substitution in writing, to the ENGINEER for review, and within thirty (30) days from the date of issue of the contract Notice To Proceed.**
1. Requests submitted after the specified period may be rejected, at the Engineer's option, without review.
- B. Each request for substitution shall be submitted separately in five (5) copies and shall contain complete data substantiating compliance of the proposed substitution with the Contract Documents.

3.02 CONTRACTORS OPTIONS

A. Requests for substitution can be classified into two general categories, products or construction methods.

1. Products (Materials or Equipment)

- a. Provide products, to the maximum extent possible, of the same generic kind meeting the quality and performance of the referenced standard and from a single source.
- b. Products specified by naming several products or manufacturers, select one of the products or manufacturers named which complies with the Contract Documents.
- c. Products specified by naming one or more products or manufacturers and stating "or equal", submit a request for substitution for product or manufacturer not specifically named.
- d. Products specified by naming one product or manufacturer and followed by words indicating no substitution, there is no option and no request for substitution will be considered.
- e. Where more than one choice is available, as a CONTRACTOR's option, select a product that is compatible with other products specified or selected.
- f. Requests for substitution for products or manufacturers shall contain product identification including: manufacturer's name and address; manufacturer's literature with model or catalog number; product description; test data; utility consumption (if applicable); justification for the proposed substitution; samples (if appropriate); name and address of similar projects on which product was used and date of installation; other data as requested by the ENGINEER to establish that the proposed substitution is equal to or better than that specified.

2. Construction Method

- a. Detailed description of the proposed method(s) including name and address of projects where the method was used; drawings illustrating method(s) and reason or justification for the proposed substitution; other data as deemed necessary or as requested by the ENGINEER to establish that the proposed substitution is equal or superior to that specified.

3. Justification For Request For Substitution

- a. In making a request for substitution, the CONTRACTOR represents that CONTRACTOR has investigated the proposed substitution and has determined that it is equal or superior to that specified; that the CONTRACTOR will provide equal to or better warranties or bonds for the proposed substitution as for the product or method specified, that the CONTRACTOR waives claims for additional costs or extension of time related to the proposed substitution that may subsequently become apparent.

3.03 ENGINEER'S OPTIONS

- A. Requests for substitutions may be rejected by the ENGINEER without further review if the request:
 1. Is received more than thirty (30) days after the date of the Notice To Proceed.
 2. Effects the project completion date.
 3. Jeopardizes the performance or the intent of the project.
 4. Requires substantial revision of the Contract Documents.
- B. Requests will not be accepted that are indicated or implied on shop drawings, and are not accompanied by a formal request for substitution by the CONTRACTOR.
- C. If the ENGINEER determines that a proposed substitute meets the requirements of the Contract Documents and is suitable for the purpose intended, it may be accepted and if accepted, reimbursement to the OWNER for the Engineer's review will not be required.
- D. If the ENGINEER determines that a proposed substitute does not meet the requirements of the Contract Documents and is not acceptable, furnish the specified product, manufacturer or method at no additional cost to the OWNER and shall reimburse the OWNER for the cost of the Engineer's review.
- E. If the ENGINEER determines that a proposed substitute does not meet the requirements of the Contract Documents as specified but is suitable as a substitute for the purpose intended:
 1. Reimburse the OWNER for the Engineer's review.

2. Furnish the product, manufacturer or method specified at no additional cost to the OWNER.
 3. Request that the ENGINEER issue a change order in which case provide accurate cost data on the proposed substitution and comparison with the product or method specified, provide the OWNER with the benefit of savings in cost and reimburse the OWNER for the Engineer's cost of preparation and negotiation of the change order.
- F. In the event an agreement cannot be reached, furnish the product or method specified at no additional cost to the OWNER and shall reimburse the OWNER for the Engineer's preparation and negotiation of the change order.

3.04 SHOP DRAWINGS

- A. Acceptance of a substitution will not relieve the CONTRACTOR from the requirement for submission of Shop Drawings as set forth in the Contract Documents.

END OF SECTION

SECTION 01660

PRODUCT STORAGE AND HANDLING REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

A. STORAGE

1. Store equipment and materials at the jobsite in accordance with the manufacturer's recommendations and directed by the OWNER.
2. Do not store unnecessary materials or equipment on the jobsite.
3. Prevent any structure from being overloaded and endanger the safety of his personnel or others.
4. Enforce the instructions of the OWNER and ENGINEER regarding the posting of regulatory signs for loadings on structures, fire safety and smoking area.

B. HANDLING AND MAINTENANCE

1. Follow manufacturer's storage instructions or approved written deviations.
 - a. Forward a copy of manufacturer's approved written deviations to the ENGINEER.
2. Equipment with moving parts shall be rotated per the manufacturer's recommendations while in storage and during the period between installation and acceptance.
3. Equipment shall be stored fully lubricated unless otherwise instructed by the manufacturer.
4. Lubricants shall be changed upon completion of installation and as frequently as required thereafter during the period between installation and acceptance.
5. New lubricants shall be put into the equipment at the time of acceptance.
6. Equipment having moving parts such as gears, and electric motors and instruments, control panels, and switchgear shall be stored in a temperature and humidity controlled building until such time as the equipment is to be installed.

7. Shafts shall be rotated as required per manufacturer's recommendations for storage.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01723

PROTECTION OF ADJACENT CONSTRUCTION

PART 1 GENERAL

1.01 SUMMARY

- A. The underground utilities, structures, and other facilities shown in the Drawings are located according to the best information available, but may vary by several feet from both the location and elevation shown.
 - 1. Explore far enough in advance of his main trench to determine the exact location and condition of utilities, structures, or facilities so that, before the pipe is installed, the ENGINEER may change the line or grade of the pipe, should that become necessary to avoid a conflict.
- B. Cost for changing the grade of the proposed main downward or upward in order to clear obstructions located differently than shown in the Drawings, or not shown in the Drawings, shall be included in the price established in the Proposal for the new depth of cut range that the main is installed in.
- C. Where the main is deflected either horizontally or vertically, and the ENGINEER requires additional work and items such as paving, air release valve assemblies, and similar items for which a pay item was established in the proposal, additional work and items will be paid for at the price bid.
- D. Determine the locations of recent additions to the systems and not shown in the Drawings.
 - 1. Exercise extreme to prevent damage to utilities resulting from contract activities.
 - 2. The location of the overhead utilities shall be verified and the ENGINEER shall be notified of conflict that might occur.
 - 3. Comply with the requirements of the utility companies and the ENGINEER for determining which poles will need shoring during excavation and shall provide shoring and support as required.
- E. Where it is necessary to temporarily interrupt house or building services, notify the house or building owner or occupant, both before the interruption and again immediately before service is resumed.
 - 1. Before disconnecting pipes or cables, obtain permission from the OWNER, or shall make suitable arrangements for their disconnection by the OWNER.

- F. Assume responsibility for damage to pipes, conduits, or cables, and restore damaged items to service promptly.
- G. Various drainage culverts and drainage ditches may be encountered along the route of the work.
 - 1. Repair, restore, or reinstall culverts that are disturbed, damaged, or removed.
 - 2. Drainage ditches shall be restored to the original cross sections existing prior to construction of this work.
 - 3. Ditches shall be left clean and free of excavated materials or other materials deposited in them as a result of this construction.
 - 4. Existing headwalls and slabs for drainage ditches, removed or damaged as a result of this construction, shall be restored.
 - 5. This work shall be performed as directed by the ENGINEER, and the work shall be considered an incidental item and the cost included in the items listed in the Proposal.

1.03 REFERENCES

A. Governmental Agencies

- 1. Work shall conform to the applicable standards of local government engineering departments.

1.04 RELOCATE OF EXISTING UTILITIES

A. Relocate existing utilities, as noted in the Drawings, or for the convenience of construction.

- 1. This work shall be completed by either the forces of the existing utility or the CONTRACTOR's forces at the discretion of the responsible utility.
- 2. Perform work in accordance with the utility company's requirements.

B. Coordinate existing utility relocations with the appropriate utilities.

- 1. Provide temporary supports or protective encasements are required during the construction, at no additional cost.

C. Conflicts between the field investigation and the information shown in the Drawings shall be brought to the immediate attention of the ENGINEER.

1. There shall be no additional payment for adjustments in grades or location resulting from locations of existing utilities.
- D. Representatives of the utility companies shall be notified in accordance with the provisions set forth in the relevant sections of the Specifications and the permitting documents.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01740

CLEANING

PART 1 GENERAL

1.01 SUMMARY

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

1.02 RELATED SECTIONS

- A. Conditions of the Contract.
- B. Each Specification Section: Cleaning for specific Products or work.

1.03 DISPOSAL REQUIREMENTS

- A. Conduct cleaning and disposal operations to comply with codes, ordinances, regulations, and anti-pollution laws.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces.
- B. Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned.
- C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 EXECUTION

3.01 DURING CONSTRUCTION

- A. Execute periodic cleaning to keep the Work, the site and adjacent properties, free from accumulations of waste materials, rubbish and windblown debris, resulting from construction operations.

- B. Provide on-site containers for the collection of waste materials, debris, and rubbish.
- C. Remove waste materials, debris and rubbish from the site periodically and dispose of at legal disposal areas away from the site.

3.02 DUST CONTROL

- A. Clean interior spaces prior to the start of finish painting and continue cleaning on an as-needed basis until painting is finished.
- B. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly-coated surfaces.

3.03 FINAL CLEANING

- A. Employ skilled workmen for final cleaning.
- B. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from sight-exposed interior and exterior surfaces.
- C. Wash and shine glazing and mirrors.
- D. Polish glossy surfaces to a clear shine.
- E. Ventilating Systems:
 - 1. Clean permanent filters and replace disposable filters if units were operated during construction.
 - 2. Clean ducts, blowers and coils if units were operated without filters during construction.
- F. Broom clean exterior paved surfaces and rake clean other surfaces of the grounds.
- G. Prior to final completion, or OWNER occupancy, CONTRACTOR shall conduct an inspection of sight-exposed interior and exterior surfaces, and work areas to verify that the entire work is clean.

END OF SECTION

SECTION 01741

FINAL CLEANING

PART 1 GENERAL

1.01 SUMMARY

- A. The CONTRACTOR shall provide equipment, tools, materials, and labor required to maintain the project site in a clean and orderly manner throughout the duration of construction and for final cleaning and touch up at end of construction. This work shall include but not be limited to, sweeping, brushing, dust control, washing, waxing and polishing, debris removal, removal of excess materials, tools, equipment and scaffolding and final cleaning of installed work.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Cleaning materials and equipment used shall be selected and employed with care to avoid scratching, marring, defacing, staining, or discoloring the surfaces cleaned. Cleaning materials shall be as recommended by the manufacturer of products and materials being cleaning.

PART 3 EXECUTION

3.01 CLEAN-UP DURING CONSTRUCTION

- A. Clean-up shall be performed as required to prevent accidents to personnel, protect work in place, and to affect the progress of the work in a timely and orderly manner.
- B. Construction clean-up shall consist of, but not be limited to, the removal of mud, oil, grease, sand, gravel, dirt, trash, scrap, debris, and excess materials from the work site on a continuous basis. Small scrap and debris may be collected in containers and large materials may be stockpiled in an area to be removed from the site periodically at the Contractor's cost.
- C. Immediately prior to the Contractors request for final inspection of the project or portion thereof, final cleanup shall be performed. Pavement damaged shall be repaired in a manner approved by the Engineer. Final grade in the area of the pipe installation shall be returned to the pre-construction elevation and condition.

END OF SECTION

SECTION 01770

CLOSEOUT PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

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

1.02 RELATED SECTIONS

- A. Conditions of the Contract.
 - 1. Fiscal provisions, legal submittals, and additional administrative requirements.
- B. Project Record Documents - Division 1.
- C. Closeout Submittals - Division 1.

1.03 BENEFICIAL OCCUPANCY

- A. When the OWNER considers work is substantially complete for beneficial use, he will submit a letter to the CONTRACTOR informing intent to take early possession of the facility for partial use.
 - 1. The written notice shall describe the OWNER's reason for early beneficial occupancy.
- B. Adjust construction work schedule to accommodate the OWNER's plan to utilize the facility.
 - 1. Continue the work while allowing the OWNER full access and use of the facility.
- C. Requests for time extension or additional costs based upon the OWNER's early occupancy of the site and use of the facilities shall not be considered.
 - 1. Additional costs associated with the OWNER's early occupancy of the site shall be borne by the CONTRACTOR.

1.04 SUBSTANTIAL COMPLETION

- A. When the CONTRACTOR considers the work is substantially complete, he shall submit to the Engineer:

1. A written notice that the work, or designated portion thereof, is substantially complete.
 2. A list of items to be completed or corrected.
- B. Within a reasonable time after receipt of such notice, the ENGINEER will make an inspection to determine the status of completion.
- C. Should the ENGINEER determine that the work is not substantially complete:
1. The ENGINEER will promptly notify the CONTRACTOR in writing, giving the reasons therefore.
 2. The CONTRACTOR shall remedy the deficiencies in the work and send a second written notice of substantial completion to the Engineer.
 3. The ENGINEER will reinspect the work.
- D. When the ENGINEER finds that the work is substantially complete, he will:
1. Prepare and deliver to the OWNER a tentative Certificate of Substantial Completion with a tentative list of items to be completed or corrected before final payment.
 2. After consideration of any objections made by the OWNER as provided by Conditions of the Contract, and when the ENGINEER considers the work substantially complete, he will execute and deliver to the OWNER and the CONTRACTOR a definite Certificate of Substantial Completion with a revised tentative list of items to be completed or corrected.

1.05 RE-INSPECTION FEES

- A. Should the ENGINEER perform re-inspections due to failure of the Work to comply with the claims of status of completion made by the CONTRACTOR:
1. The OWNER will compensate the ENGINEER for such additional services.
 2. The OWNER will deduct the amount of such compensation from the final payment to the CONTRACTOR.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01780

CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SUMMARY

- A. Upon final inspection and before acceptance and final payment, the CONTRACTOR shall deliver to the OWNER guarantees and warranties, affidavits of payments of claims and Record Drawings.
- B. Required guarantees shall be bound in booklet form with covers properly labeled to identify the project and content.
- C. Maintain a complete set of Contract Documents at the project site and on which maintain a complete record of actual construction, which differs from what is shown in the Contract Documents.
 - 1. Show actual installed locations of buried pipe and conduit and other matters or equipment, which is indicated diagrammatically.
 - 2. Make markings in a neat, legible manner and full identified and/or explained by notes.

1.02 RELATED SECTIONS

- A. Conditions of the Contract: Fiscal provisions, legal submittals and additional administrative requirements.
- B. Project Record Documents - Division 1.
- C. Closeout Procedures - Division 1.

1.03 FINAL INSPECTION

- A. When the CONTRACTOR considers the work is complete, he shall submit written certification that:
 - 1. Contract Documents have been reviewed.
 - 2. Work has been inspected for compliance with Contract Documents.
 - 3. Work has been completed in accordance with Contract Documents.

4. Equipment and systems have been tested in the presence of the OWNER's representative and are operational.
 5. Work is completed and ready for final inspection.
- B. The ENGINEER will make an inspection to verify the status of completion with reasonable promptness after receipt of such certification.
- C. Should the ENGINEER consider that the work is incomplete or defective:
1. The ENGINEER will promptly notify the CONTRACTOR in writing, listing the incomplete or defective work.
 2. Remedy the stated deficiencies and send a second written certificate to the ENGINEER that the work is complete.
 3. The ENGINEER will re-inspect the work.
- D. When the ENGINEER finds that the work is acceptable under the Contract Documents, he shall request the CONTRACTOR to make closeout submittals.

1.04 CONTRACTOR'S CLOSEOUT SUBMITTALS TO ENGINEER

- A. Evidence of compliance with requirements of governing authorities.
- B. Project Record Documents: To requirements of Division 1.
- C. Spare Parts and Maintenance Materials: Division 1.
- D. Evidence of Payment and Release of Liens: To requirements of General and Supplementary Conditions.

1.05 FINAL ADJUSTMENT OF ACCOUNTS

- A. Submit a final statement of accounting to the Engineer.
- B. Statement shall reflect all adjustment to the Contract Sum:
 1. The original Contract Sum.
 2. Additions and deductions resulting from:
 - a. Previous Change Orders
 - b. Allowances
 - c. Unit Prices

- d. Deductions for uncorrected work
 - e. Penalties and Bonuses
 - f. Deductions for liquidated damages
 - g. Deductions for re-inspection payments
 - h. Other adjustments
- 3. Total Contract Sum, as adjusted.
 - 4. Previous payments.
 - 5. Sum remaining due.

C. ENGINEER will prepare a final Change Order, reflecting approved adjustments to the Contract Sum where not previously made by Change Orders.

1.06 FINAL APPLICATION FOR PAYMENT

A. Submit the final Application for Payment in accordance with procedures and requirements stated in the Conditions of the Contract.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01785

PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.01 SUMMARY

A. Maintain at the site for the OWNER one record copy of:

1. Contract Drawings
2. Contract Specifications
3. Record Drawings
4. Addenda
5. Change Orders and other Modifications to the Contract
6. ENGINEER'S Field Orders or Written Instructions
7. Approved Shop Drawings, Working Drawings, and Samples
8. Field Test Reports
9. Construction Photographs

1.02 RELATED SECTIONS

- A. Construction Photographs and Video Recordings – Section 01321
- B. Shop Drawings, Product Data, and Samples – Section 01334
- C. Closeout Procedure – Section 01770

1.03 MAINTENANCE OF DOCUMENTS AND SAMPLES

- A. Store documents and samples in CONTRACTOR's field office apart from documents used for construction.
- B. File documents and samples in accordance with Construction Specifications Institute (CSI) Master Format number system.
- C. Maintain documents in a clean, dry, legible condition and in good order
 1. Do not use record documents for construction purposes.

- D. Make documents and samples available at all times for inspection by the ENGINEER.
- E. As a prerequisite for monthly progress payments, the CONTRACTOR is to exhibit the currently updated "record documents" for review by the ENGINEER and the OWNER.

1.04 RECORD DOCUMENTS

- A. Label each document "RECORD" in neat large printed letters.
- B. Record information concurrently with construction progress.
- C. Drawings; Prepared a Certified Survey, by Professional Surveyor and Mapper (PSM) registered in the State of Florida, including elevations and stationing at increments specified by the ENGINEER, with the following information:
 - 1. Depths of various elements of foundation in relation to datum.
 - 2. Underground utilities.
 - a. Record horizontal and vertical locations of existing underground utilities (water, sewer, gas, electricity, signal cables, and drainage) impacted by the work, with ties from permanent features to manholes, valves, forcemain elbows, service lateral plugged ends, and connections to sewer mains and final surface grades, wherever it varies from existing grades and appurtenances uncovered during construction referenced to permanent surface improvements.
 - b. Record horizontal and vertical locations of new underground utilities and appurtenances: manholes, valves, elbows, fittings, service lateral plugged ends, connections to sewer mains, and final surface grades, referenced to permanent surface improvements.
 - 3. Location of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure.
 - 4. Field changes of dimensions and details.
 - 5. Changes made by Field Order or by Change Order.
 - 6. Details not in original Contract Drawings.
 - 7. Equipment and piping relocations.
 - 8. Building and tank locations.

D. Specifications and Addenda - legibly mark each Section to record:

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

E. Shop drawings (after final review and approval)

1. One set of record shop drawings for each process equipment, piping, (including casings) electrical system and instrumentation system.

1.05 SUBMITTAL

A. At the completion of work, the CONTRACTOR must deliver complete “As-Built” drawings to the ENGINEER for the OWNER. They shall consist of one (1) 24” x 36” reproducible set, six (6) 24” x 36” blackline sets, and one (1) CD consisting of the electronic CADD files, version 2020.

1. These “As-Built” drawings are to be signed and sealed by a Professional Surveyor and Mapper (PSM), currently registered and licensed in the state of Florida.
2. The ENGINEER will supply the electronic CADD files to the CONTRACTOR.
3. The “As-Built” electronic CADD files shall be generated in .dgn, .dwg, or .dxf file format, as specified by the ENGINEER.

B. Accompany submittal with transmittal letter in duplicate, containing:

1. Date
2. Project Title and Number
3. CONTRACTOR's Name and Address
4. Title and Number of each Record Document
5. Signature of CONTRACTOR or his Authorized Representative

C. Submittal of “As-Built” drawings shall be in accordance with Division 1.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01787

OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.01 SUMMARY

- A. Compile product data and related information appropriate for OWNER's maintenance and operation of products furnished under Contract.
 - 1. Prepare operating and maintenance data as specified in this Section and as referenced in other pertinent sections of Specifications.
- B. Instruct OWNER's personnel in maintenance of products and in operation of equipment and systems.

1.02 RELATED SECTIONS

- A. Closeout Procedures - Division 1
- B. Shop Drawings, Product Data, and Samples - Division 1
- C. Closeout Submittals- Division 1
- D. Project Record Documents - Division 1

1.03 QUALITY ASSURANCE

- A. Preparation of data shall be done by personnel:
 - 1. Trained and experienced in maintenance and operation of described products.
 - 2. Familiar with requirements of this Section.
 - 3. Skilled as technical writers to the extent required to communicate essential data.
 - 4. Skilled as draftsman competent to prepare required drawings.

1.04 FORM OF SUBMITTALS

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

B. Format:

1. Size: 8 1/2 inches x 11 inches
2. Paper: 20 pound minimum, white, for typed pages.
3. Text: Manufacturer's printed data, or neatly typewritten.
4. Drawings:
 - a. Provide reinforced punched binder tab, bind in with text.
 - b. Reduce larger drawings and fold to size of text pages, but not larger than 11 inches x 17 inches.
5. Provide fly-leaf for each separate product, or each piece of operating equipment.
 - a. Provide types description of product, and major component parts of equipment.
 - b. Provide indexed tabs.
6. Cover:
 - a. Identify each volume with typed or printed title "OPERATING AND MAINTENANCE INSTRUCTIONS".
 - b. List:
 - 1) Title of Project
 - 2) Identity of separate structure as applicable.
 - 3) Identity of general subject matter covered in this manual.

C. Binders:

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

1.05 CONTENT OF MANUAL

A. Neatly typewritten table of contents for each volume, arranged in systematic order.

1. Contractor, name of responsible principal, address and telephone number.
2. A list of each product required to be included, indexed to content of the volume.
3. List, with each product, name, address and telephone number of:
 - a. Subcontractor of installer
 - b. Maintenance CONTRACTOR, as appropriate
 - c. Identify area of responsibility of each
 - d. Local source of supply for parts and replacement.
4. Identify each product name and other identifying symbols as set forth in Contract Documents.

B. Product Data:

1. Include only those sheets that are pertinent to the specific product.
2. Annotate each sheet to:
 - a. Clearly identify specific product or part installed.
 - b. Clearly identify data applicable to installation.
 - c. Delete references to inapplicable information.

C. Drawings:

1. Supplement product data with drawings as necessary to clearly illustrate:
 - a. Relations of component parts of equipment and systems.
 - b. Control and flow diagrams.
2. Coordinate drawings with information in Project Record Documents to assure correct illustration of completed installation.

3. Do not use Project Record Documents as maintenance drawing.
- D. Written text, as required to supplement product data for the particular installation:
 1. Organize in consistent format under separate headings for different procedures.
 2. Provide logical sequence of instructions of each procedure.
- E. Copy of each warranty, bond and service contract issued:
 1. Provide information sheet for OWNER's personnel, give:
 - a. Proper procedures in event of failure.
 - b. Instances that might affect validity of warranties or bonds

1.06 MANUAL FOR MATERIALS AND FINISHES

- A. Submit five copies of complete manual in final form.
- B. Content; for architectural products, applied materials and finishes:
 1. Manufacturer's data, giving full information on products.
 - a. Catalog number, size, and composition.
 - b. Color and texture designations.
 - c. Information required for re-ordering special-manufactured products.
 2. Instructions for care and maintenance.
 - a. Manufacturer's recommendation for types of cleaning agents and methods.
 - b. Cautions against cleaning agents and methods, which are detrimental to product.
 - c. Recommended schedule for cleaning and maintenance.
- C. Content, for moisture-protection and weather-exposed products:
 1. Manufacturer's data, giving full information on products:
 - a. Applicable standards.

- b. Chemical composition.
- c. Details of installation.
- 2. Instructions for inspection, maintenance and repair.
- D. Additional requirements for maintenance data: Respective sections of Specifications.
- E. Provide complete information for products specified.

1.07 MANUAL FOR EQUIPMENT AND SYSTEMS

- A. Submit five copies of complete manual in final form.
- B. Content, for each unit of equipment and system, as appropriate:
 - 1. Description of unit and component parts.
 - a. Function, normal operating characteristics and limiting conditions
 - b. Performance curves, engineering data and tests
 - c. Complete nomenclature and commercial number of replaceable parts
 - 2. Operating procedures:
 - a. Start-up, break-in, routine and normal operating instructions
 - b. Regulation, control, stopping, shut-down and emergency instructions
 - c. Summer and Winter operating instructions
 - d. Special operating instructions
 - 3. Maintenance Procedures:
 - a. Routine operations
 - b. Guide to "trouble-shooting"
 - c. Disassembly, repair, and reassembly
 - d. Alignment, adjusting, and checking
 - 4. Servicing and lubrication schedule

- a. List of lubricants required
 5. Manufacturer's printed operating and maintenance instructions
 6. Description of sequence of operation by control manufacturer
 7. Original manufacturer's parts list, illustrations, assembly drawings and diagrams required for maintenance
 - a. Predicted list of parts subject to wear
 - b. Items recommended to be stocked as spare parts
 8. As-installed control diagrams by controls manufacturer
 9. Each CONTRACTOR's coordination drawings
 - a. As-installed color coded piping diagrams
 10. Charts of valve tag numbers, with location and function of each valve
 11. List of original manufacturer's spare parts, manufacturer's current prices and recommended quantities to be maintained in storage
 12. Other data as required under pertinent sections of specifications
- C. Contents, for each electric and electronic system, as appropriate:
1. Description of system and component parts
 - a. Function, normal operating characteristics, and limiting conditions
 - b. Performance curves, engineering data and tests
 - c. Complete nomenclature and commercial number of replaceable parts
 2. Circuit directories of panel-boards
 - a. Electrical service
 - b. Controls
 3. As-installed color coded wiring diagrams
 4. Operating procedures:
 - a. Routine and normal operating instructions

- b. Sequences required
 - c. Special operating instructions
5. Maintenance procedures:
- a. Routine operations
 - b. Guide to "trouble-shooting"
 - c. Disassembly, repair and reassembly
 - d. Adjustment and checking
6. Manufacturer's printed operating and maintenance instructions
7. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.
8. Other data as required under pertinent sections of specifications
- D. Prepare and include additional data when the need for such data becomes apparent during instruction of OWNER's personnel.
- E. Additional requirements for operating and maintenance data: Respective sections of Specifications.
- F. Provide complete information for product specified.

1.08 SUBMITTAL SCHEDULE

- A. Submit two copies of preliminary draft of proposed formats and outlines of contents of Operation and Maintenance Manuals within thirty (30) days after Notice to Proceed.
- 1. The ENGINEER will review the preliminary draft and return one copy with comments.
- B. Submit two copies of completed data in final form no later than 30 days following the ENGINEER's review of the last shop drawing and submittal.
- 1. One copy will be returned with comments to be incorporated into final copies.

- C. Submit specified number of copies of approved data in final form directly to the offices of the ENGINEER, Craig A. Smith & Associates, within 30 calendar days of product shipment to the project site and preferably within 30 days after the reviewed copy is received.
- D. Submit six copies of addendum to the operation and maintenance manuals as applicable and certificates as specified in Division 1 within 30 days after final inspection and plant start-up test.
- E. Final Operation and Maintenance submittals shall be in large three ring binders organized by specification Section and plainly marked.

1.09 INSTRUCTION OF OWNER'S PERSONNEL

- A. Prior to final inspection or acceptance, fully instruct OWNER's designated operating and maintenance personnel in operation, adjustment and maintenance of products, equipment and systems.
- B. Operating and maintenance manual shall constitute the basis of instruction.
 - 1. Review contents of manual with personnel in full detail to explain all aspects of operations and maintenance.

1.10 ENGINEER'S O & M CHECKLIST

- A. The ENGINEER will review Operation and Maintenance Manuals submittals on operating equipment for conformance with the requirements of this Section.
 - 1. The review will generally be based upon the checklist presented on the following pages (Form 01780) for the benefit of the CONTRACTOR and his suppliers.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

FORM 01780
OPERATION AND MAINTENANCE DATA
REVIEW CHECKLIST

EQUIPMENT _____	SUBMITTAL DATE _____
MANUFACTURER _____	APPROVAL TYPE _____
SECTION NUMBER _____	DRAWING NUMBER _____

- _____ Does shop drawing and submittal match for model/series/configuration?
- _____ Is color & printing correct on binder?
- _____ Is submittal properly indexed?
- _____ Does submittal pertain only to equipment being submitted?
- _____ Is submittal easily understood and instructively arranged?
- _____ Does submittal include start-up, shut-down, and trouble-shooting procedures?
- _____ Are sufficient drawings and schematics included to supplement written description?
- _____ For each piece of equipment supplied, is listing of name plate data provided and attached?
- _____ Are drawings provided printed on paper eleven inches high and folded to eight and one half inches wide?
- _____ Is proper and complete instruction for servicing included?
- _____ Is there a suggested operating log sheet for equipment?
- _____ Is a schedule for lubrication provided?
- _____ Is there a recommended preventative maintenance schedule?
- _____ Are necessary safety precautions clearly indicated where they relate to equipment?
- _____ Is area representative information provided (Name, Address, Phone Number)?
- _____ Are specified spare parts indicated and listed?

The following are points of rejection necessitating resubmittal by CONTRACTOR:

END OF SECTION

SECTION 02200

SITE PREPARATION

PART 1 GENERAL

1.01 SUMMARY

- A. Provide equipment, materials, and labor and performing functions necessary to move personnel and equipment on site, set up offices, trailers, facilities, construction utilities, obtain permits, and prepare the sites for construction.
- B. Remove personnel, equipment, temporary facilities, and provide final clean up of the sites when construction is complete.

1.02 WORK SPECIFIED ELSEWHERE

- A. Contract Documents
- B. General Requirements - Division 1
- C. Temporary Utilities - Division 1
- D. Earthwork - Division 2
- E. Bituminous Concrete Pavement - Division 2
- F. Clearing and Grubbing - Division 2
- G. Construction Facilities - Division 1

PART 2 PRODUCTS

2.01 TEMPORARY FACILITIES

- A. Provide temporary facilities required for performing the work.

2.02 PARKING FACILITIES

- A. Provide parking facilities for personnel working on the project.
 - 1. No employee or equipment parking will be permitted on the OWNER's property except as specifically designated for CONTRACTOR's use.

2.03 PROJECT SIGNS

- A. Construction and installation of project signs is not required, but if done must be in accordance with the OWNER'S requirements.**

2.04 CONTRACTOR'S STAGING AREA

- A. At no expense to the OWNER, arrange for and provide staging area to base CONTRACTORS' office and for material and equipment storage.
 - 1. The OWNER will not provide any land for this purpose.

PART 3 EXECUTION

3.01 LAYOUT

- A. Set up construction facilities in a neat and orderly manner within a designated area at the location of his choice as approved by the OWNER and the ENGINEER.
- B. Accomplish required work in accordance with applicable sections of these specifications or as approved.
- C. Provide the services of a Professional Land Surveyor, currently licensed and registered in Florida, to provide necessary horizontal and vertical survey lines and control, based upon principal control points and bench marks provided by the OWNER, as required by the General Conditions.

3.02 OBSTRUCTIONS

- A. Some obstructions may not be shown.
 - 1. Bidders are advised to carefully inspect the existing facilities before preparing their proposals.
 - 2. The removal and replacement of minor obstructions such as electrical conduits, air, water, waste piping, and similar items shall be anticipated and accomplished, even though not shown or specifically mentioned.
- B. Major obstructions encountered that are not shown in the Drawings or could not have been foreseen by visual inspection of the site prior to bidding should immediately be brought to the attention of the ENGINEER.
 - 1. The ENGINEER will make a determination for proceeding with the work.

2. If the ENGINEER finds that the obstruction adversely affects the CONTRACTOR's costs or schedule for completion, a proper adjustment to the Contract will be made in accordance with the General Conditions.

3.03 HOUSEKEEPING

- A. Maintain the work site and the temporary facilities in a clean and orderly manner.
 1. The OWNER reserves the right to maintain the property in a neat and orderly state at the CONTRACTOR's expense if the CONTRACTOR fails to respond to notices by the OWNER within reasonable time.

3.04 DEMOBILIZATION

- A. At the completion of work on each phase or portion of the project, remove construction personnel, equipment, and temporary facilities from the site.
- B. Transporting unused materials belonging to the OWNER to a place of storage designated by the ENGINEER.
- C. Remove and dispose of other materials and debris resulting from the construction, to an approved site.
- D. Return areas to their original condition.

3.05 PROJECT SIGNS

- A. If the CONTRACTOR is required to erect project signs, the ENGINEER will direct where the signs are to be placed.
 1. Maintain signs in good condition until final completion of the project.
 2. Remove the signs and restore the sites when directed.

3.06 RECORDS

- A. Keep one record copy of Specifications, Drawings, Addenda, Modifications, and Shop Drawings at the site in good order and annotated to show changes made during the construction process.

END OF SECTION

SECTION 02220
SITE DEMOLITION

PART 1 GENERAL

1.01 SUMMARY

- A. This section includes furnishing labor, materials, equipment and incidentals required for the demolition, relocation and/or disposal of building materials and equipment to be removed from the project.
- B. This section provides for the complete or partial removal and disposal of specified existing structures, foundations, slabs, piping, mechanical, electrical, existing (to be abandoned) piping and miscellaneous appurtenances encountered during construction operations.
- C. This Section calls attention to certain activities necessary to maintain and facilitate operation during and immediately following construction and do not purport to cover of the activities necessary.
 - 1. Diligently direct activities toward maintaining continuous operation of the existing facilities and minimizing operation inconvenience.
 - 2. Develop a Demolition and Removal Plan in accordance with Paragraph 1.06 of this Section.
- D. Demolition includes:
 - 1. Demolition, partial removal and cutting of existing masonry as required for the new construction.
 - 2. Distribution of salvageable and excess unacceptable material as specified below.
 - 3. Off-site disposal of excess and unacceptable materials.
- E. Examine the drawings regarding the existing system, visit the site and determine the extent of the work and operational conditions under which the work is to be perform.

1.02 PERMITS AND NOTICES

A. Permits and Licenses:

1. Obtain necessary permits and licenses for performing the work and furnish a copy to the ENGINEER prior to commencing the work.
2. Comply with the requirements of the permits.

B. Notices:

1. Issue written notices of planned demolition to companies or local authorities owning utility conduit, wires or pipes running to or through the project site.
2. Submit copies of the notices to the ENGINEER.

C. Utility Services:

1. Notify utility companies or local authorities furnishing gas, water, electrical, telephone, or sewer service to remove equipment owned by them in structures to be demolished and to remove, disconnect, cap, or plug their services to facilitate demolition.

1.03 CONDITIONS OF STRUCTURES

A. The OWNER and the ENGINEER assume no responsibility for the actual condition of the structures to be demolished or modified.

B. Conditions existing at the time of inspection for bidding purposes will be maintained by the OWNER insofar as practicable.

1. However, variations within the structure may occur prior to the start of demolition work.

1.04 RULES AND REGULATIONS

A. The Standard Building Codes shall control the demolition, modification or alteration of the existing buildings or structures.

B. No blasting shall be done on site.

1. Do not bring to or store explosives on the project site.

1.05 DISPOSAL OF MATERIAL

- A. Salvageable or specifically requested material is the property of the OWNER.
 - 1. Dismantle material to such a size that it can be readily handled, and deliver the salvageable material requested by the OWNER to a storage area designated by the OWNER.
- B. Materials that the OWNER rejects shall become the CONTRACTOR's property and must be removed from the site.
- C. Haul concrete, concrete block, and unsalvageable brick to a waste disposal site.
- D. Haul other material to a waste disposal site.
- E. On site storage or sale of removed items is not allowed.

1.06 SUBMITTALS

- A. Submit to the ENGINEER for approval, six (6) copies of the proposed Demolition and Removal Plan for the structures and modifications specified below prior to the start of work.
 - 1. Include in the coordination of shutoff, capping and continuation of utility service as required.
 - 2. Include in the Demolition and Removal Plan, the following:
 - a. A detailed sequence of demolition and removal work to ensure the uninterrupted progress of the OWNER's operations, and the expeditious completion of the CONTRACTOR's work.
 - b. Evidence (by signature) of approval of the OWNER of the work plan.
- B. Before commencing demolition work, modifications necessary to bypass the affected structure will be completed.
 - 1. Actual work will not begin until the ENGINEER has inspected and approved the modifications, and authorized commencement of the demolition work.
- C. The above procedure must be followed for each individual demolition operation.

1.07 TRAFFIC AND ACCESS

- A. Conduct demolition and modification operations, and the removal of equipment and debris to ensure minimum interference with roads, streets, walks both on-site and off-site and to ensure minimum interference with occupied or used facilities.
- B. Special attention is directed towards maintaining safe and convenient access to the existing facilities by plant personnel and plant associated vehicles.**
 - 1. Relocation of the CONTRACTOR's materials, labor, or equipment due to uncoordinated interruption will be at the CONTRACTOR's expense.**
- C. Do not close or obstruct streets, walks or other occupied or used facilities without permission from the ENGINEER and Plant Supervisor.
 - 1. Provide alternate routes around closed or obstructed traffic in access ways.

1.08 DAMAGE

- A. Promptly repair damage caused to adjacent facilities by demolition operations as directed by the ENGINEER and at no cost to the OWNER.

1.09 UTILITIES

- A. Maintain existing utilities to remain in service and protect against damage during demolition operations.
- B. Do not interrupt existing utilities serving occupied or used facilities, except when authorized by the ENGINEER.
 - 1. Provide temporary services during interruptions to existing utilities as acceptable to the ENGINEER.
- C. Cooperate with the OWNER to shut off utilities serving structures of the existing facilities as required by demolition operations.
- D. Assume responsibility for making necessary arrangements and performing work involved in connections with the discontinuance or interruption of public and private utilities or services under the jurisdiction of the utility companies.
- E. At the service mains disconnect and terminate utilities being abandoned
 - 1. Maintain conformance with the requirement of the utility companies or the municipality owning or controlling them.

1.10 POLLUTION CONTROL

- A. For pollution control, use water sprinkling, temporary enclosures, and other suitable methods as necessary to limit the amount of dust and dirt rising and scattering in the air to the lowest level of air pollution practical for the conditions of work.
 - 1. Comply with the governing regulations.
- B. Clean structures and improvements of dust, dirt and debris caused by demolition operations as directed by the ENGINEER.
 - 1. Return areas to conditions existing prior to the start of work.

1.11 QUALITY CONTROL

- A. Protect existing materials and equipment to be salvaged or reused from damage.
- B. Cap or plug pipelines to be abandoned.
 - 1. Place covers and label junction boxes, conduits and wire as abandoned.
- C. Leave exposed ends of pipe and conduit or junction boxes covered and safe.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 SEQUENCE OF WORK

- A. The sequence of demolition and renovation of existing facilities will be in accordance with the approved Demolition and Removal Plan as specified in Paragraph 1.06 of this Section.
- B. Reduce the out of service time for the equipment to be removed, refurbished, and relocated.

3.02 REMOVAL OF EXISTING PROCESS EQUIPMENT, PIPING, AND APPURTENANCES

- A. Clean, flush, and drain equipment, piping, and appurtenances.
 - 1. Equipment to be retained by the OWNER as specified in Paragraph 1.05 above shall be dismantled sufficiently to permit thorough cleaning and draining.
 - 2. Leave valves open.

3. Cap and sleeve abandoned piping.
4. Plug and seal openings remaining after removal of the existing equipment, piping, and appurtenances, as directed by the ENGINEER.

3.03 STRUCTURES TO BE COMPLETELY DEMOLISHED OR REMOVED

A. Remove existing drainage structures and pipe as shown in the Drawings.

- 1. Demolish above ground surface amenities including asphalt pavement, sub base materials, concrete sidewalks, curb and gutter, and sod to make room for construction or new facilities, unless otherwise shown in the Drawings.**
- 2. Remove demolished material and equipment from site.**

B. Removal of existing structures by blasting will not be acceptable.

END OF SECTION

SECTION 02231

CLEARING AND GRUBBING

PART 1 GENERAL

1.01 SUMMARY

- A. Supply equipment, materials, and labor and performing functions required for clearing and grubbing the work site in preparation for the Construction.
- B. Clear and grubbing the area within the limits of construction as required, including utility easements.

1.02 WORK SPECIFIED ELSEWHERE

- A. General Conditions
- B. General Requirements - Division 1
- C. Site Preparation - Division 2
- D. Earthwork - Division 2

1.03 STANDARDS AND REGULATIONS

- A. Comply with regulations and ordinances of the State of Florida, County, and City regarding burning and disposal of debris resulting from the clearing and grubbing operation.

1.04 SUBMITTALS

- A. Submit for approval, the location of sites to be used for disposal of debris resulting from the clearing and grubbing operation.

1.05 MEASUREMENT AND PAYMENT

- A. Measurement and payment will be included in the lump sum prices bid for each Construction Work Section, as shown on the Bid Schedule, for which price and payment shall constitute full compensation for furnishing materials, equipment and performing work in connection therewith.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.01 CONSTRUCTION

- A. The work of clearing and grubbing shall include the removal and satisfactory disposal of structures and of other obstructions, including underground obstructions, except for work, which might be specifically included for removal under other items of work.
- B. Deposits of muck, peat, bark, trash, or other debris occurring within the limits of clearing and grubbing or where directed by the ENGINEER shall be removed to their full depth and backfilled with native sand.
- C. Protect from injury property obstructions that are to remain in place, such as buildings, sewers, drains, water, or gas pipes, except for unusual cases when so directed by the ENGINEER.
- D. Areas of the right-of-way outside of the limits of construction may be shown in the Drawings or designated by the ENGINEER to be landscaped.
- E. Clearing and grubbing shall include removal of undesirable trees, stumps, undergrowth, and vegetation within the areas of work.
- F. Save natural growth and trees for landscaping as the ENGINEER directs.
- G. Standard clearing and grubbing shall consist of the complete removal and disposal of sidewalks, drives, trees, shrubs, walls, timber, brush, stumps, roots, grass, weeds, sawdust, rubbish, and other obstructions resting on or protruding through the surface of the existing ground and the excavated areas.
- H. Remove stumps, roots, and other debris from excavation for construction of roadway embankment, roadway base, or building pads, to a depth of at least one (1) foot below the ground surface.
- I. Plow the surface to a depth of not less than six (6) inches and remove stumps and roots thereby exposed to a depth of at least one (1) foot.
- J. Remove stumps and roots protruding through or appearing on the sides and surface of the completed excavation to a depth of at least one (1) foot.

3.02 DISPOSAL OF MATERIALS

- A. Timber, stumps, brush, roots, rubbish and other objectionable material resulting from clearing and grubbing shall be disposed of by the CONTRACTOR in locations and by methods approved by the ENGINEER.
- B. Burning shall be subject to applicable laws, ordinances, and regulations and shall be done at locations where trees and shrubs adjacent to the cleared area will not be harmed.
 - 1. Obtain necessary permits for on-site burning.
- C. Where burning is prohibited by law, ordinance, or regulation, dispose of the materials within approved areas or hauled to the county landfill in accordance with local laws and regulations.
- D. Applicable landfill or dumping fees will be paid by the CONTRACTOR.

END OF SECTION

SECTION 02300

EARTHWORK

PART 1 GENERAL

1.01 SUMMARY

- A. Furnish equipment, materials, and labor and performing functions required for earthwork as specified in the Drawings and Specifications as well as unspecified earthwork necessary to complete the work as specified, including demucking, excavating, filling, grading, compaction, and disposal of excess material.
- B. Any list of equipment and/or materials set forth in this section shall not be taken to exclude other incidentals necessary to complete the work in accordance with the Drawings and Specifications for the intended use.

1.02 RELATED SECTIONS

- A. General Conditions - Bidding and Contract Requirement
- B. General Requirements - Division 1
- C. Site Conditions - Division 1
- D. Payment Procedures - Division 1
- E. Site Preparation - Division 2
- F. Pipe and Tubes - Division 2

1.03 STANDARDS AND REGULATIONS

- A. Florida Department of Transportation - Standard Specifications for Road and Bridge Construction - Latest Edition.
- B. American Association of State Highway and Transportation Officials (AASHTO).

1.04 SUBMITTALS

- A. Submit a schedule of earthwork activities together with an estimated list of equipment to be used.
- B. The schedule shall be subject to approval by the ENGINEER and shall be updated periodically as requested by the ENGINEER.

1.05 MEASUREMENT AND PAYMENT

- A. Measurement and payment will be compensated on a unit and/or lump sum price as delineated in the Proposal Bid Form for which price and payment shall constitute full compensation for furnishing labor, equipment, and materials to perform work in connection therewith.

1.06 GUARANTEES

- A. Guarantee materials and work performed for a period of one (1) year from the date of substantial completion.
- B. Take corrective action to eliminate defective materials or workmanship for the guarantee period.

1.07 TESTS AND CERTIFICATES

- A. Perform compaction tests as specified, as requested by the ENGINEER, and in accordance with AASHTO.

1.08 EXISTING CONDITIONS

- A. Project borings and soils report are presented in Division 1.

PART 2 PRODUCTS

2.01. BEDDING AND BACKFILL:

- A. Refer to Division 2 Section 2315, Excavation and Fill and as shown in the Drawings.

B. UNSATISFACTORY MATERIALS

1. Unsatisfactory materials, as are identified below.
 - a. Materials that cannot be satisfactorily placed and compacted to a stable and durable condition.
 - b. Soil that contains excessive moisture or moisture that will limit the degree of compaction.
 - 1) At the CONTRACTORS option and expense, material may be dried and used for backfill.
 - 2) New material shall be at CONTRACTORS expense.

- c. Materials including, but not limited to, materials containing roots, loam, wood, or other organic matter, trash, debris, muck, sod, peat, or other objectionable materials which may be compressible or cannot be properly compacted.
- d. Man-made fills, refuse, or backfills from previous construction.

B. UNYIELDING MATERIALS

1. Shall consist of rock and gravelly soils with stones greater than 3 inches in any dimension or as defined by the pipe manufacturer, whichever is smaller.

D. SATISFACTORY MATERIALS

1. Refer to the details shown in the Drawings for specific requirements.

E. ROCK BEDDING, HAUNCHING, AND INITIAL BACKFILL MATERIAL

1. Rock bedding shall meet the Florida Department of Transportation Standard Specification for No. 57 stone.
2. Pipe haunching shall contain good clean structural type fill.
3. Initial backfill material shall be common fill as described above.

F. BACKFILL MATERIALS

1. Shall consist of satisfactory material consisting of natural, predominantly well graded materials with no more than 40 percent by weight passing the No. 200 sieve and at a moisture content that will facilitate compaction, free from stones of such size as recommended by the pipe manufacturer, or larger than 2 inches in any dimension, whichever is smaller.
2. The backfill material shall be free of stones larger than 1 inch in any dimension, or as recommended by the pipe manufacturer, whichever is smaller, when pipe is coated or wrapped for protection against corrosion.
3. Shall be clean earth fill, composed of sand, sand and clay, sand and rock, or crushed rock.
4. Where concrete or other encasement of pipe or other utilities is indicated, the backfill shall begin after the encasement has been inspected and approved and has attained 3/4 of its designed strength.

5. Material for the first layers of backfill shall be lowered to within 2 feet above the top of pipes before it is allowed to fall on the pipes, unless the material is placed with approved chutes or other devices that protect the pipes from the impact of stones conveyed from greater height.

G. FINE MATERIALS

1. Shall be carefully placed and tamped around the lower half of the utility; backfilling shall be carefully continued in layers not exceeding 6-inches above the top of the utility, using the best available material from the excavation, if approved, and excluding stones or rock fragments larger than:

3 inches On concrete, cast-iron or steel pipe

1 1/2 inches On clay pipe

1 inch On plastic pipe

1/2 inch On fiber and asbestos cement pipe

H. BORROW MATERIALS

1. Shall be used if suitable material from the excavation is not available.

2.02 PLASTIC WARNING TAPE:

- A. Plastic marking tape shall be acid and alkali resistant polyethylene film, 6 inches wide with minimum thickness of 0.004 inch.
- B. Tape shall have a minimum strength of 1750 psi lengthwise and 1500 psi crosswise.
- C. The tape shall be manufactured with integral wires, foil backing, or other means to enable detection by a metal detector when the tape is buried up to 3 feet deep.
- D. The tape shall be of a type specifically manufactured for marking and locating underground utilities.
- E. The metallic core of the tape shall be encased in a protective jacket or provided with other means to protect it from corrosion.
- F. Tape color shall be as specified in Table 1 and shall bear a continuous printed inscription describing the specific utility.

TABLE 1. Tape Color

Red:	Electric
Orange:	Telephone, Alarm, and Communications
Blue:	Water Systems
Green:	Sewer Force Mains, Sewer Service Laterals

2.03 GEOTEXTILE FILTER FABRIC:

- A. Filter fabric for mats and liners shall be a pervious sheet of polyester, nylon, or polypropylene filaments woven or otherwise formed into a uniform pattern with distinct and measurable openings.
- B. The filter fabric shall provide an Equivalent Opening Size (EOS) no finer than the US Standard Sieve No. 100 and no coarser than the US Standard Sieve No. 50.
 - 1. EOS is defined as the number of the US Standard Sieve having openings closest in size to the filter fabric openings.
- C. The filaments shall consist of a long-chain synthetic polymer composed of at least 85 percent, by weight, of propylene, ethylene, or vinylidene-chloride.
- D. The filaments shall contain stabilizers and/or inhibitors added to the base plastic to make the filaments resistant to deterioration due to ultraviolet and heat exposure.
- E. The fabric shall have a minimum physical strength of 50 pounds per inch in direction when tested in accordance with ASTM D 1682, using the Grab Test Method with one square inch jaws and a constant rate of travel of 12 inches per minute.
- F. Elongation at failure shall be between 30 and 70 percent.
- G. The fabric shall be constructed so that the filaments will retain their relative position with respect to each other.
- H. The edges of the fabric shall be selvaged or otherwise finished to prevent the outer material from pulling away from the fabric.
- I. The fabric shall be woven into a width such that it may be installed without longitudinal seams.

PART 3 EXECUTION

3.01 DEMUCKING

- A. Muck, organic matter, or other unsuitable material within the limits of the worksite, shall be excavated and removed.
- B. Depth of removal shall be that required to reach suitable material.
- C. The muck hole shall be dewatered to provide visual inspection by the ENGINEER.
- D. The muck shall be removed in such a manner as to prevent the unsuitable materials from mixing with suitable material to be used for backfilling.
- E. Where muck is encountered at the boundary of the site; sheeting shall be installed and left in place to preclude future damage to the installed fill by adjacent muck.
- F. Suitable material shall be placed and compacted where muck or other unsuitable material has been removed and as required to elevate the site to finish grade as specified in this section.
- G. Muck and other unsuitable material shall be disposed of at locations secured by the CONTRACTOR and approved by the ENGINEER.
- H. Furnish to the ENGINEER, a written release from the OWNER of the property on which the excess material is disposed, stating that the agreements have satisfactorily been fulfilled.
- I. Material shall be spread in a manner to drain properly and not disturb existing drainage conditions.
- J. Where approved by the ENGINEER muck may be stockpiled and used for top dressing on areas to be grassed.
 - 1. The muck to be used for top dressing shall be free from appreciable quantities of hard clods, stiff clay, hard pan, gravel, brush, large roots, or other deleterious materials, and of reasonably uniform quality.
 - 2. The organic content shall be at least 5 percent and the pH shall be in the range of 5.0 to 7.0.

3.02 UTILITIES

- A. Furnish equipment, materials, and labor required to complete excavating, trenching and backfilling for utilities, including dewatering, shoring, bracing, utility bed compacting, protecting slabs, restoration of surfaces, and disposing of surplus materials as identified in the Drawings and/or Specifications.
- B. Length of trench to be excavated ahead of pipelaying shall be limited to sufficient trench for one day's pipe laying operation.

- C. Where existing utilities are indicated, or their presence is suspected, employ appropriate detection methods to locate the utilities.
- D. Excavation in the vicinity of utilities shall be carefully carried out to prevent damage to the existing utilities.
- E. Excavation within 12-inches of existing utility shall be by hand.

3.03 TRENCH EXCAVATION

- A. Where trenches are to be cut in pavement, the pavement cut shall be made ahead of the excavation, leaving a uniform edge with minimum disturbance of the remaining pavement.
- B. Pavement pieces 6-inches and larger are not to be mixed with other excavated material, but are to be disposed of away from the work site before the remainder of the excavation is made.
- C. Minimum width of the trench shall be equal to the outside diameter of the pipe at the joint plus 12-inches on each side.
- D. Maximum trench width shall not exceed the nominal diameter plus 2-feet.
- E. Trench walls shall be vertical, however, for large diameter piping, or where deep trenching is required, sloped sides may be permitted subject to the approval of the ENGINEER.

3.04 BEDDING

- A. The pipe bed shall be adequately graded and shaped such that the pipe will be in continuous contact for its full length and the bottom 1/3 of its circumference, spaces for joints, fittings, manholes and pump stations shall be excavated with space to install joint couplings and other connecting devices.
- B. Bell holes shall be excavated to the necessary size at each joint or coupling to eliminate point bearing.
- C. Stones of one inch or greater in dimension, or as recommended by the pipe manufacturer, whichever is smaller, shall be removed to avoid point bearing.
- D. Filter material and bedding shall be provided under utility lines, where indicated or specified.
- E. Trench grade for utilities or structures not requiring special bedding material are to be defined as the grade of the bottom surface of the utility or structure to be considered to be part of this work.

- F. Trench grade for utilities in rock shall be defined as 4-inches below the outside of the bottom of the utility or structure, which 4-inches shall be backfilled with suitable bedding material.
- G. Overexcavation made in error shall be backfilled to trench grade with suitable compacted fill at the CONTRACTOR's expense.

3.05 GRAVITY PIPE AND STRUCTURES

- A. Where the Drawings indicate a force main paralleling a gravity sewer, the CONTRACTOR may utilize a common trench, subject to the ENGINEER's approval.
- B. Where a common trench is used, the force main shall be founded on a shelf of undistributed soil.
- C. Excavation for manholes and wetwells, or similar structures, shall be of sufficient size to permit the installation of precast structures or the placement and removal of forms for the full length and width of cast-in-place structure footings and foundations, as shown.
- D. When concrete or masonry is to be placed in an excavated area, special care shall be taken not to disturb the bottom of the excavation.
- E. Excavation to the final grade level shall be verified before the concrete or masonry is to be placed.

3.06 ROCK

- A. Rock shall be cleaned of loose debris and cut to a firm surface, either level, stepped or serrated, as shown or as directed.
- B. Loose disintegrated rock and thin strata shall be removed.

3.07 SHEETING

- A. Sheeting and bracing shall be provided and continuously maintained where required to prevent damage to property, injury to persons, or erosion and cave-ins.
- B. Where practical sheeting shall be driven prior to excavation to avoid loss of material to be retained.
- C. When excavating below the sheeting, care shall be taken to avoid trimming that will cause voids in the banks to be retained.

- D. Sheeting and bracing shall be removed as backfilling progresses and shall be completely removed when the trench has been backfilled to at least 1/2 its depth or when removal will not endanger construction or adjacent structures.
- E. Voids caused by removal shall be backfilled immediately with sand or other approved fine material and compacted by ramming or by watering.
- F. When required and directed in writing, by the ENGINEER, sheeting, bracing, or shoring shall be left in place and the top shall be cut off neatly at an approved elevation below finished grade.

3.08 SEQUENCE OF EXCAVATION

- A. Excavation in a given area shall proceed from the deepest excavation to the shallowest excavation to avoid undermining completed roadways, utilities or structures.

3.09 DEWATERING

- A. Utilities are to be laid "in the dry."

- 1. Trench excavations may be dewatered by using one or more of the following methods:

- a. Well point systems:

- 1) Shall be efficient enough to lower the water level in advance of the excavation and maintain the level continuously to keep the trench bottom and sides firm and dry
- 2) Shall be designed especially for this type of service, and the pumping unit used is to be capable of maintaining a high vacuum and at the same time of handling large volumes of air as well as water.
- 3) Shall be operated in such a manner as to prevent damage to other property.

- b. Gravity underdrain systems

- 1) Shall have adequate capacity to lower the water level in the trench such that the main utility may be laid "in the dry."

- c. Sumps

- 1) Shall be provided at various points along the route of the underdrain system for the use of pumps to remove the water.

- 2) If the material encountered at trench grade is suitable for passage of water without destroying the sides or bottom of the trench sumps may be provided at intervals at the at the side of the main trench excavation and pumps may be used to lower the water level by taking their suction from these sumps.
 - 3) Care shall be exercised to prevent the movement of utility foundation material and a bed of crushed stone may be required.
- B. Grading shall be done, as may be necessary to prevent surface water from flowing into the excavation, and water accumulating therein shall be removed so that the stability of the bottom and sides of the excavation is maintained.
 - C. The excavation shall be dewatered by appropriate methods where and when necessary to maintain a dry and stable excavation bottom, and keep free from water during construction.
 - D. Obtain required dewatering permits from applicable agency having jurisdiction.
 1. Costs of complying with such permit requirements shall be borne solely by the CONTRACTOR.
 - E. Water from trench dewatering operations shall be disposed of without causing damage or inconvenience to the work, the surrounding area or general public.

3.10 OBSTRUCTIONS

- A. The exact location of pipes, conduits, wires, mains, footings and other underground structures and obstructions encountered in trenching or excavating shall be determined.
- B. The obstructions shall be protected adequately from damage or displacement.
- C. Damage thereto shall be promptly and properly repaired, and displacements shall be corrected.
- D. Survey monuments or benchmarks, which are to be disturbed by this work, shall be carefully witnessed before removal and replaced upon completion of the work by a Registered Land Surveyor.

3.11 BEDDING, BACKFILL, AND COMPACTION

- A. Bedding shall be of the type and thickness shown.
- B. Maximum stone size shall not exceed 3/4-inch, or the maximum size recommended by the pipe manufacturer, whichever is smaller.

- C. Initial backfill material shall be placed in layers of a maximum of 6 inches loose thickness and compacted with approved tampers to 95 percent maximum density and to a height of at least 1-foot above the utility pipe or conduit.
- D. The first layers of the backfill shall be thoroughly compacted and be completed before the remainder of the trench is backfilled.
 - 1. Compaction shall be equal to 98 percent of maximum density, as determined by AASHTO Specification T-99.
- E. Compaction by water flooding or jetting will not be permitted.
- F. Density tests for determination of the above-specified compaction shall be made by a testing laboratory designated by the ENGINEER and at the expense of the CONTRACTOR.
- G. Test locations will be determined by the ENGINEER, but shall be spaced not more than 300 feet apart where the trench cut is continuous in pavements or areas to be paved.
- H. Tests shall also be made where a trench crosses a paved roadway or future paved roadway.
- I. If test results are unsatisfactory, re-excavate and re-compact the backfill at his expense until the desired compaction is obtained.
- J. For continuous trenches, additional compaction tests shall be made on each side of an unsatisfactory test to determine the extent of re-excavation and re-compaction necessary.
- K. Spacing of the additional tests will be determined by the ENGINEER.
- L. Backfilling operations for excavations for utilities within buildings that have soil-bearing floor slabs shall be conducted in a manner resulting in densities comparable to the densities of the soil adjacent to the excavation.
- M. Excavation within buildings shall be maintained free of water until the backfilling is completed.
- N. Flooding or puddling with water to consolidate backfill may be done in unpaved areas, only when approved by the ENGINEER.
- O. Where approved, the flooding or puddling operation shall be repeated with each 2 feet of backfill placed.

- P. Mechanical compaction shall be accomplished using pneumatic or gasoline-powered tampers and/or flat plate vibrators, except in close proximity to the utility in the first layers of the backfill where compaction is to be obtained with hand-operated tamping devices.

3.12 BACKFILL ON SIDES OF PIPE

- A. The backfill shall be brought up evenly on both sides of pipe for the full length of the pipe.
- B. Care shall be taken to ensure thorough compaction of the fill under the haunches of the pipe.

3.13 BACKFILL ABOVE THE PIPE

- A. The remainder of the trench shall be backfilled in layers not exceeding 9-inches.
- B. Maximum dimension of a stone or rock fragment shall be 6-inches.
- C. Backfill shall be suitably compacted by rolling, tamping, or other settlement.
- D. When trenches are cut in pavements or areas to be paved, compaction, as determined by AASHTO Specification T-99, shall be equal to 98 percent of maximum density; in other areas compaction shall not be less than 98 percent of maximum density.
- E. Backfill for sidewalks, turned, or seeded area and miscellaneous areas not specifically designated above shall be deposited in layers of a maximum of 10 inches loose thickness, and compacted to 85 percent maximum density for cohesive soils and 90 percent maximum density for cohesionless soils.
- F. Plastic warning tape shall be placed directly over the pipes and conduits at a depth of 18 inches below finished grade for the sewage force main, sewer service laterals, water lines, electric lines, alarm and communications lines.

3.14 SLAB

- A. Where insufficient cover, excessive loads or local jurisdiction require, a protective concrete slab 6 inches thick, as indicated in the Drawings or as required by local authority, whichever is of greatest depth, shall be provided.
- B. The trench shall be properly stepped back, as required, but the width of the slab shall not be less than the width of the trench plus 2 feet.
- C. Concrete shall be ready-mixed and have twenty-eight (28) day compressive strength of 3,000 psi.

1. Finished top surface shall be screened.
- D. Minimum reinforcement shall be welded wire fabric, 6 inches by 6 inches - w2.9 by w2.9.
- E. Top of slab shall be 1-inch minimum below finished grade of the final surface course.

3.15 EXISTING OBSTRUCTIONS

- A. Pavement cut or damaged in connection with the work under this section shall be rebuilt or repaired.
- B. Restored pavement shall be at least equal in every respect to the pavement that was cut or damaged, including the base course, surface treatment and grade.
- C. Temporary sand seal coat pavement surface shall be applied to the cut or damaged areas.
- D. This temporary surfacing shall be replaced by the final restored pavement.
- E. Sand seal coat temporary surfacing shall not be removed until fifteen (15) days after it has been constructed.
- F. Existing pavement shall be cut back a minimum of 1 foot beyond each edge of the pavement that was cut when the trenching was done or 1 foot beyond each edge of the trench, whichever is greater.
- G. Temporary surfacing, backfill, existing pavement and its base course shall be removed to a depth of 7 inches or to the depth indicated.

3.16 STOCKPILING OF SUITABLE EXCESS MATERIAL

- A. During excavation, excess material from one trench area that is satisfactory for backfilling shall be stockpiled for use in other areas of the work in an orderly manner, at a distance from the banks of the trench sufficient to avoid overloading and to prevent slides or cave-ins.
- B. Failure to protect the stockpiles and allowing material to become unsatisfactory as a result, such material, if directed, shall be removed and replaced with satisfactory on-site or imported material from approved sources at no additional cost to the OWNER.
- C. Excavated material not required or not satisfactory for backfill shall be removed from the site and shall be disposed of in designated areas.

- D. Excess suitable material shall be carefully stockpiled for use in other portions of the work, as specified below.
- E. Debris and excess material shall be disposed of off site, as approved by the ENGINEER.

END OF SECTION

SECTION 02310

GRADING

PART 1 GENERAL

1.01 SUMMARY

- A. Perform grading work within the limits, elevations and grades indicated in the Drawings and as specified herein.
- B. This Section specifies material and placement of fill above existing grades that is not to be located under roads or under structures.

1.02 QUALITY CONTROL

- A. Grade the site to the required elevations.
- B. Spot elevations are shown in the Drawings and uniformly slope the finished surfaces between these locations.
- C. Excavated material meeting the requirements noted in the paragraph "Fill" may be used in the formation of embankments as shown in the Drawings.
- D. Provide from off-site sources additional fill material required to complete the embankments.

PART 2 PRODUCTS

2.01 FILL

- A. Fill material shall meet the requirements as described in Division 2 - "Earthwork".
- B. Fill material shall be reviewed by the Engineer prior to use.
- C. Determine the volume of material required for the site.

PART 3 EXECUTION

3.01 GRADING AND COMPACTION

- A. Place fill material in lifts not to exceed 12-inches and compacted to a density of not less than 95 percent of maximum dry density at optimum moisture as determined by ASTM D1557 method D.
- B. Place fill material with a moisture content within plus or minus 2 percentage points of optimum.

3.02 FINE GRADING

- A. Fine grade disturbed areas after structures, bases, and pavements are completed and the yard piping trenches backfilled.
- B. Remove lumber, undesirable materials and rocks larger than the 3-inch size from the surface.
- C. Shaped and sloped the completed surface to drain away from the structures.
- D. Completed surface elevations shall be within 0.1 foot of the elevation shown in the Drawings, unless directed by the ENGINEER.
- E. Minor adjustments to line and grade may be required as the work progresses in order to satisfy field conditions.

END OF SECTION

SECTION 02315

EXCAVATION AND FILL

PART 1 GENERAL

1.01 SUMMARY

- A. Furnish labor, materials, equipment, and incidentals necessary to perform excavation, backfill, grading, and slope protection required to complete the piping work, as shown in the Drawings and Specifications.
- B. The work shall include, but not necessarily be limited to: manholes, pits and pipe, bedding, backfilling, fill and required borrow; grading and disposal of surplus and unsuitable materials; and related work such as sheeting, bracing, and water handling.
- C. Provide trench safety systems such as sheeting and bracing in accordance with state and local regulations.
- D. No claims for additional monies will be allowed or considered based on substrata or ground water conditions.
- E. Prior to commencing the excavation, submit a plan of CONTRACTORS proposed operations to the ENGINEER for review.

1.02 RELATED SECTIONS

- A. Site Preparation - Division 2
- B. Earthwork - Division 2
- C. CONTRACTOR's Quality Control - Division 1

1.03 REFERENCES

- A. Florida Chapter 90-96 "Trench Safety Act".

1.04 TRENCH PROTECTION

- A. Construct and maintain sheeting and bracing as required to support the sides of excavations, to prevent movement which could diminish the width of the excavation below that necessary for proper construction, and to protect adjacent structures, existing piping and foundation material from disturbance, undermining, or other damage.

- B. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed they shall be immediately filled and compacted.
- C. For pipe trench sheeting, no sheeting is to be withdrawn if driven below mid-diameter of pipe, and no wood sheeting shall be cut off at a level lower than 1 foot above the top of pipe unless otherwise directed by the ENGINEER.
- D. If during the progress of the work the ENGINEER decides that additional wood sheeting should be left in place, he may direct the CONTRACTOR in writing.
- E. If steel sheeting is used for trench sheeting, removal shall be as specified above, unless written approval is given by the ENGINEER for an alternate method of removal.
- F. Sheeting and bracing, not left in place, shall be carefully removed in such a manner as not to endanger the construction or other structures, utilities, existing piping.
- G. Voids left or caused by withdrawal of sheeting shall immediately be refilled with sand or ramming with tools especially adapted to that purpose, by watering or otherwise as may be directed.
- H. The right of the ENGINEER to order sheeting and bracing left in place shall not be construed as creating obligation on his part to issue these orders, and his failure to exercise his right to do so shall not relieve the CONTRACTOR from liability for damages to persons or property occurring from or upon the work occasioned by negligence or otherwise, growing out of a failure on the part of the CONTRACTOR to leave in place sufficient sheeting and bracing to prevent caving or moving of the ground.

1.05 JOB CONDITIONS

- A. Examine the site and review the available test borings or undertake soil borings prior to submitting bid, taking into consideration conditions that may affect work.
- B. Assume responsibility for variations of sub-soil quality or conditions at locations other than places shown and at the time the investigation was made.
- C. Existing Utilities: Locate existing underground utilities in the areas of work.
 - 1. If utilities are to remain in place, provide adequate means of protection during earthwork operations.
 - 2. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult the ENGINEER and the OWNER of such piping or utility immediately for directions.

3. Cooperate with OWNER and utility companies in keeping respective services and facilities in operation.
 4. Repair damaged utilities to satisfaction of utility OWNER.
 5. Demolish and completely remove from site existing underground utilities indicated in the Drawings to be removed.
- D. Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights.
1. Operate warning lights as recommended by authorities having jurisdiction.
- E. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

1.06 SUBMITTALS

- A. Furnish the ENGINEER, for approval, laboratory test report of a representative sample of fill material obtained from on site sources weighing approximately 50 pounds, at least ten calendar days prior to the date of anticipated use of this material.
- B. For each material obtained from other than on site sources, notify the ENGINEER of the source of the material and shall furnish the ENGINEER, for approval, laboratory test reports of a representative sample weighing approximately 50 pounds, at least ten calendar days prior to the date of anticipated use of this material.

PART 2 PRODUCTS

2.01 MATERIALS

A. Description:

1. Materials for use as base, fill and backfill shall be described below:
 - a. Satisfactory soil materials are defined as those complying with American Association of State Highway and Transportation Officials (AASHTO) M-145, soil classification Groups A-1, A-2-4, A-2-5, and A-3.
 - b. Unsatisfactory soil materials are those defined in AASHTO M-145 soil classification Groups A-2-6, A-2-7, A-4, A-5, A-6, and A-7 along with peat and other highly organic soils.

B. Structural Fill:

1. Structural fill material shall be a well graded, suitable soil material consisting of a minimum of 60 percent clean medium fine grain sized quartz sand, free of organic, deleterious and/or compressible percent clean medium fine grain sized quartz sand, free of organic, deleterious and/or compressed material.
2. Rock in excess of 2 1/2-inches in diameter shall not be used in the fill material.
3. Structural fill shall not contain hardpan, stones, rocks, cobbles, or other similar materials.

C. Common Fill:

1. Common fill material shall be satisfactory soil material containing no more than 20 percent by weight finer than No. 200 mesh sieve.
2. It shall be free from organic matter, muck, marl, and rock exceeding 2 1/2-inches in diameter.
3. Common fill shall not contain broken concrete, masonry, rubble or other similar materials.
4. Materials falling within the above Specifications, encountered during the excavation, may be stored in segregated stockpiles for reuse.
5. Material, which in the opinion of the ENGINEER is not suitable for reuse, shall be spoiled as specified herein for disposal of unsuitable materials by the CONTRACTOR.

D. Rock Bedding:

1. Rock bedding shall be 3/8-inch to 3/4-inch washed and graded limerock.
2. This rock shall be graded so that 99 percent will pass a 3/4-inch screen and 80 percent will be retained on a No. 8 screen.
3. Material meeting the Florida Department of Transportation Standard Specification for No. 57 stone shall be acceptable.

PART 3 EXECUTION

3.01 GENERAL

- A. Excavation, backfill, and grading necessary to complete the work shall be made by the CONTRACTOR and this cost shall be included in the Contract price.
- B. Material shall be furnished as required from off site sources and hauled to site.
- C. Take necessary precautions to maintain the work area in a safe and workable condition.
- D. Protect work by flagging, marking, lighting and barricading.
- E. Preserve and protect existing above and underground structures, pipelines, conduits, cables, drains, or utilities.
- F. Failure of the Drawings to show the existence of these obstructions shall not relieve the CONTRACTOR from this responsibility.
- G. The cost of repair from damage, which occurs to these obstructions during or as a result of construction, shall be borne by the CONTRACTOR without additional cost to the OWNER.
- H. Trench Boxes, Drag Boxes, or Drag Shields made of steel may be used.

3.02 TRENCH EXCAVATION

- A. Excavation for trenches required for the installation of pipes shall be made to the depths indicated in the Drawings.
- B. Excavate trench to provide minimum of 36-inch clear cover over the pipe bell unless otherwise noted in the Drawings.
- C. Excavate in a manner and to a width that will give suitable room for laying the pipe within the trenches, for bracing and supporting and for pumping and drainage facilities.
- D. The trench width at the top of the pipe shall not exceed the allowable as determined by the depth of cut and indicated in the Drawings.
- E. Rock shall be removed to a minimum 8-inches clearance around the bottom and sides of the pipe or ducts being laid.
- F. Where pipe is to be laid in limerock bedding or encased in concrete, the trench may be excavated by machinery to or just below the designated subgrade provided that the material remaining in the bottom of the trench remains undisturbed.
- G. Where the pipes or ducts are to be laid directly on the trench bottom the lower part of the trenches shall not be excavated to the trench bottom by machinery.

- H. The last of the material being excavated shall be done manually in such a manner that will give a flat bottom true to grade so that pipe can evenly and uniformly supported along its entire length on undisturbed material or bedding rock.
- I. Bell holes shall be made as required manually so that there is no bearing surface on the bells and pipes are supported along the barred only.
- J. The bottom of the excavations shall be firm and dry and acceptable to the ENGINEER.
- K. Excavate organic soil material from the bottom of the trench and replace with rock bedding, at least 6 inches thick.

3.03 PIPE INTERFERENCES AND ENCASEMENT

- A. Abide by the following schedule of criteria concerning interferences with other utilities.
 - 1. In no case shall there be less than 0.3-feet between two pipelines and structures.
 - 2. Class I Concrete Encasement: Wherever there is clearance between water mains or water services, then a concrete encasement shall be provided in accordance with the typical detail as shown in the Drawings.
 - 3. Class II Concrete Encasement: Wherever there is more than 0.3 foot, but less than 1.0 foot clearance between two pipe lines, or between pipe lines and structures, then a concrete encasement shall be provided in accordance with the typical detail as shown in the Drawings.
- B. The ENGINEER shall have full authority to direct the placement of the various pipes and structures in order to facilitate construction, expedite completion and to avoid conflicts.

3.04 BACKFILLING

- A. Backfilling over pipes shall begin as soon as practical after the pipe has been laid, jointed, and inspected and the trench filled with suitable compacted material to the mid-diameter of the pipe.
- B. Backfilling over ducts shall begin not less than three days after placing concrete encasement.
- C. Backfilling shall be prosecuted expeditiously as detailed in the Drawings.

- D. Space remaining between the pipe and sides of the trench shall be packed full by hand shovel with selected earth, from stones having a diameter no greater than 2-inches and thoroughly compacted by non-mechanical methods, as fast as materials are placed, up to a level of one foot above the crown of pipe.
- E. Compact to 98 percent maximum density in layers not to exceed 4-inches up to the centerline of the pipe from the trench bottom and in layers not to exceed 6-inches from the pipe centerline to 12-inches above the pipe.
- F. The filling shall be carried up evenly on both sides with at least one man tamping for each man shoveling material into the trench.
- G. The remainder of the trench above the compacted backfill, as just described above, shall be filled and thoroughly compacted with common fill by rolling, ramming, or puddling, as the ENGINEER may direct.
- H. Compact common fill in 12-inch layers to 98 percent maximum density.
- I. The bedding rock in muck areas shall consist of the at least 10-inches of washed and grade limerock placed in the trench to the proposed elevation of the centerline of the pipe prior to pipelaying.
- J. This bedding shall not be used as a drain for ground water.
- K. Take precautions necessary to maintain the bedding in a compacted state and to prevent washing, erosion or loosening of this bed.
- L. In locations where pipes pass through building walls, take the following precautions to consolidate the refill up to an elevation of at least 1-foot above the bottom of the pipes:
 - 1. Place structural fill in these areas for a distance of not less than 3-feet either side of the centerline of the pipe in level layers not exceeding 6-inches in depth.
 - 2. Wet each layer to the extent directed and thoroughly compact each layer with a power tamper.

3.05 GRADING

- A. Grading shall be performed at places indicated in the Drawings, to the lines, grades and elevations shown or as directed by the ENGINEER and shall be made in a manner that the requirements for formation of embankments can be followed.
- B. Unacceptable material encountered, of whatever nature within the limits indicated, shall be removed and disposed of as directed.

- C. During the process of excavation, the grade shall be maintained in a well-drained condition.
 - 1. When directed, temporary drains and drainage ditches shall be installed to intercept or divert surface water, which may affect the prosecution or condition of the work.
- D. If at the time of excavation it is not possible to place material in its proper section of the permanent structure, it shall be stockpiled in approved areas for later use.
- E. No extras will be considered for the stockpiling or double handling of excavated material.
- F. The right is reserved to make minute adjustments or revisions in lines or grades if found necessary as the work progresses, due to discrepancies in the Drawings or in order to obtain satisfactory construction.
- G. Stones or rock fragments larger than 2 1/2-inches in their greatest dimensions will not be permitted in the top 6-inches of the subgrade line of fills or embankments.
- H. Fill slopes shall be uniformly dressed to the slope, cross-section and alignment shown in the Drawings, or as directed by the ENGINEER.
- I. In cut, loose, or protruding rocks on the back slopes shall be barred loose or otherwise removed to line or finished grade of slope.
- J. Cut and fill slopes shall be uniformly dressed to the slope, cross-section and alignment shown in the Drawings or as specified by the ENGINEER.
- K. No grading is to be done in areas where there are existing pipe lines that may be uncovered or damaged until these lines which must be maintained are relocated, or where lines are to be abandoned, required valves are closed and drains plugged at manholes.
- L. Replace pavement cut or otherwise damaged during the progress of the work as specified elsewhere herein or as shown in the Drawings.

3.06 DISPOSAL OF UNSUITABLE AND SURPLUS MATERIAL

- A. Surplus and unsuitable excavated material shall be disposed of at the CONTRACTOR's cost in one of the following ways as directed by the ENGINEER.
 - 1. Transport to soil storage area on OWNER's property and stockpile or spread as directed by the ENGINEER.

2. Transport from OWNER's property and legally dispose of.
3. Permits required for the hauling and disposing of this material beyond OWNER's property shall be obtained prior to commencing hauling operations.
4. Copies of required permits shall be provided to the ENGINEER.
5. Suitable excavated material may be used for fill if it meets the Specifications for common fill and is approved by the ENGINEER.
6. Excavated material so approved may be neatly stockpiled at the site where designated by the ENGINEER provided there is an area available where it will not interfere with the operation of the facility nor inconvenience traffic or adjoining property owners.

3.07 FIELD QUALITY CONTROL

- A. Retain a certified laboratory and make arrangements for testing necessary to comply with these Specifications, in accordance with Division 1.
- B. Provide copies of laboratory test results to the ENGINEER.
- C. Conduct one test per lift for each 500 linear feet of pipeline, or a minimum of two compaction tests per lift for projects with less than 1,000 linear feet of pipeline, at locations directed by the ENGINEER.
- D. Provide, at CONTRACTOR expense, additional compaction tests requested by the ENGINEER to insure that proper compaction is provided.

END OF SECTION

SECTION 02319

TRENCHING

PART 1 GENERAL

1.01 SUMMARY

- A. Furnish labor, materials, equipment, and incidentals necessary to perform excavation, backfill, grading, and slope protection required to complete the piping work, as shown in the Drawings and Specifications.
- B. The work shall include, but not necessarily be limited to: manholes, pits and pipe, bedding, backfilling, fill and required borrow; grading and disposal of surplus and unsuitable materials; and related work such as sheeting, bracing and water handling.
- C. Provide trench safety systems such as sheeting and bracing in accordance with state and local regulations.

1.02 RELATED WORK

- A. Site Preparation - Division 2
- B. Earthwork - Division 2
- C. Excavation and Fill - Division 2

1.03 TRENCH PROTECTION

- A. Structural Excavation Backfill & Compaction
 - 1. Construct and maintain sheeting and bracing as required to support the sides of excavations, to prevent movement which could diminish the width of the excavation below that necessary for proper construction, and to protect adjacent structures, existing piping and foundation material from disturbance, undermining, or other damage.
 - 2. Prevent voids outside of the sheeting, but if voids are formed they shall be immediately filled and compacted.
 - 3. For pipe trench sheeting, no sheeting is to be withdrawn if driven below mid-diameter of pipe, and no wood sheeting shall be cut off at a level lower than 1 foot above the top of pipe unless otherwise directed by the ENGINEER.

4. If during the progress of the work the ENGINEER decides that additional wood sheeting should be left in place, he may direct the CONTRACTOR in writing.
5. If steel sheeting is used for trench sheeting, removal shall be as specified above, unless written approval is given by the ENGINEER for an alternate method of removal.
6. Sheeting and bracing, not left in place, shall be carefully removed not to endanger the construction or other structures, utilities, existing piping.
7. Voids left or caused by withdrawal of sheeting shall immediately be refilled with sand or ramming with tools especially adapted to that purpose, by watering or otherwise as may be directed.
8. The right of the ENGINEER to order sheeting and bracing left in place shall not be construed as creating obligation on the ENGINEER to issue an order, and the ENGINEER's failure to exercise the ENGINEER's right to do so shall not relieve the CONTRACTOR from liability for damages to persons or property occurring from or upon the work occasioned by negligence or otherwise, growing out of a failure on the part of the CONTRACTOR to leave in place sufficient sheeting and bracing to prevent caving or moving of the ground.

1.04 JOB CONDITIONS

- A. Examine the site and review the available test borings or undertake his own soil borings prior to submitting his bid, taking into consideration conditions that may affect Construction work.
- B. The OWNER and ENGINEER will not assume responsibility for variations of sub-soil quality or conditions at locations other than places shown and at the time the investigation was made.
- C. Existing Utilities: Locate existing underground utilities in the areas of work. If utilities are to remain in place, provide adequate means of protection during earthwork operations.
 1. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult the ENGINEER and the OWNER of this piping or utility immediately for directions.
 2. Cooperate with OWNER and utility companies in keeping respective services and facilities in operation.
 3. Repair damaged utilities to satisfaction of utility OWNER.

4. Demolish and completely remove from site existing underground utilities indicated in the Drawings to be removed.
- C. Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights.
- D. Operate warning lights as recommended by authorities having jurisdiction.
1. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

1.05 SUBMITTALS

- A. Furnish the ENGINEER, for approval, a representative sample of fill material obtained from on site sources weighing approximately 50 pounds, at least ten calendar days prior to the date of anticipated use of this material.
- B. For each material obtained from other than on site sources, notify the ENGINEER of the source of the material and shall furnish the ENGINEER, for approval, a representative sample weighing approximately 50 pounds, at least ten calendar days prior to the date of anticipated use of this material.

PART 2 PRODUCTS

2.01 MATERIALS

A. General:

1. Materials for use as base, fill, and backfill is described below:
 - a. Satisfactory soil materials are defined as those complying with American Association of State Highway and Transportation Officials (AASHTO) M-145, soil classification Groups A-1, A-2-4, A-2-5, and A-3.
 - b. Unsatisfactory soil materials are those defined in AASHTO M-145 soil classification Groups A-2-6, A-2-7, A-4, A-5, A-6, and A-7 along with peat and other highly organic soils.

B. Structural Fill:

1. Structural fill material shall be a well graded, suitable soil material consisting of a minimum of 60 percent clean medium fine grain sized quartz sand, free of organic, deleterious and/or compressible percent clean medium fine grain sized quartz sand, free of organic, deleterious and/or compressed material. Rock in excess of 2 1/2 inches in diameter shall not be used in the fill material.

2. Structural fill shall not contain hardpan, stones, rocks, cobbles, or other similar materials.

C. Common Fill:

1. Common fill material shall be satisfactory soil material containing no more than 20 percent by weight finer than No. 200 mesh sieve. It shall be free from organic matter, muck, marl, and rock exceeding 2 1/2 inches in diameter.
2. Common fill shall not contain broken concrete, masonry, rubble, or other similar materials.
3. Materials falling within the above Specifications, encountered during the excavation, may be stored in segregated stockpiles for reuse.
4. Material, which in the opinion of the ENGINEER is not suitable for reuse, shall be spoiled as specified herein for disposal of unsuitable materials.

D. Rock Bedding:

1. Rock bedding shall be 3/8-inch to 3/4-inch washed and graded limerock.
2. This rock shall be graded so that 99 percent will pass a 3/4-inch screen and 80 percent will be retained on a No. 8 screen.
3. Material meeting the Florida Department of Transportation Standard Specification for No. 57 stone shall be acceptable.

PART 3 EXECUTION

3.01 GENERAL

- A. Excavation, backfill and grading necessary to complete the work shall be made by the CONTRACTOR and the cost thereof shall be included in the Contract price.
- B. Material shall be furnished as required from off site sources and hauled to site.
- C. Take necessary precautions to maintain the work area in a safe and workable condition.
- D. Protect work by flagging, marking, lighting and barricading.
- E. Preserve and protect above and underground structures, pipe lines, conduits, cables, drains, or utilities which are existing at the time the CONTRACTOR encounters them.

- F. Failure of the Drawings to show the existence of these obstructions shall not relieve the CONTRACTOR from this responsibility.
- G. The cost of repair of damage, which occurs to these obstructions during or as a result of construction, shall be borne by the CONTRACTOR without additional cost to the OWNER.

3.02 TRENCH EXCAVATION

- A. Excavation for trenches required for the installation of pipes shall be made to the depths indicated in the Drawings.
- B. Excavate trench to provide minimum of 36-inch clear cover over the pipe bell, unless otherwise noted in the Drawings.
- C. Excavate in a manner and to a width that will give suitable room for laying the pipe within the trenches, for bracing and supporting, and for pumping and drainage facilities.
- D. The trench width at the top of the pipe shall not exceed the allowable as determined by the depth of cut and indicated in the Drawings.
- E. Rock shall be removed to a minimum 8-inches clearance around the bottom and sides of the pipe or ducts being laid.
- F. Where pipe is to be laid in limerock bedding or encased in concrete, the trench may be excavated by machinery to or just below the designated subgrade provided that the material remaining in the bottom of the trench remains undisturbed.
- G. Where the pipes or ducts are to be laid directly on the trench bottom the lower part of the trenches shall not be excavated to the trench bottom by machinery.
- H. The last of the material being excavated shall be done manually in a manner that will give a flat bottom true to grade so that pipe can evenly and uniformly supported along its entire length on undisturbed material or bedding rock.
- I. Bell holes shall be made as required manually so that there is no bearing surface on the bells and pipes are supported along the barred only.
- J. The bottom of the excavations shall be firm, dry, and acceptable to the ENGINEER.
- K. Excavate organic soil material from the bottom of the trench and replace with rock bedding, at least 6 inches thick.

3.03 PIPE INTERFERENCES AND ENCASEMENT

- A. Abide by the following schedule of criteria concerning interferences with other utilities.
 - 1. In no case shall there be less than 0.3-feet between two pipelines and structures.
 - 2. Class I Concrete Encasement: Wherever there is clearance between water mains or water services, then a concrete encasement shall be provided in accordance with the typical detail as shown in the Drawings.
 - 3. Class II Concrete Encasement: Wherever there is more than 0.3-foot, but less than 1.0-foot clearance between two pipe lines, or between pipe lines and structures, then a concrete encasement shall be provided in accordance with the typical detail as shown in the Drawings.
- B. The ENGINEER shall have full authority to direct the placement of the various pipes and structures in order to facilitate construction, expedite completion, and to avoid conflicts.

3.04 BACKFILLING

- A. Backfilling over pipes shall begin as soon as practical after the pipe has been laid, jointed, and inspected and the trench filled with suitable compacted material to the mid-diameter of the pipe.
- B. Backfilling over ducts shall begin not less than three days after placing concrete encasement.
- C. Backfilling shall be prosecuted expeditiously as detailed in the Drawings.
- D. Space remaining between the pipe and sides of the trench shall be packed full by hand shovel with selected earth, from stones having a diameter greater than 2-inches and thoroughly compacted with a tamper as fast as placed, up to a level of one foot above the top of pipe.
 - 1. Compact to 95 percent maximum density in layers not to exceed 4 inches up to the centerline of the pipe from the trench bottom and in layers not to exceed 6 inches from the pipe centerline to 12 inches above the pipe.
- E. The filling shall be carried up evenly on both sides with at least one man tamping for each man shoveling material into the trench.

- F. The remainder of the trench above the compacted backfill, as just described above, shall be filled and thoroughly compacted with common fill by rolling, ramming, or puddling, as the ENGINEER may direct. Compact common fill in 12-inch layers to 95 percent maximum density.
- G. The bedding rock in muck areas shall consist of the at least 10 inches of washed and grade limerock placed in the trench to the proposed elevation of the centerline of the pipe prior to pipe laying.
 - 1. This bedding shall not be used as a drain for ground water.
 - 2. Take precautions necessary to maintain the bedding in a compacted state and to prevent washing, erosion or loosening of this bed.
- H. In locations where pipes pass through building walls, take the following precautions to consolidate the refill up to an elevation of at least 1 foot above the bottom of the pipes:
 - 1. Place structural fill in these areas for a distance of not less than 3 feet either side of the centerline of the pipe in level layers not exceeding 6-inches in depth.
 - 2. Wet each layer to the extent directed and thoroughly compact each layer with a power tamper.

3.05 GRADING

- A. Grading shall be performed at these places as are indicated in the Drawings, to the lines, grades and elevations shown or as directed by the ENGINEER and shall be made in a manner that the requirements for formation of embankments can be followed.
 - 1. Unacceptable material encountered, of whatever nature within the limits indicated, shall be removed and disposed of as directed.
 - 2. During the process of excavation, the grade shall be maintained in a well-drained condition.
 - 3. When directed, temporary drains and drainage ditches shall be installed to intercept or divert surface water, which may affect the prosecution or condition of the work.
- B. If at the time of excavation it is not possible to place material in its proper section of the permanent structure, it shall be stockpiled in approved areas for later use.
 - 1. No extras will be considered for the stockpiling or double handling of excavated material.

- C. The right is reserved to make minute adjustments or revisions in lines or grades if found necessary as the work progresses, due to discrepancies in the Drawings or in order to obtain satisfactory construction.
- D. Stones or rock fragments larger than 2 1/2 inches in their greatest dimensions will not be permitted in the top 6 inches of the subgrade line of fills or embankments.
- E. Fill slopes shall be uniformly dressed to the slope, cross-section and alignment shown in the Drawings, or as directed by the ENGINEER.
- F. In cut, loose or protruding rocks on the back slopes shall be barred loose or otherwise removed to line or finished grade of slope.
 - 1. Cut and fill slopes shall be uniformly dressed to the slope, cross-section and alignment shown in the Drawings or as specified by the ENGINEER.
- G. No grading is to be done in areas where there are existing pipe lines that may be uncovered or damaged until the lines which must be maintained are relocated, or where lines are to be abandoned, required valves are closed and drains plugged at manholes.
- H. Replace pavement cut or otherwise damaged during the progress of the work as specified elsewhere herein or as shown in the Drawings.

3.06 DISPOSAL OF UNSUITABLE AND SURPLUS MATERIAL

- A. Surplus and unsuitable excavated material shall be disposed of at the CONTRACTOR's cost in one of the following ways as directed by the ENGINEER.
 - 1. Transport to soil storage area on OWNER's property and stockpile or spread as directed by the ENGINEER.
 - 2. Transport from OWNER's property and legally dispose of surplus and unsuitable materials.
 - a. Any permit required for the hauling and disposing of this material beyond OWNER's property shall be obtained prior to commencing hauling operations.
 - b. Provide copies of required permits to the ENGINEER.
 - 3. Suitable excavated material may be used for fill if it meets the Specifications for common fill and is approved by the ENGINEER.

- a. Excavated material so approved may be neatly stockpiled at the site where designated by the ENGINEER provided there is an area available where it will not interfere with the operation of the facility nor inconvenience traffic or adjoining property owners.

4. Removal as described in Division 2.

3.07 FIELD QUALITY CONTROL

A. The CONTRACTOR shall retain a certified laboratory and make arrangements for testing necessary to comply with these Specifications, in accordance with Division 1.

1. One copy of the laboratory test results will be sent to the ENGINEER.

B. Conduct one test per lift for each 300 linear feet of pipeline, or a minimum of two compaction tests per lift for projects with less than 300 linear feet of pipeline, at locations directed by the ENGINEER.

END OF SECTION

SECTION 02513

ASPHALTIC CONCRETE PAVING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Prepare sub-grade to receive base course.
- B. Place stabilizing base courses, work and compact.
- C. Prime base course, place asphalt pavement.

1.02 RELATED WORK

- A. Section 01410: Testing Laboratory Services.
- B. Section 02211: Site Grading.
- C. Section 02580: Pavement Marking.

1.03 REFERENCE STANDARDS

- A. ASTM D1557 - Tests for Moisture - Density Relationship of Soils using 10 lb. Rammer in 18 inch Drop.
- B. AASHTO M-81 - Penetration Graded Asphalt Cement.
- C. AASHTO M-140 - Emulsified Asphalt.
- D. FDOT Standard Specifications for Road & Bridge Construction - Section 200 - Rock Base
- E. FDOT Standard Specifications for Road and Bridge Construction - Section 285 – Optional Base Material.
- F. FDOT Standard Specifications for Road and Bridge Construction - Section 250 - Shell Stabilized Base.
- G. FDOT Standard Specifications for Road and Bridge Construction - Section 320 - Hot Mix Asphalt – Plant Methods and Equipment.
- H. FDOT Standard Specifications for Road and Bridge Construction - Section 330 - Hot Bituminous Mixtures General Construction Requirements.

- I. FDOT Standard Specifications for Road and Bridge Construction - Section 334 – Superpave Asphalt Concrete.
- J. FDOT Standard Specifications for Road and Bridge Construction - Section 913A – Shell-Rock Material.
- K. FDOT Standard Specifications for Road and Bridge Construction - Section 916 – Bituminous Materials.

1.04 TESTING AND INSPECTION

- A. Testing and inspection of asphalt pavement mixes and testing of placed stabilizing base course and asphalt pavement will be performed by an independent testing laboratory, in accordance with Section 01410-Testing Lab Services, and Section 01020-Allowances. Testing and inspection will be performed so as to minimize disruption to work.
- B. Allow testing laboratory access to the mixing plant for verification of weights or proportions, character of materials used and determination of temperatures used in the preparation of asphalt concrete mix.
- C. When and if required, the testing laboratory will perform laboratory tests on proposed asphalt pavement mixes to determine conformity with requirements.
- D. The testing laboratory will perform one series of compaction tests for stabilizing base course and for asphalt pavement. The contractor shall pay for costs of additional testing as required due to improper performance of work.
- E. When stabilizing base course or portion thereof has been placed and compacted in accordance with requirements, notify the testing laboratory to perform density and bearing value tests. Do not place asphalt pavement until results have been verified and base course installation approved.
- F. If compaction tests indicate that stabilizing base course or asphalt paving do not meet specified requirements, remove defective work, replace and retest at Contractor's expense.

PART 2 - MATERIALS

2.01 Shell-Rock

- A. Shell-rock materials to be used for shell-rock base shall be defined as naturally occurring heterogeneous deposits of limestone with interbedded layers or lenses of loose and cemented shell, to include cemented sands (calclitic sandstone). This material shall be mined and processed in a manner that will result in a reasonably homogenous finished product. Approval of mineral aggregate sources shall be in accordance with 6-3.3.
- B. Deleterious Substances- Shell-rock materials shall not contain lumps of clay, organic matter, cherty or other extremely hard materials, or other substances not defined, in sufficient quantity as to be detrimental to the finishing, strength, or performance of the base. The material shall not contain loose, free silica sand in sufficient quantity to prevent bonding of the base, or to result in a surface which is susceptible to distortion under construction traffic, or accumulation of loose sand on the finished surface which precludes bonding of the bituminous tack coat with the base, nor shall the material contain more than 50% loose, free shells, corals or skeletal remain of other marine invertebrates (retained on the No. 4 sieve). Materials shall contain no water sensitive clay minerals.
- C. Physical and Chemical Properties - Shell-rock material shall meet the following physical and chemical properties:

Limerock Bearing Ratio (LBR) (FM 5-515) - Production of this material shall be controlled so as to meet the following requirements for LBR value:

- The average of test values shall not be less than 100.
- No individual test value shall be less than 90.
- No two consecutive test values between 90 and 100.

Plasticity (AASHTO T89 and AASHTO T90) - That portion of the material passing the No. 40 sieve shall be non-plastic.

Carbonates (FM-5-514) - The minimum of the average percentage of carbonates of calcium and magnesium shall be 50. Material represented by any individual carbonate LOT average of less than 45% is unacceptable.

Gradation Requirements - Materials classified as shell-rock shall be graded uniformly down to dust and in addition, meet the following specific requirements:

- Passing 3-1/2 inch sieve (maximum dimension not to exceed 6 inches) minimum 97%
- Passing No. 4 sieve maximum 70%
- Passing No. 200 sieve maximum 20% (washed)

2.02 LIMEROCK

- A. Composition - The minimum percentage of carbonates of calcium and magnesium in the limerock material shall be 70. The maximum percentage of water-sensitive clay mineral shall be 3 percent. Limerock material shall

not contain cherty or other extremely hard pieces, or lumps, balls or pockets of sand or clay size material in sufficient quantity as to be detrimental to the proper bonding, finishing, or strength of the limerock base.

- B. Gradation and Size Requirements - At least 97 percent (by weight of the material shall pass a 3½ inch sieve and the material shall be graded uniformly down to dust. The fine material shall consist entirely of dust of fracture. All crushing or breaking-up which might be necessary in order to meet such size requirements shall be done before the material is placed on the road.
- C. Limerock Bearing Requirements - Limerock material used in construction of limerock base shall have an average LBR value of not less than 100. The average LBR value of material produced at a particular source shall be determined in accordance with an approved quality control procedure.

2.03 CRUSHED CONCRETE

- A. Composition - The minimum percentage of carbonates of calcium and magnesium in the material shall be 70. All foreign material such as metal fragments, organic matter, etc. shall be removed from the material before delivery to the job site.
- B. Gradation - 100 percent (by weight) of the material shall pass a 3 inch sieve, with 40 percent to 70 percent passing the number 10 sieve. Not more than 20 percent, by dry weight, of the material shall pass the 200 sieve by washing. all crushing or breaking up which might be necessary in order to meet such size requirements shall be done before the material is placed on the road.
- C. Bearing Requirements - The Crushed Concrete Base shall have an average Limerock Bearing Ration (LBR) of not less than 100. The average LBR value of material produced at a particular source shall be determined in accordance with an approved quality control procedure.
- D. Crushed Concrete may be substituted for Limerock as base material by adding 2 inches to the specified thickness.

2.04 PRIME COAT

- A. Prime coat shall be one of the following:
 - 1. Cutback Asphalt, Grade RC-70 or RC-250 shall meet the requirements of AASHTO Specification M-81.
 - 2. Emulsified Asphalt Grade SS-1 or SS1H shall meet the requirements of ASSHTO Specifications M-140 and/or M-280.

2.05 TACK COAT

- A. Tack coat shall be one of the following:
 - 1. Asphalt Cement, Penetration Grade 85-100 shall meet the requirements of AASHTO Specification M-20.
 - 2. Emulsified Asphalt, Grade RS-2 shall meet the requirements of AASHTO Specification M-140.

2.06 ASPHALTIC CONCRETE

- A. Asphaltic concrete surface course - Type SP-12.5 asphaltic concrete wearing surface, 1½ inches in compacted thickness or as indicated on the Drawings, in accordance with the aforesaid DOT Standard Specification.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Subgrade shall be stabilized per Section 160 - Stabilizing, of the FDOT Standard Specifications.
- B. Bearing Value Requirements for subgrade stabilization
 - 1. Limerock Bearing Ratio - Minimum LBR 40 under paved and curbed areas, and minimum LBR 30 in shoulder and swale areas.
 - 2. Florida Bearing Value - Minimum FBV 75 pounds per square inch (psi) under paved and curbed areas, and minimum FBV 50 psi in shoulder and swale areas.

3.02 TRANSPORTING BASE COURSES

The limerock shall be transported to the point where it is to be used, over rock previously placed if practicable, and dumped on the end of the preceding spread. Hauling over the subgrade and dumping on the subgrade will be permitted when these operations will not be detrimental to the base as determined by the Engineer.

3.03 EQUIPMENT

- A. Base Course - The rock shall be spread by mechanical rock spreaders, equipped with a device which strikes off the rock uniformly to laying thickness, and capable of producing an even distribution of the rock.

- B. Pressure Distributor - The pressure distributor shall be equipped with pneumatic tires having a sufficient width of rubber in contact with the road surface to avoid breaking the bond or forming a rut in the surface. The distance between the centers of openings of the outside nozzles of the spray bar shall be equal to the width of the application required, within an allowable variation two (2) inches.

3.04 SPREADING BASE COURSE

- A. Method of Spreading - The limerock shall be spread uniformly with equipment as specified in 3.02 above. All segregated areas of fine or coarse rock shall be removed and replaced with properly graded rock.
- B. Number of Courses - When the specified compacted thickness of the base is greater than six inches, the base shall be constructed in two courses. The thickness of the first course shall be approximately one-half the total thickness of the finished base, or enough additional to bear the weight of the construction equipment without disturbing the subgrade.

3.05 COMPACTING AND FINISHING BASE

- A. Dynamic Compactor with vibratory rollers shall not be used on this project and shall not be permitted at the job site. The contractor is responsible for all damages caused by compaction operations.
- B. Single-Course Base - For single-course base, after the spreading is completed the entire surface shall be scarified and then shaped so as to produce the required grade and cross section after compaction.
- C. Double-Course Base - For double-course base, the first course shall be cleaned of foreign material and bladed and brought to a surface cross section approximately parallel to that of the finished base. Prior to the spreading of any material for the upper course, the density tests for the lower course shall be made and the Engineer shall have determined that the required compaction has been obtained. After the spreading of the material for the final course is completed, its surface shall be finished and shaped so as to produce the required grade and cross section after compaction, and free of scabs and laminations.
- D. Moisture Content - When the material does not have the proper moisture content to insure the required density, wetting or drying will be required. When water is added it shall be uniformly mixed-in by disking to the full depth of the course which is being compacted. Wetting or drying operations shall involve manipulation, as a unit, of the entire width and depth of the course which is being compacted.

- E. Density Requirements - As soon as proper conditions of moisture are attained the material shall be compacted to a density of not less than 98 percent of maximum density as determined by AASHTO T-180. The minimum density which will be acceptable at any location outside the traveled roadway.

- F. Density Test - 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.
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 tests on the finished base.

G. Correction of Defects:

1. Contamination of Base Material - If, at any time, the subgrade material should 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.
2. Cracks and Checks - 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, the Contractor shall remove the cracks or checks by rescarifying, reshaping, adding base material where necessary, and recompacting.

H. Surface Testing - The finished surface of the base course shall be checked with a templet cut to the required crown and with a 15 foot straightedge laid parallel to the center line of the road. All irregularities greater than $\frac{1}{4}$ inch shall be corrected by scarifying and removing or adding base course material as required, after which the entire area shall be recompacted.

3.06 PRIMING

A. Preparation - The prime coat shall be applied only when the base meets the specified density requirements and the moisture content in the top half of the base does not exceed 90 percent of the optimum moisture of the base material. At the time of priming, the base shall be firm, unyielding and in such condition that no undue distortion will occur.

Before any bituminous material is applied, all loose material, dust, dirt, caked clay and other foreign material which might prevent proper bond with the existing surface shall be removed for the full width of the application. Particular care shall be taken in cleaning the outer edges of the strip to be treated, to insure that the prime or tack coat will adhere.

When the prime or tack coat is applied adjacent to curb and gutter, valley gutter or any other concrete surfaces, such concrete surfaces (except where they are to be covered with a bituminous wearing course) shall be covered with heavy paper, or otherwise protected while the prime or tack coat is being applied. Any bituminous material deposited on such concrete surfaces shall be removed.

The temperature of the prime material shall be between 100 degrees Fahrenheit and 150 degrees Fahrenheit. The actual temperature shall be that which will insure uniform distribution. The material shall be applied by means of a pressure distributor. The amount to be applied will be

dependent on the character of the surface and shall be sufficient to coat the surface thoroughly and uniformly, with no excess.

- B. Rate of Application - The rate of application shall be not less than 0.10 gallon per square yard, unless a lower rate is approved by the Engineer.
- C. Sprinkling - If so required by the Engineer the base shall be lightly sprinkled with water and rolled with a traffic roller, in advance of the application of the prime.
- D. Sanding - The primed base shall be covered by a light uniform application of cover material. If considered necessary for proper distribution of spread, the cover material shall be lightly dragged with a drag broom, after which it shall be rolled with a traffic roller.
- E. Sampling Device on Transport Tanks - All transport tanks delivering bituminous materials for use on the project shall be equipped with an approved spigot-type sampling device.
- F. Temperature Sensing Device on Transport Tanks - All transport tanks delivering bituminous materials shall be equipped with an approved dial type thermometer. The thermometer shall have a temperature range from 50 degrees Fahrenheit to 500 degrees Fahrenheit in 25 degrees Fahrenheit increments with a minimum dial diameter of two inches.

3.07 QUALITY CONTROL

- A. Testing Surface - The finished surface of the base course shall be checked with a templet cut to the required crown and with a 15-foot straightedge laid parallel to the centerline of the road. All irregularities greater than $\frac{1}{4}$ inch shall be corrected by scarifying and removing or adding rock as required, after which the entire area shall be recompact as specified hereinbefore. In the testing of the surface, the measurements will not be taken in small holes caused by individual pieces of rock having been pulled out by the grader.
- B. Thickness Requirements:
 - 1. Measurements - Thickness of base shall be measured at intervals of not more than 200 feet. Measurements shall be taken at various points on the cross section, through holes not less than three inches in diameter.
 - 2. Areas Requiring Correction - Where the compacted base is deficient by more than $\frac{1}{2}$ inch from the thickness called for in the plans, the Contractor shall correct such areas by scarifying and adding rock. The base shall be scarified and rock added for a distance of 100 feet

in each direction from the edge of the deficient area. The affected areas shall then be brought to the required state of compaction and to the required thickness and cross section.

3. Deficient Areas Left in Place - As an exception to the requirement for correcting areas of base which show a thickness deficiency exceeding the allowable $\frac{1}{2}$ inch, the deficiency might be considered as not sufficient to seriously impair the required strength of the base and may be left in place. No payment, however, will be made for such deficient areas left in place and not corrected.

3.08 MAINTENANCE

The Contractor will be responsible for assuring that the true crown and templet are maintained, with no rutting or other distortion, and that the base meets all the requirements, at the time the surface course is applied.

3.09 PROTECTING ADJACENT WORK

Provide adequate protection for all adjacent construction, whatever it may be, against bituminous spraying. Spraying of bituminous material on work, other than base course, will not be accepted.

3.10 TRANSPORTATION OF THE ASPHALT

The surface course shall be transported in tight vehicles previously cleaned of all foreign material. The inside surface of the truck bodies shall be only thinly coated with soapy water or an approved emulsion containing not over 5 percent oil. Kerosine, gasoline or similar products shall not be used. After coating and before loading, the truck bodies shall be raised and drained of all excess liquids.

3.11 INSTALLATION OF FINAL ASPHALTIC CONCRETE SURFACE COURSE

The Contractor shall install Type SP-12.5 asphaltic concrete surface course over the entire surface in two (2) $\frac{3}{4}$ inch lifts.

Mechanical spreading and screeding equipment shall be of an approved type that is self-propelled and can be steered. It shall be equipped with a receiving and disbursing hopper and a mechanical screed or strike-off member capable of adjustment to regulate the depth of material being spread. Tandem Type 5 to 12 ton steel- wheeled rollers shall be used for sealing. Self- Propelled, pneumatic-tired traffic rollers equipped with at least 7b smooth tread, low pressure tires, having a total weight of 6 to 10 tons shall be used for final rolling.

3.12 FIELD QUALITY CONTROL

The final surface course of all pavements will be required to be checked by a rolling straightedge. The finished surface shall not vary more than 3/16 inch from the straightedge applied parallel to the centerline of the pavement. The straightedge shall have an effective length of 15 feet.

END OF SECTION

SECTION 02630
STORM DRAINAGE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplemental Conditions and Division 1 Specification Sections, apply to work specified in this section.

1.02 SCOPE

- A. The work specified in this section consists of furnishing drainage pipe, conforming to these specifications and of the particular types, sizes and dimensions shown in the plans. This work shall include the installation of the pipe at locations called for, in conformity with the lines and grades given, and the furnishing and construction of such catch basins, inlets, manholes, walls, joints, connections, etc., to new and existing pipes as may be required to complete the work as indicated in the plans.

1.03 WORK SPECIFIED ELSEWHERE

- A. Cast-in-Place Concrete – Section 03300

1.04 STANDARDS AND REGULATIONS

- A. Applicable Standards:

- 1. American Association of State Highway and Transportation Officials (AASHTO).
- 2. American Society for Testing and Materials (ASTM).
- 3. Florida Department of Transportation (FDOT) Standard Specifications for Road and Bridge Construction – latest edition.

- B. Governmental Agencies: All work shall conform to the applicable standards of the FDOT.

1.05 SUBMITTALS

- A. The CONTRACTOR shall submit five (5) copies of shop drawings of all pipe, pipe joints, pipe connecting bands, drainage structures, structure frames and grates and any other materials used for construction of the storm drainage.

1.06 GUARANTEE

- A. The CONTRACTOR shall guarantee all materials and equipment furnished and installed and all work performed for a period of one (1) year from the date of substantial completion. The guarantee shall stipulate that the completed system is free from all defects due to faulty materials or workmanship and the CONTRACTOR shall promptly make such corrections as may be necessary by reason of such defects, including the repairs of any damage to other parts of the system resulting from such defects.

PART 2 - PRODUCTS

2.01 PIPE MATERIALS

- A. Reinforced Concrete Pipe: Concrete pipe shall be of first quality and manufactured conforming to ASTM Designation C 76, latest revision, minimum design requirements shall be for Class III Reinforced Concrete Pipe, wall designation B, as modified by Section 941 Concrete Pipe, Section 942 Pipe Gaskets, and Section 430-7 Requirements for Concrete Pipe, FDOT, Standard Specifications for Road and Bridge Construction.
- B. Corrugated Aluminum Pipe: Corrugated Aluminum Pipe shall conform to the requirements of AASHTO M 196 (circular corrugated pipe) or AASHTO M 211 (helically corrugated pipe), and Section 945 FDOT, Standard Specifications.
- C. Corrugated Steel Pipe: Corrugated Steel Pipe shall conform to the requirements of AASHTO M36 and Section 943, FDOT Standard Specifications and shall be bituminous coated.
- D. Corrugated High Density Stormwater Polyethylene Pipe: shall conform to the requirements of ASTM D3212 and AASHTO M294 and FDOT Section 948-2 as manufactured by Advanced Drainage Systems, Inc. (ADS). The corrugated HDPE stormwater pipe shall have corrugated exterior and smooth interior walls.
- E. Polyvinyl Chloride Pipe: Polyvinyl Chloride Pipe shall conform to the requirements of ASTM D-3034, SDR 35.
- F. High Density Polyethylene Forcemain Pipe: shall conform to AWWA C906, ductile iron pipe with fusion welded but joints. Refer to section pipes and tubes for a complete specification for HDPE pipe.

2.02 JOINTS

- A. Concrete Pipe Joints: Except where otherwise specified, round rubber gaskets for use in concrete pipe joints shall meet with the requirements of Article 5.9 of ASTM C361, with the additional requirements that the gasket used shall be of such cross sectional area and perimeter as to properly fit the space provided in the pipe joint in which it is to be used, and shall be the sole element relied on to maintain a tight joint. Prior to use, the gasket shall be stored in as cool a place as practicable. The concrete joints shall conform to FDOT Standards Section 941 Concrete Pipe, Section 942 Pipe Gaskets, Section 430-7 Requirements for Concrete Pipe, and ASTM C443-98.
- B. Corrugated Aluminum Pipe Joints: Field joints for aluminum pipe shall be made with bands fabricated of the same alloy as the culvert sheeting and shall meet the requirements of AASHTO M196. The banded joints shall be gasketed with neoprene gasket of a design shown to secure a soil tight or watertight joint.
- C. Corrugated Steel Pipe Joints: Field joints for steel pipe shall be made with bands fabricated of the same alloy as the culvert sheeting and shall meet the requirements of AASHTO M36. The banded joints shall be gasketed with a neoprene gasket of a design shown to secure a soil-tight or watertight joint.
- D. Corrugated Polyethylene Pipe Joints: series 65 Pro Link WT watertight joining system with O-ring gaskets as manufactured by Advanced Drainage Systems, Inc. (ADS). Performance specifications ASTM D3212 and AASHTO M294.
- E. Polyvinyl Chloride Pipe Joints: Rubber sealing rings for pipe joints shall conform to ASTM D-3212.

2.03 FRENCH DRAINS

- A. French drains shall conform to the requirements of Section 4431 FDOT Standard Specifications.
- B. Filter fabric shall conform to the requirements of Sections 514 and 985, FDOT Standard Specifications.

2.04 INLETS MANHOLES AND JUNCTION BOXES

- A. All drainage inlets, manholes, and junction boxes shall be precast concrete conforming to ASTM C-478 and 64T. All concrete shall have not less than 3000-psi compressive strength at 28 days.
- B. Structure sections shall be joined with a mastic sealing compound. The remaining space shall be filled with the cement mortar and finished so as to produce a smooth continuous surface inside and outside the wall sections.

- C. All openings in precast structures shall be cast at the time of manufacture. Holes for piping shall be six inches larger than the outside diameter of the proposed pipe. All spaces between the manhole and the pipe shall be completely filled with mortar and finished smooth.
- D. Mortar used for concrete structures shall conform to M C-270. Mortar material shall be mixed one part Type 2 Portland cement to two parts aggregate by volume. Portland cement shall conform to ASTM C-144 and aggregate shall conform to ASTM C-144.
- E. The CONTRACTOR shall furnish the ENGINEER with shop drawings of all precast structures for his approval prior to fabrication. Shop drawings shall show all dimension, reinforcing steel and specifications.
- F. Handling and Storing: Pipe shall be protected during shipping, storage and handling against impact shocks, free fall or other damage. Any damaged pipe shall be removed from the job site immediately.

2.05 GRATINGS

- A. Iron frames, grates, and lids shall conform to ASTM A48 and shall be Class 30. The castings shall be true to design, dimension, weight, and detail as shown on the contract drawings.

2.06 FORMS

- A. Forms for cast in place headwalls or other concrete structures shall be wood or metal, so designed and constructed that they may be removed without injury to the concrete. They shall be built true to line and grade and braced in a substantial and unyielding manner, and shall be approved by the ENGINEER before being filled with concrete.

2.07 CONCRETE

- A. Class I, concrete shall be used for headwalls, pipe, end walls, and other miscellaneous concrete items. Except as may be modified in the plans or special provisions the required minimum 28-day compressive strength for Class I concrete shall be 2500 psi.

2.08 CONCRETE REINFORCEMENT

- A. Concrete reinforcement in sizes No. 3 (3/8-inch) and larger shall be deformed steel bars of the shapes and sizes indicated on the drawings.
- B. The steel shall be newly rolled stock, substantially free from mill scale, rust, dirt, grease, or other foreign matter. Bars shall be domestic billet steel.

- C. Reinforcing bars shall be Grade 60, in conformance with ASTM Specifications for Concrete Reinforcement, Designation A615, except stirrups and ties shall be Grade 40.
- D. Deformations on bars for concrete reinforcement shall conform to the ASTM Specifications for concrete reinforcement, Designation A615.
- E. Tie Wire - The tie wire shall be 16 gauge or heavier, black annealed wire.
- F. Metal Accessories - metal accessories shall be galvanized and sufficient in size and number to rigidly support the reinforcing steel under all conditions.
- G. Clean loose rust, grease, or any other coating that could interfere with bond. Where there is delay in depositing concrete after reinforcement is in place, bars shall be reinspected and cleaned when necessary.
- H. All steel reinforcing shall be placed in the exact positions and with the spacing shown on the plans or as ordered, during the placing of the concrete. The clear distance between parallel bars shall not be less than one and one half times the bar diameter, and shall in no case be less than one inch, nor less than one and one-third times the maximum size of coarse aggregate. Unless shown otherwise on the drawings, bars shall be lapped not less than 24 diameters nor less than 12 inches.
- I. Minimum concrete coverings over reinforcement shall be as follows:
 - 1. For footings and slabs deposited against earth -three inches.
 - 2. For formed surfaces to be exposed to weather, dampness, or in contact with ground after removal of forms - two inches.

2.09 RIP RAP HEADWALLS

- A. Portland cement shall be from an approved source and the product of an established and reputable manufacturer.
- B. Fine aggregate shall meet the requirements of Section 902-2.3 of FDOT Standard Specifications.
- C. Sacks shall be jute sacks, or any suitable sacks of any material which will hold the sand-cement mixture without leakage when handled and which are permeable or absorptive enough to permit the passage of water when wetted. The sacks shall be of uniform size and dimensions, in order to provide uniformity of lines in the completed work. They shall be free from holes and strong enough to stand handling without ripping or splitting. Only one type and size of sack shall be used at any one structure.

2.10 STORMCEPTOR

- A. The separator shall remove oil and sediment from storm water during frequent wet weather events. The separator shall treat a minimum of 75 to 90 percent of the annual runoff volume and be capable of removing 50 to 80 percent of the total suspended sediment load (TSS) and 60 to 95 percent of the floatable free oil. The separator must be capable of trapping silt and clay size particles in addition to large particles. The separator shall be installed underground as part of the storm sewer system and be structurally designed for HS-20 (OHBD) traffic loading at the surface. The storage in the separator shall be vertically oriented. The separator shall be maintainable from the surface via one access point without requiring entry into the separator.
- B. The separator shall be equipped with an internal high flow bypass that regulates the flow rate into the treatment chamber and conveys high flows directly to the outlet such that scour and/or re-suspension of material previously collected in the separator does not occur. External bypasses are not acceptable. The bypasses shall be physically separated from the separation area to prevent mixing. The separator shall be circular, and constructed from either fiberglass or precast concrete risers. The concrete separator shall be designed and manufactured in accordance with ASTM C-478. The concrete joints shall be oil resistance, water tight and meet the design criteria according to ASTM C-443. In the concrete Stormceptor, a fiberglass insert, bolted and sealed watertight to the inside of the bypass chamber, will divert low to normal stormwater flows into the treatment chamber. The first 16 inches (405 mm) of oil storage shall be lined with fiberglass to prevent migration through the pores in the concrete.
- C. The difference between the inlet pipe elevation to the separator and the outlet pipe elevation from the separator shall be 1 inch (25 mm). For a multiple inlet pipe design there is a 3-inch (75 mm) difference between the inlet pipe invert and the outlet pipe invert. The separator shall be able to be used as a bend structure in the storm sewer system. The access cover for the separator shall clearly indicate that it is an oil/sediment separator.
- D. The separator shall be capable of containing spills of floatable substances such as free oil and not be compromised by temporary backwater conditions (i.e., trapped pollutants should not be re-suspended and scoured from the separator during backwater conditions). The capabilities of the selected separator must be documented with scientific studies and reports.

PART 3 – EXECUTION

3.01 EXCAVATION

- A. Requirements for all Excavation: Foundation pits shall be excavated to permit the placing of the full widths and lengths of footings shown in the plans with full

horizontal beds. Corners or edges of footings shall not be rounded or undercut. All excavation shall be carried to foundation materials satisfactory to the ENGINEER regardless of the elevation shown on the plans. Unless a firm footing can be established on solid rock before such depths is reached, it shall be carried to such additional depth as may be necessary to eliminate any danger of undermining. Wherever rock bottom is secured, the excavation shall be done in such manner as to allow the solid rock to be exposed and prepared in horizontal beds for receiving the masonry. All loose and disintegrated rock or thin strata shall be removed. All foundation excavations shall be inspected and approved by the ENGINEER prior to the placing of masonry.

B. Earth Excavation - Foundation Material other than Rock:

1. When masonry is to rest on an excavated surface other than rock, special care shall be taken to avoid disturbing the bottom of the excavation, and the final removal of the foundation material to grade shall not be made until just before the masonry is to be placed. In case the foundation material is soft or mucky the ENGINEER may require the CONTRACTOR to excavate to a greater depth and to backfill to grade with approved material.

C. Removal of Obstructions:

1. The CONTRACTOR shall perform all excavation of whatever substances encountered to the depths indicated on the drawings or as necessary. Excavation shall be unclassified regardless of material encountered. This shall include necessary clearing and grubbing of any foreign substance encountered within the structure or trench area.
2. Boulders, logs, or any unforeseen obstacles encountered in excavating shall be removed and no additional compensation will be allowed because of difficulties met in driving through or removing such obstructions.
3. No separate payment for excavation as such will be made. The cost thereof shall be included in the prices for the pipe installation. Excavation material suitable for backfill shall be piled in an orderly manner at a sufficient distance from the trench to avoid overloading and to prevent slides or cave-ins.

D. Rock Excavation:

1. All rock and other hard foundation material shall be freed of all loose material, cleaned, and cut to a firm surface; either level, stepped vertically and horizontally, or serrated, as may be directed by the ENGINEER. All seams shall be cleaned out and filled with concrete or mortar.

E. Removal of Unstable Material:

1. It is the intent of this specification that all pipe and other structures shall be provided with a stable foundation, and that any material, which by reason of kind or condition is not and cannot be made stable by drainage or compaction, shall be removed or replaced. Therefore, any material encountered at the elevation shown on the drawings or specified for pipe that will not or cannot be improved to provide a stable foundation for the pipe, shall be removed and replaced. All unstable material below the grade line of the pipe shall be removed for the full width of the trench and replaced with suitable selected material, compacted as specified elsewhere in these specifications. For the purpose of this specification, muck, peat and other highly organic soils shall be considered to be unstable materials. Also, any soil which is or might become wet to such a degree that its moisture content is equal to or greater than 90 percent of its liquid limit will have to be specifically approved by the ENGINEER with regard to stability, or shall be considered to be an unstable material requiring removal and replacement.

3.02 PIPE TRENCH EXCAVATION

- A. Trenches for pipe culverts and for storm sewers shall be excavated to the required depth and to a width sufficient to provide adequate working room. For pipe lines placed above the natural ground line the embankment shall be placed and compacted, prior to excavation of the trench, to an elevation at least two feet above the top of the pipe and to a width equal to four pipe diameters, and the trench then excavated to the required grade. Where the soils permit, the trench sides shall be vertical up to at least the mid-point of the pipe.
- B. Work shall be performed in compliance with applicable Trench Safety Standards identified in the Occupational Safety and Health Administration's Excavation Safety Standards (OSHA), 29 C.F.R.S. 1926.650 Subpart P will be adhered to during trench excavation in accordance with Florida Statutes 553.60 through 533.64 inclusive (1990), "Trench Safety Act".
- C. For all pipe culverts and storm sewers 24 inches or over in diameter (except side drain), the bedding shall be shaped to conform to the outside of the pipe, for a depth of not less than 10 percent of its total height (outside dimensions) and recesses provided to receive the bell.
- D. Where wet conditions are such that dewatering by normal pumping methods, including wellpointing, would not be effective, then this requirement may be modified by the ENGINEER. No payment will be allowed for select bedding material, which might be utilized by the CONTRACTOR for his own convenience in lieu of dewatering.
- E. For all side drains, and for pipe culverts less than 24 inches in diameter, the trench bottom may be either flat, or shaped to fit the bottom of the pipe, except

as provided for trenches, cut below grade and for areas of unsuitable foundation material. Regardless of the shape of the trench bottom, excavation shall be made for the hubs as required to allow the pipe barrel to rest firmly on the trench bottom. The bottom of the trench shall be rounded so that the bottom quadrant of the pipe will rest firmly on undisturbed soil for as nearly the full length of the barrel as proper jointing operations will permit. This part of the excavation shall be done manually only a few feet in advance of the pipelaying by men skilled in this type of work. Unauthorized overdepths shall be backfilled with loose, granular, moist earth, thoroughly tamped. Whenever the presence of incipient slides is noted during excavation, the trench walls shall be restrained with adequate sheeting, shoring and bracing. Trench excavation in the proximity of certain existing sanitary sewers and other utility lines shall be protected by either steel or wood sheeting. Used sheet piling in good condition, which has been inspected and approved by the ENGINEER, may be used in place of new sheet piling.

- F. The CONTRACTOR shall provide adequate equipment for the removal of storm or subsurface waters, which may accumulate in the excavated areas. If subsurface water is encountered, the CONTRACTOR shall utilize approved means to adequately dewater the excavation so that it will be dry for working and pipelaying. A wellpoint system or other approved dewatering method shall be utilized, if necessary, to maintain the excavation in a dry condition for preparation of the trench bottom and for pipe laying.
- G. Contractor shall, wherever necessary, provide temporary sidewalks and driveway entrances at his own expense, including safe bridges over trench and fencing around excavations for pedestrian protection.
- H. Contractor to adhere to the construction pollution prevention plan prior to any activities.

3.03 UNSUITABLE MATERIAL

- A. When rock, boulders, or other hard, lumpy or unyielding materials are encountered in the trench bottom they shall be removed to a depth at least 12 inches below the bottom of the pipe. Muck or other soft material considered by the ENGINEER to be unsuitable as foundation for the pipe shall be removed to a depth as where sand or other acceptable material is encountered, and to the width of the trench as directed by ENGINEER.

3.04 PIPE BEDDING

- B. When undercutting is required in order to remove unsuitable material (either hard or soft), the trench shall be backfilled to a point six inches above the bottom of the pipe, with suitable granular material which will form a firm bed for the pipe, and the bottom shall be shaped to fit the pipe to a point six inches above the bottom of the pipe. Such bedding material shall be coarse sand,

washed limerock or other suitable granular material. Where bell and spigot pipe is used, the bell holes shall be deep enough to ensure that the bell does not bear on the bottom of the excavation, and shall not be excessively wide in the longitudinal direction of the culvert or storm drain.

3.05 COMPACTION

- A. When a pipe trench is undercut in order to remove unsuitable material or for other reasons, it shall be brought to required grade using suitable materials, after which the bottom shall be compacted to match approximately the density of the soil in which the trench was cut.

3.06 PIPELAYING

- A. As pipe laying progresses, the interior of the pipe shall be cleaned of all dirt and superfluous materials. The CONTRACTOR shall, at all times, take whatever measures are necessary to prevent the entrance of dirt and other foreign matter into the storm sewer system. In the event that it is necessary to clean the pipe before final acceptance, the CONTRACTOR shall do so without additional compensation.
- B. Open Trench - No more than 200 linear feet, or the length of trench between consecutive drainage structures, shall be left open behind pipe laying, whichever distance is greater. In no instance shall any trench be left open for more than 24 hours before backfilling in accordance with these specifications.

3.07 DEWATERING

- A. The CONTRACTOR shall provide adequate equipment for the removal of storm or subsurface waters that may accumulate in the excavation. If subsurface water is encountered, the CONTRACTOR shall utilize suitable equipment to adequately dewater the excavation so that it will be dry for work and pipelaying. A wellpoint system or other ENGINEER approved dewatering method shall be utilized, if necessary, to maintain the excavation in a dry condition for preparation of the trench bottom and for pipe laying. Dewatering by trench pumping will not be permitted if migration of fine-grained natural material from bottom, sidewalls or bedding material will occur. In the event that satisfactory dewatering cannot be accomplished due to subsurface conditions or where dewatering could damage existing structures, the CONTRACTOR shall obtain the ENGINEER's approval of wet trench construction procedure before commencing construction. Dewatering shall cease in a manner to allow the subsurface water to slowly return to normal levels.
- B. Water pumped from the trench or other excavation shall be disposed of in storm sewers having adequate capacity, canals or suitable disposal pits. CONTRACTOR is responsible for acquiring all permits required to discharge

the water, and shall protect waterways from turbidity during the dewatering operation. In areas where adequate disposal sites are not available, partially backfilled trenches may be used for water disposal only when the ENGINEER approves the CONTRACTOR's plan for trench disposal in writing. The CONTRACTOR's plan shall include temporary culverts, barricades and other protective measures to prevent damage to property or injury to any person or persons. No flooding of streets, roadways, driveways or private property will be permitted. Engines driving dewatering pumps shall be equipped with residential type mufflers.

3.08 PUMPING

- A. Pumping from the interior of any foundation enclosure shall be done in such a manner as to preclude the possibility of any portion of the concrete materials being carried away. No pumping shall be done while concrete is being placed, or for a period of at least 24 hours thereafter, unless it is done from a suitable pump separated from the concrete work by a watertight wall.

3.09 BACKFILLING

A. Backfill Materials:

- 1. Backfilling to the original ground surface or subgrade surface of openings made for structures, with a sufficient allowance for settlement, shall be a part of the work of excavation, although the ENGINEER may require that the material used in making the backfill be obtained from a source entirely apart from the structure. All material used for backfill shall be of a quality acceptable to the ENGINEER, and shall be free from large lumps, wood, or other extraneous material.
- 2. Heavy construction equipment will not be permitted to cross over culvert or storm sewer pipes until backfill material has been placed and compacted to the finished earthwork grade or to an elevation at least 2-1/2 feet above the crown of the pipe.

B. Compaction Under Wet Conditions:

- 1. Where wet conditions do not permit the use of mechanical tampers, compaction of the backfill shall be done with hand tampers. Only A-3 material will be allowed for use in the hand tamped portions of the backfill. When the backfill has reached an elevation and condition such as to make the use of the mechanical tampers practicable, the mechanical tamping shall be done in such a manner and to such extent as to transfer the compaction force into the sections previously tamped by hand.

C. Compaction Requirements for Pipe Culverts and Storm Sewers:

1. The backfilling of pipe trenches shall be done in three stages as follows:
 - a. In the first stage the CONTRACTOR shall provide adequate compacted fill beneath the haunches of the pipe, using mechanical tampers suitable for this purpose. This compaction applies to the material placed beneath the haunches of the pipe.
 - b. In the second stage the CONTRACTOR shall obtain a well-compacted bed and fill along the sides of the pipe and to a point at least one foot above the top of the pipe. The width of backfill and compaction to be done under this second stage shall be the width of the portion of the trench having vertical sides, or, when no portion of the trench having vertical sides, it shall be to a width at least equal to twice the outside diameter of the pipe.
 - c. In the third stage the remainder of the trench shall be backfilled with suitable material, which shall be compacted in accordance with the requirements below.

2. Compaction:

- a. The backfill for the first and second stages shall be placed in six-inch layers (compacted thickness) and shall be compacted to 98% of maximum density as determined by AASHTO T180. Where the backfill lies within the roadway embankment or subgrade, it shall be compacted to the densities specified for these areas.
- b. When pavement is to be constructed over the pipe, the backfill for the third stage shall be placed in the manner and compacted to the degree required for the first and second stages. Where no pavement is to be constructed and vehicular traffic is not to pass over the pipe, the third stage backfill shall be compacted to a firmness approximately equal to that of the soil adjacent to the pipe trench.

D. Backfill Under Wet Conditions:

1. Where wet conditions are such that dewatering by normal pumping methods would not be effective, the procedure outlined below may be used when specifically authorized by the ENGINEER in writing and noted in the job diary. In such specifically authorized cases the backfill material used below the elevation at which mechanical tampers would be effective shall be of the A-3 soil classification (based on AASHTO Designation M145-49). After the pipe is bedded properly, the A-3 material shall be placed, and rammed and compacted under the pipe haunches by the use of timbers or hand tampers, and hand-tamping continued during the placing of the backfill until the backfill reaches an elevation such that its moisture content will permit the use of mechanical tampers. When the backfill has reached

such elevation, normally acceptable backfill material may be used and compaction shall be obtained by the use of mechanical tampers. The mechanical tamping shall be done in such manner and to such extent as to transfer the compacting force into the previously hand-tamped fill.

E. Requirements for Thick Lift Compaction in Granular Materials:

1. If the CONTRACTOR has compaction equipment with which the required density can be obtained in thicker lifts than permitted above and upon satisfactory evidence that the proposed equipment will produce work equal in quality to that produced by the specified methods, the ENGINEER may permit placement of granular material of soil groups A-1, A-2, or A-3 in lifts up to a maximum of three foot compacted thickness. The CONTRACTOR will be required to furnish equipment and labor to excavate and backfill test pits to be dug for the performance of density tests.
2. Use of thick lift compaction procedures will not be allowed for first stage backfilling (beneath the haunches) of pipe culverts and storm sewers.

3.10 CONSTRUCTION METHODS FOR RIP RAP HEADWALLS

- A. The sand and cement shall be mixed dry, in the proportions of five cubic feet of sand to one bag of cement, until the mixture is of uniform color.
- B. The mixed material shall be accurately measured into each sack, with care being taken to place the same amount of material in each sack, and at least the top six inches of the sacks shall remain unfilled to allow for properly tying or folding and to insure against breakage of the sack during placing.
- C. The filled sacks shall be placed with their tied or folded ends all in the same direction unless otherwise shown on the plans. The sacks shall be laid with broken joints, in a regular pattern. The sacks shall be rammed or backed against each other so as to form a close and molded contact after the sand and cement mixture has set up. Sacks ripped with sound, unbroken sacks. Reinforcing rods shall be added as shown on the plans. All sacks shall then be thoroughly saturated with water.
- D. Immediately after watering, all openings between sacks shall be filled with dry grout composed of one part Portland cement and five parts sand.
- E. After the bags have been set up, a concrete cap shall be formed and poured on the headwall as shown on the plans.

3.11 TESTING

- A. The Contractor is required to perform lamping and infiltration/exfiltration tests on the gravity stormwater pipe system to verify that the pipe system is watertight.
- B. The Contractor will be required to video the gravity stormwater pipe system after completion to verify that the pipe system is watertight.

3.12 REPLACING PAVEMENT

- A. Where existing pavement, curb, curb and gutter, sidewalk or valley gutter is removed only for the purpose of constructing or removing box culverts, pipe culverts, storm sewers, inlets, manholes, etc., such pavement, etc., shall be replaced and restored to as good condition as determined by the ENGINEER, as before removal, and without direct compensation therefore. The replaced pavement shall be of the same or similar type as that removed.

3.13 CLEANING UP

- A. Upon completion of the work, the CONTRACTOR shall leave the structure and all adjacent areas affected by his operations in a neat and presentable condition, and shall remove and clean up all rubbish and surplus material at locations and methods approved by the ENGINEER.

3.14 SUBMITTALS

- A. As-Built Drawings - During the progress of work of the storm drain system, the Contractor shall record on a spare set of site drawings the exact locations, as installed, of all underground and otherwise concealed piping and other storm drainage system items not installed in locations shown on the Contract Drawings.
- B. These drawings shall be submitted to the Owner prior to request for final payment.

END OF SECTION

SECTION 02743

ASPHALT CONCRETE PAVEMENT REPAIR

PART 1 GENERAL

1.01 SUMMARY

- A. Furnish labor, equipment, and material required for cutting, removing, protecting, replacing or stabilizing existing roadways, driveways and pavement of the various types encountered, removed or damaged under this Contract.
- B. Existing utility castings, including valve boxes, manholes, handholes, pull boxes, inlets and similar structures in the areas of trench restoration, pavement replacement and pavement overlay shall be adjusted to be flush with the surface of the finished work, at no additional cost to the OWNER.
- C. Protection for pavements, limerock base courses and asphaltic surface courses, within the work area.
 - 1. Payment for pavement restoration will be made only where such limerock base courses or surface courses are encountered within the limits defined in the pavement repair details shown in the Drawings and/or in the Standard Details.
 - 2. Base course or surface course beyond those limits, damaged as a result of the CONTRACTOR's operation, shall be restored in accordance with the applicable requirements of these Specifications, at no additional cost to the OWNER.
 - 3. In writing, notify the authority having jurisdiction over the street, of existing damaged pavement prior to proceeding with work in the vicinity.
 - 4. Forward a copy of these notices to the ENGINEER.
- D. Permanent pavement repair shall be in accordance with the details shown in the Drawings and/or in the FDOT Standard Details herein with edges straight and parallel and patches rectangular in plan.
 - 1. Paving replacement required beyond the limits shown in the details, and as called for in the Specifications, shall be at the CONTRACTOR's expense.
 - 2. Where trenches are located out of the existing pavement and damage occurs to the pavement, it shall also be replaced at no expense to the OWNER.

- E. Promptly replace pavement markings removed or obliterated, using like materials and without expense to the OWNER.

PART 2 PRODUCTS

2.01 MATERIALS

- A. The percentages of maximum density for subgrade and limerock base specified herein are minimum.
 - 1. Greater percentages of maximum density shall be obtained, if so required by the governing authority having jurisdiction over the work location.
- B. Asphaltic concrete mixtures shall be obtained only from plants, which comply with the requirements of D.O.T. Specifications, Section 320 as applicable, using materials specified herein, and producing the specified mixture.
 - 1. General construction requirements for hot bituminous mixtures specified herein shall conform to D.O.T. Specifications, Section 330, as applicable.
- C. Equipment necessary for construction shall be on the job site in first class working condition.
 - 1. Spilling or dropping of petroleum products is prohibited and defective equipment shall be removed or replaced immediately.
 - 2. Comply with clean up requirements.
- D. Asphaltic concrete shall be laid only where the surface to be covered is intact, firm, cured and dry, and only when weather conditions are suitable.
 - 1. The temperature of the mixture at the time of spreading shall be within 25 °F of the temperature set by the ENGINEER.
 - 2. No mixture shall be spread when the air temperature is less than 40 °F nor when the spreading cannot be finished and compacted during daylight hours.
- E. Mixture caught in transit by a sudden rain may be laid at the CONTRACTOR's risk, if the base is in suitable condition.
 - 1. Under no circumstances shall asphalt material be placed while rain is falling, or when there is water on the area to be covered.

PART 3 EXECUTION

3.01 TEMPORARY PAVING

- A. Prior to commencing excavation, the asphalt surface shall be sawcut within the limits of the allowable trench width.
 - 1. Temporary paving will be required along the entire route where the original paved surface is removed.
 - 2. Temporary paving shall be placed the same day the trench is backfilled.
 - 3. The trench shall be backfilled as required in Trenching - Section 02319, up to 1 inch below the existing pavement surface and a temporary, cold mixed sand/asphalt pavement shall be constructed up to the level of the existing pavement surface.
 - 4. The liquid asphalt shall be Grade RC-70 conforming to the requirements of D.O.T. Specifications, Section 916-2.
 - 5. The sand shall conform to the requirements of D.O.T. Specifications, Section 902 for fine aggregate.

- B. The cold mix shall be installed one block at a time not crossing intersections to a maximum unpaved ditch length of 1200 feet.
 - 1. When either of these limits is reached, complete the installation of paving prior to continuing with his excavation work.
 - 2. Backfill, compaction and temporary paving is to keep pace with the pipe installation.
 - 3. Written permission must be obtained from the Department and the municipal agency permitting the work to allow greater lengths than 1,200 feet.
 - 4. Permitting agencies may reduce the allowable limits in their permit, or for other unforeseen right-of-way conditions.

- C. Prior to completion of the work remove the 1 inch of cold mix and surplus backfill.
 - 1. Replace 1 inch of cold mix and surplus backfill with the specified compacted limerock base course and asphalt within the approved working limits.
 - 2. Municipal agencies permitting this work may accelerate the time for removal

of the cold mix, at their discretion.

- D. Maintain the temporary pavement in a condition satisfactory to the ENGINEER until its removal.
 - 1. Removal shall include surplus backfill material.
 - 2. Replacement shall be made within 30 days with the permanent pavement.
 - 3. In replacing the temporary paving with permanent pavement, work shall be completed in sections compatible with specified traffic maintenance procedures.
- E. No payment shall be made for temporary paving work and the cost for such work shall be included in the prices bid for other applicable items of work.
- F. Should the CONTRACTOR elect to install temporary hot mix asphalt, to be left in place, in lieu of cold mix asphalt, a suitable credit for cold mix will be provided to the OWNER when the hot mix temporary asphalt is left in place and installed over properly compacted Limerock base course and shall be incorporated into the specified permanent pavement restoration as part of Type I paving replacement.
- G. Sand seal on the limerock base course will not be permitted in lieu of temporary paving.

3.02 TYPE I PAVING REPAIRS (LIMEROCK BASE AND ASPHALTIC CONCRETE SURFACE)

- A. Type I paving repairs shall be made with an 8-inch thick compacted limerock base and a minimum 1-inch thick Asphaltic concrete surface.
- B. Limerock for pavement base shall be obtained from local sources where the overburden was removed from the pits prior to mining operations.
 - 1. The limerock shall comply with the requirements of D.O.T. Specifications, Section 911.
- C. The backfill previously placed and compacted shall be excavated to the required depth below the existing road surface and the existing paving shall be cut back beyond excavations, using an abrasive disc saw to trim the edges to straight and true lines.
 - 1. Eight inches of limerock base shall be placed in two layers, each layer compacted to not less than 98 percent density.

2. During rolling, it shall be wet down as necessary to secure the greatest possible compaction.
 3. After rolling, the entire surface shall be thoroughly scarified to a depth of not less than 3 inches and shaped to conform to the existing surface, then watered and rolled again.
 4. Rolling and watering shall continue until the entire depth of the base is bonded and compacted into an unyielding mass.
- D. If the subgrade material becomes churned up and mixed with the limerock base course materials, without additional compensation, dig out and remove the mixture, reshape and compact the subgrade and replace the materials removed with clean rock which shall be watered and rolled until satisfactorily compacted.
- E. After the limerock base course has been properly prepared and is dry and ready to receive the wearing surface, a prime coat of emulsified asphalt (Grade RS 2) shall be applied at a rate of 0.10 gallon per square yard, or as approved by the ENGINEER, immediately followed by the asphaltic concrete.
1. The prime coat shall be applied to the entire limerock base course uniformly, and shall thoroughly coat surfaces.
 2. Care shall be taken to tack coat and bond the edges of surrounding pavement.
 3. The tack coat shall not advance ahead of the paving by more than 300 feet in business or residential areas unless otherwise approved by the ENGINEER.
- F. The Asphaltic concrete shall be plant mixed, using the best grade of local aggregates of approved size and gradation and mixed with an approved binder and conforming to either the State of Florida Department of Transportation Specifications, Type S-1 Asphaltic Concrete, Section 331-1 through 331-5, or as ordered by the ENGINEER.
1. Where the width of the repair permits, the material shall be placed by means of an approved mechanical spreader and finisher.
 2. The mixture shall be compacted to true grade and cross section by means of a tandem roller weighing not less than eight tons.
 3. The compacted asphaltic concrete mixture shall not be less than one inch in thickness.
 4. Rolling shall proceed as closely behind the spreader as possible and material shall be completely compacted the same day it is placed.

3.03 TYPE II PAVING REPAIR (SPECIAL LIME ROCK BASE AND ASPHALTIC CONCRETE SURFACE)

- A. Type II repairs will be used only when the restoration work falls within the limits of a State Road and shall be performed in accordance with the latest Florida Department of Transportation Standard Specifications for Road and bridge Construction.

3.04 TYPE V PAVING REPAIRS (ASPHALTIC CONCRETE WEARING SURFACE OVERLAY)

- A. Since the quantity of Type V repairs that may be required is usually unknown until Contract pavement restoration work begins, Type V based on pricing listed in the Bid Summary Sheet.
 - 1. A Contingent Item may or may not be used at the option of the OWNER, and provisions contained within the Contract Documents for quantity overruns will not be applicable.
- B. Type V paving repairs shall consist of a machine-laid asphaltic concrete wearing surface overlay which shall be nominal one-inch thick asphaltic concrete meeting the material requirements of Type I repairs as specified.
 - 1. As used herein, "overlay" shall mean Type V paving repairs.
 - 2. A special wearing surface may be substituted if required.
- C. In general, the overlay will be applied in a full lane width or widths, after the permanent paving repairs over the trench have been made.
- D. Longitudinal and transverse asphalt replacement overlay wearing surfaces shall butt into adjacent existing asphalt wearing surfaces in full lane asphalt restoration.
 - 1. The finish elevation of the new full lane overlay shall meet existing elevations adjacent to the new work.
- E. The existing asphaltic concrete surface shall be saw cut for its full depth or 1-inch minimum, and then stripped back for at least 2 feet into the area to be overlaid to a second cut which shall also be in clean straight lines.
 - 1. The second, or interior, cut edge shall be rolled with a tandem roller weighing not less than 8 tons before the overlay is applied.
 - 2. The stripped area shall be used to provide a smooth transition between the overlay and the existing pavement.

3. Before placing the overlay, cut edges and the stripped area shall be tack coated with specified emulsified asphalt.
- F. If the CONTRACTOR requests in writing to "feather" the longitudinal edge, and if written permission is granted to "feather" the asphalt by the Department and the local municipality, a sanded mix of 70-30 type shall be used.
1. "Feathering" shall begin 18 inches from the tapered edge.
- G. Prior to installing a full lane width overlay over existing asphalt the trench and shoulders over the pipe shall be sawcut and filled with asphalt to the required depth and terminating flush with the existing adjacent asphalt in accordance with the municipality having jurisdiction over the work for Types I, II.
1. Type V overlay will be installed as detailed above.
- H. When a minor amount of asphalt surface will remain, generally with large pipe installations, after the pipe is installed and the required longitudinal saw cutting the asphalt, the CONTRACTOR may request permission to remove the asphalt in the lane, at his expense, by saw cutting the asphalt adjacent to the existing lane, then placing the Type V overlay flush with the adjacent asphalt.
1. This would require that the Type I, II finish elevation be lowered 1 inch to allow for the Type V overlay.
- I. Before the overlay is applied, existing surfaces shall be swept clean of dirt and debris, using a power driven broom if warranted by the size of the location to be overlaid and/or as ordered by the ENGINEER.
1. Pavement edges shall be cleared of encroaching vegetation, loose sand, rock and other foreign matter.
 2. When this existing surface is thoroughly clean, approximately 0.10 gallon per square yard immediately followed by the asphaltic concrete overlay.
 3. The tack coat shall not advance ahead of the paving by more than 300 feet in business or residential areas unless otherwise approved by the ENGINEER.
 4. When the existing surface is thoroughly clean, a tack coat of Emulsified asphalt, Grade PS-2 (anionic) shall be applied at the rate of approximately 0.10 gallon per square yard, immediately followed by the asphaltic concrete overlay.
 5. The tack coat shall not advance ahead of the paving by more than 300 feet in business or residential areas unless otherwise approved by the

ENGINEER.

- J. Machine-laid overlay shall be place by means of an approved mechanical spreader, and the mixture shall be compacted to true grade and cross section by means of a tandem roller weighing not less than 8 tons.
- K. The compacted overlay shall be thicker as required to produce a smooth uniform surface free of irregularities, but shall not be less than one inch in thickness.
 - 1. Existing depressed areas in the asphalt collecting water after a rainfall shall be corrected before placing the asphalt overlay.
 - 2. Rolling after proceed as close behind the spreading of the asphalt as possible, and materials shall be completely compacted the same day it is placed.

3.05 STATE ROAD PAVEMENT RESTORATION (1:10 CONCRETE BACKFILL AND BASE AND ASPHALTIC CONCRETE SURFACE)

- A. State Road pavement Restoration, where required, shall be made with a backfill/base of 1:10 cement/s concrete mix.
 - 1. In cases, regardless of water table, the 1:10 mix shall be placed from 12 inches above the top of the pipe to an elevation 3 inches below the adjacent asphalt surface.
 - 2. A 3-inch thick asphaltic concrete course, machine-laid in two equal layers, cold-milled removal of 1 inch of pavement (for full lane width) 1 inch thick asphaltic concrete wearing surface where shown in the Drawings.
- B. After the base surface has been properly prepared and is dry and ready to receive the wearing surface, a tack coat of emulsified asphalt (Grade RS-2) shall be applied at a rate of 0.10 gallon per square yard, immediately followed by the asphaltic concrete.
 - 1. The tack coat shall be applied to the entire base uniformly, and shall thoroughly coat surfaces.
 - 2. Care shall be taken to tack coat and bond the edges of surrounding pavement.
- C. The 3-inch asphaltic concrete course (two 1½-inch lifts) shall be plant mixed, using the best grade of local aggregates of approved size and gradation and mixed with an approved binder and conforming to either the State of Florida Department of Transportation Specifications, Type S-1 Asphaltic Concrete, Section 331-1 through 331-5, or as ordered by the ENGINEER.

1. Where the width of the repair permits, the material shall be placed by means of an approved mechanical spreader and finisher.
2. The mixture shall be compacted to true grade and cross section by means of a tandem roller weighting not less than 8 tons.
3. The compacted asphaltic concrete mixture shall not be less than three inches in thickness.
4. Rolling shall proceed as closely behind the spreader as possible and material shall be completely compacted the same day it is placed.

3.06 COLD MILLING

- A. Cold milling of the existing pavement for 1 inch deep shall be done by using an automated pavement planer capable of maintaining an accurate depth of 1 inch.
 1. Cold milling equipment shall meet the approval of the Florida Department of Transportation, or other municipality having jurisdiction, before work is started.
- B. After the pavement has been milled and mechanically cleaned, a tack coat shall be applied as specified above.
- C. A full lane of one-inch thick asphaltic concrete wearing surface Type S-3 Asphalt Concrete (per Florida Department of Transportation Specifications, Sections 331 and 337, respectively) shall then be applied in accordance with the above specifications.

3.07 PAVEMENT MARKINGS

A. Traffic Paint

1. Traffic paint used for this work shall conform with the requirements of Section 971-12 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction, or, at the CONTRACTOR's option, fast dry traffic paint, as specified in D.O.T. Specifications, Section 971-13 may be used.
2. The colors of the paint shall be yellow or white as existed before the repair.
3. Equipment shall be of a type and design, which will readily obtain the required uniformity of application of the stripes, both as to thickness of coating and as to alignment.
 - a. The paint machine shall be of the spray type and shall be capable of spraying the paint to the required spread without thinning of the paint.

- b. The paint tank shall be equipped with a mechanical agitator.
 - c. The nozzle shall have cut-off valves, which will apply broken or skip lines automatically.
 - d. Each nozzle shall also be provided with suitable line guides, either metallic shrouds or air blasts.
4. Painting shall be done only during daylight hours and, as far as practicable, shall be terminated in time to permit sufficient drying by sunset.
 - a. No paint shall be applied when moisture is present on the surface to be painted or when the air temperature is below 40 °F.
 - b. Painting shall not be done when winds are sufficient to cause spray dust.
5. The surface that 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.
 - a. Vegetation or soil shall be removed from the pavement before edge stripping is begun.
6. The paint shall be thoroughly mixed before it is poured into the painting machine and no thinning of the paint will be allowed.
 - a. Before the start of each day's work the paint container, the connections, and the spray nozzles on the machine shall be thoroughly cleaned with paint thinner or other suitable cleaner.
7. The traffic stripe shall be of the specified width with clean, true edges and without sharp breaks in the alignment.
 - a. A uniform coating of paint shall be obtained and the finished stripe shall contain no light spots or paint skips.
 - b. Stripes, which do not have a uniform, satisfactory appearance, both day and night, shall be corrected.
8. Newly painted stripes, including edge stripes, shall be protected until the paint is sufficiently dry to permit vehicles to cross stripe without damage from the tires.
 - a. While the center line stripes are being painting, traffic shall be routed to the right side of the painting operations and the newly painted stripe.
 - b. When necessary, a pilot car shall be used to protect the painting

operations from traffic interference.

9. Portions of the stripes damaged by passing traffic or from other cause shall be repainted at the CONTRACTOR's expense.

B. Thermoplastic Traffic Stripes and Markings

1. 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.
 - a. The thermoplastic compound shall be as specified in Section 711 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.
 - b. 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.
2. The colors of the compound shall be white or yellow as existed before the repair.
3. Reflective Pavement Markers and their installation shall conform to the D.O.T. Specifications, Section 706.
4. Where thermoplastic is to be applied to cement concrete pavement, a sealing primer as specified in D.O.T. Specifications, Sections 711-2.2, shall be applied in advance of the placing of the stripes.
5. The thermoplastic shall be applied to the pavement utilizing extrusion or spray application equipment.
 - a. The application equipment shall be so constructed as to provide continuous mixing and agitation of the material.
 - b. Conveying parts of the equipment between the main material reservoir and the shaping die or gun shall be so constructed as to prevent accumulation and clogging.
 - c. The equipment shall be constructed so that mixing and conveying parts up to and including the shaping die or gun, maintain the material at the plastic temperature with heat transfer oil or electrical element control led heat.
 - d. Direct fire heat transfer will not be allowed.

6. The application equipment shall be so constructed as to insure continuous uniformity in the dimensions of the stripe.
 - a. The applicator shall provide a means for cleanly cutting of square stripe ends and shall provide a method of applying "skip" lines.
7. Glass spheres applied to the surface of the completed stripe shall be applied by an automatic bead dispenser attached to the striping machine in such a manner that the beads are dispensed almost instantaneously upon the installed line.
8. Special kettle(s) shall be provided for melting and heating the thermoplastic material.
 - a. The kettle(s) shall be equipped with automatic thermostatic control devices in order to provide uniform temperature control and prevent overheating of the material.
 - b. The applicator and kettle(s) must be so equipped and arranged as to satisfy the requirements of the National Fire Underwriters, and the State of Florida.
9. Applicators shall be mobile and maneuverable to the extent that straight lines can be followed and normal curves can be made in a true arc.
 - a. The applicator equipment to be used on roadway installations shall consist of either hand equipment or truck mounted units depending on the type of marking required.
10. The hand applicator equipment shall be insulated and shall have sufficient capacity to hold 150 pounds of molten material and shall be sufficiently maneuverable to install crosswalks; lane, edge and center lines; arrows and legends.
 - a. The truck mounted unit for lane, edge, and center lines shall consist of a mobile self contained unit carrying its own material capable of operating at a minimum speed of five miles per hour while installing striping.
11. Application time, weather limitations and surface preparation shall be in accordance with D.O.T. Specifications, Sections 710-4, 710-5 and 710-8.
12. The material, when formed into traffic stripes or other markings must be readily renewable by placing an overlay of new material directly over an old line of compatible material in such a manner that no splitting or separation takes place.
13. The application temperature shall be within the range specified by the

manufacturer of the thermoplastic compound being used.

14. All pavement edge lines, gore, island and diagonal strip markings, bike lane symbols and messages, wherever located, shall have a minimum thickness of 0.060 inch at the edges and a maximum thickness of 0.120 inch at the center.
 - a. A minimum average film thickness of 0.060 inch shall be maintained.
 - b. Lane lines, center lines, transverse markings (except shoulder markings), and pavement markings within traffic wearing area (such as dotted turning guide lines) shall have a minimum thickness of 0.090 inch at the edges and a maximum thickness of 0.188 inch at the center.
 - c. A minimum average film thickness of 0.090 shall be maintained.
 - d. Thickness measurements shall be an average in over a three foot length.
15. The glass sphere top coating shall be applied by a type of glass sphere dispenser or gun, which will embed the spheres into the line surface to at least one-half their diameter.
 - a. The glass sphere top coating shall not incur more than a 10 percent loss during the first 30 days of traffic exposure.

END OF SECTION

SECTION 02756

REINFORCED CEMENT CONCRETE PAVEMENT

PART 1 GENERAL

1.01 SUMMARY

- A. Furnish labor, equipment, and material required for installation of reinforced cement concrete pavement for residential, commercial, industrial, and municipal driveways.
- B. Provide damage protection for adjacent concrete driveways, sidewalk, and curb and gutter within the work area.

1.02 RELATED SECTIONS

- A. Cast-in-Place Concrete - Section 03300
- B. Concrete Formwork and Accessories - Section 3100.

1.03 PAYMENT

- A. Payment has been established in the Bid Summary Sheet for the removal and replacement of concrete driveways.
 - 1. No other compensation will be provided.

PART 2 PRODUCTS

2.01 CONCRETE

- A. Concrete shall conform to the applicable provisions specified in Division 3 of these Contract Documents.

PART 3 EXECUTION

3.01 CONCRETE DRIVEWAYS

- A. Concrete driveways shall be restored in full sections or blocks rather than trench width plus two feet (shoulders), if the original construction was divided into such sections or blocks.
 - 1. The existing driveway shall be cut with an abrasive disc saw to trim the edges

to straight and true lines, with edges parallel and rectangular in plan.

2. The interior concrete shall then be broken up, removed from the site and disposed of properly.
- B. Driveways, and sidewalk crossing driveways, shall be replaced with a concrete slab having a minimum thickness of 6 inches.
1. Steel reinforcement is not required unless the existing driveway (or sidewalk) is so reinforced, in which case the replaced driveway shall also be reinforced to match the existing.
- C. Forms as are necessary shall be set up and the subgrade regarded for a slab 6 inches thick.
1. The subgrade shall be thoroughly compacted and wet down prior to placing the concrete.
 2. The driveways and sidewalk concrete surface shall be given a surface and edging finish to match, as nearly as possible, that of the existing driveway and sidewalk.
 3. The finish and edging shall be obtained through the use of screeds, trowels, edgers, and any other tools normally required by the trade in performing this kind of work.
- D. Forms for driveways including those for expansion joints, shall be metal and shall be clean and well oiled prior to placing concrete.
1. The forms shall be set in place far enough in advance of concrete placing for the ENGINEER to check line and grade.
 2. Abrupt changes in line and grade will not be permitted.
 3. Forms shall be set to insure smooth curvature and alignment both vertically and horizontally.
 4. Forms shall be left in place for a minimum of 24 hours after concrete has been placed.
- E. Replacement driveways shall match the elevation and alignment of existing driveways wherever a connection is made.
- F. Replace driveways to match special concrete and other existing conditions.
1. No additional compensation shall be paid for this work.

END OF SECTION

SECTION 02765

PAVEMENT MARKINGS AND TRAFFIC SIGNS

PART 1 - GENERAL

1.01 SCOPE

This section consists of pavement markings and traffic signs on the Drawings, specified herein and as required for a complete installation.

1.02 QUALITY ASSURANCE

- A. The phrase "DOT Specifications" shall refer to the Florida Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition. 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.
- B. Pavement markings for this Project shall conform to the Florida Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition. Pavement markings removed or obliterated by the Contractor's operations shall be promptly replaced in kind to the satisfaction of the City of Oakland Park Public Works, Traffic Engineering Division, or other authority having jurisdiction over the work area.

1.03 CERTIFICATION

The Contractor shall furnish the manufacturer's certification that all signs furnished conform to these specifications and shall replace or repair at his expense all signs that fail to meet this requirement.

PART 2 - PRODUCTS

2.01 PAVEMENT MARKING

Paint for pavement strips shall be as specified in Part 3, Execution.

2.02 REFLECTIVE MARKERS

Reflective markers shall be installed in the pavement in accordance with OSHA, DOT and Broward County Public Works requirements.

2.03 TRAFFIC SIGNS

- A. General: Traffic regulating signs shall conform to the colors, dimensions and requirements of the Manual on Uniform Traffic Control Devices (ANSI) and displaying the lettering and symbols indicated on the Drawings.
- B. Sign Panels and Support Members: Sign panels and support members shall conform to Aluminum Association Alloy 6061-T6.
- C. Bolts: Bolts shall conform to Aluminum Association Alloy 2024-T4 with an anodic coating 0.0002-inches thick minimum and chromate sealed.
- D. Nuts: Nuts shall conform to Aluminum Association Alloy 6269-T9.
- E. Reflective Sheeting: Reflective sheeting shall conform to DOT Type A requirements.
- F. Construction Warning Signs: The CONTRACTOR shall install traffic and warning signs during construction in accordance with OSHA, DOT and Broward County Public Works requirements.

PART 3 - EXECUTION

3.01 TRAFFIC PAINT

- A. This type of pavement painting shall be used where no thermoplastic paint is required or as temporary paint during the time required for paving "cure" prior to application of thermoplastic paint markings.
- B. Traffic paint used for this work shall conform with the requirements of Section 971-12 of the Florida Department of Transportation Standard Specifications for Road and bridge Construction, or, at the Contractor's option, fast dry traffic paint, as specified in D.O.T. Specifications, Section 971-13, may be used.
- C. The colors of the paint shall be yellow or white, as existed before the repair.
- D. All equipment shall be of a type and design which will readily produce the required uniformity of application of the stripes, both as to thickness of coating and alignment. The paint machine shall be of the spray type, capable of spraying the paint to the required "spread" without thinning of the paint. The paint tank shall be equipped with a mechanical agitator. The nozzle shall have cut-off valves which will apply broken or "skip" lines automatically. Each nozzle shall also be provided with suitable line guides, either metallic shrouds or air blasts.
- E. Painting shall be done only during daylight hours and, as far as practicable, shall be terminated in time to permit sufficient drying by sunset. No paint shall be applied when moisture is present on the surface to be painted or when the air temperature is below 40

degrees F. Painting shall not be done when winds are sufficient to cause spray dust.

- F. 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.
- G. The paint shall be thoroughly mixed before it is poured into the painting machine and no thinning of the paint will be allowed at any time. Before the start of each day's work, the paint container, the connections, and the spray nozzles on the machine shall be thoroughly cleaned with paint thinner or other suitable cleaner.
- H. 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.
- I. 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 routed 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.
- J. Any portions of the stripes damaged by passing traffic or from other causes shall be repainted.
- K. Paint for temporary pavement markings shall also be used where thermoplastic markings are to be applied after the asphaltic concrete has "cured." The cure time shall be based on thermoplastic manufacturer's recommendations. However, in accordance with FDOT requirements, asphalt shall have been in place for 30 days before application of thermoplastic stripe.

3.02 THERMOPLASTIC TRAFFIC STRIPES AND MARKINGS

- A. Thermoplastic pavement markings, including stripes, pavement messages, stop bars, directional arrows, reflective pavement markers and other miscellaneous items, shall be replaced as existed before the repair was made. 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. Upon cooling to ambient pavement temperature, the compound shall produce an adherent pavement marking of specified thickness and width and capable of resisting deformation.
- B. The colors of the compound shall be white or yellow, as existed before the repair.
- C. Where thermoplastic markings are to be applied to concrete pavement, a sealing primer, as

specified in F.D.O.T. Specifications Section 711-2.2, shall be applied in advance of the placing of the stripes.

- D. The thermoplastic shall be applied to the pavement utilizing either extrusion or spray application equipment. The application equipment shall be so constructed as to provide continuous mixing and agitation of the material. Conveying parts of the equipment between the main material reservoir and the shaping die or gun shall be so constructed as to prevent accumulation and clogging. The equipment shall be constructed so that all mixing and conveying parts up to and including the shaping die or gun, maintain the material at the plastic temperature with heat transfer oil or electrical element controlled heat. Direct fire heat transfer will not be allowed.
- E. The application equipment shall be so constructed as to insure continuous uniformity in the dimensions of the stripe. The applicator shall provide a means for cleanly cutting off square stripe ends and shall provide a method of applying "skip" lines. The use of pans, aprons, or similar appliances which the die overruns will not be permitted.
- F. Glass spheres applied to the surface of the completed stripe shall be applied by an automatic bead dispenser attached to the striping machine in such a manner that the beads are dispensed almost instantaneously upon the installed line.
- G. Special kettle(s) shall be provided for melting and heating the thermoplastic material. The kettle(s) shall be equipped with automatic thermostatic control devices to provide uniform temperature control and prevent overheating of the material. The applicator and kettle(s) shall be equipped and arranged as to satisfy the requirements of the National Fire Underwriters, the State of Florida, Broward County and any municipal authority applicable to where the work is being done.
- H. Applicators shall be mobile and maneuverable to the extent that straight lines can be followed and normal curves can be made in a true arc. The applicator equipment to be used on roadway installations shall consist of either hand equipment or truck mounted units depending on the type of marking required.
- I. The hand applicator equipment shall be insulated, have sufficient capacity to hold 150 pounds of molten material, and be sufficiently maneuverable to install crosswalks; lane, edge and center lines; arrows and legends.
- J. The truck mounted unit for lane, edge and center lines shall consist of a mobile self-contained unit carrying its own material capable of operating at a minimum speed of five miles per hour while installing striping.
- K. Application time, weather limitations and surface preparation shall be in accordance with F.D.O.T. Specifications Sections 710-4, 710-5 and 710-8. In accordance with FDOT requirements, asphalt shall have been in place for 30 days before application of

thermoplastic stripe.

- L. The material, when formed into traffic stripes or other markings, shall be readily renewable by placing an overlay of new material directly over an old line of compatible material in such a manner that no splitting or separation takes place.
- M. The application temperature shall be within the range specified by the manufacturer of the thermoplastic compound being used.
- N. All pavement edge lines, gore, island and diagonal strip markings, bike lane symbols and messages, wherever located, shall have a minimum thickness of 0.060 inch at the edges and a maximum thickness of 0.120 inch at the center. A minimum average film thickness of 0.060 inch shall be maintained. All lane lines, center lines, transverse markings (except shoulder markings) and pavement markings within traffic wearing area (such as dotted turning guide lines) shall have a minimum thickness of 0.090 inch at the edges and a maximum thickness of 0.188 inch at the center. A minimum average film thickness of 0.090 shall be maintained. All thickness measurements shall be an average in any three foot length.
- O. The glass sphere top coating shall be applied by a type of glass sphere dispenser or gun which will embed the spheres into the line surface to at least one-half their diameter. The glass sphere top coating shall not incur more than a 10 percent loss during the first 30 days of traffic exposure.
- P. Reflective pavement markers shall be installed as they existed before the repair. They shall be replaced with the appropriate color or colors and oriented in the correct direction as specified in Section 706 of the F.D.O.T. Specifications. Paving markings for this Project shall conform to the Florida Department of Transportation Standard Specifications for Road and Bridge Construction, as revised by the governing agency.

3.03 FABRICATION

Preparation of sign blanks and fabrication of reflectorized faces shall conform to the applicable requirements of DOT Sections 700-4 and 700-5.

END OF SECTION

SECTION 02769

REFLECTIVE PAVEMENT MARKERS

PART 1 GENERAL

1.01 SUMMARY

- A. Furnish labor, equipment, and material for installation of reflectorized pavement markers and removing pavement markers at locations designated in the Drawings.
- B. The work shall be done in accordance with the contract Specifications and Drawings.

1.02 DEFINITIONS

- A. Type 1 Markers shall have amber bi-directional reflective faces.
- B. Type 2 Markers shall have bi-directional reflective faces with one face colorless and the other face colored red.
- C. Type 3 Markers shall have bi-directional reflective faces with one face colored red and the other face colored amber.
- D. Type 4 Markers shall have an amber mono-directional reflective face.
- E. Type 5 Markers shall have a colorless mono-directional reflective face.
- F. Class A Markers shall meet the specific intensity requirements of 706-2.3.2, without the reflective face treatment.
- G. Class B Markers shall meet the specific intensity requirements, 706-2.3.2, after the reflective face has been treated as specified in 706-2.3.3(a).
- H. Horizontal entrance angle - the angle in the horizontal plane between the direction of incident light and the normal to the leading edge of the marker.
- I. Observation angle - the angle at the reflector between the observer's line of sight and the direction of the light incident on the reflector.
- J. Specific intensity - candlepower of the returned light at the chosen observation and entrance angles for each foot-candle of illumination at the reflector on a plane perpendicular to the incident light.

1.03 METHOD OF MEASUREMENT

- A. The contract unit price for markers furnished and installed shall include equipment, labor, and material necessary to make a complete and accepted installation.
- B. The contract unit price for marker removal shall consist of equipment, material, and labor necessary to remove, pick up and dispose of the marker.

1.04 BASIS OF PAYMENT

- A. The contract unit price each for Reflective Pavement Marker and the contract unit price each for Removal of Existing Pavement Markers shall be full compensation for work specified under these items.

1.05 RELATED SECTIONS

- A. Submittals - Division 1

PART 2 PRODUCTS

2.01 MATERIALS

A. REFLECTIVE MARKERS

1. The marker shall consist of a molded methyl methacrylate or an acrylonitrile butadiene styrene (ABS) shell filled with a mixture of an inert thermostating compound and filler material.
 - a. Methyl methacrylate shall conform to the requirements of Federal Specification L-P380C, Type 1, Class 3.
2. The marker shall have a maximum width of five inches and a maximum height of 0.75 inch.
3. The minimum area of each reflective face shall be 1.50 square inches.
4. The outer surface shall be smooth and corners and edges exposed to traffic shall be rounded.
5. The base shall be substantially free of glass or substances that may reduce their bond to adhesive.
6. Strength Requirements:

- a. Marker General Strength
 - 1) The marker shall support a minimum load of 2,000 pounds when tested in accordance with a manufacturer developed test approved by the Department.
 - 2) Failure shall constitute either breakage or significant deformation of the marker at loads less than or equal to 2,000 pounds.
 - 3) Should the marker fail, four additional markers shall be tested.
 - 4) The failure of one of the four markers shall be cause for rejection of the entire lot.
 - 5) Only Class B Markers shall be subjected to the face strength test.
 - 6) The red reflective face of Type 2 and Type 3 Class B Markers shall not be subjected to the face strength test.

b. Reflective Face Strength:

- 1) The marker shall be placed in a convection oven at 130°F for one hour.
- 2) While at the elevated temperature, the face shall be impacted by a 0.2-pound dart fitted with a 0.25-inch radius spherical head falling perpendicularly onto the surface from a height of six inches.
- 3) The impact area shall exhibit only concentric cracks.
- 4) Failure shall constitute radial cracks along the area.

7. Optical Requirements:

a. Specific Intensity:

- 1) The specific intensity of each colorless reflective face of the marker at 0.2 degree observation angle shall not be less than the following when:
 - a) The incident light is parallel to the base of the marker,
 - b) The reflective face has been subjected to the optical testing procedure specified

Horizontal Entrance Angle	Specific Intensity
0 Degree	3.0
20 Degree	1.2

- 2) The specific intensity of amber reflective faces shall be equal to or greater than 60 percent of the value for colorless faces.
 - 3) The specific intensity of red reflective faces shall be equal to or greater than 20 percent of the value for colorless faces.
 - 4) The specific intensity of blue reflective faces shall be equal to or greater than 10 percent of the value for colorless faces.
- c. Optical Testing Procedure:
- 1) Reflective Face Treatment for Class B Markers:
 - a) The reflective face of Class B Markers shall be prepared in accordance with the following procedure prior to measuring the specific intensity.
 - i) A pad one inch in diameter shall be formed from No. 3 coarse steel wool, which conforms to Federal Specification FF-W-1825.
 - ii) The steel wool pad shall be placed on the reflective face.
 - iii) The entire reflective face shall be rubbed 100 times with an applied load of 50 pounds.
 - b) For Type 2 and 3 Markers, the red reflective faces shall not be subjected to the testing preparation procedure.
- d. Optical Measurements:
- 1) The markers to be tested shall be located with the center of the reflecting face at a distance of five feet from a uniformly bright source having an effective diameter of 0.2 inch.
 - 2) The photocell width shall be 0.5 inch.
 - 3) It shall be shielded to eliminate stray light.
 - 4) The distance from light source center to the photocell center shall be 0.21 inch.
 - 5) If a test distance other than five feet is used, the source and receiver dimensions and the distance between source and receiver shall be modified in the same proportion as the test distance.

- 6) A random sample of five markers will constitute a representative sample for a lot.
- 7) If more than one marker fails the initial test, a new sample (five markers) may be tested.
- 8) Failure of more than one marker in the retest shall be cause for rejection of the entire lot.

B. ADHESIVE

1. General Requirements:

- a. Bituminous adhesive as recommended by the marker manufacturer shall be used for bonding the markers to the pavement.
- b. The adhesive used shall be one of the products included on the Qualified Products List, current at the time of the adhesive proposal for use.

2. Specific Requirements for Bituminous Adhesive:

- a. The adhesive shall be material suitable for bonding pavement markers to Portland cement concrete pavement, not to be used with bituminous pavement and chip-sealed surfaces when the road surface and marker temperatures are in the range of 50°F to 160°F.
- b. The composition of the adhesive must not deteriorate when heated to and applied at temperatures up to 425°F using either air or oil-jacketed melters.
- c. The adhesive shall be packaged in self-releasing cardboard containers with essentially flat and parallel top and bottom surfaces allowing the packages to be stack properly.
- d. Each package shall have a net weight of either 50 or 60 pounds and shall weigh within two pounds of the stated quantity.
- e. Self-releasing cardboard dividers, which will separate each package into sections weighing no more than 15 pounds each, shall be part of the packaging.
- f. Each package shall show the manufacturer's name, net weight, and lot or batch number and shall be printed with "Bituminous Adhesive for Pavement Markers" or similar wording identifying the contents.
- g. The adhesive will be tentatively accepted by a manufacturer's certified test report.

- h. The certified test report shall show the test results and shall state that the adhesive represented by the test results meets the requirements of the specifications and has the properties and characteristics as herein specified.
- i. Furnish six copies of the test report to the State Materials ENGINEER.
- j. Each certification shall also contain a Material Safety Data Sheet.
- k. Standard Type:
 - 1) The asphaltic material and mineral filler shall comply with the following requirements:
 - 2) Adhesive Properties:

	Minimum	Maximum	Method
Softening Point, °F	200	-	ASTM D 36
Penetration	10	20	ASTM D 5
Flow, inches	-	0.2	ASTM D 3407
Viscosity, 400 °F, Poises	-	75	ASTM D 2669
Flash Point, C. O. C., °F	550	-	ASTM D 92

- 3) Asphalt properties determined on the filler-free material derived from the extraction and Abson recovery process as explained in Test Methods.

	Minimum	Maximum	Method Penetration, 100 g
5 Second, 77°F	25	-	ASTM D 5
Viscosity, 275 °F, Poises	12	-	ASTM D 2171

- 4) Filler properties determined using the filler separation technique described in test methods.

	Minimum	Maximum	Method
Filler Content, Percent by Weight	50	75	5)
Filler Fineness Percent passing:			ASTM C430
Sieve No.100	100		
Sieve No.200	95		
Sieve No.325	75		

5) Filler material:

- a) Shall be separated from the asphalt to determine filler content and filler fineness.
- b) The portion of the adhesive insoluble in 1,1,1-trichloroethane shall be considered the filler content.
- c) Filler content shall be determined by weighing 10.00 ± 0.01 grams of solid adhesive into centrifuge flask with approximately 100-ml volume as specified in ASTM D 1796.
- d) Add 50 ml of 1,1,1-trichloroethane to the adhesive, which should be broken up into small pieces in order to speed the dissolution process.
- e) Swirl or stir with a fine rod, taking care not to lose solids.
- f) Place the sample flask in a balanced centrifuge and spin using a minimum relative centrifugal force of 150 (as determined in Section 6 of ASTM D 1796) for 10 minutes.
- g) Remove the sample flask and decant the solvent, taking care not to lose solids.
- h) Repeat the application of solvent and centrifuging until the solvent becomes clear and the filler is visually free of asphalt.
- i) Dry the filler at $160 \pm 5^{\circ}\text{F}$ to remove solvent and weigh the resulting filler.
- j) Filtration of the decanted solvent may be performed to verify there is no loss of filler.
- k) Percent filler content is calculated as follows:

$$\text{FILLER CONTENT (Percent by Weight)} = \frac{\text{FILLER WEIGHT (grams)} * 100}{\text{ORIGINAL ADHESIVE WEIGHT (grams)}}$$

3. Flexible Adhesive:

- a. The hot applied flexible pavement marker adhesive shall be a hot melt thermoplastic material capable of bonding the marker without excessive marker movement at hot summer temperatures and remain flexible at winter temperatures.
- b. The adhesive shall comply with the following physical requirements when melted in accordance with ASTM D 3407 and poured into suitable test molds:

Penetration, 77°F (ASTM D 5)	25 Max.
Softening Point (ASTM D 2398).	200°F Min.
Brookfield Viscosity, 400°F (ASTM D 3236)	10,000 cp Max.
Ductility at 77°F, 5 cm/min (ASTM D 113)	15 cm Min.
Ductility at 39.2°F, 1 cm/min (ASTM D 3407)	5 cm Min.
Asphalt Compatibility (ASTM D 3407)	Pass

- c. Thermoplastic striping materials are not suitable for this specification.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Placement of the markers shall be in accordance with the Traffic Operations Standards unless otherwise specified.
- B. 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 other material, which would adversely affect the adhesive.
- C. Reflective markers shall be installed in a manner that the reflective face of the marker is perpendicular to a line parallel to the roadway centerline.
- D. No markers shall be installed over longitudinal or transverse joints of the pavement surface.
- E. 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.
- F. 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.
- G. Excessive adhesive shall be removed from in front of the reflective faces.

- H. If adhesive or foreign matter adheres to the reflective face of the marker, the marker shall be replaced.
- I. The marker shall be protected against impact until the adhesive has hardened.
- J. The ENGINEER shall determine the minimum time necessary to cure the adhesive for sufficient set to bear traffic.
- K. Specific Installation Requirements Utilizing Bituminous Adhesive:
 - 1. The markers may be cemented to the pavement with a bituminous adhesive conforming to this specification.
 - 2. The markers shall be installed when the pavement is dry and the pavement temperature is no less than 50°F, and no more than 160°F.
 - 3. The portion of the highway surface to which the marker is to be bonded by the adhesive shall be free of dirt, curing compound, grease, oil, moisture, loose or unsound layers, paint or other material which would adversely affect the bond of the adhesive.
 - 4. Cleaning shall be done by blast cleaning on Portland cement concrete and old bituminous pavements.
 - 5. New bituminous pavement that is clean need not be blast-cleaned unless the surface contains an abnormal amount of asphalt or the surface is contaminated with dirt, grease, paint, oil or other material, which would adversely affect the bond of the adhesive.
 - 6. The bituminous adhesive shall be melted and heated in either thermostatically controlled double boiler type units utilizing heat transfer oil or thermostatically controlled electric heating pots.
 - 7. Direct flame melting units shall not be used with flexible adhesives, but may be used with standard adhesive in accordance with manufacturer's recommendations.
 - 8. The melter/applicator unit shall be suited for both melting and pumping application through heated applicator hoses.
 - 9. The adhesive shall be heated to between 375 and 425°F and applied directly to the pavement surface from the melter/applicator by either pumping or pouring.
 - 10. It is important that application temperature be maintained between 375 and 425°F as lower temperatures may result in decreased adhesion while higher temperatures may damage the adhesive.

11. Sufficient adhesive shall be used to insure total contact with the bottom of the marker.
12. Markers shall be applied to the adhesive immediately (within 10 seconds) to assure bonding.
13. The marker shall be placed in position by applying downward pressure until the marker is firmly seated with the required adhesive thickness and squeeze out.
14. Excessive adhesive squeeze out shall be removed from the pavement and adhesive on the exposed surfaces of the markers shall be immediately removed.
15. Soft rags moistened with mineral spirits conforming to Federal Specifications TT-T-291 or kerosene may be used if necessary, to remove adhesive from exposed faces of pavement markers.
16. No other solvent may be used.
17. The adhesive may be reheated and reused.
18. The pot life at application temperatures shall not exceed manufacturer's recommendations.
19. Clean out of equipment and tanks may be performed using petroleum solvents as diesel fuel or similar materials.
20. Solvent must be removed from the equipment tanks and lines before the next use of the melter.

3.02 FIELD QUALITY CONTROL

- A. In the event that more than two percent of the markers fail in adhesion within the first 45 days under the traffic, replace failed markers at CONTRACTOR'S expense.
- B. If more than five percent of the markers fail in adhesion during the initial 45 days period, the replacement period shall be extended an additional 45 days from the date that replacement markers have been installed.
- C. If, at the end of the additional 45 day period, more than two percent of markers (initial installation and 45 day replacements combined) fail in adhesion, replace failed markers at CONTRACTOR'S expense.

END OF SECTION

SECTION 02773

CEMENT CONCRETE GUTTERS AND CURBS

PART 1 GENERAL

1.01 SUMMARY

- A. Furnish labor, equipment, and material required for cutting, removing, protecting, and replacing existing concrete curb and gutter of the various types encountered, removed or damaged under this Contract.
- B. Provide damage protection for adjacent concrete driveways, sidewalks and curb and gutter within the work area.

1.02 PAYMENT

- A. If payment items have not been established in the Proposal for the removal and replacement of concrete curb and gutter, the cost for this work shall be included in the overall Project cost bid.
- B. No other compensation will be provided.

1.03 RELATED SECTIONS

- A. Concrete Division - 3
- B. Reinforced Cement Concrete Pavement Division - 2

PART 2 PRODUCTS

2.01 CONCRETE

- A. Concrete shall conform to the applicable provisions specified in Division 3 of these Contract Documents.

PART 3 EXECUTION

3.01 CURB AND GUTTER

- A. Restore curb and gutter in lengths equal to trench width plus two (2) feet (shoulders), or ten (10) feet, whichever is greater, unless otherwise permitted or ordered by the ENGINEER.

- B. Removal of existing curb and gutter, installation of forms, preparation of subgrade, and perform the final finish as specified for driveways.
- C. Match the shape and final finish of the existing curb and gutter.

END OF SECTION

SECTION 02775

SIDEWALKS

PART 1 GENERAL

1.01 SUMMARY

- A. Furnish labor, equipment, and material required for cutting, removing, protecting, and replacing existing sidewalks of the various types encountered, removed or damaged under this Contract.
- B. Provide damage protection for adjacent concrete driveways, sidewalk, and curb and gutters within the work area.
- C. Furnish labor, equipment, and material required for installation of sidewalks of the various types specified under this Contract.

1.02 PAYMENT

- A. If payment items have not been established in the Proposal for the removal and replacement of concrete sidewalks, the cost for such work shall be included in the overall Project cost bid.
- B. If payment items have not been established in the Proposal for new concrete sidewalks, the cost for such work shall be included in the overall Project cost bid.
- C. No other compensation will be provided.

1.03 REFERENCES

- A. State of Florida Department of Transportation
Roadway and Traffic Design Standards: Sections 304, 305, and 310.

1.04 RELATED SECTIONS

- A. Concrete, Division - 3
- B. Reinforced Cement Concrete Pavement, Division - 2

PART 2 PRODUCTS

2.01 CONCRETE

- A. Concrete shall conform to the applicable provisions specified in Division 3 of these Contract Documents.

PART 3 EXECUTION

3.02 SIDEWALKS

- A. Restore sidewalks in full section.
- B. Removal of existing sidewalk, installation of forms, preparation of subgrade, and perform the final finish as specified hereinabove for driveways, except that the minimum thickness of the sidewalk shall be 4 inches thick.

END OF SECTION

SECTION 02916

MULCHING

PART 1 GENERAL

1.01 SUMMARY

- A. Furnishing labor, equipment, and material needed to provide finished grass ground cover by the placing and spreading of mulching.

1.02 RELATED SECTIONS

- A. Clearing and Grubbing - Division 2.
- B. Topsoil - Division 2.
- C. Earthwork - Division 2.
- D. Seeding and Supplements - Division 2.

1.03 REFERENCES

- A. Standards - Federal Specifications (FS) 0-F-241C.
- B. Testing Agency - Independent testing laboratory.
- C. Requirements of Regulating Agencies - Comply with requirements of the State Department of Agriculture.
- D. Source Quality Control - Producer's tests for purity and germination of seed, dated within nine months of sowing.
- E. Cost of Testing - The testing is at expense of the CONTRACTOR.

1.04 SUBMITTALS

- A. Test Report - Results of seed purity and germination tests.
- B. Certificates - Manufacturer's certification that materials meet specification requirements.

1.05 MEASUREMENT AND PAYMENT

- A. Payment for mulching shall be for areas of completed grass cover that have been accepted by the ENGINEER as field measured.
- B. Payment will be made at the unit price bid for mulching, which price and payment shall constitute full compensation for furnishing materials and performing work in connection therewith and incidental thereto.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.01 CONDITIONS

- A. Check that preceding work affecting ground surface is completed.
- B. Do not start work until conditions are satisfactory.

3.02 APPLICATION

- A. See seeding and soil supplements - Division 2.

END OF SECTION

SECTION 02919

TOPSOIL

PART 1 GENERAL

1.01 SUMMARY

- A. The work covered by this section consists of furnishing labor, equipment, and material needed to provide finished grass ground cover by the placing and spreading of topsoil.

1.02 RELATED SECTIONS

- A. Clearing and Grubbing - Division 2.
- B. Mulching - Division 2.
- C. Earthwork - Division 2.
- D. Seeding and Soil Supplements - Division 2.

1.03 REFERENCES

- A. Standards - Federal Specifications (FS) 0-F-241C.
- B. Testing Agency - Independent testing laboratory.
- C. Requirements of Regulating Agencies - Comply with requirements of the State Department of Agriculture.
- D. Cost of Testing - The testing is at expense of the CONTRACTOR.

1.04 SUBMITTALS

- A. Test Report - Results of seed purity and germination tests.
- B. Certificates - Manufacturer's certification that materials meet specification requirements.

1.05 MEASUREMENT AND PAYMENT

- A. Payment will be made at the unit price bid for topsoil, which price and payment shall constitute full compensation for furnishing materials and performing work in connection therewith and incidental thereto.

PART 2 PRODUCTS

2.01 WATER

- A. Free or matter harmful to plant growth.

2.02 TOPSOIL

- A. Material used for topsoil shall be material supplied by CONTRACTOR from off-site sources or from excavated pond bottom area if suitable for this use.
- B. Topsoil mixture shall be suitable for plant growth and free from hard clods, stiff clay, hardpan, gravel, brush, large roots, refuse or other deleterious material, and shall be of reasonably uniform quality.
- C. Rocks larger than 1 inch in diameter shall be removed.
- D. Organic content as determined in accordance with AASHTOT 194 shall be at least five percent (5%) and the pH shall be between 5.0 and 7.0.

PART 3 EXECUTION

3.01 CONDITIONS

- A. Check that preceding work affecting ground surface is completed.
- B. Do not start work until conditions are satisfactory.

3.02 PREPARATION

- A. Stockpiled topsoil shall be spread to a thickness of two (2) inches over areas to be seeded.
 - 1. The resulting ground elevation shall be the proposed finished grade shown in the Drawing.
- B. Till fertilizer into top two (2) inches of soil at rate of 12-lbs/1000 sq. ft.
- C. Water dry topsoil to depth of five (5) inches at least forty eight (48) hours prior to seeding to obtain a loose friable seed bed.

END OF SECTION

SECTION 02923

SEEDING AND SOIL SUPPLEMENTS

PART 1 GENERAL

1.01 SUMMARY

- A. Furnishing labor, equipment, and material needed to provide finished grass ground cover by the placing and spreading of seeding.

1.02 RELATED SECTIONS

- A. Clearing and Grubbing - Division 2.
- B. Mulching - Division 2.
- C. Earthwork - Section 2.
- D. Top Soil - Division 2.

1.03 REFERENCES

- A. Standards - Federal Specifications (FS) 0-F-241C.
- B. Testing Agency - Independent testing laboratory.
- C. Requirements of Regulating Agencies - Comply with requirements of the State Department of Agriculture.
- D. Source Quality Control - Producer's tests for purity and germination of seed, dated within nine months of sowing.
- E. Cost of Testing - The testing is at expense of the CONTRACTOR.
- F. Fertilizers - Mixed, Commercial.

1.04 SUBMITTALS

- A. Test Report - Results of seed purity and germination tests.
- B. Certificates - Manufacturer's certification that materials meet specification requirements.

1.05 MEASUREMENT AND PAYMENT

- A. Payment for seeding shall be for areas of completed grass cover that have been accepted by the ENGINEER as field measured.
- B. Payment will be made at the unit price bid for seeding, which price and payment shall constitute full compensation for furnishing materials and performing work in connection therewith and incidental thereto.

PART 2 PRODUCTS

2.01 SEED

- A. Species - Equal parts of Pensacola Bahia and Gulf improved rye.
- B. Clean, dry, new crop seed, dry remixed immediately prior to sowing.

2.02 WATER

- A. Free of matter harmful to plant growth.

2.03 SOIL STERILIZERS

- A. As recommended by State and Local Agricultural Agencies.

2.04 FERTILIZER

- A. FS O-F-241, Type 1, Grade A or B.
- B. The chemical designation shall be 12-8-8, with at least fifty percent (50%) of the nitrogen from a non-water soluble organic source.

PART 3 EXECUTION

3.01 CONDITIONS

- A. Check that preceding work affecting ground surface is completed.
- B. Do not start work until conditions are satisfactory.
- C. Do not perform seeding when wind exceeds fifteen (15) mph.
- D. Seed during times acceptable to the ENGINEER.

3.02 PREPARATION

- A. Apply a soil sterilizer to topsoil per manufacturer's direction.
 - 1. Seeding shall not commence until after the proper time recommended by the manufacturer.
- B. Till fertilizer into top two (2) inches of soil at rate of 12-lbs/1000 sq. ft.
- C. Water dry topsoil to depth of five (5) inches at least forty eight (48) hours prior to seeding to obtain a loose friable seed bed.

3.03 APPLICATION

- A. Broadcast half of seed with mechanical seeder.
- B. Broadcast remaining half of seed at right angles to first seeding pattern, using same broadcast method.
- C. Apply seed at 10-lbs./1000 sq. ft.
- D. Cover seed to depth of one-eighth (1/8) inch by racking, harrowing, and cultivating.
- E. Roll seeded area with roller weighing maximum of 150 lbs./ft. of width.
 - 1. Make two (2) passes.
- F. Spread mulch uniformly to completely cover seeded area.
- G. Water seeded areas to depth of six (6) inches immediately after seeding/rolling operations.

3.04 PROTECTION

- A. Immediately after seeding, erect barricades and warning signs as necessary to protect seeded areas from foot and vehicular traffic until grass is established.

3.05 ESTABLISHMENT

- A. Watering
 - 1. Keep soil moist during seed germination period.
 - 2. Supplement rainfall to produce total of two (2) inches per week after germination.

- B. Reseed and mulch spots larger than one (1) sq. ft. not having uniform stand of grass.
- C. Establishment period to extend until acceptance by the OWNER.

3.06 CLEAN-UP

- A. Remove trash and excess materials from project site.
- B. Maintain paved areas in clean condition.
- C. Remove barriers and signs from project site at termination of establishment period.

3.07 FINAL INSPECTION AND ACCEPTANCE

- A. Request final inspection as the area is completed and grass is established.
- B. Reseed rejected grass area within two (2) weeks after the inspection or as otherwise directed by the ENGINEER.

END OF SECTION

SECTION 02924

SODDING

PART 1 GENERAL

1.01 SUMMARY

- A. Repair lawns and grassed rights of way damaged or removed during the construction of the pump station.

1.02 RELATED WORK

- A. Clearing and Grubbing - Division 2.
- B. Earthwork - Section 2.
- C. Top Soil - Division 2.

1.03 REFERENCES

- A. Federal Specification (FS) 0-F-241q (1), Fertilizer Mixed, Commercial.
- B. Materials shall conform to the requirements established by the State Department of Agriculture.

1.04 SUBMITTALS

- A. Growers Certification:
 - 1. Grass species.
 - 2. Compliance with State and Federal quarantine restrictions.
- B. Manufacturer's certification of fertilizer and herbicide composition and application rates.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver sod on pallets.
- B. Protect roots from exposure to wind and sun.
- C. Protect sod against dehydration, contamination and heating during transportation and delivery.

- D. Do not deliver more sod than can be installed within twenty-four (24) hours.
- E. Keep stored sod moist and under shade or covered with moistened burlap.

- F. Do not stack sod more than two (2) feet deep.

- G. Do not tear, stretch, or drop sod.

1.07 WARRANTY

- A. Guarantee sod for period of three (3) months after date of substantial completion.
- B. Repair damage to other plants during sod replacement at no cost to the OWNER.

PART 2 PRODUCTS

2.01 MATERIALS

A. Sod

1. Grass Species is to be Stenotaphrum secundatum - St. Augustine "Floritam", or approved equal.
2. American Sod Producers Association (ASPA) Grade
 - a. Use nursery grown or approved equal sod.
3. Furnish sod in pads of the following dimensions:
 - a. Length: twenty-four (24) inches plus or minus five (5) percent
 - b. Width: sixteen (16) inches plus or minus five (5) percent
 - c. Thickness: 1-1/2 inches excluding top growth and thatch.
4. Grow sod in organic "muck" soil, with minimum 1-inch soil intact on roots.
5. Mow sod to a uniform height of 2- 1/2 inches, when harvested.
6. Thatch: Maximum 1/2-inches uncompressed.
7. Use diseases free sod: entomologist of the State Department of Agriculture must inspect for nematodes, pests, and pest larvae.
8. Weeds: Free of Bermuda grass, nut grass, and other objectionable plant and material.

9. Uniform in color, leaf texture and density.

B. WATER

1. Free of substances harmful to plant growth. Free from chemicals or minerals that stain or discolor.

C. FERTILIZER

1. Federal Specification (FS) O-F-241 c (1), Grade A or 8.

2. The chemical designation shall be 16-4-8, with at least fifty (50) percent of the nitrogen from a non-water-soluble organic source.

D. HERBICIDES

1. As approved by the State of Department of Agriculture.

E. TOPSOIL

1. Topsoil mixture shall be suitable for plant growth.

2. Topsoil mixture shall be free from hard clods, stiff clay, hardpan, gravel, brush, large roots, refuse, or other deleterious material and of reasonable uniform quality.

3. Maximum Soluble Salts: 550 ppm

4. Top soil mixture shall be free of weeds, plants, seeds, insects, and undesirable materials, before delivery to the site.

a. Sterilization of topsoil shall not affect viability of new plant growth in treated topsoil.

PART 3 EXECUTION

3.01 SURFACE PREPARATION

A. Wet surface to a uniform depth of two (2) to three (3) inches or until upper surface is reasonable wet and compacted before installing sod.

B. Roll soil with 100 lb. roller; make two (2) passes.

3.02 INSTALLATION

A. Verify topsoil placement.

- B. Install sod species as specified herein.
- C. Locate trees and palms and paint a forty-eight (48) inch diameter circle on the soil around the trunk of each species planted in sodded areas.
 - 1. Do not install sod within painted circle.
- D. Begin sodding at bottom of slopes and install parallel to contours.
- E. Lay first row of sod in straight line with long dimension of pads parallel to slope contours; continue laying sod accordingly.
- F. Butt side and end joints flush and tight.
 - 1. Do not allow ends to curl or break.
- G. Stagger end joints in adjacent rows.
 - 1. Do not stretch or overlap sod.
- H. Peg sod on slopes with a ratio of 1:3 (rise:run) or greater using a minimum of two stakes per square yard, using six (6) inches minimum nursery grade bamboo stakes.
- I. Sod installed adjacent to planting beds should be a minimum distance from the first row of shrubs, equal half the spacing of the shrubs (Example: shrubs spaced eighteen (18) inches on center - sod should be nine (9) inches from center of shrub).
- J. Trim sod to provide clean edges for trees and planting beds; sod should follow planting beds to provide clean, smooth, and flowing lines.
- K. Water sod immediately after transplanting.
- L. Roll sod, except on pegged areas, with roller weighing not more than 100 lbs. per foot of roller width; make two (2) passes.
- M. Water sod and soil to depth of six (6) inches within four (4) hours after rolling.
- N. Cut a forty-eight (48) inch diameter, clean round saucer around each tree or palm planted in sodded areas to provide for mulch.
 - 1. Do not injure root ball or cut sprinkler or utility lines.

3.03 SOD ESTABLISHMENT

A. Watering:

1. Keep sod moist during first week after planting.
2. After first week, supplement rainfall to produce total of one (1) inch per day until sod has acclimated.

B. Weed Eradication: maintain grass in a weed free condition until OWNER acceptance.

C. Fertilizer: Apply fertilizer uniformly at manufacturer's recommended rate, two weeks after sod installation.

1. Fertilizer should be dispensed using lightweight spreaders.

D. Maintenance period to extend until acceptance of the OWNER.

3.04 CLEANING

A. Immediately clean spills from paved and finished surface areas.

B. Remove debris and excess materials from project site.

3.05 FINAL INSPECTIONS

A. Project final payment approval determines OWNER acceptance.

B. Replace rejected sod areas with acceptable sod within two weeks after the inspection.

END OF SECTION

SECTION 02956

RESTORATION OF UNDERGROUND PIPES

PART 1 GENERAL

1.01 SUMMARY

- A. The work specified in this Section includes all labor, materials, equipment, and tools necessary to seal sewer joints and cracks remotely, to test and confirm the effectiveness of the seal.

1.02 CLEANING

- A. Cleaning shall be performed by the Contractor using a hydraulic cleaner and is to be adequate for seating a lateral packer.
- B. If the main sewer is not cleaned adequately for seating a lateral packer and/or accessing lateral connections, the Contractor will move to a different line section and continue working.
- C. When this line is cleaned a second time, the Contractor will reinspect by a "Quick Pull" and determine if the sewer line is clean, and if the laterals are accessible.

1.03 TELEVISION INSPECTION

- A. Television inspection is limited to a "Quick Pull".
- B. During the television inspection the operator notes obstructions, offset joints, debris, the location of lateral connections, and the general condition of each lateral.
- C. The "Quick Pull" inspection is videotaped, and only data relating to the lateral sealing report is logged.
- D. During the television inspection, the Contractor determines which laterals can be accessed, and if there is enough clearance for the lateral sealing packer.
- E. The Contractor makes the final determination on lateral sealing packer clearance.

PART 2 PRODUCTS

2.01 CHEMICAL SEALING MATERIAL

- A. The following is a generic listing of acceptable chemical sealing materials and the basic requirements, properties and characteristics of each.

1. Acrylamide base gel sealing material:
 - a. A minimum of 10% acrylamide base material by weight in the total sealant mix.
 - b. Higher concentration (%) of acrylamide base material may be used to increase strength or offset dilution during injection.
 - c. Ability to tolerate some dilution and react in moving water during injection.
 - d. Viscosity of approximately 2 centipoise, which can be increased with additives.
 - e. Constant viscosity during the reaction period.
 - f. Controllable reaction time from 10 seconds to 1 hour.
 - g. Reaction (curing), which produces a homogeneous, chemically stable, non-biodegradable firm flexible gel.
 - h. Ability to increase mix viscosity, density, and gel strength by the use of additives.

2. Acrylic base gel chemical sealing material:
 - a. Minimum of 10% acrylic base material by volume in the total sealant mix.
 - b. A higher concentration (%) of acrylic base material may be used to increase strength or offset dilution during injection.
 - c. Ability to tolerate some dilution and react in moving water during injection.
 - d. Viscosity of approximately 2 centipoise, which can be increased with additives.
 - e. Constant viscosity during the reaction period.
 - f. Controllable reaction time from 5 seconds to 6 hours.
 - g. Reaction (curing), which produces a homogeneous, chemically stable, non-biodegradable flexible gel.
 - h. Ability to increase mix viscosity, density and gel strength by the use of additives.

3. Acrylate base gel chemical sealing material:
 - a. A minimum of 12%* acrylate base material by weight in the total sealant mix.
 - b. A higher concentration (%) of acrylate base material may be used to increase strength or offset dilution during injection.
 - c. Note: If the acrylate base material is in a 40% solution, it must comprise 30% by weight of the total sealant mix to have 12% base material.
 - d. Ability to tolerate some dilution and react in moving water during injection using a low VOID packer.
 - e. Viscosity of approximately 2 centipoise, which can be increased with additives.
 - f. Constant viscosity during the reaction period.
 - g. Controllable reaction time from 10 seconds to 1 hour.
 - h. Reaction (curing), which produces a homogeneous, chemically stable, non-biodegradable flexible gel.
 - i. Ability to increase mix viscosity, density and gel strength by the use of additives.

4. Urethane base gel chemical sealing material:
 - a. 1 part urethane prepolymer thoroughly mixed with between 5 and 10 parts of water by weight.
 - b. The recommended mix ratio is 1 part urethane prepolymer to 8 parts of water (11% prepolymer).
 - c. Liquid prepolymer having a solids content of 77% to 83%, specific gravity of 1.04 (8.65 pounds per gallon), and a flash point of 20°F.
 - d. Liquid prepolymer having a viscosity of 600 to 1200 centipoise at 70°F that can be pumped through 500 feet of 1/2-inch hose with a 1000 psi head at a flow rate of 1 ounce per second.
 - e. Water used to react the prepolymer should have a pH of 5 to 9.

- f. Cure time of 80 seconds at 40°F, 55 seconds at 60°F, and 30 seconds at 80°F when 1 part prepolymer is reacted with 8 parts of water only.
 - g. Higher water ratios give longer cure times.
 - h. Cure time that can be reduced to 10 seconds for water temperatures of 40°F to 80°F when 1 part prepolymer is reacted with 8 parts of water containing a sufficient amount of gel control agent additive.
 - i. Relatively rapid viscosity increase of the prepolymer/water mix.
 - j. Viscosity increases from about 10 to 60 centipoise in first minute for 1 to 8 prepolymer/water ratio at 50°F.
 - k. Reaction (curing) which produces a chemically stable and nonbiodegradable, tough, flexible gel.
 - l. Ability to increase mix viscosity, density, gel strength and resistance to shrinkage by the use of additives to the water.
5. Urethane base foam chemical sealing material:
- a. Approximately 1 part of urethane prepolymer thoroughly mixed with 1 part of water by weight (50% prepolymer).
 - b. A liquid prepolymer having a solids content of 82% to 88%, specific gravity of 1.1 (9.15 pounds per gallon), and a flash point of 20°F.
 - c. A liquid prepolymer having a viscosity of 300 to 500 centipoise at 72° F, that can be pumped through 500 feet of 1/2-inch hose with a 500 psi head at a flow rate of 1 ounce per second.
 - d. A cure time of 15 minutes at 40°F, 8.2 minutes at 70°F, and 4.6 minutes at 100°F when the prepolymer is reacted with water only.
 - e. A cure time of 5.5 minutes at 40°F, 8.2 minutes at 70°F, and 2.6 minutes at 100°F when the prepolymer is reacted with water containing 0.4% accelerator.
 - f. During injection, foaming, expansion, and viscosity increase occur.
 - g. Physical properties of the cured foam of approximately: 14 pounds per cubic foot density, 80 to 90 psi tensile strength, and 700% to 800% elongation when mixture of 50% prepolymer and 50% water undergoes a confined expansion to five times its initial liquid volume.

PART 3 EXECUTION

3.01 INTENT:

- A. It is the intent of the sewer pipe joint sealing work to seal sewer pipe joints that have leakage rates of 1/4 gallon per minute or more utilizing the internal joint sealing method.
- B. It is realized that this method may only be used on sewer pipe sections in sound physical condition.
- C. Longitudinally cracked or broken pipe will not be sealed. When bell cracks or chips are evident from pipe section offset, sealing may be undertaken where the offset is small enough to allow proper seating of the sealing packer on both sides of the joint to be sealed.

3.02 EQUIPMENT:

- A. The basic equipment shall consist of a closed-circuit television system, necessary chemical sealant containers, pumps, regulators, valves, hoses, etc., and joint sealing packers for the various sizes of sewer pipes.
- B. The packer shall be cylindrical and have a diameter less than the pipe size and have cables attached at each end to pull it through the line.
- C. The packer device shall be constructed in a manner to allow a restricted amount of sewage to flow.
- D. Generally, the equipment shall be capable of performing the specified operations in lines where flows do not exceed the maximum line flows for joint testing/sealing.

3.03 JOINT SEALING PROCEDURE:

- A. Joints showing visible leakage or joints that have failed the joint test specified shall be sealed as specified.
- B. Joint sealing shall be accomplished by forcing chemical sealing materials into or through faulty joints by a system of pumps, hoses, and sealing packers.
- C. Jetting or driving pipes from the surface that could damage or cause undermining of the pipelines shall not be allowed.
- D. Uncovering the pipe by excavation of pavement and soil (which would disrupt traffic, undermine adjacent utilities and structures, and cause further damage to the pipe lines being repaired) shall not be allowed.

- E. The packer shall be positioned over the faulty joint by means of a measuring device and the closed-circuit television camera in the line.
- F. It is important that the procedure used by the Contractor for positioning the packer be accurate to avoid overpulling the packer and thus not effectively sealing (grouting) the intended joint.
- G. The packer ends (end elements, sleeves) shall be expanded using controlled pressure.
- H. The expanded ends shall seal against the inside periphery of the pipe to form a VOID area at the faulty joint, now completely isolated from the remainder of the pipeline.
- I. Into this isolated area, sealant materials shall be pumped through the hose system at controlled pressures that are in excess of groundwater pressures.
- J. The pumping unit, metering equipment, and the packer device shall be designed so that proportions and quantities of materials can be regulated in accordance with the type and size of the leak being sealed.

3.04 JOINT SEALING VERIFICATION:

- A. Upon completing the sealing of each individual joint, the packer shall be deflated until the VOID pressure meter reads zero pressure, and then reinflated and the joint retested as specified.
- B. Should the VOID pressure meter not read zero, the Contractor shall clean his equipment of residual grout material or make the necessary equipment repairs/adjustments to produce accurate VOID pressure readings.
- C. Joints that fail to meet the specified test criteria shall be resealed and retested until the test criteria can be met in order to receive a payment.

3.05 RESIDUAL SEALING MATERIAL:

- A. Residual sealing materials that extend into the pipe, reduce the pipe diameter, or restrict the flow shall be removed from the joint.
- B. The sealed joints shall be left reasonably “flush” with the existing pipe surface.
- C. If excessive residual sealing materials accumulate in the line (and/or if directed by the Owner’s Representative) the manhole section shall be cleaned to remove the residual materials.

3.06 RECORDS:

- A. Complete records shall be kept of joint sealing performed in each manhole section.
- B. The records shall identify the manhole section in which the sealing was done, the location of each joint sealed, and the joint sealing verification results.

3.07 GUARANTEE:

- A. All sewer pipe joint sealing work performed shall be guaranteed against faulty workmanship and/or materials for a period of one year after the completion of the work.
- B. Prior to the expiration of the guarantee period and initial retest, an area consisting of specific manhole sections shall be selected by the Engineer/Owner.
- C. Manhole sections to be retested shall be randomly selected throughout the project area and shall be representative of the majority of the sealing work originally performed.
- D. The initial test area shall consist of at least 5%, but not exceed 10%, of the linear feet contained in the original project.
- E. Within the initial retest area, the Contractor shall retest all previously sealed joints as specified.
- F. Any joints failing the retest shall be resealed. If the failure rate of the retested joints is less than 5% of the joints retested, the work shall be considered satisfactory and no further retesting will be required.
- G. Payment for retesting the initial area shall be at the unit price bid for each item of work required (e.g.: cleaning, TV inspection, testing, etc.).
- H. No compensation shall be provided for resealing (grouting) joints that fail.
- I. If, in the retest area, the failure rate of the retested joints exceeds 5% of the joints retested, an additional retest area of equivalent size shall be selected and all previously sealed joints shall be retested.
- J. Additional testing and sealing, if necessary, will continue until a failure rate of less than 5% is met.
- K. Any additional testing/sealing required beyond the initial retest area shall be accomplished at no cost to the owner.

- L. Should as much as 25% of the original project be retested and fail to meet the 5% requirement, the Contractor will be required to provide the same number of crews as utilized in the original project so that the retesting will proceed at a more rapid rate.

3.08 TESTING

- A. Air testing laterals is accomplished by isolating the area to be tested with the packer and applying positive pressure into the isolated VOID area.
- B. A sensing unit is used for continuous monitoring of the VOID pressure.
- C. This sensing unit is located within the VOID area and accurately transmits pressure readout to the control panel.
- D. The test procedure consists of applying air pressure into each isolated VOID area.
- E. To isolate a VOID, the lateral sealing packer is positioned straddling the lateral.
- F. The operator inflates the packer ends to isolate the lateral and inserts an inflatable inversion tube.
- G. Once the designated pressure in the isolated VOID is displayed on the meter of the control panel, the application of air pressure is stopped and a twenty-second waiting period commences.
- H. The VOID pressure is observed during this period.
- I. If the VOID pressure drop is greater than that allowed in the following Air Test Table, the lateral is considered to have failed the air test and is grouted.

AIR TEST TABLE

Initial VOID Pressure	VOID Pressure After 20 seconds
12 - 11	4.8 - 4.4
11 - 10	4.4 - 4.0
10 - 9	4.0 - 3.6
9 - 8	3.6 - 3.2
8 - 7	3.2 - 2.8
7 - 6	2.8 - 2.4
6 - 5	2.4 - 2.0

- J. After completing the air test for each individual lateral, the lateral packer is deflated, with the VOID pressure meter continuing to display VOID pressure.

- K. If the VOID pressure does not drop to approximately zero, the equipment is adjusted to provide a zero VOID pressure reading at the monitor.

3.09 SEALING

- A. Sealing begins if the lateral does not pass the air test as described above.
- B. The lateral packer remains in position, maintaining the isolated VOID.
- C. Chemical grout sealant is pressure injected through the lateral packer into the annular space between the inversion tube and the lateral pipe.
- D. Under pressure, the grout material is then forced out into the soil through leaking joints and pipe defects.
- E. The amount of chemical grout pumped is based on the number of pump strokes delivered to each lateral.
- F. The number is recorded on the sealing log.

3.10 RETEST

- A. Upon completion of the lateral sealing procedure the lateral is air tested a second time to verify the sealing of the connection.
- B. The air test is the same as outlined above.
- C. If the lateral fails the air test a second time, the grouting procedure is repeated.
- D. This sequence of air testing, grouting, and subsequent air testing is repeated until either the lateral is sealed or it is determined that the grout consumption is too high and may result in the blockage of the lateral pipe.
- E. The final determination to stop subsequent attempts to seal a lateral will be made jointly between the Owner's Representative and the Contractor.

3.11 VERIFY FLOW

- A. Lateral flow is verified after the successful sealing of each lateral.
- B. With the lateral packer in position, the inversion tube is retracted and air pressure is injected into the lateral.
- C. Should a pressure build in the lateral and not drop to approximately zero in a few seconds, the packer is moved off the connection and the connection is viewed with a television camera.

- D. With the camera viewing the connection point, an attempt is made to obtain a water flush by the occupant.
- E. If no water is viewed during this procedure, it is assumed the building sewer is blocked with grout and the responsibility to clear the lateral will be the Client's.
- F. A notification form is attached to the door of each home or building for which laterals have been grouted.
- G. This notification to the occupant states that the lateral servicing this listed address was grouted on this particular date and if any blockage of sanitary flow occurs, the occupant should call a given phone number.
- H. The Owner is to supply these notification forms to the Contractor.

3.12 VIDEOTAPE

- A. The complete procedure is videotaped during the air testing and sealing operation.
- B. The videotapes are submitted to the Owner for review and permanent record.
- C. The videotape displays the date, manhole numbers, footage to the lateral, and VOID pressure readout.
- D. In addition, the data obtained during this operation is recorded on a lateral testing and sealing log provided by either the Owner or the Contractor.

END OF SECTION

SECTION 03100

CONCRETE FORMWORK AND ACCESSORIES

Part 1 GENERAL

1.01 SUMMARY

- A. Furnish equipment, materials, and labor required for construction and removal of forms for the containment of concrete to be cast in place, as shown in the Drawings or as required for the completion of the project.
- B. Provide equipment, materials, and labor required for joints in concrete, chamfer strips, and accessories as required for a complete installation as indicated in the Drawings and Specifications.

1.02 RELATED SECTION

- A. General Conditions - Bidding and Contract Requirement
- B. Site Work - Division 2.
- C. Submittals - Division 2.

1.03 REFERENCES

- A. The following codes and standards shall govern workmanship and materials unless modified more stringently in the Drawings and Specifications.
 - 1. The Standard Building Code (latest edition).
 - 2. ACI - 301 "Specifications for Structural Concrete for Buildings" (latest edition) is part of these specifications.

PART 2 PRODUCTS

2.01 WOOD FORM MATERIAL

- A. Formwork shall conform to standards of ACI 301 and 347 unless otherwise noted.
- B. Lumber shall have a minimum moisture content of nineteen (19%) percent.
- C. Members that have bows, twists, knots, or other defects, which make it unsuitable for the intended purpose, shall be rejected.

1. Plywood shall be exterior DFPA, three-quarter (3/4) inch minimum thickness, with faces in good condition.
2. Lumber shall be #2 short leaf Southern Pine.
 - a. Beam bottom forms shall be one and one-half (1-1/2) inch minimum thickness.
3. Rough hardware shall be galvanized including bolts, anchors, nails, plates, and inserts.
 - a. Bolts shall be of this size and length as detailed and shall be three quarter (3/4) inch minimum diameter where not detailed.
 - b. Bolts shall be provided with washers.
4. Ties shall be "snap" type, or threaded end, completely removable or other approved type.

2.02 FORM ACCESSORIES

A. Form accessories shall be of a commercially manufactured type.

1. Form ties shall be so constructed that the ends, or end fasteners, can be removed without causing appreciable spalling at the faces of the concrete.
2. After ends, or end fasteners of form ties have been removed, the embedded portion of the ties shall terminate not less than 2 inches from the formed face of the concrete that is exposed to wastewater or closed surfaces above the wastewater and not less than 3/4 inch from the formed face of other concrete.
3. Form ties in walls designed to retain liquids shall be provided with a water seal at mid-thickness of the wall.

2.03 CHAMFER STRIPS

A. Chamfer strips shall be polyvinyl strips designed to be nailed in the forms to provide a 3/4-inch chamfer at exposed edges of beams and interior rectilinear structural columns.

1. Chamfer strips shall not be used at corners of walls.

2.04 EXPANSION JOINT MATERIAL

A. Expansion joint filler shall be of closed cell Neoprene type, conforming to ASTM 1056, Type 1040 as manufactured by Williams Products, Inc., Troy, Michigan, or equal.

2.05 FORM COATING

- A. Form coating shall be a coating that will effectively prevent absorption of moisture and prevent bond with concrete and will not stain concrete surfaces and shall be compatible with paint systems specified in Paint - Division 9.

2.06 WATERSTOPS

- A. All joints subject to, or likely to be subject to internal or external liquid pressure shall have waterstops installed.
 - 1. Plastic waterstops shall be manufactured from virgin polyvinyl chloride and shall not contain scrap or reclaimed material.
 - 2. Properties of the PVC used shall conform to U.S. Army Corps of Engineers Specification CRD C572.
 - 3. Waterstops shall be serrated type with a center hollow bulb.

PART 3 EXECUTION

3.01 WORKMANSHIP

- A. Forms shall be installed true to line and dimensions with snap ties and supports to maintain them in position, without bows or bulging during pouring, vibrating, and curing the concrete.
- B. Dimensional tolerances of formwork shall be designed and installed assuring that the finished concrete will comply with dimensional tolerances of ACI 301 and the required tolerances to properly accommodate the equipment installation as verified from the manufacturer's shop drawings.
 - 1. Embedded or cast-in anchors or inserts required for the performance of the work shall be furnished and the location carefully supervised.
 - 2. No lumber shall be stored closer than four (4) inches to grade of floors.
 - a. Lumber stored outside shall be covered with visqueen or other suitable protection on top and sides.
 - b. Stack so as to allow proper air circulation.
 - 3. Brace, plumb, and level members and secure with sufficient nails, spikes, and bolts to insure rigidity and safety under concrete placement.

- a. No metal to remain within one (1) inch of the surface of the concrete after removal.
 - b. Wire ties are not permitted.
4. Unless otherwise indicated in the Drawings, exposed foundation sides and grade beams shall be formed.
 - a. Forms shall be properly constructed, correctly aligned and of sufficient strength to retain wet concrete without excessive leaking, deflection or distortion.
 - b. Temporary openings shall be provided for cleaning and inspection of the base of vertical forms and other places where necessary.
 - c. Where required wood inserts, nailing blocks or other wood to be set in the forms shall be installed in an approved manner.
 - d. The inside of the forms shall be coated with an approved oil, and dampened before the concrete is poured.
 5. Wood or metal forms will be required on sides of foundations, walls, and walks.
 - a. Joist forms shall be accurately laid out and securely anchored, and shall be carefully handled to insure continued true and accurate pours.
 6. Provide and maintain forms and shoring and for safe practice in their use and removal.
 7. Concrete on which forms have given way will be replaced or repaired at the discretion of the ENGINEER as soon as forms are removed.
 8. The ENGINEER shall be notified at least twenty four (24) hours prior to placing concrete in order that forms and reinforcing steel may be inspected.
 9. Masonry installed after concrete - Anchor exterior wall masonry, which is installed after concrete is poured, in one of the two following methods:
 - a. Provide one (1) inch deep by three (3) inch wide concrete lugs around perimeter.
 - b. Provide continuous perimeter dovetail anchor slots for example H + B #305 galvanized steel with matching #303 by five and one-half (5-1/2) inch crimped twelve (12) gauge galvanized steel brick anchors.
 - 1) Anchors shall be spaced not over sixteen (16) inch on-center vertically and forty eight (48) inch on-center horizontally.

- 2) These dovetail anchors shall also be used wherever masonry passes in front of concrete columns or beams (interior and exterior).
 - 3) Nail-on anchors will not be accepted.
 - 4) No anchors are required where concrete is poured after masonry.
10. Remove forms and shoring in a manner as to insure the safety of the structure and personnel.
- a. No forms or shoring shall be removed until members supported have acquired sufficient strength to support their weights and loads to be imposed thereon, and in no case earlier than seven (7) days
 - b. Removal of forms - Pinch bars, wrecking bars or other metal tools shall not be placed against as cast concrete finish surfaces to wedge forms loose, only wooden wedges shall be used.
 - 1) Wedging shall be done carefully and gradually.
 - 2) Driving accomplished only by light tapping.

3.02 WATERSTOPS

- A. Waterstops shall be continuous PVC waterstops and shall be joined by heating the ends with a thermostatically controlled electric splicing iron as recommended by the manufacturer.
- B. The position and shape of the waterstop shall be maintained unchanged before, during, and after the concrete placing operation.

3.03 CONSTRUCTION JOINT

- A. The placing of concrete shall be carried on continuous between construction joints and the work shall be executed so that these joints will occur in the locations designed in the Drawings.
 1. If the CONTRACTOR proposes different locations, or additional intermediate construction joints, he shall submit to the ENGINEER marked up prints of the CONTRACTOR Drawings showing location, extent and type of joints proposed.
 2. These submittals shall be made well in advance of construction, and the proposed joints shall be incorporated in the work only if the changes are acceptable to the ENGINEER.
3. Submit drawings in accordance with the Special Conditions.

4. Installation of additional intermediate joints shall not relieve the CONTRACTOR of his responsibilities to produce a watertight and/or structurally adequate component.

3.04 EXPANSION JOINTS

- A. Reinforcement or other fixed items embedded or bonded into the concrete shall not be run continuously through expansion joints.
 1. A neat chamfered edging shall be provided to finish edges around expansion joints.
- B. Thoroughly clean expansion joints shall be located a minimum distance of five feet from the corner of intersecting walls, including corners, unless specific requests are formally made and accepted by the ENGINEER.

END OF SECTION

SECTION 03210
REINFORCING STEEL

PART 1 GENERAL

1.01 SUMMARY

- A. Furnish equipment, materials, and labor required for the supply, forming, and placement of reinforcing steel as specified in the Drawings or as required for the project.

1.02 RELATED SECTIONS

- A. General Conditions - Bidding and Contract Requirement
- B. General Requirements - Division 1
- C. Site Conditions - Division 1
- D. Submittals - Division 1
- E. Concrete Form Work and Accessories - Division 3
- F. Cast in Place Concrete - Division 3

1.03 REFERENCES

- A. The following codes and standards shall govern workmanship and materials unless modified more stringently in the Drawings and Specifications.
 - 1. The Standard Building Code (latest edition).
 - 2. ACI - 301 "Specifications for Structural Concrete for Buildings" (latest edition) is part of these specifications.
 - 3. Reinforcing shall conform to the requirements of ACI - 301, 315, 80, and 318 (latest editions).
 - 4. Welding certificate conforming to AWS D1.4 - 79.

1.04 SUBMITTALS

- A. Submit reinforcing steel shop drawings to the ENGINEER for approval.
 - 1. Check and approve steel shop drawings prior to submittal to the ENGINEER.

2. The CONTRACTOR's stamp and signature is required on shop drawings prior to submittal.

1.05 MEASUREMENT AND PAYMENT

- A. Measurement and payment will be included in the lump sum prices for the appropriate work items, as shown in the Bid Schedule, as required for those items which price and payment shall constitute full compensation for furnishing materials and performing work in connection herewith and as specified in the scope of work under this section.

1.06 TESTS AND CERTIFICATES

- A. The cost of the initial steel testing and subsequent tests during the progress of the work ordered by the ENGINEER shall be paid for by the CONTRACTOR, including retesting of rejected material.

PART 2 PRODUCTS

- A. Reinforcing steel shall conform to ASTM A-615 New Domestic Billet, Grade 60.
- B. Steel shall have a 305 deformation.
- C. Provide clean steel free from loose scale of flake rust or coating that destroys or reduces the bond to the concrete.
 1. Keep steel clean until used or wire brushed before placing.
- D. Welded Wire Mesh Reinforcement shall be ASTM Specification A-185 and A-82 hot dipped galvanized wire.
- E. Metal Accessories - Spacers, ties, chairs, and devices necessary for proper placing, spacing, supporting, and fastening or reinforcement shall be supplied and placed as required by the Manual of Standard Practice for Detailing Concrete Structures (ACI 315-80).
 1. Provide plastic coated feet on chairs, spacers, and bolsters.

PART 3 EXECUTION

3.01 WORKMANSHIP

- A. Bars shall be accurately fabricated, carefully placed as indicated in the Drawings, securely supported and fastened to prevent movement or displacement during the pouring of the concrete.

- B. Placement of reinforcing shall conform to the requirements of "CRSI Recommended Practice for Placing of Reinforcing Bars".
- C. Splices shall be in accordance with ACI Code, except liquid retention structures shall conform to requirements shown in the Drawings.
 - 1. Securely wire wall dowels at foundations to the footing steel.
 - 2. Where stub columns are poured (as in the case of stem walls) the dowels shall be of a length sufficient to satisfy requirements of ACI Code and to provide a minimum distance of 36-diameter lap where the main column is joined to the stub column.
 - 3. Place and support mesh by means of chairs or other approved devices, so that it maintains its proper position in the slab during the pouring operations.
- D. Size stirrups and column ties for bars designated in the Drawings and fabricate to provide a clearance of 1 1/2 inches between the outside of the tie and the surface of the concrete.
- E. Unless shown otherwise in the Drawings, maintain the following minimum concrete cover:
 - 1. Bottom of suspended slabs: 3/4-inch
 - 2. Top of slabs: 1-inch
 - 3. Walls, beams and columns: 2-inches
 - 4. Formed concrete contacting soil: 2-inches
 - 5. Concrete placed against soil: 3-inches
- F. See Drawings for special requirements for liquid retention structures.
- G. Support column and beam reinforcing from formwork with plastic accessories.
- H. Support slab reinforcing on non-metallic slab bolsters.

3.02 INSPECTION

- A. Notify the ENGINEER of the time when steel will be ready for inspection at least 24 hours in advance.
 - 1. Allow sufficient time for necessary correction before scheduled pour.

- B. Correct incorrect or improperly placed steel and re-inspect by the ENGINEER prior to placing concrete.
- C. Place no concrete except where the ENGINEER has inspected and approved the reinforcing steel.
 - 1. Cost of reinspection shall be paid by the CONTRACTOR.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SUMMARY

- A. Furnish equipment, materials, and labor required for the supply, casting, finishing, curing, and testing of cast-in-place concrete, as specified in the Drawings and Specifications, or as required for the complete project.

1.02 RELATED SECTIONS

- A. General Conditions - Bidding and Contract Requirement
- B. Summary of Work - Division 1
- C. Site Conditions - Division 2
- D. Concrete Formwork and Accessories - Division 3
- E. Reinforcing Steel - Division 3
- F. Submittals - Division 1
- G. Guarantees - Division 1

1.03 REFERENCES

- A. The latest edition of the following codes and standards shall govern workmanship and materials unless modified more stringently herein.
 - 1. The Standard Building Code.
 - 2. ACI 301 "Specifications for Structural Concrete for Buildings" is part of these specifications, except as modified here in or in the Drawings.
 - a. Construct concrete decks with a maximum of 1/8-inch deviation using a 10-foot long straightedge placed in any direction on the surface.
 - 3. ACI 211.1, 308, 309, 318, and 347.
 - a. SFBC shall govern where provisions of the ACI conflict.
 - 4. ASTM C33, C94, C143, C150, D544 and D1190-52T.

1.04 MEASUREMENT AND PAYMENT

- A. Measurement and payment will be included in the lump sum prices for the appropriate work items, as shown in the Bid Schedule, as required for those items which price and payment shall constitute full compensation for furnishing materials and performing work in connection herewith and as specified in the scope of work under this section.

1.05 TESTS AND CERTIFICATES

A. TESTS

1. Make tests in accordance with the recommendations of ASTM.
 - a. Do not exceed maximum concrete slumps as specified above.
 - b. Make five cylinders for each test required.
 - c. Take samples for the test from the mixer at the 1/4 and 3/4 points in the load.
2. The ENGINEER may order core borings or other special tests during the progress of the work.
3. Removed and replaced at no cost to the OWNER concrete failing indicated tests.
4. CONTRACTOR to pay the cost of testing.
 - a. Propose a testing agency for approval by the ENGINEER.

B. SLUMP TESTS

1. Perform slump tests in accordance with ASTM C143 (latest edition) by testing agency.
 - a. Make tests for each 10 cubic yards, or fraction thereof, of each pour.
 - b. In the event the slump exceeds the specified requirements, the batch shall be rejected.

C. AIR TESTS

1. Testing agency shall test the air content of the freshly mixed concrete in accordance with ASTM C231 or C173 (latest edition) for each 10 cubic yards, or fraction thereof, of each pour.

- a. In the event the percentage of air content is not within the limits in the specifications for entrained air content, the batch shall be rejected.

D. STRENGTH TESTS

1. Testing agency shall mold 5 specimens for each increment of 50 yards or less of each day's pour or as directed by the ENGINEER.
 - a. Maintain records for each specimen as to location, pour, and date.
 - b. Test specimens - one at 3 days, one at 7 days, two at 28 days, and one at 45 days, if the 28-day tests fail to meet the specified strengths.
2. Cooperate with the ENGINEER or persons employed by the testing agency for testing in making, storing and curing of the test cylinders.

PART 2 PRODUCTS

2.01 CEMENT

- A. Use Domestic Portland cement conforming to ASTM C150 (latest edition), Type I, except Type II shall be used for liquid retention structures.

1. Only one domestic brand shall be used throughout the duration of the project.

2.02 AGGREGATES

- A. Aggregates shall meet the requirements of ASTM C33.

1. Do not use aggregates taken from salt water.

- B. Provide clean, hard, sharp, natural sand having a fineness modulus between 2.5 and 3.0 as fine aggregate.

- C. Provide clean gravel of crushed stone, gradation no. 57 as coarse aggregates.

2.03 WATER

- A. Provide potable water, free from deleterious amounts of oils, acids, alkalis, organic matter, or other harmful matter.

2.04 EXPANSION MATERIALS

- A. Pre-molded joint fillers shall conform to ASTM D544 Type V, equal to Celete 2 "Flexcell", 1/2 inch thick (or as shown in the Drawings), by width as indicated in the details.
- B. Poured in place shall conform to ASTM D1190-52T, equal to Servicized Products Corp., hot poured "Paraplastic."

2.05 SLEEVES, HANGERS AND INSERTS

- A. Inserts, hangers, sleeves, anchors, ties, bolts, dowels, thimbles, nailers, ground, or other devices required for the attachment or passage of other work shall be located by the CONTRACTOR from the Drawings in confirmation with the shop drawings or as approved by the ENGINEER.

B. BOLTS

- 1. Install stainless steel bolts of size and length specified as indicated in the Drawings.
- 2. Use 3/4-inch minimum size, with washers on both ends, where not indicated.

C. CHASES

- 1. Form chases with wood or metal forms or sleeves.
- 2. Remove wood.
- 3. Provide galvanized metal sleeves, if sleeves will not be removed.
- 4. Provide cast iron caulking sleeves where plumbing sleeves passes through exterior walls, slabs, or foundations.

D. OTHERS

- 1. Anchor bolts, ringlets, and inserts shall be of type, size, and spacing as required by the trades involved.
- 2. Use stainless steel on submerged applications and/or where corrosive environments exist as determined by the ENGINEER.

2.06 CURING COMPOUNDS

- A. Do not use compound, which will interfere with adhesion or cause other deleterious reaction with indicated finish.
- B. Provide curing compounds containing fugitive dye, fading not sooner than 7 days.

- C. Use Castle Chemical Corp., Demicon Cure-Hard, Clear-Spread at 400 square feet per gallon or approved equal for slabs not receiving additional topping or finish.
- D. Other Concrete - Use Lambert Corp. #64 Resin Base Clear; Master Builders Co. "Masterkure"; Sonneborn Chemical and Refining Corp., "Hydrocide Curing Compound Resin X Clear"; Guardian Chemical Co. "Clear Bond"; Karl E. Reynolds Curing Compound for curing, hardening, and sealing.

2.07 CONCRETE ADMIXTURES

- A. Admixtures for concrete structures with liquid retention are listed below:
 - 1. Air entrainment per ASTM C-260 6 plus or minus 1 percent.
 - 2. Retarder per ASTM C-494 type D.

2.08 MISCELLANEOUS

- A. Provide 0.006-inch polyethylene film vapor barrier.
- B. Provide Wheeling galvanized Tensiform or equal by Granco or U.S. Steel for Metal decking.

PART 3 EXECUTION

3.01 PROPORTIONING AND MIXING

- A. Use "ready-mixed" concrete in accordance with ASTM C-94.
- B. Submit the proposed mix, as a shop drawing, together with slump and cylinder tests for approval.
- C. Mix tests shall be by an independent testing laboratory.
- D. Clearly indicate the proposed location in the project for each mix submitted.
 - 1. See Submittals Division - 1.
- E. Mixes for liquid retention structures shall have a minimum 28-day strength of 4,000 psi.
 - 1. Other mixes shall be 3,000 psi unless otherwise noted.
 - 2. Minimum cement content shall be 5.5 sacks per cubic yard for 4,000 psi and 5.0 sacks per cubic yard for 3,000 psi.

3. Maximum slumps shall be:
 - a. Footings: 3 inches
 - b. Slabs, Beams: 4 inches
 - c. Columns, Walls: 4 inches
4. Single pour, which involves two specified slumps, shall be governed by the lesser.
5. Maximum water/cement ratio for liquid retention structures shall be 0.41.
6. Place concrete within 1 1/2 hours after introduction of water to the mix. Under no conditions may additional water be added.

3.02 PLACING

- A. Place concrete expeditiously in clean, damp forms that are not oily to the touch.
- B. Spray forms with water immediately prior to placing concrete.
- C. Secure reinforcement in position, have it inspected, and obtain approval before pouring concrete.
- D. Do not rest runways for transporting concrete on reinforcing steel.
- E. Concrete placing time shall be in strict accordance with ACI standards, latest edition.
- F. Do not place concrete under water
- G. Poured during daylight unless approved by the ENGINEER.
- H. Where the reinforcing steel above the pour is coated with concrete while pouring below, concrete shall be removed from the reinforcing steel after the pour is complete.
- I. SPECIAL
 1. Flat, true surfaces are essential on concrete pours for floors.
 2. A ten foot (10') straight edge placed in any position on the floor shall contact the floor in its entire length with a tolerance of 1/8 inch.
 3. Provide smooth finished floor throughout with no discernible waves.
 4. Grind pours not meeting these requirements, until they are acceptable.

5. Existing conditions do not relieve the CONTRACTOR from meeting these requirements.

J RECESSES

1. Lay out and form, as required, recesses for door operators, closer hardware, sensor plates, mats, and equipment.

K. BONDING AGENTS

1. Wherever a topping or other pour of less than 1 1/2 inches thickness is required, a two-part epoxy bonding agent shall be used of a manufacturer approved by the ENGINEER.
2. Do not use bonding agents for liquid retention structures slabs where grout is to be the "topping."
3. Clean existing slabs prior to the topping pour to assure a proper bond.
4. Use steam and/or solvents if required.
5. This requirement also applies to grout addition in liquid retention structures.

L. COMPACTION

1. Place concrete, except for footings, in layers not over 12 inches deep until compacted by internal vibrating equipment, supplemented by hand rodding and tamping as required.
 - a. Do not use vibrators to move concrete laterally inside the forms.
 - b. Internal vibrators shall maintain a speed of at least 5,000 impulses per minute when submerged in concrete.
 - c. Maintain at least one spare vibrator, in working condition, at the site.
 - d. Limit the duration of vibration to the time necessary to produce satisfactory consolidation without causing segregation but in no case less than 20 seconds per square foot of exposed surface.
 - e. Move the vibrator constantly and placed in each specific spot only once.
 - f. Provide consolidation methods and equipment conforming to ACI-309.

M. COLUMNS/WALLS

1. Place concrete in columns forms before the beam and slab steel is in place.
2. Place column/wall concrete without dropping more than 8 feet.

N. SLABS AND BEAMS

1. Clean slab and beam forms after placing wall concrete.
2. Do not place concrete in roof and wall beams or slabs until concrete in walls has been in place a minimum of four hours.
3. Place concrete for slabs and beams continuously and arrange work to assure joints will be located at the points specified.
4. Slope floor slabs with floor drains uniformly to the floor drain.
5. Place slabs on fill carefully to avoid damage to vapor barriers.

O. CONSTRUCTION JOINTS

1. Locate keyed construction joints as shown or near points of maximum potential movement and shear, subject to approval.
2. Locate construction joints at the underside of floor and roof members, tops of foundations and near the quarter point or third point of the span in slabs, beams or girders.
3. Locate construction joints for liquid retention structures as shown in the Drawings.
4. Install keyed construction joints, straight and smooth, in slabs on fill, at wall centerlines.
5. Cure keyed construction joints a minimum of 24 hours before fresh concrete is deposited.
6. Expansion joints in walkways on grade shall not exceed 20 feet on centers, unless otherwise noted, and at changes in directions.
7. Mark walks in 5'-0" sections, unless otherwise shown in the Drawings.
8. Mark and tool the walks before concrete has become set.
9. Make minimum walk thickness 4 inches.

3.03 FINISHING

A. Provide finishes for concrete surfaces as indicated below:

1. Smooth, double trowel floors and bottom slabs of liquid retention structures.
2. Broom finish exterior slabs and walkways, edges and joints tooled.
3. Smooth rub finish walls, columns, and beams of liquid retention structures

3.04 CURING

A. Water cure liquid retention structures in accordance with ACI-308 for a period of 14 days after pouring.

B. Cure other concrete by application of curing compounds as specified herein, applied in strict accordance with the manufacturer's recommendations.

1. Curing shall start as soon as possible after pouring.

3.05 TIME BETWEEN POURS

A. At least two hours shall elapse after depositing concrete in long or high columns and/or heavy walls before depositing in beams, girders or slabs supported thereon.

1. For short columns and low height walls, 10 feet or less, waiting time shall be at least 45 minutes prior to depositing concrete in beams, girders, brackets, column capitals or slabs supported thereon.
2. Consider beams, girders, brackets, column capitals, and haunches as part of the floor or roof system and place monolithically therewith.

3.06 VAPOR BARRIER

A. Use vapor barriers under slabs on grade utilizing maximum reasonable widths.

1. Lap joints a minimum of 6 inches and seal penetrations with pressure sensitive tape.
2. Do not apply vapor barriers under liquid retention structures.

3.07 INSPECTION

A. Obtain approval of the ENGINEER of the pour limits of each day prior to the start of pouring.

B. Do not cover reinforcing steel with concrete until the ENGINEER has given his approval to start pour for the limits of the day.

3.08 CONSTRUCTION AND EXPANSION JOINTS

- A. Locate joints where shown in the Drawings.
 - 1. Make column joints horizontal and true.
 - 2. Form beam joints with plywood and slope from the vertical 12 inches to 1 inches away from the beam center at the top.
- B. Make expansion joints straight and true and to details shown in the Drawings.
 - 1. Securely placed and located moisture stops and inserts for cover plates.
- C. When construction joints become necessary at locations other than those shown in the Drawings, the ENGINEER's approval shall be obtained prior to installation of the joints or pouring of concrete.
- D. For walls of liquid retention structures, 14 days shall elapse prior to pouring adjacent to existing hardened concrete at vertical construction joints, so initial drying shrinkage can occur with minimal restraint.

END OF SECTION

SECTION 04064

MORTAR FOR ENGINEERED MASONRY

PART 1 GENERAL

1.01 SUMMARY

- A. Furnish labor, materials, equipment, and incidentals required to install mortar adhered products.

PART 2 PRODUCTS

2.01 MORTAR

- A. Provide type "M" mortar with average compressive strength at 28 days of 2,500 psi, Florida Portland cement or Lehigh Portland cement masonry cement interground mixture of Portland cement clinker and limestone, or equal.
- B. Dry mix the mortar to laboratory established proportions with only as much water added as required to produce workability.

2.02 SAND

- A. Sand shall be clean, durable particles, free from injurious amount of organic matter.
- B. Provide sand conforming to the limits of ASTM C 144.
- C. Provide sand for grout conforming to ASTM C 144 or C 33 as required.

2.03 WATER

- A. Use water from a potable source, suitable for domestic consumption.

2.04 HYDRATED LIME

- A. Provide hydrated lime conforming to requirements of Federal Specification SS-L-351, Type "M", domestic manufactured.

2.05 GROUT

- A. Mix grout for C. M. U. cores containing reinforcement for wind load resistance, and for setting bearing plates or machinery according to the approved recommendations of the manufacturer to give the necessary consistency for placing and to give a minimum compressive strength of 3,000 psi in 3 days.

2.06 NON-SHRINK GROUT

- A. Use Embeco Aggregate in non-shrink grout, as manufactured by the Master Builders Company, Ferrolith by Sonneborn, or equal and be proportioned with sand in strict accordance with the manufacturer's instructions for the use intended.

PART 3 EXECUTION

3.01 SHIPPING, HANDLING AND STORAGE

- A. Deliver, store, and handle mortar materials so as to prevent damage, deterioration, or contamination.
- B. Store materials under cover in a dry place and in the original packaging.

3.02 PROPORTIONING AND MIXING

- A. Control and accurately maintain specified proportions measurement.
 - 1. Workability of consistency of mortar on the board shall be sufficiently wet to be worked under the trowel.
 - 2. Make water for tempering available on the scaffold.
 - 3. Discard mortar, which has begun to "set" after initial mixing.
 - 4. Retemper mortar that has stiffened due to evaporation to restore its workability.
 - 5. Do not re-temper the mortar at the mixer.
- B. Machine mix mortar in a type of mixer acceptable to the ENGINEER in which the quantity of water can be accurately and uniformly controlled.
 - 1. The mixing time shall not be less than 5 minutes, approximately 2 minutes of which shall be for mixing the dry materials and not less than 3 minutes for continuing the mixing after the water has been added.

2. Where hydrated lime is used for mortar requiring a lime content, the CONTRACTOR will have the option of using the dry-mix method for first converting the hydrated lime into a putty.
3. Where the dry-mix method is employed, the materials for each batch shall be well turned over together until the even color of the mixed, dry materials indicates that the cementitious materials has been thoroughly distributed throughout the mass, after which the water shall be gradually added until a thoroughly mixed mortar.

3.03 CLEANING

- A. Clean out mortar boxes at the end of each day's work, and keep tools clean.

END OF SECTION

SECTION 04070

MASONRY GROUT

PART 1 GENERAL

1.01 DESCRIPTION

- A. Scope of Work: The work included in this Section consists of grouting the various items listed hereinafter and indicated in the Drawings.
- B. Related Work Described Elsewhere:
 - 1. Sanitary Sewer System, Division 2
 - 2. Precast Concrete Manholes, Division 3

1.02 SUBMITTALS

- A. Materials and shop drawings:
 - 1. See Division 1 for submittal requirements.
- B. Submit manufacturer's literature for review on non-shrink grout data including grout properties, mixing, surface preparation, and installation instructions.

1.03 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver grouting materials and store in unbroken containers with seals and labels intact as packaged by the manufacturer.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Non-shrink, Non-metallic Grout: Sauereisen F-100 Level Fill, Master Builders Masterflow 713, Burke Non-Ferrous, Non-Shrink Grout or equal pre-mixed type.
- B. Non-shrink Metallic Grout: Master Builders Embeco 636 Grout pre-mixed type.

PART 3 EXECUTION

3.01 PREPARATION

A. Clean bonding surfaces of dust and oil.

3.02 INSTALLATION

A. Non-shrink Grout:

1. Use non-shrink, non-metallic grout for grouting column base plates, anchor bolts, reinforcing bars, pipe sleeves, machinery supports, and pump base plates.
2. Mix and place non-shrink grout as recommended by the manufacturer.
3. Mix grout as close to the work area as possible and transported quickly to its final position in a manner that will not permit segregation of materials.
4. Cure non-shrink grout with water saturated burlap for at least 3 days.
5. Do not operate machinery set on grout pads until the grout has cured for at least 36 hours.

3.03 MEASUREMENT AND PAYMENT

- A. No additional payment shall be made for the work previously specified.
- B. The CONTRACTOR's Lump Sum Bid as set forth in the Proposal shall continue full compensation for the work involved in this section.

END SECTION

SECTION 04200

UNIT MASONRY

PART 1 GENERAL

1.01 SUMMARY

A. Furnish labor, materials, and equipment and perform functions required in the installation and maintenance of the work covered by this Section.

1. This work includes:

a. Unit masonry work.

b. Angles, sleeves, anchors, inserts, and ties required to be built into masonry work.

1.02 RELATED SECTIONS

A. Steel reinforcement: Division - 3

B. Concrete: Division - 3

C. Mortar for Engineered Masonry: Division - 4

1.03 REFERENCES

A. ACI 530, "Specifications for Masonry Structures"

B. National Concrete Masonry Association: Standard Specifications for the Design and Construction of Load Bearing Concrete Masonry, NCMA TR-75B.

C. Standard Building Code, latest edition.

1.04 QUALITY ASSURANCE

A. Allowable Tolerances:

1. Plumb: $\pm 1/8$ inch in 5'-0", non-cumulative.

2. Horizontal Warp: $\pm 1/8$ inch in 5'-0", non-cumulative.

3. Level Courses in Wall Panels: $\pm 1/4$ inch.

1.05 SUBMITTALS

- A. Manufacturer's product data indicating compliance with specified requirements.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Portland Cement: ASTM C150-84, Type I, white or gray, as required.
- B. Masonry Cement: ASTM C91-83a, Type II.
- C. Sand: 100 percent passing a #8 sieve, and not more than 15 percent passing a #100 sieve, ASTM C144-81.
- D. Water: City potable water.
- E. Wall Reinforcement: Truss type welded wire masonry reinforcement, every second course, 9 gauge deformed wire, minimum weight for 8 inch wall 187lbs. per 1000 lineal feet, .048 sq. in. effective cross sectional steel area sized for width of block.
 - 1. Comply with material requirements of ASTM Standard A 82 for high tensile steel.
- F. Anchors: Galvanized steel, minimum 12 inch long.
- G. Waterproofing: SEC #1, manufactured by SEC Manufacturing Co., or equivalent approved by Architect/ENGINEER.
- H. Concrete Block: Hollow load-bearing blocks, ASTM C-90, Grade N, Type I, moisture content requirements as stipulated in the guide specifications of the Florida Concrete and Products Assoc., Inc., weight of concrete more than 100 lbs. per cubic foot, compressive strength minimum 2000 p. s. i., nominal 8 inches by 8 inches by 16 inches.
 - 1. Use standard blocks specially designed for use at jambs, beams, as required.

PART 3 EXECUTION

3.01 MORTAR

- A. ASTM C270, Type S, with compressive strength of 1800 p. s. i. at twenty-eight (28) days, except that Type M with 2500 p. s. i. shall be used for reinforced masonry, when required by code and where indicated in the Drawings.
 - 1. Ingredients:
 - a. Portland cement, sand, hydrated lime and water, or masonry cement, sand, and water, with waterproofing added in accordance with the manufacturer's recommendations in mortar for exterior work.
- B. Mix mortar with minimum amount of water for satisfactory workability, and only in quantity needed for immediate use.
 - 1. The mason may adjust the consistency.
 - 2. Do not use mortar after the cement has begun its initial set.
 - 3. Re-tempering will not be permitted.
- C. Pointing and Cleaning: On completion, point up exposed masonry, including joints at concrete columns and beams.
 - 1. Fill holes and joints, remove loose mortar, cut out defective joints, and re-point only where necessary.
 - 2. Masonry surfaces which are to be exposed, either painted or unpainted, shall be thoroughly cleaned free of mortar and stains and the joints pointed to obtain a level, smooth surface.

3.02 ERECTION

- A. Protect masonry work from damage, both in appearance and structural stability.
 - 1. When rain is imminent and the work discontinued, cover the top of exposed masonry with a strong waterproof membrane, well secured in place.
 - 2. Replace walls damaged during construction by wind action or failure to provide adequate protection and bracing, at no expense to the OWNER.
- B. Lay masonry in a common running bond, with vertical joints centered over masonry units below.
- C. Do not step back unfinished work for joining with new work.
 - 1. Complete the last course laid between columns or walls before interrupting the day's work.

2. Tothing may be restored to only when specifically approved by the ENGINEER.
 3. Remove loose mortar before new work is started, and wet the exposed joint thoroughly before laying new work.
- D. Built-In metal frames, vent blocks, access doors, and anchor bolts required by other trades as the work progresses.
1. Check with other trades for these items.
- E. Bed each course solidly in mortar, under face shells and webs, with vertical joints, slushed full and breaking halfway over units in the course next below, unless stacked bond is specified or noted in the Drawings.
1. Terminate walls under soffits of existing beams or slab construction slightly below the soffit and fill the remaining space with mortar after roof dead loads have been brought to bear on the structure.
 2. Fill cavities with mortar in walls or partitions supporting plumbing fixtures or other items, voids at door jambs, and other spaces requiring grout fill, so that anchoring devices are in a solid field not less than 8 inches in every direction from their center.
 3. Reinforce exterior walls by placing wall reinforcement as indicated in the Drawings.
 4. Lap reinforcing sufficiently at splices (24 inches min.) to ensure continuity.
- F. Where block walls abut the vertical surface of a concrete member, provide cast-in-place recessed reglets for dovetail, corrugated, galvanized, 1 inch wide by 1/8-inch thick anchors at the end of each wall reinforcement run.
1. Where new block walls abut existing or previously erected concrete or masonry walls, secure anchors to existing wall by breaking through the block or chipping a recess in concrete and filling the space with grout, to prevent horizontal movement.
- G. Where walls with concrete filled voids are indicated, use regular concrete with pea rock aggregate and a compressive strength of 3000 psi at twenty-eight (28) days.
1. Comply with the requirements of Division 3.
- H. Do not wet concrete masonry units before laying.

1. Erect masonry plumb, true to line, level, and accurately spaced, with each course breaking joints with course next below, unless a stacked pattern is indicated in the Drawings.
 2. Keep bond pattern plumb throughout, and corners and reveals plumb and true.
 3. Use power drills and saws for penetration of plumbing and other pipes in exposed locations.
 4. Fill chases and knockouts after other work is installed in them to restore the integrity of the wall.
- I. For Exposed Masonry Finishes
1. Do not use cracked, spalled, or chipped blocks.
 2. Use extra care to set blocks plumb, with even, uniform tooled joints, and to keep mortar smears from the face of the block.
 3. Set courses level and line up the face of the units to provide a flat surface without warpage or breaks at the joints.
 4. Strike the excess mortar from the joints with a trowel run parallel to the joint to avoid smearing the block face.
 5. Joint thickness: 3/8-inch.
 6. Keep setting mortar from the face of the block and wipe excess away before it sets.
 - a. The blocks will remain exposed and painted in the finished condition.
 - b. Replace blocks defaced by excessive mortar smears that interfere with the uniform texture and color of the wall.

END OF SECTION

SECTION 04220

CONCRETE MASONRY UNITS

PART 1 GENERAL

1.01 SUMMARY

- A. Provide materials, equipment, and labor required to complete the concrete masonry work in accordance with the Drawings and Specifications.
- B. Coordinate work with that of other trades.

1.02 STORAGE

- A. Store materials under cover, in dry place, and in a manner to prevent damage or straining.
- B. Deliver blocks to site dry in compliance with specification limitation for moisture and kept dry by storing off ground and under cover.
- C. Remove blocks from site, that have become wet.

1.03 CERTIFICATION

- A. Furnish certificates from manufacturer in triplicate prior to delivery of concrete masonry units to the job site.
 - 1. Include on each certificate signature of an authorized officer of the manufacturing company, CONTRACTOR's name and address, project location, quantities, and date of shipment.
 - 2. Certify units for compliance with these Specifications.

1.04 SAMPLES

- A. Submit to the OWNER for approval in accordance with the Special Conditions, two (2) samples each of proposed masonry units, reinforcements, ties, control joint material and fillers.
- B. Re-submit as required until approved.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

A. Concrete masonry units (C. M. U.) are load-bearing blocks conforming to ASTM C 90, Grade N-1.

1. Obtain units from one manufacturer to insure even color and texture.
2. Provide nominal face dimensions of eight (8) inches by sixteen (16) inches.

2.02 SHAPES

A. Provide special shapes as required to complete concrete masonry work.

2.03 MORTAR

A. Provide mortar as specified under Division 4 for the specific installation required.

PART 3 EXECUTION

3.01 JOB LAYOUTS

A. Lay out coursing horizontally and vertically as shown in the Drawings.

1. Avoid block cuts less than four (4) inches wide.
2. Provide eight (8) inches vertical coursing.
3. Provide 3/8-inch thick joints.
4. Bed joints shall be indicated to receive masonry joint reinforcing, ties, and/or anchors.

3.02 WORKMANSHIP

A. Lay masonry plumb and true to line.

1. Keep bond plumb throughout.
2. Avoid over plumbing and pounding of corners and jambs to fit stretcher units after they are set in position.
3. Remove and replace hardened mortar where adjustment must be made after mortar has started to set.

4. Use concrete brick to course out walls concealed in the finished work.
 5. Cut masonry units dry.
 6. Use a masonry saws for cuts exposed to the finished work.
- B. Clean equipment used in placing, moving, and storing mortar, at end of each day's work.
1. Immediately before placing metal reinforcing, anchors, and ties, remove loose rust, tie wires and tags and other foreign matter that will degrade the bond.

3.03 REINFORCING

- A. Reinforce horizontal joints continuously with ends lapped six (6) inches and laps staggered vertically.
- B. Provide prefabricated corners and tee at intersection walls.
- C. Reinforce above and below openings in the bed joint immediately above and below.
- D. Extend reinforcing two (2) feet behind jambs.
- E. Space horizontal reinforcing at sixteen (16) inches on-center vertically.

3.04 ANCHORS AND TIES

- A. Place anchors and ties a minimum of sixteen (16) inches vertically and twenty-four (24) inches horizontally, unless otherwise indicated.
- B. Make anchors and ties for masonry into adjacent concrete walls at the specified spacing.

3.05 BOND

- A. Lay masonry units in running bond by lapping unit in successive courses a distance of one-half (1/2) a unit.
1. Level courses with joints of uniform width.
 2. Finish joints flush.

3. Units shall have full mortar coverage of the face shells in both the horizontal and vertical joints.
4. Point joints solid with mortar on both sides and wall.
5. Firmly compact joints in exposed work, with a pointing tool when partially set.

3.06 MORTARING

- A. Lay courses in a full bed of mortar.
 1. Lay units with mortar applied to face shell of block previously laid as well as to block to be laid to insure well-filled joints.
- B. Join new masonry to existing or partially set work by first cleaning loose mortar and joints.
 1. When it is necessary to stop a horizontal run, rack back one-half (1/2) block length in each course; tothing shall not be permitted.
- C. Strike joints flush in block in unexposed spaces.
 1. Strike joints of block exposed in the finished work and tool when partially set with a glass or steel, twenty-four (24) inch long tool.
 2. Use a tool approximately twice the size of the joint.
- D. Fill solidly hollow metal frames, mullions and spaces around built-in items with grout.
- E. Provide eight (8) inch minimum of solid end bearing the full height of wall for lintels.
- F. Cut and patch finished masonry to accommodate work of other trades in a manner that will not damage or mar appearance of adjoining masonry.
- G. Point holes in masonry.
 1. Cut out and point up defective joints.

3.07 CONTROL JOINTS

- A. Install control joints as detailed and located as shown in the Drawings.

- B. Locate joints only as directed with a maximum length, horizontally, between vertical control joints of thirty (30) feet.
- C. Make joints equal in width to the standard mortar joint.
- D. Provide discontinuous horizontal joint enforcing at control joints.

3.08 CHASES

- A. Construct masonry slots, chases, or openings required for the proper installation of the work of other Sections as indicated in the Drawings or in accordance with information furnished before the work is started at the points affected.
- B. Do not cut chase into a wall constructed of hollow units after it is built, except as directed and approved by the OWNER.

3.09 PROTECTED

- A. Brush surfaces as work progresses and maintained as clean as it is practicable.
- B. Rake back unfinished work where possible, and toothed only where absolutely necessary.
- C. Cover and protect walls, before leaving fresh or unfinished work, against damage by means of waterproof paper, tarpaulins, boards, or other means.

3.10 CLEANUP

- A. Clean mortar and grout drippings from exposed masonry and adjacent surfaces as soon as possible to prevent surfaces from being permanently stained.
- B. Remove drippings and smears before mortar or grout sets or hardens.
- C. Remove mortar extruded beyond face of walls or partitions.

3.11 HOT WEATHER CONSTRUCTION

- A. Provide masonry construction in hot weather conforming to the applicable requirements of the Florida Building Code, latest edition, unless otherwise specified herein.

END OF SECTION

SECTION 15105

PIPES AND TUBES

PART 1 GENERAL

1.01 SUMMARY

- A. Furnish, install, place in operation, and test specified piping complete with fittings, wall pipes, exterior wall sleeves, couplings, adapters, hanger supports and other appurtenances as shown in the Drawings and Specifications as required for a complete installation.
- B. Pipe and fittings covered by these specifications shall be furnished by fully qualified manufacturers experienced in the fabrication, casting and manufacture of the pipe materials specified herein.
 - 1. The pipe and fittings shall be designed, fabricated and installed in accordance with the best practice of the trade and the standards specified herein.
- C. No material furnished under this specification shall be shipped to the job site until submittals have been reviewed.
- D. Each submittal shall be identified as specified in the General Conditions.

1.02 RELATED SECTIONS

- A. Clearing and Grubbing - Section 02231
- B. Earthwork - Section 02300
- C. Construction Photographs and Video Recordings - Section 01321
- D. Valves - Section 15110
- E. Submittal Procedures - Section 01330
- F. Shop Drawings, Product Data, and Samples - Section 01334

1.03 SUBMITTALS

- A. Submit Shop Drawings in accordance with the procedures and requirements set forth in the Specifications.
- B. Each submittal shall be complete incorporating information and data listed

herein and additional information required to evaluate the proposed piping material's compliance with the Contract Documents.

1. Partial or incomplete submissions will be returned to the CONTRACTOR without review.

C. Data to be submitted shall include, but not be limited to:

1. Catalog Data consisting of specifications, illustrations and a parts schedule that identifies the materials to be used for the various piping components and accessories.
 - a. The illustrations shall be in sufficient detail to serve as a guide for assembly and disassembly.
2. Complete layout and installation drawings with clearly marked dimensions.
 - a. Piece numbers, which are coordinated with the tabulated pipe layout schedule, shall be clearly marked.
 - b. Scale and size of the drawings shall conform to the specifications in the General Conditions.
 - c. Piping layout drawings shall indicate the following information; pipe supports, location, support type, hanger rod size, insert type and the load on the hanger in pounds.
3. Weight of all component parts.
4. Design calculations where specified.
5. Tabulated pipe layout schedule that shall include the following information for pipe and fittings, restrained joints, service, pipe size, working pressure, wall thickness, and piece number.

1.04 Manufacturer's Recommendations

- A. Where installation procedures are required to be in conformance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the ENGINEER prior to the installation.

1.05 MEASUREMENT AND PAYMENT

- A. Measurement and payment will be based upon work completed and accepted in accordance with the Drawings and Specifications.

1. No separate payment will be made for excavation, trenching, backfilling, leakage tests or other incidental items of work not shown in the BID SCHEDULE and authorized by the ENGINEER, in writing, as extra work.

1.06 GUARANTEE

- A. Guarantee materials and equipment furnished and installed, and work performed for a period of one (1) year from the date of substantial completion.
 1. The guarantee shall stipulate that the completed system is free from all defects due to faulty materials or workmanship and promptly make such corrections as may be necessary by reason of such defects including the repairs of any damage to other parts of the system resulting from such defects.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Pipe and fittings shall be marked with the manufacturer's name or trade mark, size, class or pressure rating, and the date of manufacture in accordance with the standards specified herein.
- B. Bolts and nuts shall be hexagonal conforming to ANSI B18.2.
- C. No raised face flanges in conformance with ANSI 816.5 class 150 will be acceptable.
 1. Raised faces shall be milled flat.
 2. The only exceptions to this rule are ANSI B16.5 class 300 pound flanges where specified and the lap joint flanges for the stainless steel pipe for low pressure air service and light wall stainless steel pipe.
- D. Gasket shall be full-faced type conforming to ANSI B16.21 except for lap joints and 300 lb. flanges.
- E. The equipment shall include, but not be limited to the following:

Paragraph	Title
2.02	Ductile Iron Pipe (DIP) and Fittings
2.03	Polyvinylchloride (PVC) Pipe
2.04	Polyvinylchloride (PVC) Pressure Pipe
2.05	High Density Polyethylene (HDPE) Pipe
2.06	Sleeve Type Couplings

2.07	Grooved Couplings
2.08	Flanged Adapters
2.09	Wall Sleeves, Pipes, and Castings
2.10	Wall Penetration Seal
2.11	Unions
2.12	Insulating Type Fittings

2.02 DUCTILE IRON PIPE (DIP) AND FITTINGS

A. Ductile iron pipe shall conform to the requirements of AWWA/ANSI C151/A21.51.

1. Provide pipe with a wall thickness for buried and encased piping conforming to the following:

Size	Pressure Class
4-inch through 6-inch	350
8-inch through 20-inch	250
24-inch	200
30-inch through 64-inch	150

2. Subject each ductile iron pipe to a hydrostatic test of at least 500 psi for 10 or more seconds.
 - a. Subject pipes of diameter 18 inches or larger to a continuing hydrostatic test in which the pressure is elevated from 500 psi to a peak pressure that induces a stress in the pipe wall equivalent to 75% of the minimum specified yield of ductile iron (42,000 psi) as calculated by:

$$P = \frac{2 \times f_s \times t}{d} \text{ where:}$$

P	=	peak hydrostatic pressure
f_s	=	stress in pipe wall during hydrostatic test (0.75 times the minimum yield strength of the ductile iron in tension)
t	=	nominal wall thickness, inches
d	=	outside diameter, inches

B. The pressure classes indicated above are the minimum permitted unless noted elsewhere.

C. Fittings for use with the ductile iron pipe specified above shall be ductile iron.

1. Cast ductile-iron fittings shall be pressure rated at 250 psi, minimum.
2. Fittings with mechanical joints, flange joints and push-on joints shall conform

to AWWA/ANSI C153/A21.53.

3. In addition, fittings with mechanical joints and push-on joints shall conform to AWWA/ANSI C111/A21.11, except that neoprene gaskets shall be used for the joint.
- D. Ductile iron pipe and fittings intended for interior use and for use above grade shall be flanged.
- E. Ductile iron pipe for use below grade shall be push-on joint and thrust restrained, where necessary, as listed on the drawing details.
- F. Ductile iron pipe for use below grade shall be thrust restrained mechanical joint, where indicated on the drawings or required for pipe crossing right-of-ways by their governing agencies.
- G. Ductile iron pipe with threaded flanges shall be manufactured in accordance with AWWA/ANSI C115/A21.15, unless otherwise specified, and with the provisions contained herein for ductile iron pipe except that wall thickness shall not be less than Class 53 unless a higher class is noted.
- H. Flanges shall be ANSI Standard Class 125, plain faced and drilled, in accordance with ANSI B16.1.
 1. Flanges on ductile iron pipe and fittings shall be ductile iron and shall be provided by the pipe manufacturer.
 2. Joint materials for flanged pipe and fittings shall be ANSI sized and approved and shall consist of hot dip galvanized bolts and nuts and 1/8 inch thick full-face neoprene gaskets.
- I. Mechanical joint pipe and fittings shall be furnished with high strength cast iron or alloy steel tee head bolts and hex nuts, with composition, dimensions and threading in accordance with AWWA/ANSI C111/A21.11.
 1. Segmented glands will not be acceptable.
 2. Bolt holes for mechanical joints shall be equally spaced, and shall straddle the vertical centerline.
- J. Thrust restrained mechanical joints for ductile iron pipe and fittings shall utilize a restraining follower gland, which when actuated imparts a multiple wedging action against the pipe, increasing its resistance as the pressure increases.
 1. Glands shall be manufactured of ductile iron conforming to ASTM A536.
 - a. Restraining devices shall be of ductile iron heat treated to a minimum

hardness of 370 BHN.

- 1) Dimensions shall be such that the gland can be used with the standardized mechanical joint bell and tee head bolts.
 - b. Twist off nuts, sized same as tee head bolts, shall be used to insure proper actuating of restraining devices.
 - c. The mechanical joint shall have a working pressure of at least 250 psi with a minimum safety factor of 2:1 and shall be MEGALUG Series 1100 as manufactured by EBAA Iron, Inc., or equal.
- K. Alternatively, thrust restrained mechanical joints for ductile iron pipe and fittings may be TR-FLEX as manufactured by U.S. Pipe and Foundry, Lok-Ring by the American Ductile Iron Pipe Co., Locked Mechanical Joint F-127D or Super Lock Joint by the Clow Corporation.
1. The restraining components, when not cast integrally with the pipe and fittings, shall be ductile iron or a high strength non-corrosive alloy steel.
 2. Tee head bolts and hexagonal nuts for restrained joints in pipe and fittings shall be of high strength cast iron or alloy steel, with composition, dimensions and threading as specified in AWWA/ANSI C111/A21.11, except that the length of the bolts shall meet the requirements for the restrained joint design.
 3. For cut grooved retainers, the thickness of barrel left after grooving shall not be less than the nominal wall thickness of equal sized non-restrained pipe as specified here in above for the centrifugally cast ductile iron pipe.
 4. The gasket and joint accessories shall be shipped in suitable protective containers.
 5. Each restrained joint and the pipe and fitting of which it is a part, shall be designed to withstand the axial thrust from an internal pipeline pressure of at least 150 psi at bulkhead conditions without reduction because of its position in the pipeline nor from support by external thrust blocks.
 6. Restrained joint pipe and fittings shall be capable of being deflected after assembly.
- L. Provide cement-mortar coating for Water Main ductile-iron pipe and fittings in accordance with AWWA/ANSI C104/A21.4 and ANSI/NSF Standard 61 for potable water contact.
1. The interior of the pipe shall receive the standard thickness of the protective cement-mortar coating, unless otherwise specified.

2. The coating shall not be applied in the gasket grooves.
- M. Provide ceramic epoxy coating for Sanitary Sewer Force main ductile-iron pipe and fittings in conform with Method A of ASTM E-96-66, Procedure A, ASTM D714-56, ASTM D 2794, and ASTM G 53-77.
1. The interior of the pipe shall receive 40 mils dry film thickness of the protective ceramic epoxy coating.
 2. The coating shall not be applied in the gasket grooves.
 - a. Special attention shall be given to the coating of fittings.
 3. Coating shall be applied to bare metal.
 4. Coating shall extend to the faces of flanges, to the end of spigots, or to the shoulder of hubs, as the case may be.
- N. Asphaltic coating shall be applied to the exterior of ductile iron pipe and fittings intended for buried service and shall conform to AWWA/ANSI C151/ A21.51.
1. Ductile iron pipe and fittings intended for interior use and for use above grade shall receive a prime coat compatible with the coating system specified in Paints and Coatings - 09900.

2.03 POLYVINYLCHLORIDE (PVC) PIPE

- A. PVC pipe shall conform to ASTM D1785 and shall be made from a 12454B compound which is a Type 1, Grade 1 plastic as defined by ASTM D1784.
1. Rerun or reclaimed materials will not be acceptable.
- B. Pipe to be used for potable water applications shall comply with the National Sanitation Foundation Standard No. 14 and shall have markings on the pipe to indicate that it has been tested and is in compliance.
- C. Wall Thickness shall be a minimum of Schedule 80, unless otherwise noted in Schedule 15D.
- D. Pipe joints shall be provided as specified in the pipe schedule.
1. Where required, socket type adapters and socket type flange adapters shall be provided.
- E. PVC pipe intended for buried service shall be socket weld joint.
- F. Socket type joints shall be made up in accordance with ASTM D2855 with a

PVC solvent cement complying with ASTM D2564.

1. The cement shall have a minimum viscosity of 2000 cps.
- G. Where flanges are to be used, flanges shall be van stone type with full-faced vinyl gaskets.
- H. Socket type pipe fittings for schedule 80 pipe shall conform to ASTM D2467.
- I. Fittings shall have the same schedule designation, joint type and be made of the same PVC compound as the connecting pipe.

2.04 POLYVINYLCHLORIDE (PVC) PRESSURE PIPE

- A. Joints shall be bell and spigot type using flexible elastomeric seals conforming to AWWA C900, DR 18 with ductile iron fittings.
- B. Restraining PVC pipe to mechanical joint DIP fittings:
1. The mechanical joint restraint shall have working pressure of at least 150 psi with a minimum safety factor of 2:1.
 2. Retainer glands shall consist of a plurality of individually activated gripping surfaces to maximize restraint capability. The glands shall have serrations on the I.D. sufficient to hold the working and test pressures.
 3. Dimensions of the glands shall be such that it can be used with standardized mechanical joint bell and tee-head bolts conforming to AWWA/ANSI C111/A21.11 and AWWA/ANSI C153/A21.53.
 4. Twist off nuts, sized same as tee-head bolts, shall be used to insure proper actuating of the restraining devices.
- C. Retainer glands for 4 through 12-inch mechanical joint fittings shall be MEGALUG Series 2000 PV as manufactured by EBAA Iron, Inc., or approved equal.
- D. Retainer glands for 14 through 30-inch mechanical joint fittings shall be MEGALUG Series 1000 PV as manufactured by EBAA Iron, Inc., or approved equal.

2.05 HIGH DENSITY POLYETHYLENE (HDPE) PIPE

- A. This specification covers high density polyethylene (PE 3408) pressure pipe primarily intended for transportation of potable water either buried or above grade.

B. Referenced Standards:

1. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, ½ inch through 3 inch For Water Services.
2. AWWA C906 - Polyethylene (PE) Pressure Pipe and Fittings, 4 inch through 63 inch For Water Distribution.
3. ASTM D2683 - Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing.
4. ASTM B3261 - Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
5. ASTM D3350 - Standard Specification for Polyethylene Plastic Pipe Fittings Materials.
6. PPI TR-3 - Policies and Procedures for Developing Recommended Hydrostatic Design Stresses for Thermoplastic Pipe Materials.
7. PPI TR-4 - Recommended Hydrostatic Strength and Design Stresses for Thermoplastic Pipe and Fittings Compounds.
8. NSF Standard # 14 - Plastic Piping Components and Related Materials.

C. Qualification of Manufacturers:

1. The Manufacturer shall have manufacturing and quality control facilities capable of producing and assuring the quality of the pipe and fittings required by these specifications.
2. Given reasonable notice, the Manufacturer's production facilities shall be open for inspection by the CITY or an authorized representative.
3. Qualified manufacturers shall be approved by the ENGINEER.
4. Approved manufacturers include DriscoPlex™, ISCO, or approved equal.

D. Material

1. Materials used for the manufacturing of polyethylene pipe and fittings shall be PE 3408 High Density Polyethylene (HDPE) meeting the ASTM D3350 cell classification of 345434C.
2. The material shall have a minimum Hydrostatic Design Basis (HDB) of 1600 psi at 73°F when tested in accordance with PPI TR-3 and shall be listed in the name of the pipe and fitting manufacturer in PPI TR-4.

3. The material used in production of potable water pipe shall be approved by the National Sanitation Foundation (NSF).
4. The Manufacturer shall certify that the materials used to manufacture pipe and fittings meet the requirements of this specification.

E. Pipe:

1. Polyethylene pipe ½” through 3” shall be DR 11, iron pipe size (IPS), and manufactured in accordance with AWWA C901, unless otherwise noted.
2. Polyethylene pipe 4” though 12” shall be DR 17, ductile iron pipe size (DIPS), and in accordance with AWWA C906, unless otherwise noted.
2. Permanent identification of piping service shall be provided by co-extruding longitudinal blue stripes into the outside surface of the pipe.
 - a. The striping material shall be the same material as the pipe material except for color.
 - b. Stripes printed or painted on the pipe outside surfaces shall not be acceptable

F. Fittings:

1. Polyethylene fittings shall be made from material meeting the same requirements as the pipe.
 - a. Polyethylene fittings shall be molded or fabricated by the manufacturer of the pipe.
2. Where applicable, fittings shall meet the requirements of AWWA C906.
3. Molded fittings shall be manufactured in accordance with either ASTM D2683 (socket fused) or ASTM D3261 (butt fused) and shall be so marked.
4. Mechanical Fittings used with polyethylene pipe shall be specifically designed for, or tested and found to be acceptable for use with polyethylene pipe.
 - a. Mechanical Fittings designed for other materials shall not be used unless authorized by the Mechanical Fitting Manufacturer.
 - b. Special precaution may exist with certain mechanical fittings or additional components may be required - consult the manufacturer of the fittings prior to use.

G. Manufacturer's Quality Control

1. The pipe and fittings Manufacturer shall have an established quality control program responsible for inspecting incoming and outgoing materials.
 - a. Incoming polyethylene materials shall be inspected for density, melt flow rate, and contamination.
 - b. The cell classification properties of the material shall be certified by the supplier.
 - c. Incoming materials shall be approved by Quality Control before processing into finished goods.
 - d. Outgoing products shall be tested as required in AWWA C901 or C906.
2. The Manufacturer shall maintain permanent Quality Control (QC) and Quality Assurance (QA) records.
 - a. Certification or copy of these records shall be made available to the purchaser on request.

2.06 SLEEVE TYPE COUPLINGS

- A. Sleeve couplings shall be Style 38 for either steel, or ductile iron pipe as manufactured by Dresser Manufacturing Division or equivalent models by Smith Blair, Rockwell Industries, or equal.
 1. Sleeve couplings shall be Style 62 for joining steel pipes to ductile iron pipe as manufactured by Dresser or equivalent models by Smith Blair, Rockwell Industries, or equal.
 2. Applications with stainless steel pipe shall be fabricated of type 316 stainless steel for components except the gaskets.
 3. Gasket material shall be compatible with the service application especially with respect to temperature requirements and chemical compatibility.
- B. The interior of the middle ring shall be painted with two coats of asphaltic coating suitable for the service intended.
 1. The middle ring shall not have a pipe stop.

2.07 GROOVED COUPLINGS

- A. Grooved couplings shall be in accordance with AWWA C606.

- B. For ductile iron pipe with nominal pipe sizes ranging from three (3) inches to twenty-four (24) inches, groove couplings shall be style 31 by Victualic, or equal.
 - 1. The joint grooving dimensions shall be in conformance to the rigid joint specifications.
 - 2. The gasket shall be a flush-seal type.
- C. Pipe wall thickness for ductile iron pipe shall be in accordance with AWWA C606.

2.08 FLANGED ADAPTERS

- A. Flanged adapters for ductile iron piping shall have either steel or gray iron bodies; models 912 or 913 as manufactured by Rockwell Industries, Styles 127 and 128 by Dresser Ind., Clow, or equal.
- B. Flange adapters shall have a minimum rated working pressure of 175 psig for gray iron body types and 150 psig for steel body types, and shall conform to applicable requirements of AWWA/ANSI C115/A21.15 and AWWA/ANSI C111/A21.11.
 - 1. Bolt hole and bolt patterns shall conform to the mating flange patterns as specified in the piping paragraphs.
 - 2. Bolts, nuts and flange gaskets shall conform to the specifications for the adjacent piping.
- C. Pipe shall be anchored by using anchor studs drilled into the coupling and connected pipe for nominal pipe sizes to twelve (12) inches.
 - 1. For nominal pipe sizes above twelve (12) inches, pipe shall be restrained by harnesses.

2.09 WALL SLEEVES, PIPES, AND CASTINGS

- A. Wall pipes or wall sleeves shall be provided in accordance with the following schedule, except where otherwise noted, when passing through new concrete or masonry structures:

From	To	Fitting
Dry Interior	Dry Interior	Wall Sleeve with Penetration Seal
Dry Interior	Dry Exterior	Wall Pipe
Dry Interior	Wet Tank	Wall Pipe
Dry Interior	Earth Exterior	Wall Pipe

Wet Tank	Earth Exterior	Wall Pipe
Wet Tank	Wet Tank	Wall Pipe
Wet Tank	Dry Exterior	Wall Pipe

- B. Transitions between interior piping materials and yard piping materials, which occur in the structural walls, shall be furnished in accordance with the details shown on the Drawings.
1. Special adapters or wall fittings shall be provided by the piping manufacturer.
- C. Except where noted, wall pipes and castings shall be equipped with a water stop and shall be ductile or gray cast iron for piping with nominal pipe sizes to thirty (30) inches.
- D. Wall sleeves shall be either galvanized steel, ductile or gray cast iron pipe and shall have a water stop where required.
1. For wall sleeves through floors, the top of the sleeve shall be raised 4-inches above finished floor elevation.
- E. Wall pipes shall be of sufficient length to pass through the wall in accordance with the details on the Drawings and shall conform to the details shown on the Drawings.
- F. The end of the wall pipes shall be of a type consistent with the piping to be connected to them and shall conform to their standards and specifications.
- G. Wall pipes shall have the same interior protection as specified for the connecting piping.
- H. Exterior protection shall be as specified for the yard or underwater piping.

2.10 WALL PENETRATION SEAL

- A. Wall penetration seals shall be a modular mechanical type, consisting of interlocking sealing links of an elastomer such as ethylene propylene and piene monomer (EPDM) shaped to continuously fill the annular space between the pipe and wall sleeve.
1. Links shall be loosely assembled with bolts to form a continuous rubber belt around the pipe with a pressure plate under each bolt head and nut.
 2. After the seal assembly is positioned in the sleeve, tightening of the bolts shall cause the rubber sealing elements to expand and provide a watertight seal between the pipe and sleeve.
 3. The watertight seal shall be effective against a hydrostatic head of at least

40 feet.

4. The seal shall also be constructed so as to provide electrical insulation between the pipe and wall, thus reducing chances of cathodic reaction between these two members.
 5. Metal hardware shall be type 18-8 stainless steel.
 6. The seal shall be similar to the Link-Seal modular wall and casing seal manufactured by Thunderline Corporation or the equivalent by other manufacturers.
- B. Select required inside diameter of each wall opening or sleeve for each pipe and the correct sizing of seal.

2.11 UNIONS

- A. For ductile iron, carbon steel, and gray cast iron pipes assembled with threaded joints and malleable iron fittings, unions shall conform to ANSI 816.39.
- B. For copper piping, unions shall have ground joints and conform to ANSI B16.18.
- C. For PVC and CPVC piping, unions shall be socket weld type with Viton O-ring.

2.12 INSULATING TYPE FITTINGS

- A. When joining two pipes of dissimilar materials, insulating type fittings shall be used to prevent galvanic action.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Furnish labor, tools, materials, and equipment necessary for installation and jointing of the pipe.
 1. Piping shall be installed in accordance with the Drawings in a neat workmanlike manner, and shall be set for accurate line and elevation.
 2. Piping shall be thoroughly cleaned before installation, and care shall be taken to keep the piping clean throughout the installation.
- B. Before setting wall sleeves, pipes, castings, and pipes to be cast in place, check Drawings, figures, and shop drawings, which may have a direct bearing on the pipe locations.
 1. Assume responsibility for the proper location of the pipes and

appurtenances during the construction of and renovation of the tanks and structures.

- C. Piping shall be attached to pumps, valves, or equipment in accordance with the respective manufacturers' recommendations.
- D. For piping assembled with threaded, solvent cemented, welded or soldered joints, liberal use of unions shall be made.
 - 1. Unions shall be provided close to main pieces of equipment and in branch lines to permit ready dismantling of piping without disturbing main pipelines or adjacent branch lines.
 - 2. A minimum of one union per straight run of pipe between fitting and/or valves with multiple lengths of pipe shall be used.
- E. Elbows between 45 and 90 degrees, for scum and sludge lines, shall be long radius type, unless designated otherwise on the Drawings.
- F. Changes in directions or elevations shall be made with fittings except for Flexible Process Tubing or as noted in the piping paragraphs.

3.01 DELIVERY, STORAGE, AND HANDLING

- A. Material delivered to the site shall be inspected for damage, unloaded and stored with a minimum of handling.
 - 1. Material shall be stored in accordance with the manufacturer's recommendations.
 - 2. The insides of pipe and fittings shall be kept free from dirt and debris.
 - 3. Gasket and plastic materials shall be kept protected from exposure to direct sunlight over extended periods.
 - 4. Solvents, solvent compounds, lubricants, elastomeric gaskets, and similar material required to install the pipes shall be stored in accordance with the manufacturer's recommendations and shall be discarded if the storage period exceeds the recommended shelf or pot life.
 - 5. Storage facilities for plastic pipe, fittings, joint material and solvents shall be classified and marked in accordance with NAPA No. 704, with classification as indicated in NAPA Nos. 49 and 325M.
 - 6. Material shall be handled in such a manner as to insure delivery to the trench in a sound, undamaged condition.
 - 7. Pipes shall be carried to the trench, not dragged.

3.02 SHIPPING, HANDLING, AND STORAGE

- A. Special care in handling shall be exercised during delivery, distribution and storage of pipe to avoid damage and setting up stresses.
 - 1. Damaged pipe will be rejected and shall be replaced at the CONTRACTOR's expense.
 - 2. Pipe and specials stored prior to use shall be stored in such a manner as to keep the interior free from dirt and foreign matter.
- B. No pipe shall be dropped from cars or trucks to the ground.
 - 1. Pipe shall be carefully lowered to the ground by mechanical means.
 - 2. In shipping, pipe and fittings shall be blocked in such manner as to prevent damage to castings or lining.
 - 3. Broken or chipped lining shall be carefully patched.
 - 4. Where it is impossible to repair broken or damaged lining in pipe because of its size, the pipe shall be rejected as unfit for use.
- C. Mechanical joint pipe shall be laid with a 1/8-inch space between the spigot and shoulder of pocket.

3.03 LAYING PIPE

- A. Proper and suitable tools and appliances for the safe convenient handling and laying of pipe shall be used and shall, in general, agree with manufacturer's recommendations.
 - 1. At the time of laying, the pipe shall be examined carefully for defects, and should pipe be discovered to be defective after being laid, it shall be removed and replaced with sound pipe at the CONTRACTOR'S expense.
- B. Perform earthwork including excavation, backfill, bedding, compaction, sheeting, shoring and bracing, denaturing and grading in accordance with Site Preparation - Section 02200.
- C. Upon satisfactory excavation of the pipe trench and completion of the pipe bedding, a continuous trough for the pipe barrel and recesses for the pipe bells, or couplings, shall be excavated by hand digging.
 - 1. When the pipe is laid in the prepared trench, true to line and grade, the pipe barrel shall receive continuous, uniform support and no pressure shall be exerted on the pipe joints from the trench bottom.

- D. Piping 3 inches and larger shall be provided with two 4 foot lengths of pipe for the first two joints outside a building or tank wall.
- E. Pipe shall be installed in accordance with the manufacturer's recommendation.
 - 1. Before being lowered into the trench, the pipes and accessories shall be carefully examined and the interior of the pipes shall be thoroughly cleaned of foreign matter and other approved methods.
 - 2. At the close of each workday and during suspension of work, a suitable stopper shall be placed in the end of the pipe last laid to prevent mud or other foreign material from entering the pipe.
- F. Lines shall be laid straight and depth of cover shall be maintained uniform with respect to finish grade, whether grading is completed or proposed at time of pipe installation.
 - 1. Where a grade or slope is shown on the Drawings, use laser based surveying instruments to maintain alignment and grade.
 - 2. At least one elevation shot shall be taken on each length of pipe and recorded.
 - 3. No abrupt changes in direction or grade will be allowed.
- G. Concrete thrust blocks shall be provided in addition to restrained joint piping where indicated on the Drawings.
- H. After pipe has been laid, inspected and found satisfactory, sufficient backfill shall be placed along the pipe barrel to hold the pipe securely in place during the conduction of the hydrostatic test.
 - 1. No backfill shall be placed over the joints until the hydrostatic test is satisfactorily completed, leaving the joints exposed to view for the detection of visible leaks.
 - 2. Upon satisfactory completion of the hydrostatic test, backfilling of the trench shall be completed.

3.04 INSTALLATION OF DUCTILE IRON PIPE AND FITTINGS

- A. Unless otherwise directed, ductile iron pipe shall be laid with the bell ends facing upstream in the normal direction of flow and in the direction of laying.
 - 1. For lines on an appreciable slope, the bells shall, at the discretion of the ENGINEER, face upgrade.

- B. Push-on, thrust restrained and mechanical joints in ductile cast iron pipe and fittings shall be made in accordance with the manufacturer's standards except as otherwise specified herein.
1. Joints between push-on and mechanical joint pipe and/or fittings shall be made in accordance with AWWA C600, except that deflection at joints shall not exceed one-half of the manufacturer's recommended allowable deflection, or one-half of the allowable deflection specified in AWWA C600, whichever is the lesser amount.
- C. Before laying push-on, thrust restrained and mechanical joint pipe and fittings, lumps, blisters, and excess bituminous coating shall be removed from the bell and spigot ends.
1. The outside of each spigot and the inside of each bell shall be wire brushed, and wiped clean and dry.
 2. The entire gasket groove area shall be free of bumps or foreign matter, which might displace the gasket.
 3. The cleaned spigot and gasket shall not be allowed to touch the trench walls or trench bottom.
 4. Vegetable soap lubricant shall be applied in accordance with the pipe manufacturer's recommendations, to aid in making the joint.
 5. The workmen shall exercise caution to prevent damage to the gasket or the adherence of grease or particles of sand or dirt.
 6. Deflections shall only be made after the joint has been assembled.
- D. Flanged joints shall only be used where indicated on the plans.
1. Before making up flanged joints in ductile iron pipe and fittings, the back of each flange under the bolt heads and the face of each flange shall have lumps, blisters, and excess bituminous coating removed and shall be wire brushed and wiped clean and dry.
 2. Flange faces shall be kept clean and dry when making up the joint, and the workmen shall exercise caution to prevent damage to the gasket or the adherence of grease or particles of sand or dirt.
 3. Bolts and nuts shall be tightened by opposites in order to keep flange faces square with each other, and to insure that bolt stresses are evenly distributed.

- E. Bolts and nuts in thrust restrained, mechanical and flanged joints shall be tightened in accordance with the recommendations of the pipe manufacturer for a leak-free joint.
 - 1. The mechanics shall exercise caution to prevent overstress.
 - 2. Torque wrenches shall be used until, in the opinion of the ENGINEER, the mechanics have become accustomed to the proper amount of pressure to apply on standard wrenches.
- F. Cutting of the ductile iron pipe for inserting valves and fittings shall be done by the CONTRACTOR in a neat and workmanlike manner without damage to the pipe, the lining, or the coating.
 - 1. Pipe 16 inches and larger in diameter shall be cut with a mechanical pipe saw.
 - 2. After cutting the pipe, the plain end shall be beveled with a heavy file or grinder to remove sharp edges.
- G. Areas of loose or damaged polyethylene lining associated with field cutting shall be repaired as recommended by the pipe manufacturer.
 - 1. Repair methods shall be as recommended by the manufacturer and shall be submitted to the ENGINEER for review.
- H. Work within the pipe shall be performed with care to prevent damage to the lining.
 - 1. Damaged lining shall be repaired or the pipe section replaced as required by the ENGINEER.
 - 2. No cable, lifting arms or other devices shall be inserted into the pipe.
 - 3. Lifting, pulling or pushing mechanisms shall be applied to the exterior of the pipe barrel.
- I. Homing the pipe shall be accomplished by the use of a hydraulic or mechanical pulling device, unless otherwise approved by the ENGINEER.
 - 1. No pipe shall be driven or struck in order to seat it home.
- J. Cleaning methods shall meet the ENGINEER's approval, and must be sufficient to remove silt, rocks, or other debris, which may have entered the pipeline during its installation.
- K. Maximum tap size for corporation stops (Mueller thread) in ductile iron pipe shall be 1½ -inches.

3.05 INSTALLATION OF POLYVINYLCHLORIDE (PVC) PIPE

- A. PVC pipes shall be installed in accordance with ASTM D2321.

3.06 HDPE INSTALLATION AND FUSION TESTING

- A. The Manufacturer shall supply an Installation Manual to the ENGINEER which outlines and guideline for handling, joining, installation, embedding and testing of polyethylene pipeline.
 - 1. These guidelines shall be used as reference material for the ENGINEER in the determination of the required procedures.
- B. Joints between plain ends of polyethylene pipe shall be made by butt fusion when possible.
 - 1. The Pipe Manufacturer's fusion process shall be followed at all times as well as the recommendations of the Fusion Machine Manufacturer.
 - 2. The wall thickness of the adjoining pipes shall have the same DR at the point of fusion.
- C. When saddle connections are fusion welded, the Manufacturer's recommended saddle fusion procedure shall be used.
- D. If mechanical fittings (which are designed for, or tested and found acceptable for use with polyethylene pipe) are utilized for transitions between pipe materials, repairs, joining pipe sections, saddle connections, or at other locations; the recommendation of the Mechanical Fitting Manufacturer must be followed.
 - 1. These procedures may differ from other pipe materials.
- E. On each day butt fusion's are to be made, the first fusion of the day shall be a trial fusion.
 - 1. The trail fusion shall be allowed to cool completely, and then fusion test straps shall be cut out.
 - 2. The test strap shall be 12" or 30 times the wall thickness in length (minimum) and 1" or 1.5 times the wall thickness in width (minimum). Bend the test strap until the ends of the strap touch.
 - 3. If the fusion fails at the joint, a new trial fusion shall be made, cooled completely and tested.
 - 4. Butt fusion of pipe to be installed shall not commence until a trail fusion has

passed the bent strap test.

- F. Socket and Saddle fusions shall be tested by a bent strap, as described by the Pipe Manufacturer.
 - 1. The pipe Manufacturer shall provide visual guidelines for inspecting the butt, saddle, and socket fusion joints.
- G. Pressure testing shall be conducted in accordance with the Manufacturer's recommended procedure.
 - 1. Pressure testing shall use water as the test media.
 - 2. Pneumatic (air) testing is prohibited.

3.07 JOINTS

A. Flanged Joints

- 1. Shall be made up with full-face gaskets as specified in the piping paragraphs.
- 2. Shall have the flange faces bearing uniformly on the gaskets.
- 3. Shall have the flanges drawn together uniformly until the joint is tight.
- 4. No washers shall be permitted for the bolt and nut assemblies.
- 5. The length of the bolts shall be uniform and in accordance with the standards specified herein.
 - a. The maximum projection of the bolt beyond the end of the nut shall be 0.25 inch. The bolt shall not fall short of the end of the nut.

B. Threaded Joints

- 1. Threads shall be clean, machine cut and pipe shall be reamed before erection.
- 2. Taps and dies shall be cleaned, sharpened and in good condition.
- 3. Threaded joints shall be made tight with Teflon tape.
- 4. After having been set up a joint shall not be backed off unless the joint is broken. The threads shall be cleaned and new tape shall be applied.

C. Solvent Cemented Joints

1. Shall be made up in accordance with ASTM D2855 and the manufacturers' recommendations.
2. The CONTRACTOR is advised to handle the solvent cements in accordance with ASTM F 402.

3.08 PIPE SUPPORT SYSTEMS

- A. Pipe support locations are not shown on the Drawings and shall follow the specifications herein in locating supports.
 1. Where deviations and modifications are required, they shall be made subject to review by the ENGINEER.
- B. Supports and parts required for the installation of the piping systems shall conform to the requirements of the ANSI Code for Pressure Piping B-31.1 and MSS Standard practice SP-58 and SP-69, except as modified and supplemented by the requirements set forth herein.
 1. Piping shall be supported in such a manner to fulfill the intent of this specification.
- C. Piping shall be rigidly supported from the building structure by approved hangers, inserts, or supports.
 1. No piping shall be supported from other piping or from metal stairs, ladders, and walkways unless specifically permitted by the ENGINEER.
- D. Unless otherwise indicated on the Drawings, piping supports shall consist of concrete piers or fabricated steel supports as specified below.
 1. Materials and workmanship shall be in full compliance with the Concrete, Reinforcing Steel, and Structural Steel sections of these specifications.
- E. Each section of the pipeline shall be laid out and connections made while the pipe is held in temporary supports
 1. After completion of connections the pipe may be clamped in position.
 2. When piping is correctly installed, a clamp or pipe connection may be loose or removed without displacement of the pipeline.
- F. Supporting appurtenances shall be arranged to prevent undue stress on equipment to which piping is connected.
 1. Supporting appurtenances shall provide the desired pitch as specified or

required for proper drainage of the piping.

2. The pipe suspension shall prevent excessive stress, excessive variation in supporting force, and possible resonance with imposed vibration while the system is in operation.
3. Valves and valve operators shall be rigidly supported independently of the piping.
4. Vertical runs of pipe shall be supported independently of the connected horizontal runs.
5. Vertical pipes shall be supported at each floor or at intervals of at least 10 feet by approved pipe collars, clamps, brackets or wall rests.
6. Supporting appurtenances, when used with copper piping, shall be copper, bronze or bronze plated.
7. Piping shall be supported independently of the equipment to which it is connected.
8. In-line devices (flowmeters) shall be removable without the need for temporary supports for adjacent and connecting piping.

G. In general, the type of pipe supports to be used shall be as follows:

Height of Centerline of Pipe Above Floor	Type of Support
0 - 3 ft.	Concrete Pier
3 - 6 ft.	Adjustable Pipe Saddle or Bracket Supports
Greater than 6 ft.	Hangers

H. Wall bracket supports shall be used where shown for pipe to be installed adjacent to a wall.

1. Where it is not feasible to install hanger supports, adjustable pipe saddle supports may be used with the permission of the ENGINEER.
2. Specifications for the bracket, saddle and hanger supports are hereinafter given in the Schedule of Pipe Supports attached at the end of the section.

I. Install pipe supports in conformance with these specifications unless otherwise shown on the Drawings.

1. Where deviations and modifications are required, they shall be made only with the permission of the ENGINEER.

2. A detailed layout of pipe supports for each building shall be submitted to the ENGINEER for review.
- J. For couplings, supports shall be placed on each side and as close to the coupling as possible.
1. Supports shall be of the guide type, which prevent axial movement resulting in pipe deflection or misalignment.
- K. Structural steel members can be used to support pipe.
- L. Stainless steel piping installed in wetwells, tanks, channels, or conduits shall be supported by hangers, hanger rods, anchorages, hardware, and inserts, fabricated of type 316 stainless steel (L grade, if welded).
- M. Where a specific pipe support is called for on the drawings, this support shall be used as, and where indicated, for the specific application.
1. Spacing of supports shall be as specified herein, unless specifically modified by the ENGINEER.
- N. Support, saddles, bearing plates, and hangers, shall support by direct contact the pipe a minimum of 120 degrees around, except as specified herein.
- O. Where continuous concrete inserts are used, the maximum concentrated load shall not be more than 50 percent of the maximum recommended loading of the channel.
1. Pipe supports shall be positioned such that they will not interfere with the use of hoisting equipment, where provided.
- P. Pipes subject to thermal expansion shall be installed perfectly aligned and concentricity guided.
1. These piping (process air, heated sludge, and hot water) support systems shall be submitted to the ENGINEER for review.
 2. The submittal shall show location of anchors, concentric pipe Guides and Expansion Joints (single or double).

3.09 PIPE SUPPORT SPACING

- A. The distance between supports for each size of pipe shall not exceed those listed in the table below.

Nominal Pipe Size	Metallic Piping	Plastic, Fiberglass, and Copper Piping
O.D. (in.)	Max. Spacing (ft.)	Max. Spacing (ft.)
1/2	5	3
3/4 to 1-1/2	6	3
2 to 3	6	4
4	10	5
6 and larger	10	6

1. If the pipe size to be supported is not listed in the schedule, the next smaller nominal pipe size spacing shall be used.
2. There shall be a minimum of one support per laying length of pipe on uninterrupted horizontal runs.
3. This support shall be placed within one (1) foot of the joint.
4. If the pipe manufacturer recommends a smaller spacing interval than specified herein, then the manufacturer's spacing shall be used.

3.10 PIPE HANGERS AND HANGER RODS

- A. Where pipe hangers are used, they shall be of the clevis or friction clamp type, except where there is a longitudinal movement due to temperature changes.
 1. Pipe hangers shall be capable of supporting the pipe in all conditions of operation.
 2. They shall allow free expansion and contraction of the piping, and prevent excessive stress resulting from transferred weight being induced into the pipe or connected equipment.
- B. Hangers shall be designed so that they cannot become disengaged by movements of the supported pipe.
 1. Lock nuts shall be used on hangers.
 2. Piping systems shall be supported by means of hangers having an individual means of vertical adjustment for leveling of lines after piping is in place.
 3. Provide spring hangers where pipe is subject to expansion and/or contraction.
- C. Hanger rods shall be subject to tensile loading only.
 1. At hanger locations where lateral or axial movement is anticipated, suitable

linkage shall be provided to permit swing.

2. Hanger rods and associated hardware shall be type 316 stainless steel.
- D. Concrete inserts and/or expansion bolts shall be capable of supporting the maximum working load of the attached rod.
- E. Sheet metal insulation protector saddle shall be used for hot water piping or refrigerant piping.
 1. Saddle shall be Grinnell Fig.167, or equal.

3.11 SADDLES

- A. Pipe saddles shall be used to cradle horizontal piping when being supported from below the springline, except where expansion of pipe requires rollers.
 1. Saddles shall be capable of being adjusted after installation.

3.12 BASE ELBOWS TEES AND CONCRETE PEDESTALS

- A. Base elbows, tees and concrete pedestals shall be provided at the locations shown on the drawings, and as specified.
 1. Vertical runs of pipe shall be supported on a base elbow and/or concrete pedestal.
 2. After completion of curing of the concrete pedestal, the piping shall be adjusted to the proper grade.

3.13 METAL FRAMING SYSTEMS

- A. A metal framing system as manufactured by Unistrut, Globe-Strut, Power-Strut, or approved equal may be used for supporting the piping system.
 1. The metal framing system shall be designed and installed according to manufacturer's recommended procedure and shall be capable of supporting the piping system as specified herein.
- B. Channels, inserts and closure strips shall be type 304 stainless steel.
- C. Fittings shall be type 304 stainless steel.
 1. Fasteners shall be type 316 stainless steel.

3.14 SUPPORTS FOR PLASTIC PIPE

- A. Pipe supports that will be used with plastic pipe shall be provided with a bearing plate where the width of hanger is less one-half (1/2) of the supported pipe's diameter.
 - 1. The bearing plate must provide bearing 180 degrees around and shall have a minimum laying length of one-half (1/2) the pipe diameter or three (3) inches minimum.
 - 2. The bearing plates shall be rigid, corrosion resistant and not subject to long term plastic flow properties.
 - 3. To assure one hundred (100) percent bearing, the pipe shall be seated on a filler material.
 - 4. This material shall be compatible for use with the plastic pipe.
 - 5. Clamps to be used with plastic pipe shall be fitted snug and shall not exert clamp pressure on the pipe.

3.15 THRUST RESTRAINT

- A. Pipe anchors shall be spaced to divide pipe into sections.
 - 1. Anchors shall be located at valves, changes in direction of piping, and major branch connections.
 - 2. Anchors shall be of a type recommended by the pipe manufacturer and reviewed by the ENGINEER.
- B. On piping, where sleeve type couplings and flanged adapters are located near fittings or valves, tie rods shall span across the coupling, as specified herein, to restrain movements of the pipe along its axial direction.
 - 1. Such restraints can be deleted if both ends of the pipe are anchored in a concrete structure with no fitting or valve occurring within the span length, in the suction piping to a pump where the coupling is between the pump and valve, or when the water pressure measured at the crown of the pipe is less than five (5) feet.
- C. Sleeve type couplings shall be harnessed except where noted.
 - 1. The harnessing shall be as shown on the drawings or as specified herein.
 - 2. Harnesses for steel pipe shall be in accordance with AWWA Manual M11 for the pipe size and pressure, working or test whichever is greater.
- D. Harnesses for ductile iron pipe shall be tie rods spanning between adjacent

flanges.

1. Friction clamps shall not be permitted.
 2. The size and number of tie rods shall be the same as for steel pipe for the same pressure and pipe size.
- E. Where the distance between adjacent flanges is in excess of ten (10) feet or where a harness cannot be used, the pipe supports adjacent to the coupling shall restrain the piping, preventing linear or angular movement resulting in the pipe separating from the coupling or misalignment in the joint.
- F. Where expansion joints are used, control units shall be provided.
1. Tie rods and control units shall be installed in accordance with to the manufacturer's recommended procedures.
- G. Tie rods and associated hardware shall be type 316 stainless steel.
- H. Valves and fittings shall be restrained in an approved manner such that the any developed unbalanced force shall be supported independent of the piping system.

3.16 FLUSHING AND TESTING

A. General

1. Furnish necessary labor and equipment required for the field tests specified below including, but not limited to, air compressor, gauges, conduit caps, temporary pipe, and connections.
2. Provide potable water for flushing and testing purposes.
3. Furnish and install means and apparatus necessary for getting the water into the pipeline and flushing and testing; including pumps, gages, meters, necessary plugs and caps, and temporary blow-off piping required to discharge water. Complete with necessary reaction-blocking to prevent pipe movement during the flushing and testing.
4. Pipelines shall be flushed and tested in such lengths or sections as agreed upon between the CITY, ENGINEER, and CONTRACTOR.
5. Give the CITY and ENGINEER reasonable notice of the time prior to testing the pipeline.
6. The CITY reserves the right, within reason, to request flushing and testing of

a section or portion of a pipeline.

7. For sewage force mains, unless otherwise specified, the minimum test pressure shall be 150 psig.

B. Flushing

1. At the conclusion of the installation work, thoroughly clean new pipe by flushing with water or other means to remove dirt, stones, and pieces of wood, which may have entered the pipe during the construction period.
 - a. If after this cleaning should any obstructions remain, they shall be corrected by the CONTRACTOR, at his own expense and to the satisfaction of the ENGINEER.
 - b. Pipelines shall be flushed at a rate of at least 2.5 feet per second for a duration suitable to the CITY, but in no event less than 60 minutes.

C. Pressure Testing

1. After the pipe has been installed, joints completed, thrust blocks have been in place for at least five days, and the trench has been partially backfilled leaving the joints exposed for examination, the pipe shall be filled with water in a manner to expel air.
 - a. The pipeline shall be subjected to a test pressure of 150 psig, as measured at the low points of the pipe, for a period of at least two hours.
 - b. Each valve shall be opened and closed several times during the test.
 - c. The exposed pipe, joints, fittings, and valves shall be examined for leaks.
 - d. Visible leaks shall be stopped or the defective pipe, fitting, joints, or valve(s) shall be replaced.

D. Leakage Testing

1. The leakage test may be conducted subsequent to or concurrently with the pressure test.
2. Pressure piping shall be tested in accordance with AWWA C600, latest revision.
3. After the new piping has been laid and backfilled, it shall be pumped to a pressure of one and one half (1½) times the maximum working pressure, or 150 psig, minimum, as applicable, and visible leaks stopped by approved methods.

4. After pressurizing the pipe, before beginning the leakage test, and in the presence of representatives of the ENGINEER, bleed water from the far end of the pipe until a noticeable drop is apparent on the gauge.
 - a. The line will then be re-pressurized and the test begun.
5. The test shall be maintained for two hours, but may be continued for one additional hour if it becomes apparent that the leakage is equal to, or greater than, the amount allowable.
6. Where applicable, and when permitted by the ENGINEER, the CONTRACTOR may fill the line, and pressurize it prior to testing, to allow the pipe lining to saturate.
7. Water supplied to the main during the test to maintain the required pressure shall be measured by a 5/8-inch meter installed on the discharge side of the test pump, or by pumping from a calibrated container.
 - a. Exhaustion of the supply or the inability to maintain the required pressure will be considered test failure.
 - b. At the conclusion of the test, the amount of water remaining in the container shall be measured and the results recorded in the test report.
8. Provide a suitable pressure gauge, recently calibrated by a testing laboratory acceptable to the ENGINEER.
 - a. Copy of certification of calibration table shall be available during the test and shall be submitted with the test report.
9. Maximum length of pipe in one test shall be 2,000 linear feet.
 - a. If the CONTRACTOR wishes to test a longer length of pipe, the allowable leakage shall still only be based upon on 2,000 linear foot pipeline segment.
 - b. After successfully tested segments of the pipeline have been joined together, re-pressurize the pipeline and inspect the exposed joint(s) for evidence of leakage.
10. Upon completion of a successful test, the ENGINEER and the CONTRACTOR shall certify the test results.
11. Questions pertaining to procedures used during the test shall be answered and decided by the ENGINEER.

12. Leaks or defective pipe disclosed by the hydrostatic test shall be corrected by the CONTRACTOR at his own expense, and the test shall be repeated.

E. Allowable Leakage – DIP and PVC Pressure Piping

1. No installation will be accepted by the ENGINEER until the leakage is less than the number of gallons per hour as determined by the formula:

$$Q = \frac{(S)(D) (\text{Square Root of } P)}{133,200}$$

in which Q = allowable leakage in gallons per hour, S = total length of pipe being tested in feet, D = diameter of pipe tested inches, and P = the average test pressure during the leakage test in pounds per square inch.

2. When testing against closed metal-seated valves, an additional leakage per closed valve of 0.0078 gal/hr/in of nominal valve size shall be allowed.

F. Allowable Leakage – HDPE Pressure Piping (Monitored Make-Up Water Test)

1. The testing procedure for HDPE pipe consists of initial expansion, and test phase. During the initial expansion phase, the test section is pressurized to the test pressure, and enough make-up water is added each hour for three (3) hours to return to test pressure.
2. The test phase follows immediately, and may be two (2), or three (3) hours. At the end of the test time, the test section is returned to test pressure by adding a measured amount of water. If the amount of make-up water added does not exceed the Table 1 values below, leakage is not indicated.

Table 1: Test Phase Make-Up Amount		
Nominal Pipe Size (in.)	Make-Up Water Allowance (U.S. Gallons/100 ft. of Pipe)	
	2-hour test	3-hour test
1½	0.10	0.17
2	0.11	0.19
3	0.15	0.25
4	0.25	0.40
6	0.60	0.90
8	1.00	1.50
10	1.30	2.10
12	2.30	3.40
14	2.80	4.20
16	3.30	5.00
18	4.30	6.50
20	5.50	8.00

22	7.00	10.50
24	8.90	13.30
30	12.70	19.20
36	18.00	27.00
42	23.10	35.30
48	27.00	43.00
54	31.40	51.70

3. For any test pressure from 1 to 1½ times the system operating design pressure, the total test time including initial pressurization, initial expansion, and time of test pressure, must not exceed eight (8) hours. If the test is not completed due to leakage, equipment failure, etc., depressurize the test section, then allow it to “relax” for at least eight (8) hours before bringing the test section up to test pressure again.

3.17 PAINTING

- A. Piping and supports shall be field painted as specified in Division 9 of the Specifications.

3.18 SPECIAL PROVISIONS AT CONCRETE EXPANSION JOINTS

- A. At ¾ or 1-inch concrete expansion joints, concrete encased pipes shall be provided with a sleeve type coupling.
 1. A cavity in the concrete shall be formed around the sleeve coupling.

3.19 REDUCING BRANCH CONNECTIONS

- A. Reducing branch connections shall be made up with tee fittings, saddles, branch outlets, or special tapped tee fittings provided with a boss.
 1. No pipe wall shall be tapped unless the tap is made with a saddle or sleeve.

3.20 EXISTING UTILITIES

- A. Pipelines shall be installed using due care with regard to existing utilities.
 1. Existing utilities are shown from best available as-built data and must be located by the CONTRACTOR (“potholed”) prior to construction.
- B. Reliance by the CONTRACTOR on existing utility locations shown on the drawings is not sufficient.
 1. Locate existing utilities prior to construction.

3.21 VALVE BOXES

A. Valve boxes, manholes, and electrical boxes, which are proposed or existing, and are effected by the proposed work, shall be raised to the elevation of the final grading.

1. This shall include additional materials as required on existing items.

B. Valve boxes shall be installed over each outside, buried valve, unless otherwise indicated.

1. Valve boxes shall be centered over the valve.

2. Fill shall be carefully tamped around each valve box to a distance of 4 feet on all sides, or to undisturbed trench face if less than 4 feet.

3.22 DEPTH OF COVER

A. Ductile iron pipe shall receive 30 inches minimum cover with approved trench and backfilling techniques.

B. PVC/HDPE pipe shall receive 36 inches minimum cover with approved trench and backfilling techniques.

