ADDENDUM NO. 1

City of Springfield
CITY COMPLEX

Mott MacDonald Project No.: 502100062

August 12, 2024

The Specifications shall be amended in the following particulars:

SPECIFICATIONS

A. Table of Contents

1. Delete the original "Table of Contents" and, in lieu thereof, insert the attached revised "Table of Contents."

B. DIVISION 1 General Requirements

1. Add the attached new Section 012100 "Allowances" to the project Specifications.
2. Move Section 019100.15 to the end of DIVISION 1 to place it in numerical order.

C. DIVISION 2 Geotechnical Report

1. Add the attached "Geotechnical Engineering Report – City Complex" dated 10/26/2021 to DIVISION 2 Geotechnical Report of the project Specifications.

D. DIVISION 2 Site Work

1. Add the following new specification Sections (attached) to DIVISION 2 Site Work of the project Specifications:

Section 02100	Erosion Control and Environmental Protections
Section 02110	Clearing and Grubbing
Section 02200	Sodding
Section 02210	Grassing (By Seed)
Section 02220	Excavating, Backfilling, and Grading for Structures
Section 02300	Trench Safety Act Compliance
Section 02340	Earthwork for Utilities
Section 02400	Water Distribution System
Section 02500	Sewer Collection System
Section 02510	Manholes, Wet Wells, and Valve Chambers
Section 02700	Paving and Storm Drains

E. DIVISION 8 Doors and Windows

1. Add the new specifications Section 087100 "Door Hardware" to DIVISION 8 of the project Specifications.

F. Division 26 Electrical

1. Change the number of Section 16992 “Commissioning of Electrical Systems” to Section 260800; there are no changes to the text.

END OF ADDENDUM No. 1

ADDENDUM NO. 1

City of Springfield
CITY COMPLEX

Mott MacDonald Project No.: 502100062

August 12, 2024

ADDENDUM NO. 1 RECEIVED BY:_____

COMPANY NAME:_____

DATE:_____

Please return acknowledgement of Addendum No. 1 by email to:
beverly.stephens@mottmac.com

PROJECT SPECIFICATIONS

TABLE OF CONTENTS (Revised per Addendum #1)

DIVISION 1

GENERAL REQUIREMENTS

SECTION 01 21 00 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements governing allowances.

B. Types of allowances include the following:

1. Lump-sum allowances.
2. Unit-cost allowances.
3. Quantity allowances.
4. Contingency allowances.
5. Testing and inspecting allowances.

C. Related Requirements:

1. Section 012200 "Unit Prices" for procedures for using unit prices, including adjustment of quantity allowances when applicable.
2. Section 012600 "Contract Modification Procedures" for procedures for submitting and handling Change Orders.
3. Section 014000 "Quality Requirements" for procedures governing the use of allowances for field testing by an independent testing agency.

1.3 DEFINITIONS

A. Allowance: A quantity of work or dollar amount included in the Contract, established in lieu of additional requirements, used to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.

1.4 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise Engineer/Architect of the date when final selection, or purchase and delivery, of each product or system described by an allowance must be completed by the Owner to avoid delaying the Work.

B. At Engineer’s/Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

C. Purchase products and systems selected by Engineer/Architect from the designated supplier.

1.5 ACTION SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances in the form specified for Change Orders.

1.6 INFORMATIONAL SUBMITTALS

A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.

C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.7 LUMP-SUM ALLOWANCES

A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Engineer/Architect under allowance and shall include freight**,** and delivery to Project site.

B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, taxes, and similar costs related to products and materials ordered by Owner or selected by Engineer/Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.

C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.

1. If requested by Engineer/Architect, retain, and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

1.8 TESTING AND INSPECTING ALLOWANCES

A. Testing and inspecting allowances include the cost of engaging testing agencies, actual tests, and inspections, and reporting results.

B. The allowance does not include incidental labor required to assist the testing agency or costs for retesting if previous tests and inspections result in failure. The cost for incidental labor to assist the testing agency shall be included in the Contract Sum.

C. Costs of testing and inspection services not specifically required by the Contract Documents are Contractor responsibilities and are not included in the allowance.

D. At Project closeout, credit unused amounts remaining in the testing and inspecting allowance to Owner by Change Order.

1.9 ADJUSTMENT OF ALLOWANCES

A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, required maintenance materials, and similar margins.

1. Include installation costs in purchase amount only where indicated as part of the allowance.
2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other markups.
3. Submit substantiation of a change in scope of Work, if any, claimed in Change Orders related to unit-cost allowances.
4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

B. Submit claims for increased costs due to a change in the scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.

1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of Work has changed from what could have been foreseen from information in the Contract Documents.
2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

A. Civil/Site/Landscaping Work - City Complex:

1. **Allowance No. 1A: Lump Sum Allowance - Civil/Site/Landscaping FURNITURE:** Include a lump sum allowance of **$12,500.00** for use according to Owner's written instructions.
2. **Allowance No. 2C: Lump Sum Allowance – Civil/ Site IT SYSTEM:** Include a lump sum allowance of **$36,000.00** for use according to Owner's written instructions for all buildings interconnected on site with fiber optics cabling.

B. Police Station – City Complex:

1. **Allowance No. 2A: Lump Sum Allowance – Police Station Building FURNITURE:** Include a lump sum allowance of **$163,000.00** for use according to Owner's written instructions.

2. **Allowance No. 2B: Lump Sum Allowance – Police Station Building APPLIANCES:** Include a lump sum allowance of **$12,500.00** for use according to Owner's written instructions.

3. **Allowance No. 2C: Lump Sum Allowance – Police Station Building IT/ACCESS CONTROL/SECURITY/AUDIO-VISUAL SYSTEMS:** Include a lump sum allowance of **$156,000.00** for use according to Owner's written instructions for structured cabling, access control, voice/data devices, drops, j-hooks, ladder rack system, rack & infrastructure equipment, network & computer equipment, security camera system, etc.

C. City Hall – City Complex:

1. **Allowance No. 3A: Lump Sum Allowance – City Hall Building FURNITURE:** Include a lump sum allowance of **$204,000.00** for use according to Owner's written instructions.

2. **Allowance No. 3B: Lump Sum Allowance – City Hall Building APPLIANCES:** Include a lump sum allowance of **$7,500.00** for use according to Owner's written instructions.

3. **Allowance No. 3C: Lump Sum Allowance – City Hall Building IT/ACCESS CONTROL/SECURITY/AUDIO-VISUAL SYSTEMS:** Include a lump sum allowance of **$230,000.00** for use according to Owner's written instructions for structured cabling, access control, voice/data devices, drops, j-hooks, ladder rack system, rack & infrastructure equipment, network & computer equipment, security camera system, etc.

D. Fire Station – City Complex:

1. **Allowance No. 4A: Lump Sum Allowance – Fire Station Building FURNITURE:** Include a contingency allowance of **$104,000.00** for use according to Owner's written instructions.

2. **Allowance No. 4B: Lump Sum Allowance – Fire Station Building APPLIANCES:** Include a lump sum allowance of **$22,500.00** for use according to Owner's written instructions.

3. **Allowance No. 4C: Lump Sum Allowance – Fire Station Building IT/ACCESS CONTROL/SECURITY/AUDIO-VISUAL SYSTEMS:** Include a lump sum allowance of **$114,000.00** for use according to Owner's written instructions for structured cabling, access control, voice/data devices, drops, j-hooks, ladder rack system, rack & infrastructure equipment, network & computer equipment, security camera system, etc.

E. <u>Public Works – City Complex:</u>

1. **Allowance No. 5A: Lump Sum Allowance – Public Works Building EQUIPMENT:** Include a contingency allowance of **$80,000.00** for use according to Owner's written instructions.

2. **Allowance No. 5B: Lump Sum Allowance – Public Works Building APPLIANCES:** Include a lump sum allowance of **$18,500.00** for use according to Owner's written instructions.

3. **Allowance No. 5C: Lump Sum Allowance – Public Works Building IT/ACCESS CONTROL/SECURITY/AUDIO-VISUAL SYSTEMS:** Include a lump sum allowance of **$105,000.00** for use according to Owner's written instructions for structured cabling, access control, voice/data devices, drops, j-hooks, ladder rack system, rack & infrastructure equipment, network & computer equipment, security camera system, etc..

END OF SECTION 012100

DIVISION 2

GEOTECHNICAL

GEOTECHNICAL ENGINEERING REPORT

City Complex
Springfield, Bay County, Florida

PREPARED FOR:

Mott MacDonald Group
11-C West 23rd Street
Panama City, Florida 32405

NOVA Project Number: 10111-2021207

October 26, 2021

NOVA
PROFESSIONAL | PRACTICAL | PROVEN

October 26, 2021

Mott MacDonald Group
11-C West 23rd Street
Panama City, Florida 32405

Attention: Mr. Tommy Pitts, Project Manager

Subject: Geotechnical Engineering Report
City Complex
Springfield, Bay County, Florida
NOVA Project Number 10111-2021207

Dear Mr. Pitts,

NOVA Engineering and Environmental LLC (NOVA) has completed the authorized subsurface exploration and geotechnical engineering evaluation for the proposed development to be constructed in Springfield, Bay County, Florida. The work was performed in general accordance with NOVA proposal number 011-20213980, dated June 22, 2021. This report briefly discusses our understanding of the project at the time of the subsurface exploration, describes the geotechnical consulting services provided by NOVA, and presents our findings, conclusions, and recommendations.

We appreciate your selection of NOVA and the opportunity to be of service on this project. If you have any questions, or if we may be of further assistance, please do not hesitate to contact us.

Sincerely,
NOVA ENGINEERING AND ENVIRONMENTAL LLC

ANDRE KNIAZEFF LICENSE No 81315 STATE OF FLORIDA PROFESSIONAL ENGINEER

Kyle Selle, E.I.
Staff Engineer
Florida Registration No. 1100023685

Andre Kniazeff, P.E.
Senior Geotechnical Engineer
Florida Registration No. 81315

Copies Submitted: Addressee (electronic)

TABLE OF CONTENTS

1.0 SUMMARY

A brief summary of pertinent findings, conclusions and recommendations is presented below. This information should not be utilized in design or construction without reading all of the recommendations presented in the text and Appendix of this report.

1.1 GENERAL

Our field exploration at the subject site consisted of performing fifteen (15) Standard Penetration Test (SPT) borings within the proposed structure footprints and eleven (11) auger borings within the proposed pavement areas. Drilling, testing, and sampling operations were performed in general accordance with ASTM designations and other industry standards.

The test borings generally encountered mixed strata of very loose to medium dense fine-grained sands to clayey fine-grained sands (USCS classifications of SP, SP-SM, SP-SC, SM, and SC) with trace to few organics from the existing ground surface elevation to the maximum depth explored of about 25 feet below existing grade (BEG).

1.2 SITE PREPARATION

We recommend removing any existing structures as well as all topsoil and surficial vegetation, trees and associated root systems, and any other deleterious non-soil materials that are found to be present from within the proposed construction limits.

For the planned roadway/parking areas, after clearing and stripping, areas that are at grade or will receive fill should be carefully evaluated by a NOVA geotechnical engineer. The engineer will require proof-rolling of the subgrade with multiple passes of a fully loaded tandem-axle dump truck or other pneumatic-tired vehicle of similar size and weight. The purpose of the proof-rolling is to locate soft, weak, or excessively wet fill or residual soils present at the time of construction. Any unstable materials observed during the evaluation and proof-rolling operations should be undercut and replaced with structural fill or stabilized in-place by scarifying and re-densifying.

Following approval of the proof-rolling operation (or subsequent to remediating areas that that do not pass the proof-rolling operation), the soils exposed at the stripped grade elevations should be compacted to a minimum soil density of at least 95 percent of the maximum dry density as determined by the Modified Proctor test method (ASTM D-1557). The top 12 inches of all pavement subgrades should be compacted to at least 98 percent.

For the proposed structure footprints, the soils exposed at and below the stripped grade elevation should be compacted to a minimum soil density of at least 98 percent of the maximum dry density as determined by the modified Proctor test method (ASTM

D-1557). The top 12 inches of all footing excavations should also be compacted to at least 98 percent.

We recommend densifying (compacting) the upper zone of very loose to loose sands (N-values of concern varying between 2 and 7) that were encountered in the upper 2 feet to 6 feet of the soil horizon in the SPT borings. This can most likely be accomplished by compacting the exposed subgrade from the stripped grade elevation with a heavy weight vibratory roller (i.e., a minimum 10-ton roller, static weight, with a minimum 5-foot drum diameter), as equipment of this size can typically impact sandy soil profiles above groundwater to depths of 5+ feet with proper moisture conditioning. A minimum of 10 overlapping passes in a crisscross pattern should be made by the dynamic roller across the entire stripped area prior to placing any lifts of fill soils

We note that vibratory compaction operations should not be performed within a clear distance of 50 feet from any adjacent structures.

For areas of the site that exhibit standing groundwater conditions at the time of initial fill placement after site stripping and grubbing activities have been completed, a "bridge lift" of clean sand (USCS classification of SP, with less than 5% soil fines) should be installed as the initial lift of fill to elevate potential flooded (post-stripping) areas above the water table. This material should be "walked in" ahead of the construction equipment being utilized to install it (typically, a bulldozer), and compaction of this lift of fill should be achieved via non-vibratory methods until stabilized conditions have been achieved at least 12 inches above the stabilized groundwater table.

A geotechnical engineer should carefully evaluate all subgrades prior to foundation, slabs-on-grade, and pavement section construction to confirm compliance with this report; evaluate geotechnical sections of the plans and specifications for the overall project; and provide additional recommendations that may be required.

1.3 GROUNDWATER CONTROL

Groundwater was encountered in the test borings at depths ranging from about 1 foot to 3¼ feet BEG at the time of our September 28 and November 1, 2021 subsurface exploration, which occurred during a period of relatively average seasonal rainfall, and at depths ranging from about ¼ foot to 1 foot BEG at the time of our November 11, 2021 subsurface exploration, which occurred during a period of above average seasonal rainfall and shortly following the passing of several significant rain events.

Depending on the time of construction and fill heights, groundwater may potentially impact the planned near surface construction, most especially during initial site preparation activities, foundation, pavement section, and subsurface utility installations. Contractors should be prepared to utilize a dewatering system during

construction to maintain separation between the groundwater levels and the desired working platforms for below-grade work.

1.4 FOUNDATION RECOMMENDATIONS

After the recommended site/subgrade preparation and fill placement, we recommend that the proposed structures be supported on conventional shallow foundation systems bearing upon compacted native soils and/or compacted structural fill. The building foundations may be designed for a maximum soil bearing pressure of **1,500 pounds per square foot (psf)**.

We note that our settlement estimations described in Section 6.4.2 of this report are based on assumed loadings of 3 kips per linear foot for continuous load bearing walls and 30 kips per column for isolated interior columns. If these loading assumptions are not accurate and actual loadings exceed the mentioned above, NOVA should be notified immediately and due to the presence of very loose to loose sandy soils, encountered in the SPT borings within the depth of the load influence, soil improvement activities or a deep foundation system would need to be considered.

We also note that sufficient fill should be added to the site to provide a minimum separation of at least 2 feet between the seasonal high groundwater (SHGW) table, which is estimated to occur approximately at the measured groundwater levels measured at each boring location during our September 28 and November 1, 2021 field exploration, and the bottom-of-footing elevation for the lowest footings planned for each proposed structure.

1.5 PARKING/DRIVE AREA RECOMMENDATIONS

We understand that a flexible (asphalt) pavement section will be employed for this development. After the recommended site/subgrade preparation and fill placement, the subsurface conditions encountered appear to be adaptable for supporting this pavement section provided that a minimum separation of at least 24 inches between the bottom of a crushed limerock or crushed concrete base course and the seasonal high groundwater (SHGW) table can be maintained. This separation may be reduced to 18 inches if Graded Aggregate Base (GAB) is employed for this project in lieu of crushed limerock or crushed concrete base.

2.0 INTRODUCTION

2.1 PROJECT INFORMATION

Our understanding of the proposed development is based on recent conversations and email exchanges with the Client, review of the provided site plan and aerial photography of the site via internet-based GIS software, a site reconnaissance performed during our field exploration activities, and our experience with similar geotechnical conditions in the near vicinity to this project site.

2.1.1 SITE PLANS AND DOCUMENTS

We were furnished with the following document:

- Document: Site Plan
  Prepared by: Mott MacDonald
  Date: Not Dated

2.1.2 PROPOSED CONSTRUCTION

We understand the proposed development will include the construction of four single-story buildings with associated utilities and asphalt paved drives/parking areas. Structural loadings were not available from the Client at the time of the issuance of this report; we have therefore assumed that isolated interior column and continuous load bearing wall loads will not exceed 30 kips per column and 3 kips per linear foot, respectively, for the planned structures.

2.1.3 SITE GRADING

Site grading details were not provided to NOVA at the time of issuance of this report. Based on the groundwater levels encountered, we anticipate that up to 3 feet of fill will be required within the proposed structure and pavement areas.

2.2 SCOPE OF WORK

Mott Macdonald Group engaged NOVA to provide geotechnical engineering consulting services for the subject project. This report briefly discusses our understanding of the project, describes our exploratory procedures, and presents our findings, conclusions, and recommendations. The primary objective of this study was to perform a geotechnical exploration within the proposed construction areas and to assess these findings as they relate to geotechnical aspects of the planned site improvements. The authorized geotechnical engineering services included a soil test boring and sampling program, laboratory testing, engineering evaluation of the field and laboratory data, and the preparation of this report. The services were performed substantially as outlined in

our proposal number 011-20213980, dated June 22, 2021, and in general accordance with industry standards.

As authorized per the above referenced proposal, this completed geotechnical report includes:

- A description of the site, fieldwork, laboratory testing and general soil conditions encountered, together with a Boring Location Plan and individual Test Boring Records.
- Site preparation considerations that include geotechnical discussions regarding site stripping and subgrade preparation and engineered fill/backfill placement.
- Recommendations for controlling groundwater and/or run-off during construction and, the need for permanent dewatering systems based on the anticipated post construction groundwater levels.
- Foundation system recommendations for the proposed structures, as deemed necessary based on the boring results.
- Slabs-on-grade construction considerations based on the geotechnical findings, including the need for a sub-slab vapor barrier or a capillary barrier.
- Recommended flexible pavement sections based on provided or assumed traffic loading and subgrade strengths estimate from correlation with test borings, laboratory data, and soil types collected from the test borings.
- The measured apparent and estimated seasonal high groundwater levels at the boring locations.
- Suitability of on-site soils for re-use as structural fill and backfill. Additionally, the criteria for suitable fill materials will be provided.
- Recommended quality control measures (i.e. sampling, testing, and inspection requirements) for site grading and pavement section installation operations.

The assessment of site environmental conditions, including the presence of wetlands or detection of pollutants in the soil, rock or groundwater, laboratory testing of samples, or a site-specific seismic study was beyond the scope of this geotechnical study. If requested, NOVA can provide these services.

3.0 SITE DESCRIPTION

3.1 LOCATION AND LEGAL DESCRIPTION

The Subject Property is located on the northwest quadrant of the intersection of East 11th Street and Transmitter Road in Springfield, Bay County, Florida. A Site Map is provided in Appendix A.

3.2 SUBJECT PROPERTY VICINITY GENERAL CHARACTERISTICS

At the time of our field exploration, the vicinity of the Subject Property generally consisted of light commercial and single-family properties, as well as vacant undeveloped land.

3.3 CURRENT USE OF THE PROPERTY

At the time of our field exploration, the Subject Property was observed to be developed with abandoned structures.

4.0 FIELD AND LABORATORY PROCEDURES

4.1 FIELD EXPLORATION

The boring locations were established in the field by NOVA personnel by using a hand-held GPS unit. Consequently, referenced boring locations should be considered approximate. If the Client desires increased accuracy, NOVA recommends that the boring locations and elevations be surveyed. Our field exploration included performing:

- Fifteen (15) SPT borings, each advanced to a depth of approximately 25 feet BEG, within the footprints of the proposed structures.
- Eleven (11) auger borings, advanced to depths between 3½ feet to 4½ feet BEG within the proposed pavement areas.

SPT Borings: The Standard Penetration Test borings were performed using the guidelines of ASTM Designation D-1586, "Penetration Test and Split-Barrel Sampling of Soils". A mud rotary drilling process was used to advance the borings. At regular intervals, soil samples were obtained with a standard 1.4-inch I.D., 2.0-inch O.D., split-tube sampler. The sampler was first seated six inches and then driven an additional foot with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler the final foot is designated the "Penetration Resistance". The penetration resistance, when properly interpreted, is an index to the soil strength and density. Representative portions of the soil samples, obtained from the sampler, were placed in sealed containers, and transported to our laboratory for further evaluation and laboratory testing.

Auger Borings: The auger borings were performed using hand operated soil samplers. At regular intervals, soil samples were obtained from a standard 3-inch O.D. sampler. Representative portions of the soil samples, obtained from the sampler, were placed in sealed containers, and transported to our laboratory for further evaluation and laboratory testing.

Test Boring Records in Appendix B present the soil conditions encountered in the borings. These records represent our interpretation of the subsurface conditions based on the field exploration data, visual examination of the recovered samples, laboratory test data, and generally accepted geotechnical engineering practices. The stratification lines and depth designations represent approximate boundaries between various subsurface strata. Actual transitions between materials may be gradual.

Groundwater Levels: The groundwater levels reported on the Test Boring Records represent measurements made at the completion of each test boring. The test borings were subsequently backfilled with soil cuttings from the drilling process for safety concerns.

4.2 LABORATORY TESTING

A laboratory testing program was conducted to characterize materials existing at the site using split spoon and bulk/grab soil samples recovered from the borings. The laboratory test data are presented in the Appendix. Selected test data are also presented on the Test Boring Records attached in the Appendix. The specific tests are briefly described below. Further laboratory testing was beyond the scope of this exploration. It should be noted that all soil samples will be properly disposed of 30 days following the submittal of this NOVA subsurface exploration report unless you request otherwise.

4.2.1 SOIL CLASSIFICATION

Soil classification provides a general guide to the engineering properties of various soil types and enable the engineer to apply past experience to current problems. In our explorations, samples obtained during drilling operations are observed in our laboratory and visually classified by an engineer. The soils are classified according to relative density (based on SPT N-values), color and texture. These classification descriptions are included on our Test Boring Records. The classification system discussed above is primarily qualitative; laboratory testing is generally required for detailed soil classification. Using the test results, the soils were visually/manually classified according to the Unified Soil Classification System. This classification system and the in-place physical soil properties provide an index for estimating the soil's behavior. The soil classification and physical properties obtained are presented in this report.

4.2.2 MOISTURE CONTENT

The moisture content is the ratio expressed as a percentage of the weight of water in a given mass of soil to the weight of the solid particles. This testing was conducted in general accordance with ASTM D-2216. Nine (9) moisture content tests were performed in this study.

4.2.3 FINES CONTENT

The percentage of fines passing through the No. 200 sieve is generally considered to represent the amount of silt and clay of the tested soil sample. This testing was conducted in general accordance with ASTM Designations D-6913 and D-1140. Nine (9) fines content tests were performed in this study.

4.2.4 Organic Content

The organic content is the ratio expressed as a percentage of the weight of organic material in a given mass of soil to the weight of the solid particles. This testing was conducted in general accordance with ASTM D-2974. One (1) organic content test was performed in this study.

5.0 SUBSURFACE CONDITIONS

5.1 GEOLOGY

According to the United States Geological Survey (USGS), the subject site is located in Bay County within the Gulf Coastal Plain, separated from the Florida Platform by geologic structures known as the Gulf Trough and Apalachicola Embayment. These structures formed a bathymetric and environmental barrier from the earliest Eocene or earliest Oligocene periods into the Miocene.

According to the "Text to Accompany the Geologic Map of Florida" by Scott, 2001, the site is generally underlain by undifferentiated sediments deposited during the Quaternary period. These sediments typically consist of siliciclastics (sand), organics and freshwater carbonates. These soils are highly permeable and form the Sand and Gravel Aquifer of the surficial aquifer system.

Surficial soils in the region are primarily siliciclastic sediments deposited in response to the renewed uplift and erosion in the Appalachian highlands to the north and sea-level fluctuations. The extent and type of deposit is influenced by numerous factors, including mineral composition of the parent rock and meteorological events.

5.2 SOIL CONDITIONS

The following paragraph provides a generalized description of the subsurface profile and soil conditions encountered by the borings. The Test Boring Records provided in the Appendix should be reviewed to provide more detailed descriptions of the subsurface conditions encountered at the boring locations. Conditions may vary at other locations and times.

The test borings generally encountered mixed strata of very loose to medium dense fine-grained sands to clayey fine-grained sands (USCS classifications of SP, SP-SM, SP-SC, SM, and SC) with trace to few organics from the existing ground surface elevation to the maximum depth explored of about 25 feet below existing grade (BEG).

5.3 GROUNDWATER CONDITIONS

5.3.1 GENERAL

Groundwater in the Gulf Coastal Plain typically occurs as an unconfined aquifer condition. Recharge is provided by the infiltration of rainfall and surface water through the soil overburden. More permeable zones in the soil matrix can affect groundwater conditions. The groundwater table is expected to be a subdued replica of the original surface topography.

5.3.2 SOIL TEST BORING GROUNDWATER CONDITIONS

Groundwater was encountered in the test borings at depths ranging from about 1 foot to 3¼ feet BEG at the time of our September 28 and November 1, 2021 subsurface exploration, which occurred during a period of relatively average seasonal rainfall, and at depths ranging from about ¼ foot to 1 foot BEG at the time of our November 11, 2021 subsurface exploration, which occurred during a period of above average seasonal rainfall and shortly following the passing of several significant rain events.

Based on our review of the subsurface conditions encountered in the test borings, we estimate that the normal permanent seasonal high groundwater (SHGW) will occur approximately at the encountered groundwater levels measured at each boring location during our September 28 and November 1, 2021 field exploration.

Note that our estimate of seasonal high groundwater levels is based on limited data and does not provide any assurance that groundwater levels will not exceed the estimated level during any given year in the future. If the rainfall intensity and duration or total rainfall quantities exceed those normally anticipated, then groundwater levels will likely exceed the estimate. If more accurate seasonal high groundwater table is required, monitoring wells should be installed around the site and monitored over a period of a few months to measure the variations in the water levels.

Groundwater levels vary with changes in season and rainfall, construction activity, surface water runoff and other site-specific factors. Groundwater levels in the Bay County area are typically lowest in the late spring and the late fall and highest in the summer with annual groundwater fluctuations by seasonal rainfall; consequently, the water table may vary at times.

6.0 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are based on our understanding of the proposed construction, our site observations, our evaluation and interpretation of the field and laboratory data obtained during this exploration, our experience with similar subsurface conditions, and generally accepted geotechnical engineering principles and practices.

Subsurface conditions in unexplored locations or at other times may vary from those encountered at specific boring locations. If such variations are noted during construction, or if project development plans are changed, we request the opportunity to review the changes and amend our recommendations, if necessary.

As previously noted, the boring locations were established in the field using a handheld GPS unit. If increased accuracy is desired by the Client, we recommend that the boring locations and elevations be surveyed.

6.1 SITE PREPARATION

We recommend removing any existing structures as well as all topsoil and surficial vegetation, trees and associated root systems, and any other deleterious non-soil materials that are found to be present from within the proposed construction limits.

For the planned roadway/parking areas, after clearing and stripping, areas that are at grade or will receive fill should be carefully evaluated by a NOVA geotechnical engineer. The engineer will require proof-rolling of the subgrade with multiple passes of a fully loaded tandem-axle dump truck or other pneumatic-tired vehicle of similar size and weight. The purpose of the proof-rolling is to locate soft, weak, or excessively wet fill or residual soils present at the time of construction. Any unstable materials observed during the evaluation and proof-rolling operations should be undercut and replaced with structural fill or stabilized in-place by scarifying and re-densifying.

Following approval of the proof-rolling operation (or subsequent to remediating areas that that do not pass the proof-rolling operation), the soils exposed at the stripped grade elevations should be compacted to a minimum soil density of at least 95 percent of the maximum dry density as determined by the Modified Proctor test method (ASTM D-1557).

For the proposed structure footprints, the soils exposed at and below the stripped grade elevation should be compacted to a minimum soil density of at least 98 percent of the maximum dry density as determined by the modified Proctor test method (ASTM D-1557).

We recommend densifying (compacting) the upper zone of very loose to loose sands (N-values of concern varying between 2 and 7) that were encountered in the upper 2

feet to 6 feet of the soil horizon in the SPT borings. This can most likely be accomplished by compacting the exposed subgrade from the stripped grade elevation with a heavy weight vibratory roller (i.e., a minimum 10-ton roller, static weight, with a minimum 5-foot drum diameter), as equipment of this size can typically impact sandy soil profiles above groundwater to depths of 5+ feet with proper moisture conditioning. A minimum of 10 overlapping passes in a crisscross pattern should be made by the dynamic roller across the entire stripped area prior to placing any lifts of fill soils

We note that vibratory compaction operations should not be performed within a clear distance of 50 feet from any adjacent structures.

For areas of the site that exhibit standing groundwater conditions at the time of initial fill placement after site stripping and grubbing activities have been completed, a "bridge lift" of clean sand (USCS classification of SP, with less than 5% soil fines) should be installed as the initial lift of fill to elevate potential flooded (post-stripping) areas above the water table. This material should be "walked in" ahead of the construction equipment being utilized to install it (typically, a bulldozer), and compaction of this lift of fill should be achieved via non-vibratory methods until stabilized conditions have been achieved at least 12 inches above the stabilized groundwater table.

A geotechnical engineer should carefully evaluate all subgrades prior to foundation, slabs-on-grade, and pavement section construction to confirm compliance with this report; evaluate geotechnical sections of the plans and specifications for the overall project; and provide additional recommendations that may be required.

6.2 FILL PLACEMENT

6.2.1 FILL SUITABILITY

Fill materials should be relatively clean sands with less than 12 percent fines (material passing the No. 200 sieve), and free of non-soil materials and rock fragments larger than 3 inches in diameter. Based on results of the test borings, on-site near surface soils that are categorized as fine-grained sands and slightly silty fine-grained sands (SP, SP-SM, SP-SC) based on the Unified Soil Classification System (USCS) are considered suitable for the use of structural fill in the building and pavement areas, provided that the materials are free of rubble, clay, rock, roots, and organics. Soils with fines contents between 13 and 25 percent (SM, SC) may also be used as fill soils for this project, but we note that strict moisture control would be required at the time of placement for these moisture-sensitive soils, and they may not dry in an applicable timeframe for this project. Soils with fines contents in excess of 25 percent are not suitable for reuse. All materials to be used for backfill or compacted fill construction should be evaluated and, if necessary, tested by NOVA prior to placement to determine

if they are suitable for their intended use. Any off-site materials used as fill should be approved by NOVA prior to acquisition.

6.2.2 SOIL COMPACTION

Fill should be placed in thin, horizontal loose lifts (maximum 12-inch depth) and compacted to a minimum soil density of at least 95 percent of the Modified Proctor maximum dry density (ASTM D-1557). The upper 12 inches of soil beneath the bottoms of all shallow foundation footings, and the top 12 inches of subgrade soils in the pavement areas, should be compacted to at least 98 percent. The upper 12 inches of soil beneath the bottoms of all shallow foundation footings, and the top 12 inches of subgrade soils in the pavement areas, should also be compacted to at least 98 percent. If a minimum soil density of at least 98 percent for all shallow foundation footings cannot be achieved, the foundation soils below the proposed structure footprint may be stabilized by "choking" angular aggregate materials (such as #57 stone) into yielding subgrade soils to stiffen them. The compaction equipment selected should be able to facilitate adequate compaction to the recommended depth of at least 2 feet below the bottom of structure foundation elevation.

In confined areas, such as utility trenches, portable compaction equipment and thinner fill lifts (3 to 4 inches) may be necessary. Fill materials used in structural areas should have a target maximum dry density of at least 100 pounds per cubic foot (pcf). If lighter weight fill materials are used, the NOVA geotechnical engineer should be consulted to assess the impact on design recommendations.

Soil moisture content should be maintained within 2 percent of the optimum moisture content. We recommend that the grading contractor have equipment on site during earthwork for both drying and wetting fill soils. Moisture control may be difficult during rainy weather.

Filling operations should be observed by a NOVA soils technician, who can confirm suitability of material used and uniformity and appropriateness of compaction efforts. He/she can also document compliance with the specifications by performing field density tests using thin-walled tube, nuclear, or sand cone testing methods (ASTM D-2937, D-6938, or D-1556, respectively). One test per 2,000 square feet in structure areas should be performed in each lift of fill, with test locations well distributed throughout the fill mass. When filling in small areas, at least one test per day per area should be performed. One (1) test at conventional spread foundations, one (1) test per lift at each planned column footing area, and one (1) test per 75 linear feet at continuous strip foundations are also recommended.

6.3 GROUNDWATER CONTROL

Groundwater was encountered in the test borings at depths ranging from about 1 foot to 3¼ feet BEG at the time of our September 28 and November 1, 2021 subsurface exploration, which occurred during a period of relatively average seasonal rainfall, and at depths ranging from about ¼ foot to 1 foot BEG at the time of our November 11, 2021 subsurface exploration, which occurred during a period of above average seasonal rainfall and shortly following the passing of several significant rain events.

Depending on the time of construction and fill heights, groundwater may potentially impact the planned near surface construction, most especially during initial site preparation activities, foundation, pavement section, and subsurface utility installations. Contractors should be prepared to utilize a dewatering system during construction to maintain separation between the groundwater levels and the desired working platforms for below-grade work.

If required, the dewatering system should be capable of lowering the groundwater elevation to a minimum of 2 feet below the desired working platform elevation(s). A local contractor familiar with similar site conditions common to the Bay County area should be able to determine an adequate dewatering method for the subject property. Common local dewatering methods include, but are not limited to, dewatering by the use of temporary well points and installing temporary construction sumps and/or trench drain systems.

As previously noted, groundwater levels are subject to seasonal, climatic, and other variations and may be different at other times and locations. The extent and nature of any dewatering required during construction will be dependent on the actual groundwater conditions prevalent at the time of construction and the effectiveness of construction drainage to prevent run-off into open excavations.

6.4 FOUNDATION RECOMMENDATIONS

6.4.1 GENERAL

We understand the proposed development will include the construction of four single-story buildings. Structural loadings were not available from the Client at the time of the issuance of this report; we have therefore assumed that isolated interior column and continuous load bearing wall loads will not exceed 30 kips per column and 3 kips per linear foot, respectively, for the planned structures.

6.4.2 SHALLOW FOUNDATION SYSTEM

Design: After the recommended site and subgrade preparation and fill placement, we recommend that a conventional shallow foundation system be

used to support the proposed structure. Foundations bearing on densified existing soils and/or compacted structural fill, as recommended in this report, may be designed for a maximum allowable soil bearing pressure of **1,500 pounds per square foot (psf)**.

We also note that sufficient fill should be added to the site to provide a minimum separation of at least 2 feet between the seasonal high groundwater (SHGW) table, which is estimated to occur approximately at the measured groundwater levels measured at each boring location during our September 28 and November 1, 2021 field exploration, and the bottom-of-footing elevation for the lowest footings planned for each proposed structure.

We recommend minimum footing widths of 24 inches for ease of construction and to reduce the possibility of localized shear failures. Exterior and interior footing bottoms should be established at least 18 inches below finished surrounding exterior grades.

Settlement: Settlements for spread foundations bearing on compacted native or approved fill materials were assessed using SPT values to estimate elastic modulus, based on published correlations and previous NOVA experience. We note that the settlements presented are based on the results of the SPT borings. Conditions may be better or worse in other areas, however, we believe the estimated settlements are reasonably conservative.

Based on the soil bearing capacity provided above, and the presumed foundation elevations as discussed above, we expect primary total settlement beneath individual foundations to be on the order of 1 inch or less. The amount of differential settlement is difficult to predict because the subsurface and foundation loading conditions can vary considerably across the site. However, we anticipate differential settlement between adjacent foundations will be on the order of ½ inch or less. The final deflected shape of the structure will be dependent on actual foundation locations and loading. Foundation support conditions are highly erratic and may vary dramatically in short horizontal distances. It is anticipated that the geotechnical engineer may recommend a different bearing capacity upon examination of the actual foundation subgrade at numerous locations.

To reduce the differential settlement if lower consistency materials are encountered, a lower bearing capacity should be used, or the foundations should be extended to more competent materials. We anticipate that timely communication between the geotechnical engineer and the structural engineer, as well as other design and construction team members, will be required.

We also note that our settlement estimations described above are based on

assumed loadings of 3 kips per linear foot for continuous load bearing walls and 30 kips per column for isolated interior columns. If these loading assumptions are not accurate and actual loadings exceed the mentioned above, NOVA should be notified immediately and due to the presence of very loose to loose sandy soils, encountered in the SPT borings within the depth of the load influence, soil improvement activities or a deep foundation system would need to be considered.

Construction: Foundation excavations should be evaluated by the NOVA geotechnical engineer prior to reinforcing steel placement to observe foundation subgrade preparation and confirm bearing pressure capacity. Foundation excavations should be level and free of debris, ponded water, mud, and loose, frozen, or water-softened soils. Concrete should be placed as soon as is practical after the foundation is excavated and the subgrade evaluated. Foundation concrete should not be placed on frozen or saturated soil.

If a foundation excavation remains open overnight, or if rain or snow is imminent, a 3 to 4-inch thick "mud mat" of lean concrete should be placed in the bottom of the excavation to protect the bearing soils until reinforcing steel and concrete can be placed.

6.5 SLABS-ON-GRADE

The conditions exposed at subgrade levels will vary across the site and may include structural fill or densified in-situ soils. The slabs-on-grade may be adequately supported on these subgrade conditions subject to the recommendations in this report. The slabs-on-grade should be jointed around columns and along walls to reduce cracking due to differential movement. An underdrain system is not necessary beneath the slabs, provided that the slabs are installed at least 2 feet above the post development high groundwater level. Impermeable vapor barriers are recommended beneath finished spaces to reduce dampness.

Once grading is completed, the subgrade can be exposed to adverse construction activities and weather conditions during the period of sub-slab utility installation. The subgrade should be well drained to prevent the accumulation of water. If the exposed subgrade becomes unstable, excessively wet or exhibits excessive rutting or pumping, the geotechnical engineer should be consulted.

6.6 PAVEMENT RECOMMENDATIONS

6.6.1 PAVEMENT DESIGN CRITERIA

A recommended flexible pavement section has been developed for this project based on our understanding of the existing subsurface conditions, review of

applicable FDOT specifications, and the assumed requirements of a 20-year pavement design life with moderate traffic loadings appropriate to a development of this size/type.

6.6.2 FLEXIBLE PAVEMENT

We recommend that a minimum compaction requirement be specified for the base and stabilized subgrade courses of at least 98 percent of the maximum dry density as determined by the Modified Proctor test method (ASTM D-1557). A minimum separation of at least 24 inches between the bottom of a crushed limerock or crushed concrete base course and the seasonal high groundwater table should be maintained. This separation may be reduced to 18 inches if Graded Aggregate Base (GAB) is employed for this project in lieu of crushed limerock or crushed concrete base.

We recommend using the parameters presented in thge table below for the flexible pavement design for this project.

STANDARD-DUTY PAVEMENT SECTION	
Surface Course (FDOT 9.5 mm SuperPave)	2 inches
FDOT Approved Crushed Limerock/Crushed Concrete Base or Graded Aggregate Base (GAB) Material	6 inches
Stabilized Subgrade (minimum LBR of 40)	12 inches
HEAVY-DUTY PAVEMENT SECTION	
Surface Course (FDOT 9.5 mm SuperPave)	1½ inches
Structural Course (FDOT 12.5 mm SuperPave)	2 inches
FDOT Approved Crushed Limerock/Crushed Concrete Base or Graded Aggregate Base (GAB) Material	8 inches
Stabilized Subgrade (minimum LBR of 40)	12 inches

Based on visual classification of the near-surface materials encountered in the test borings, it appears that the native slightly silty and silty sandy soils may not meet the minimum LBR requirement of 40 for the stabilized subgrade course (SSC), and therefore stabilization of the native subgrade soils should be anticipated as being potentially needed for this project if the pavement sections will be installed at/near current site grade elevations. An imported material having a minimum LBR value of 40 should be specified for the final (12-inch) lift of fill for pavement areas being installed over fill.

All asphalt material and paving operations should meet applicable specifications of the Asphalt Institute and Florida Department of Transportation. A NOVA technician should observe placement and perform density testing of the stabilized subgrade course, base course material and asphalt.

7.0 CONSTRUCTION OBSERVATIONS

7.1 SUBGRADE

Once site grading is completed, the subgrade may be exposed to adverse construction activities and weather conditions. The subgrade should be well-drained to prevent the accumulation of water. If the exposed subgrade becomes saturated or frozen, the NOVA geotechnical engineer should be consulted.

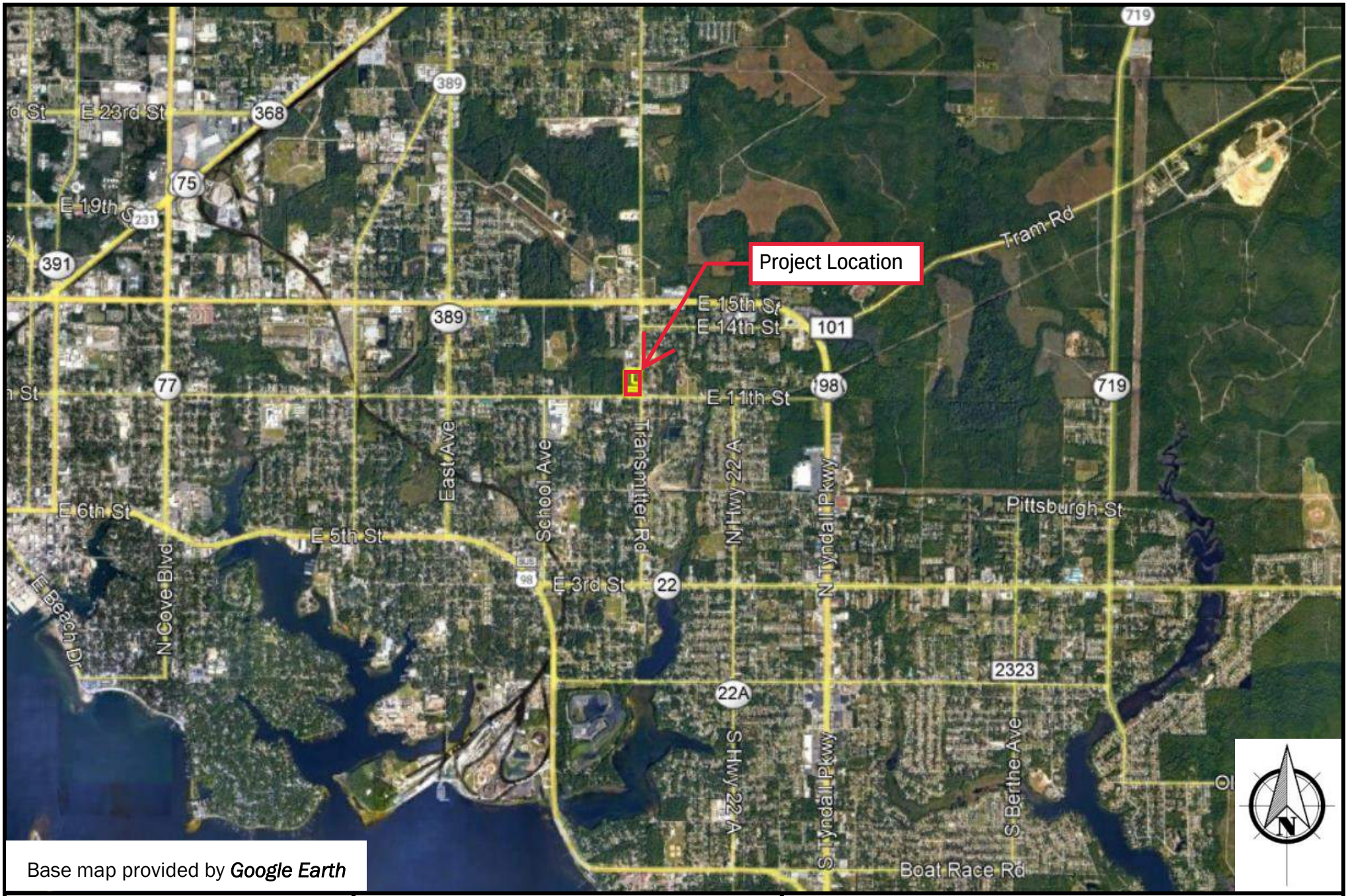
7.2 SHALLOW FOUNDATIONS

Foundation excavations should be level and free of debris, ponded water, mud, and loose, frozen, or water-softened soils. All foundation excavations should be evaluated by a NOVA geotechnical engineer prior to reinforcing steel placement to observe foundation subgrade preparation and assess bearing pressure capacity. Due to variable site subsurface and construction conditions, some adjustments in isolated foundation bearing pressures, depth of foundations or undercutting and replacement with controlled structural fill may be necessary.

7.3 PAVEMENTS

The recommended pavement section should utilize materials and be constructed in accordance with applicable FDOT specifications and specific project requirements. Also, NOVA should be retained during construction to confirm subgrade conditions are as anticipated and that the construction process is as required by the contract documents.

APPENDIX A
Figures and Maps



Base map provided by ***Google Earth***

Scale: Not To Scale	
Date Drawn: September 29, 2021	
Drawn By: T. White	
Checked By: A. Kniazeff	

NOVA

17612 Ashley Drive
Panama City Beach, Florida 32413
850.249.6682 ♦ 850.249.6683

PROJECT LOCATION MAP

City Complex

Springfield, Bay County, Florida

NOVA Project Number 10111-2021207

Soil Map—Bay County, Florida
(City Complex, 10111-2021207)

Map Scale: 1:1,390 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 20 40 80 120

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Bay County, Florida
Survey Area Data: Version 20, Jun 10, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

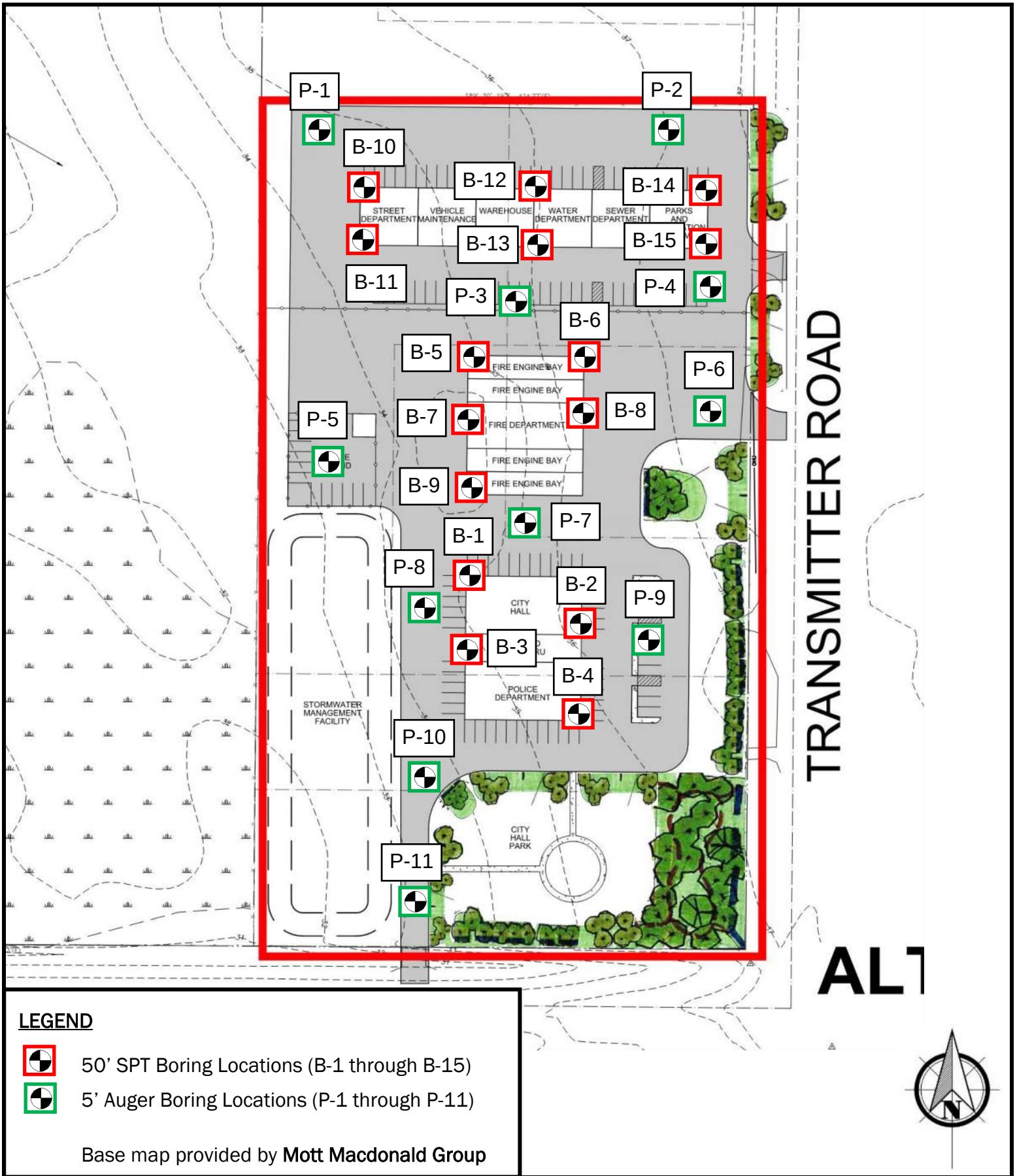
Date(s) aerial images were photographed: Jan 18, 2015—Mar 7, 2015

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
25	Hurricane sand, 0 to 2 percent slopes	4.7	56.6%
32	Plummer sand	3.6	43.4%
Totals for Area of Interest		**8.3**	**100.0%**

APPENDIX B
Subsurface Data



LEGEND

50' SPT Boring Locations (B-1 through B-15)

5' Auger Boring Locations (P-1 through P-11)

Base map provided by **Mott Macdonald Group**

Scale: Not To Scale	
Date Drawn: September 29, 2021	
Drawn By: T. White	
Checked By: A. Kniazeff	

NOVA

17612 Ashley Drive
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BORING LOCATION PLAN

City Complex

Springfield, Bay County, Florida

NOVA Project Number 10111-2021207

NOVA

KEY TO BORING LOGS

SYMBOLS AND ABBREVIATIONS

SYMBOL	DESCRIPTION
N-Value	No. of Blows of a 140-lb. Weight Falling 30 Inches Required to Drive a Standard Spoon 1 Foot
WOR	Weight of Drill Rods
WOH	Weight of Drill Rods and Hammer
	Sample from Auger Cuttings
	Standard Penetration Test Sample
	Thin-wall Shelby Tube Sample (Undisturbed Sampler Used)
% REC	Percent Core Recovery from Rock Core Drilling
RQD	Rock Quality Designation
	Stabilized Groundwater Level
	Seasonal High Groundwater Level (also referred to as the W.S.W.T.)
NE	Not Encountered
GNE	Groundwater Not Encountered
BT	Boring Terminated
-200 (%)	Fines Content or % Passing No. 200 Sieve
MC (%)	Moisture Content
LL	Liquid Limit (Atterberg Limits Test)
PI	Plasticity Index (Atterberg Limits Test)
K	Coefficient of Permeability
Org. Cont.	Organic Content
G.S. Elevation	Ground Surface Elevation

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE-GRAINED SOILS More than 50% retained on the No. 200 sieve*	GRAVELS 50% or more of coarse fraction retained on No. 4 sieve	CLEAN GRAVELS	GW	Well-graded gravels and gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines
		GRAVELS WITH FINES	GM	Silty gravels and gravel-sand-silt mixtures
			GC	Clayey gravels and gravel-sand-clay mixtures
	SANDS More than 50% of coarse fraction passes No. 4 sieve	CLEAN SANDS 5% or less passing No. 200 sieve	SW**	Well-graded sands and gravelly sands, little or no fines
			SP**	Poorly graded sands and gravelly sands, little or no fines
		SANDS with 12% or more passing No. 200 sieve	SM**	Silty sands, sand-silt mixtures
			SC**	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS 50% or more passes the No. 200 sieve*	SILTS AND CLAYS Liquid limit 50% or less		ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, lean clays
			OL	Organic silts and organic silty clays of low plasticity
	SILTS AND CLAYS Liquid limit greater than 50%		MH	Inorganic silts, micaceous or diamicaceous fine sands or silts, elastic silts
			CH	Inorganic clays or clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity
			PT	Peat, muck and other highly organic soils

*Based on the material passing the 3-inch (75 mm) sieve
** Use dual symbol (such as SP-SM and SP-SC) for soils with more than 5% but less than 12% passing the No. 200 sieve

RELATIVE DENSITY
(Sands and Gravels)
Very loose – Less than 4 Blow/Foot
Loose – 4 to 10 Blows/Foot
Medium Dense – 11 to 30 Blows/Foot
Dense – 31 to 50 Blows/Foot
Very Dense – More than 50 Blows/Foot

CONSISTENCY
(Silts and Clays)
Very Soft – Less than 2 Blows/Foot
Soft – 2 to 4 Blows/Foot
Medium Stiff – 5 to 8 Blows/Foot
Stiff – 9 to 15 Blows/Foot
Very Stiff – 16 to 30 Blows/Foot
Hard – More than 30 Blows/Foot

RELATIVE HARDNESS
(Limestone)
Soft – 100 Blows for more than 2 Inches
Hard – 100 Blows for less than 2 Inches

MODIFIERS

These modifiers Provide Our Estimate of the Amount of Minor Constituents (Silt or Clay Size Particles) in the Soil Sample
Trace – 5% or less
With Silt or With Clay – 6% to 11%
Silty or Clayey – 12% to 30%
Very Silty or Very Clayey – 31% to 50%

These Modifiers Provide Our Estimate of the Amount of Organic Components in the Soil Sample
Trace – Less than 3%
Few – 3% to 4%
Some – 5% to 8%
Many – Greater than 8%

These Modifiers Provide Our Estimate of the Amount of Other Components (Shell, Gravel, Etc.) in the Soil Sample
Trace – 5% or less
Few – 6% to 12%
Some – 13% to 30%
Many – 31% to 50%

NOVA

TEST BORING RECORD B-1

PROJECT NAME: City Complex
DATE: 10/1/2021
PROJECT NO.: 2021207
CLIENT: Mott Macdonald Group
PROJECT LOCATION: Springfield, Bay County, Florida
LOCATION: See Boring Location Plan
ELEVATION: Existing Grade
DRILLED BY: J. Governale
LOGGED BY: K. Selle
DRILLING METHOD: Mud Rotary
HAMMER:
APPARENT GW DEPTH: ▼ 2.0 feet
ESHGW DEPTH: ▽

Legend: ● N-Value (Blows per Foot); ▲ Moisture Content (%); ◇ Organic Content (%); ■ Fines Content (%); PL and LL marked on a 10–90 scale.

Depth (feet)	Elevation	Material Description	Graphic	Groundwater	Sample Type	N-Value
0		Loose grey/dark grey silty fine-grained SAND (SM)				5
				▼		
		Loose light grey slightly silty fine-grained SAND (SP-SM)				5
5		Loose light grey/light brown to light grey clayey fine-grained SAND (SC)				10
						5
						4
10						
15						4
20						7
25		Medium dense light grey silty fine-grained SAND (SM)				15
		Boring Terminated at 25 feet				

Note:

This information pertains only to this boring and should not be interpreted as being indicative of the site.

TEST BORING RECORD B-2

PROJECT NAME: City Complex **DATE:** 10/1/2021
PROJECT NO.: 2021207 **CLIENT:** Mott Macdonald Group
PROJECT LOCATION: Springfield, Bay County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: J. Governale **LOGGED BY:** K. Selle
DRILLING METHOD: Mud Rotary **HAMMER:**
APPARENT GW DEPTH: ▼ 3.0 feet **ESHGW DEPTH:** ▽

Depth (feet)	Material Description	N-Value
0	Loose grey/light brown to light grey/light brown silty fine-grained SAND (SM)	6
		10
5	Medium dense light brown slightly silty fine-grained SAND (SP-SM)	13
	Loose light grey/light brown clayey fine-grained SAND (SC)	7
	Loose light grey very clayey fine-grained SAND (SC)	4
10		
	Loose grey to grey/brown clayey fine-grained SAND (SC)	4
15		
		4
20		
	Medium dense light grey silty fine-grained SAND (SM)	14
25	Boring Terminated at 25 feet	

Graphic | Groundwater | Sample Type

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)
PL LL
10 20 30 40 50 60 70 80 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Note:

TEST BORING RECORD B-3

PROJECT NAME: City Complex **DATE:** 10/1/2021
PROJECT NO.: 2021207 **CLIENT:** Mott Macdonald Group
PROJECT LOCATION: Springfield, Bay County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: J. Governale **LOGGED BY:** K. Selle
DRILLING METHOD: Mud Rotary **HAMMER:**
APPARENT GW DEPTH: ▼ 2.0 feet **ESHGW DEPTH:** ▽

Depth (feet)	Material Description	Graphic	Groundwater	Sample Type	N-Value
0	Loose grey/brown silty fine-grained SAND (SM)		▼		5
	Medium dense light grey slightly silty fine-grained SAND (SP-SM)				12
5					15
	Loose light grey slightly clayey fine-grained SAND (SP-SC)				7
	Loose grey/brown very clayey fine-grained SAND (SC)				4
10					
	Very loose to loose grey clayey fine-grained SAND (SC)				3
15					
					6
20					
	Medium dense light grey slightly silty fine-grained SAND (SP-SM)				14
25	Boring Terminated at 25 feet				

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)
PL LL
10 20 30 40 50 60 70 80 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Note:

TEST BORING RECORD B-4

PROJECT NAME: City Complex **DATE:** 10/1/2021
PROJECT NO.: 2021207 **CLIENT:** Mott Macdonald Group
PROJECT LOCATION: Springfield, Bay County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: J. Governale **LOGGED BY:** K. Selle
DRILLING METHOD: Mud Rotary **HAMMER:**
APPARENT GW DEPTH: ▼ 3.0 feet **ESHGW DEPTH:** ▽

Depth (feet)	Material Description	N-Value
0	Loose light grey/light brown silty fine-grained SAND (SM)	5
	Loose light grey slightly silty fine-grained SAND (SP-SM)	9
5	Medium dense light grey fine-grained SAND (SP)	16
	Loose light grey/light brown clayey fine-grained SAND (SC)	8
		4
10		
	Loose dark grey slightly silty fine-grained SAND with decaying wood (SP-SM)	8
15		
	Loose brown slightly silty fine-grained SAND (SP-SM)	9
20		
	Loose light grey silty fine-grained SAND (SM)	10
25	Boring Terminated at 25 feet	

Groundwater: ▼

Sample Type

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)
PL LL
10 20 30 40 50 60 70 80 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Note:

TEST BORING RECORD B-5

PROJECT NAME: City Complex **DATE:** 10/11/2021
PROJECT NO.: 2021207 **CLIENT:** Mott Macdonald Group
PROJECT LOCATION: Springfield, Bay County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: J. Governale **LOGGED BY:** K. Selle
DRILLING METHOD: Mud Rotary **HAMMER:**
APPARENT GW DEPTH: ▼ 0.3 feet **ESHGW DEPTH:** ▽

Depth (feet)	Material Description	N-Value
0	Very loose grey/brown silty fine-grained SAND (SM)	2
5	Medium dense light grey slightly silty fine-grained SAND (SP-SM)	13, 19
10	Loose light grey fine-grained SAND (SP)	6, 4
15	Very loose dark brown silty fine-grained SAND with decaying wood (SM)	3
20	Loose to medium dense brown to light grey slightly silty fine-grained SAND (SP-SM)	11
25	Boring Terminated at 25 feet	15

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)
PL LL
10 20 30 40 50 60 70 80 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Note:

TEST BORING RECORD B-6

PROJECT NAME: City Complex **DATE:** 10/1/2021
PROJECT NO.: 2021207 **CLIENT:** Mott Macdonald Group
PROJECT LOCATION: Springfield, Bay County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: J. Governale **LOGGED BY:** K. Selle
DRILLING METHOD: Mud Rotary **HAMMER:**
APPARENT GW DEPTH: ▼ 2.0 feet **ESHGW DEPTH:** ▽

Depth (feet)	Material Description	N-Value
0		
	Loose to medium dense light grey/light brown to light grey slightly silty fine-grained SAND (SP-SM)	10
		14
5		14
	Loose light grey clayey fine-grained SAND (SC)	7
		4
10		
	Very loose grey/dark grey clayey fine-grained SAND with decaying wood (SC)	3
15		
	Very loose grey/brown slightly silty fine-grained SAND (SP-SM)	3
20		
	Loose grey/light grey silty fine-grained SAND (SM)	11
25		
	Boring Terminated at 25 feet	

Graphic | Groundwater | Sample Type

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)
PL LL
10 20 30 40 50 60 70 80 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Note:

TEST BORING RECORD B-7

PROJECT NAME: City Complex **DATE:** 10/1/2021
PROJECT NO.: 2021207 **CLIENT:** Mott Macdonald Group
PROJECT LOCATION: Springfield, Bay County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: J. Governale **LOGGED BY:** K. Selle
DRILLING METHOD: Mud Rotary **HAMMER:**
APPARENT GW DEPTH: ▼ 1.0 foot **ESHGW DEPTH:** ▽

Depth (feet)	Material Description	N-Value
0		
	Loose grey/light grey silty fine-grained SAND (SM)	4
	Loose brown/light brown slightly silty fine-grained SAND (SP-SM)	11
5	Medium dense light grey fine-grained SAND (SP)	13
	Loose light grey clayey fine-grained SAND (SC)	8
		4
10		
	Very loose dark grey clayey fine-grained SAND with decaying wood (SC)	2
15		
	Loose grey/brown to grey/light grey slightly silty fine-grained SAND (SP-SM)	7
20		
		11
25		
	Boring Terminated at 25 feet	

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)
PL LL
10 20 30 40 50 60 70 80 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Note:

TEST BORING RECORD B-8

PROJECT NAME: City Complex **DATE:** 10/1/2021
PROJECT NO.: 2021207 **CLIENT:** Mott Macdonald Group
PROJECT LOCATION: Springfield, Bay County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: J. Governale **LOGGED BY:** K. Selle
DRILLING METHOD: Mud Rotary **HAMMER:**
APPARENT GW DEPTH: ▼ 2.0 feet **ESHGW DEPTH:** ▽

Depth (feet)	Material Description	Graphic	Groundwater	Sample Type	N-Value
0	Loose grey/brown silty fine-grained SAND (SM)		▼		8
	Medium dense light grey slightly silty fine-grained SAND (SP-SM)				15
5	Medium dense light grey fine-grained SAND (SP)				17
	Loose light grey clayey fine-grained SAND (SC)				9
					4
10					
15	Very loose dark grey silty fine-grained SAND with decaying wood (SM)				3
20	Very loose to medium dense grey/brown to grey/light grey fine-grained SAND (SP-SM)				3
25					15
	Boring Terminated at 25 feet				

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)
PL LL
10 20 30 40 50 60 70 80 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Note:

TEST BORING RECORD B-9

PROJECT NAME: City Complex **DATE:** 10/1/2021
PROJECT NO.: 2021207 **CLIENT:** Mott Macdonald Group
PROJECT LOCATION: Springfield, Bay County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: J. Governale **LOGGED BY:** K. Selle
DRILLING METHOD: Mud Rotary **HAMMER:**
APPARENT GW DEPTH: ▼ 1.0 foot **ESHGW DEPTH:** ▽

Depth (feet)	Material Description	N-Value
0	Loose grey/brown silty fine-grained SAND (SM)	6
5	Loose to medium dense light grey slightly silty fine-grained SAND (SP-SM)	13
		12
	Loose light grey fine-grained SAND (SP)	7
10	Very loose to loose light grey to grey clayey fine-grained SAND (SC)	4
15		2
20	Loose grey/brown silty fine-grained SAND (SM)	4
25		11
	Boring Terminated at 25 feet	

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)
PL LL
10 20 30 40 50 60 70 80 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Note:

TEST BORING RECORD B-10

PROJECT NAME: City Complex **DATE:** 10/11/2021
PROJECT NO.: 2021207 **CLIENT:** Mott Macdonald Group
PROJECT LOCATION: Springfield, Bay County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: J. Governale **LOGGED BY:** K. Selle
DRILLING METHOD: Mud Rotary **HAMMER:**
APPARENT GW DEPTH: ▼ 0.5 feet **ESHGW DEPTH:** ▽

Depth (feet)	Material Description	N-Value
0	Very loose grey/brown silty fine-grained SAND (SM)	2
5	Very loose to loose grey/light brown very clayey fine-grained SAND (SC)	2
		4
10	Very loose to loose light grey clayey fine-grained SAND (SC)	4
		3
15	Loose grey/dark grey clayey fine-grained SAND with decaying wood (SC)	4
20	Loose grey/light grey slightly silty fine-grained SAND (SP-SM)	7
25	Medium dense grey/light grey fine-grained SAND (SP)	13
	Boring Terminated at 25 feet	

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)
PL LL
10 20 30 40 50 60 70 80 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Note:

TEST BORING RECORD B-11

PROJECT NAME: City Complex **DATE:** 10/11/2021
PROJECT NO.: 2021207 **CLIENT:** Mott Macdonald Group
PROJECT LOCATION: Springfield, Bay County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: J. Governale **LOGGED BY:** K. Selle
DRILLING METHOD: Mud Rotary **HAMMER:**
APPARENT GW DEPTH: ▼ 0.5 feet **ESHGW DEPTH:** ▽

Depth (feet)	Material Description	N-Value
0		
	Very loose brown slightly silty fine-grained SAND (SP-SM)	3
	Loose to medium dense light grey/light brown to light grey clayey fine-grained SAND (SC)	13
5		28
		6
		4
10		
	Very loose grey/dark grey clayey fine-grained SAND with decaying wood (SC)	3
15		
	Loose to medium dense grey/light grey slightly silty fine-grained SAND (SP-SM)	12
20		
		15
25		
	Boring Terminated at 25 feet	

Graphic: Groundwater; Sample Type

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)
PL LL
10 20 30 40 50 60 70 80 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Note:

TEST BORING RECORD B-12

PROJECT NAME: City Complex **DATE:** 10/11/2021
PROJECT NO.: 2021207 **CLIENT:** Mott Macdonald Group
PROJECT LOCATION: Springfield, Bay County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: J. Governale **LOGGED BY:** K. Selle
DRILLING METHOD: Mud Rotary **HAMMER:**
APPARENT GW DEPTH: ▼ 1.0 foot **ESHGW DEPTH:** ▽

Depth (feet)	Material Description	N-Value
0	Loose light orange/light brown silty fine-grained SAND (SM)	4
	Loose grey/light grey slightly silty fine-grained SAND (SP-SM)	7
5	Very loose to medium dense light grey/light brown to grey/brown clayey fine-grained SAND (SC)	14
		6
		3
10		
		2
15		
	Loose grey to grey/light grey slightly silty fine-grained SAND (SP-SM)	6
20		
		12
25	Boring Terminated at 25 feet	

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)
PL LL
10 20 30 40 50 60 70 80 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Note:

TEST BORING RECORD B-13

PROJECT NAME: City Complex **DATE:** 10/11/2021
PROJECT NO.: 2021207 **CLIENT:** Mott Macdonald Group
PROJECT LOCATION: Springfield, Bay County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: J. Governale **LOGGED BY:** K. Selle
DRILLING METHOD: Mud Rotary **HAMMER:**
APPARENT GW DEPTH: ▼ 0.7 feet **ESHGW DEPTH:** ▽

Depth (feet)	Material Description	N-Value
0	Loose grey/brown silty fine-grained SAND (SM)	4
5	Loose light grey/light brown to grey/light grey slightly silty fine-grained SAND (SP-SM)	8, 7
10	Very loose to loose grey/light grey clayey fine-grained SAND (SC)	5, 3
15		2
20		6
25	Medium dense grey/light grey slightly silty fine-grained SAND (SP-SM)	16
	Boring Terminated at 25 feet	

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)
PL LL
10 20 30 40 50 60 70 80 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Note:

TEST BORING RECORD B-14

PROJECT NAME: City Complex **DATE:** 10/11/2021
PROJECT NO.: 2021207 **CLIENT:** Mott Macdonald Group
PROJECT LOCATION: Springfield, Bay County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: J. Governale **LOGGED BY:** K. Selle
DRILLING METHOD: Mud Rotary **HAMMER:**
APPARENT GW DEPTH: ▼ 1.0 foot **ESHGW DEPTH:** ▽

Depth (feet)	Material Description	N-Value
0	Very loose to loose light grey/light brown slightly silty fine-grained SAND (SP-SM)	2
5		10
	Very loose to loose light grey/light brown clayey fine-grained SAND (SC)	12
10		4
		2
15	Loose grey clayey fine-grained SAND with decaying wood (SC)	4
20	Loose to medium dense grey/brown to light grey/light brown slightly silty fine-grained SAND (SP-SM)	10
25		19
	Boring Terminated at 25 feet	

Graphic | Groundwater | Sample Type

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)
PL LL
10 20 30 40 50 60 70 80 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Note:

NOVA

TEST BORING RECORD B-15

PROJECT NAME: City Complex **DATE:** 10/11/2021
PROJECT NO.: 2021207 **CLIENT:** Mott Macdonald Group
PROJECT LOCATION: Springfield, Bay County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: J. Governale **LOGGED BY:** K. Selle
DRILLING METHOD: Mud Rotary **HAMMER:**
APPARENT GW DEPTH: ▼ 1.0 foot **ESHGW DEPTH:** ▽

Depth (feet)	Material Description	N-Value
0		
	Very loose grey/light grey silty fine-grained SAND (SM)	2
	Loose light grey slightly silty fine-grained SAND (SP-SM)	8
5	Very loose brown to grey clayey fine-grained SAND (SC)	4
		4
10		3
15		4
20	Loose grey slightly silty fine-grained SAND (SP-SM)	8
25	Medium dense light grey fine-grained SAND (SP)	24
	Boring Terminated at 25 feet	

Graphic; Groundwater; Sample Type

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)
PL LL
10 20 30 40 50 60 70 80 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Note:

TEST BORING RECORD P-1

PROJECT NAME: City Complex **DATE:** 9/28/2021
PROJECT NO.: 2021207 **CLIENT:** Mott Macdonald Group
PROJECT LOCATION: Springfield, Bay County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: T. White **LOGGED BY:** K. Selle
DRILLING METHOD: Hand Auger **HAMMER:**
APPARENT GW DEPTH: ▼ 2.0 feet **ESHGW DEPTH:** ▽ 2.0 feet

Depth (feet)	Elevation	Material Description	Graphic	Groundwater	Sample Type	N-Value
0		Grey/brown to brown/light brown silty fine-grained SAND (SM)				
		Light grey slightly silty fine-grained SAND (SP-SM)		▼		
5		Boring Terminated at 4 feet				

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)
PL LL
10 20 30 40 50 60 70 80 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Note:

NOVA

TEST BORING RECORD P-2

PROJECT NAME: City Complex **DATE:** 9/28/2021
PROJECT NO.: 2021207 **CLIENT:** Mott Macdonald Group
PROJECT LOCATION: Springfield, Bay County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: T. White **LOGGED BY:** K. Selle
DRILLING METHOD: Hand Auger **HAMMER:**
APPARENT GW DEPTH: ▼ 1.7 feet **ESHGW DEPTH:** ▽ 1.7 feet

Depth (feet)	Elevation	Material Description	Graphic	Groundwater	Sample Type	N-Value
0		Grey/brown to grey silty fine-grained SAND (Sm)		▼		
		Light grey slightly silty fine-grained SAND (Sp-sm)				
		Boring Terminated at 3.5 feet				
5						

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)
PL LL
10 20 30 40 50 60 70 80 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Note:

NOVA

TEST BORING RECORD P-3

PROJECT NAME: City Complex **DATE:** 9/28/2021
PROJECT NO.: 2021207 **CLIENT:** Mott Macdonald Group
PROJECT LOCATION: Springfield, Bay County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: T. White **LOGGED BY:** K. Selle
DRILLING METHOD: Hand Auger **HAMMER:**
APPARENT GW DEPTH: ▼ 1.2 feet **ESHGW DEPTH:** ▽ 1.2 feet

Depth (feet)	Elevation	Material Description	Graphic	Groundwater	Sample Type	N-Value
0		Grey to brown silty fine-grained SAND (Sm)				
		Light grey slightly silty fine-grained SAND (Sp-sm)		▼		
5		Boring Terminated at 4 feet				

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)

PL LL
10 20 30 40 50 60 70 80 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Note:

TEST BORING RECORD P-4

PROJECT NAME: City Complex **DATE:** 9/28/2021
PROJECT NO.: 2021207 **CLIENT:** Mott Macdonald Group
PROJECT LOCATION: Springfield, Bay County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: T. White **LOGGED BY:** K. Selle
DRILLING METHOD: Hand Auger **HAMMER:**
APPARENT GW DEPTH: ▼ 2.0 feet **ESHGW DEPTH:** ▽ 2.0 feet

Depth (feet)	Elevation	Material Description	Graphic	Groundwater	Sample Type	N-Value
0		Grey/brown silty fine-grained SAND (Sm)				
		Light grey slightly silty fine-grained SAND (Sp-sm)		▼		
		Light brown silty fine-grained SAND (SM)				
5		Boring Terminated at 4 feet				

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)
PL LL
10 20 30 40 50 60 70 80 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Note:

TEST BORING RECORD P-5

PROJECT NAME: City Complex **DATE:** 9/28/2021
PROJECT NO.: 2021207 **CLIENT:** Mott Macdonald Group
PROJECT LOCATION: Springfield, Bay County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: T. White **LOGGED BY:** K. Selle
DRILLING METHOD: Hand Auger **HAMMER:**
APPARENT GW DEPTH: ▼ 2.7 feet **ESHGW DEPTH:** ▽ 2.7 feet

Depth (feet)	Elevation	Material Description	Graphic	Groundwater	Sample Type	N-Value
0		Grey/dark grey silty fine-grained SAND with few organics - organic silt (SM)				
		Light grey/light brown to grey/brown slightly silty fine-grained SAND (SP-sm)		▼		
		Orange/light grey clayey fine-grained SAND (Sc)				
5		Boring Terminated at 4.5 feet				

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)
PL LL
10 20 30 40 50 60 70 80 90

◇ ■

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Note:

TEST BORING RECORD P-6

PROJECT NAME: City Complex **DATE:** 9/28/2021
PROJECT NO.: 2021207 **CLIENT:** Mott Macdonald Group
PROJECT LOCATION: Springfield, Bay County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: T. White **LOGGED BY:** D. Ritzel
DRILLING METHOD: Hand Auger **HAMMER:**
APPARENT GW DEPTH: ▼ 1.7 feet **ESHGW DEPTH:** ▽ 1.7 feet

Depth (feet)	Elevation	Material Description	Graphic	Groundwater	Sample Type	N-Value
0		Grey to brown/light brown slightly silty fine-grained SAND (Sp-sm)		▼		
5		Boring Terminated at 4 feet				

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)
PL LL
10 20 30 40 50 60 70 80 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Note:

NOVA

TEST BORING RECORD P-7

PROJECT NAME: City Complex **DATE:** 9/28/2021
PROJECT NO.: 2021207 **CLIENT:** Mott Macdonald Group
PROJECT LOCATION: Springfield, Bay County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: T. White **LOGGED BY:** D. Ritzel
DRILLING METHOD: Hand Auger **HAMMER:**
APPARENT GW DEPTH: ▼ 1.7 feet **ESHGW DEPTH:** ▽ 1.7 feet

Depth (feet)	Elevation	Material Description	Graphic	Groundwater	Sample Type	N-Value
0		Grey/dark grey slightly silty fine-grained SAND with trace organics - organic silt (SP-SM)		▼		
		Brown to light grey slightly silty fine-grained SAND (SP-SM)				
5		Boring Terminated at 4 feet				

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)
PL LL
10 20 30 40 50 60 70 80 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Note:

NOVA

TEST BORING RECORD P-8

PROJECT NAME: City Complex **DATE:** 9/28/2021
PROJECT NO.: 2021207 **CLIENT:** Mott Macdonald Group
PROJECT LOCATION: Springfield, Bay County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: T. White **LOGGED BY:** D. Ritzel
DRILLING METHOD: Hand Auger **HAMMER:**
APPARENT GW DEPTH: ▼ 2.0 feet **ESHGW DEPTH:** ▽ 2.0 feet

Depth (feet)	Elevation	Material Description	Graphic	Groundwater	Sample Type	N-Value
0		Dark brown silty fine-grained SAND with trace organics - organic silt (SM)				
		Orange/brown silty fine-grained SAND (Sm)				
		Brown to light brown slightly silty fine-grained SAND (SP-SM)		▼		
5		Boring Terminated at 4 feet				

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)

PL LL
10 20 30 40 50 60 70 80 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Note:

NOVA

TEST BORING RECORD P-9

PROJECT NAME: City Complex **DATE:** 9/28/2021
PROJECT NO.: 2021207 **CLIENT:** Mott Macdonald Group
PROJECT LOCATION: Springfield, Bay County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: T. White **LOGGED BY:** D. Ritzel
DRILLING METHOD: Hand Auger **HAMMER:**
APPARENT GW DEPTH: ▼ 2.2 feet **ESHGW DEPTH:** ▽ 2.2 feet

Depth (feet)	Elevation	Material Description	Graphic	Groundwater	Sample Type	N-Value
0		Grey/brown silty fine-grained SAND (SM)				
		Grey/brown slightly silty fine-grained SAND (SP-SM)				
5		Boring Terminated at 4 feet				

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)
PL LL
10 20 30 40 50 60 70 80 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Note:

TEST BORING RECORD P-10

PROJECT NAME: City Complex **DATE:** 9/28/2021
PROJECT NO.: 2021207 **CLIENT:** Mott Macdonald Group
PROJECT LOCATION: Springfield, Bay County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: T. White **LOGGED BY:** K. Selle
DRILLING METHOD: Hand Auger **HAMMER:**
APPARENT GW DEPTH: ▼ 3.2 feet **ESHGW DEPTH:** ▽ 3.2 feet

Depth (feet)	Elevation	Material Description	Graphic	Groundwater	Sample Type	N-Value
0		Grey/brown to light grey silty fine-grained SAND (Sm)				
		Light grey to light grey/light brown clayey fine-grained SAND (Sc)				
5		Boring Terminated at 4.5 feet				

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)

PL LL
10 20 30 40 50 60 70 80 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Note:

NOVA

TEST BORING RECORD P-11

PROJECT NAME: City Complex **DATE:** 9/28/2021
PROJECT NO.: 2021207 **CLIENT:** Mott Macdonald Group
PROJECT LOCATION: Springfield, Bay County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: T. White **LOGGED BY:** K. Selle
DRILLING METHOD: Hand Auger **HAMMER:**
APPARENT GW DEPTH: ▼ 2.0 feet **ESHGW DEPTH:** ▽ 2.0 feet

Depth (feet)	Elevation	Material Description	Graphic	Groundwater	Sample Type	N-Value
0		Brown/dark brown silty fine-grained SAND with few organics - organic silt (Sm)				
		Light grey/light brown to light grey slightly silty fine-grained SAND (Sp-sm)		▼		
5		Boring Terminated at 3.5 feet				

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)

PL LL
10 20 30 40 50 60 70 80 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Note:

APPENDIX C
Laboratory Data

SUMMARY OF CLASSIFICATION & INDEX TESTING

City Complex
Springfield, Bay County, Florida
NOVA Project Number 10111-2021207

Boring Number	Sample Depth (ft)	Natural Moisture (%)	Percent (%) Passing Sieve #200	Organic Content (%)	USCS Soil Classification
B-1	4.0 - 6.0	16	14.5	—	SC
B-3	0.0 - 2.0	18	14.1	—	SM
B-8	0.0 - 2.0	11	13.2	—	SM
B-10	2.0 - 4.0	14	32.5	—	SC
B-14	4.0 - 6.0	14	23.9	—	SC
P-5	0.0 - 0.75	26	26.4	3.6	SM
P-10	0.0 - 0.75	22	23.6	—	SM
P-10	0.75 - 1.25	15	16.1	—	SM
P-11	0.0 - 0.75	31	23.5	—	SM

NOVA

APPENDIX D
Support Documents

QUALIFICATIONS OF RECOMMENDATIONS

The findings, conclusions and recommendations presented in this report represent our professional opinions concerning subsurface conditions at the site. The opinions presented are relative to the dates of our site work and should not be relied on to represent conditions at later dates or at locations not explored. The opinions included herein are based on information provided to us, the data obtained at specific locations during the study, and our previous experience. If additional information becomes available which might impact our geotechnical opinions, it will be necessary for NOVA to review the information, re-assess the potential concerns, and re-evaluate our conclusions and recommendations.

Regardless of the thoroughness of a geotechnical exploration, there is the possibility that conditions between borings may differ from those encountered at specific boring locations, that conditions are not as anticipated by the designers and/or the contractors, or that either natural events or the construction process has altered the subsurface conditions. These variations are an inherent risk associated with subsurface conditions in this region and the approximate methods used to obtain the data. These variations may not be apparent until construction.

The professional opinions presented in this report are not final. Field observations and foundation installation monitoring by the geotechnical engineer, as well as soil density testing and other quality assurance functions associated with site earthwork and foundation construction, are an extension of this report. Therefore, NOVA should be retained by the owner to observe all earthwork and foundation construction to confirm that the conditions anticipated in this study actually exist, and to finalize or amend our conclusions and recommendations. NOVA is not responsible or liable for the conclusions and recommendations presented in this report if NOVA does not perform these observation and testing services.

This report is intended for the sole use of **Mott MacDonald Group** only. The scope of work performed during this study was developed for purposes specifically intended by **Mott MacDonald Group** only and may not satisfy other users' requirements. Use of this report or the findings, conclusions or recommendations by others will be at the sole risk of the user. NOVA is not responsible or liable for the interpretation by others of the data in this report, nor their conclusions, recommendations, or opinions.

Our professional services have been performed, our findings obtained, our conclusions derived, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices in the State of Florida. This warranty is in lieu of all other statements or warranties, either expressed or implied.

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a civil engineer may not fulfill the needs of a constructor — a construction contractor — or even another civil engineer. Because each geotechnical- engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. No one except you should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply this report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical-engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

Geotechnical Engineers Base Each Report on a Unique Set of Project-Specific Factors

Geotechnical engineers consider many unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk-management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical-engineering report that was:

- not prepared for you;
- not prepared for your project;
- not prepared for the specific site explored; or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical-engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical-engineering report is based on conditions that existed at the time the geotechnical engineer performed the study. *Do not rely on a geotechnical-engineering report whose adequacy may have been affected by*: the passage of time; man-made events, such as construction on or adjacent to the site; or natural events, such as floods, droughts, earthquakes, or groundwater fluctuations. *Contact the geotechnical engineer before applying this report to determine if it is still reliable.* A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ — sometimes significantly — from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide geotechnical-construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are Not Final

Do not overrely on the confirmation-dependent recommendations included in your report. *Confirmation-dependent recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's confirmation-dependent recommendations if that engineer does not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

A Geotechnical-Engineering Report Is Subject to Misinterpretation

Other design-team members' misinterpretation of geotechnical-engineering reports has resulted in costly

problems. Confront that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Constructors can also misinterpret a geotechnical-engineering report. Confront that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing geotechnical construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical-engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make constructors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give constructors the complete geotechnical-engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise constructors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure constructors have sufficient time* to perform additional study. Only then might you be in a position to give constructors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and constructors fail to recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Environmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform an *environmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold-prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, many mold- prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical- engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; *none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.*

Rely, on Your GBC-Member Geotechnical Engineer for Additional Assistance

Membership in the Geotechnical Business Council of the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you GBC-Member geotechnical engineer for more information.

GEOTECHNICAL BUSINESS COUNCIL
of the Geoprofessional Business Association

8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone: 301/565-2733 Facsimile: 301/589-2017
e-mail: info@geoprofessional.org www.geoprofessional.org

DIVISION 2

SITEWORK

SECTION 02100 EROSION CONTROL AND ENVIRONMENTAL PROTECTION

PART 1 – GENERAL

1.01 SCOPE OF WORK

A. The work specified in this Section consists of providing, maintaining and removing temporary and permanent erosion and sedimentation controls.

B. Land disturbance activity requiring a Development Order will not commence until the order is approved.

C. Basic Principles
1. Conduct the earthwork and excavation activities in such a manner to fit the topography, soil type and conditions.
2. Minimize the disturbed area and duration of exposure to erosion elements.
3. Stabilize disturbed areas immediately.
4. Safely convey run-off from the site to an outlet such that erosion will not be increased off site.
5. Retain sediment on site that was generated on site.
6. Minimize encroachment upon watercourses.

D. Temporary Erosion and Sedimentation Control; In general, temporary erosion and sedimentation control procedures shall be directed toward:
1. Preventing soil erosion at the source.
2. Preventing silt and sediment from entering any waterway if soil erosion cannot be prevented.
3. Preventing silt and sediment from migrating downstream in the event it cannot be prevented from entering the waterway.

E. Permanent Erosion Control: Permanent erosion control measures shall be implemented to prevent sedimentation of the waterways and to prevent erosion of the Project site.

1.02 DESCRIPTION OF WORK (for projects that disturb one acre or less)

A. The work of this section consists of the necessary erosion control and environmental protection measures required to control erosion and provide environmental protection on the project and areas outside the limits of the project, so as to prevent pollution of water, detrimental effects to public or private property adjacent to the project, damage to work on the project, and to satisfy the specific or general conditions of applicable permits and regulations. The need for temporary erosion control and environmental protection shall be considered as an anticipated condition of construction for compliance with state and federal laws and it is the Contractor's responsibility for providing the necessary solutions as part of these contract documents.

B. Erosion control work includes, but is not limited to, the following:
1. Temporary erosion control
2. Permanent erosion control

C. Environmental protection work includes, but is not limited to, the following:

1. Staked hay bales
2. Staked Geobales
3. Sediment control fence
4. Sedimentation basins
5. Turbidity barriers
6. Temporary gravel construction entrance

1.03 DESCRIPTION OF WORK (for projects that disturb more than one acre)

A. Construction activities associated with this project will disturb more than one acre of land. The Contractor shall obtain coverage under a NPDES Stormwater Permit and implement appropriate pollution prevention techniques to minimize erosion and sedimentation and properly manage stormwater. The Florida Department of Environmental Protection adopted under Rule 62-621.300(4), *F.A.C.*, the General Permit for Stormwater Discharge from Large and Small Construction Activities (CGP). The CGP requires:

1. A CGP Notice of Intent (NOI) [DEP Form 62-621.300(4)(b)] must be submitted to DEP. There is an application fee for the NOI.
2. A Notice of Termination (NOT) [DEP Form 62-621.300(6)] must be submitted to DEP to discontinue permit coverage. A NOT may be submitted only when the site meets the eligibility requirements for termination specified in the CGP.

B. The Stormwater Pollution Prevention Plan (SWPPP) must be developed and implemented to be in compliance with the permit. The Plan must include the following:

1. A site evaluation of how and where pollutants may be mobilized by stormwater.
2. A site plan for managing stormwater runoff.
3. Identification of appropriate erosion and sediment controls and Stormwater Best Management Practices (BMPs) to reduce erosion, sedimentation, and stormwater pollution.
4. A maintenance and inspection schedule.
5. A record keeping process.
6. Identification of stormwater exit areas.

C. A copy of the SWPPP must be available at the immediate site of the construction activity. Best Management Practices (BMPs) must be identified to fit the specific project. Both structural and non-structural controls will be applicable. Some of the commonly used controls are:

1. Structural Controls
    a. Retention Ponds: Permanent structures designed to allow time for sediments to settle and water to infiltrate the ground.
    b. Temporary Sediment Basins: Structures designed to detain sediment-laden runoff from disturbed areas long enough for sediments to settle out and control the release of stormwater.

c. Entrance/Exit Controls: Temporary controls, such as gravel, used to stabilize the entrances/exits to the site to reduce the amount of soils transported onto paved roads by vehicles (known as “track-out”).
d. Silt Fencing: A temporary erosion and sediment control used to prevent dirt from entering waterways before bare soil is stabilized with vegetation.
e. Berms: A temporary erosion and sediment control that physically prevents polluted runoff from entering nearby storm drain inlets and waters

2. Non-Structural Controls
a. Stabilization: Techniques such as sodding, seeding/ mulching, and stone cover, which reduce the erosion of exposed soils and steep grades.
b. Phased Construction: Scheduling construction to occur during the dry season or to minimize the amount of land cleared at any one time.
c. Good Housekeeping: Techniques such as oil and fuel containment, spill prevention and clean-up, and street sweeping of “tracked-out” soils, which help prevent the contamination of stormwater runoff.

D. Detailed information and guidance for SWPPP development and for compliance inspections is available at the following web sites:

http://www.dep.state.fl.us/water/stormwater/npdes/construction3.htm

http://www.floridadep.org/water/nonpoint/erosion.htm

1.04 QUALITY ASSURANCE

A. Codes and Standards: Perform all work in compliance with applicable requirements of governing authorities having jurisdiction.
1. Comply with the provisions of the following codes and standards (latest edition), except as shown or specified:
a. "Standard Specifications for Road and Bridge Construction," Florida Department of Transportation, latest edition. Herein specified or shown on the plans as "Section XXX, FDOT Standard Specifications”.
b. "Roadway and Traffic Design Standards", Florida Department of Transportation, latest edition. Herein specified as "FDOT Standard Index No. XXX”.
c. "American Society for Testing and Materials (ASTM) Publications" as follows:

D123	Standard Terminology Relating to Textiles
D1683	Standard Test Method for Failure in Sewn Seams of Woven Apparel Fabrics

D2487	Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
D3786	Standard Test Method for Bursting Strength of Textile Fabrics—Diaphragm Bursting Strength Tester Method
D3787	Standard Test Method for Bursting Strength of Textiles-Constant-Rate-of-Traverse (CRT) Ball Burst Test
D4439	Standard Terminology for Geosynthetics
D4533	Standard Test Method for Trapezoid Tearing Strength of Geotextiles
D4632	Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
D5141	Standard Test Method for Determining Filtering Efficiency and Flow Rate of the Filtration Component of a Sediment Retention Device

B. Certification
   1. The Contractor shall be responsible for providing the required material certifications prior to construction. Failure to provide certification may result in rejection of the material and replacement at no cost to the Owner.

1.05 SUBMITTALS

A. Material Certificates
   1. Provide copies of materials certificates signed by material producer and Contractor, certifying that each material item complies with or exceeds specified requirements. When test requirements are specified, the Contractor shall supply results performed by a certified testing laboratory.

PART 2 – MATERIALS

2.01 TEMPORARY EROSION CONTROL (Vegetation and Coverings)

A. General
   1. Temporary erosion control features shall consist of, but not be limited to, temporary grassing, temporary sodding, temporary mulching, sandbagging, artificial coverings, berms, and baled hay or straw.

B. Temporary Grassing
   1. Grassing shall be as specified in Section 02210 except as modified herein. Perennial grass seed may be omitted if permanent erosion control will be placed prior to death of annual grass.

C. Temporary Sod

1. Sod shall be as specified in Section 02200.

D. Temporary Mulch
   1. Mulch shall be as specified in Section 02210.

E. Sandbagging
   1. Sandbagging shall consist of furnishing and placing sandbags in configurations, so as to control erosion and siltation.

F. Artificial Coverings
   1. This work shall consist of furnishing and applying fiber mats, netting, plastic sheeting, or other approved covering to the earth surfaces.

G. Baled Hay, Straw or Geo Hay
   1. This work shall consist of construction of baled hay, geo hay, or straw dams to protect against downstream accumulations of silt.
   2. The baled hay, geo hay or straw dams shall be constructed in accordance with the details shown in the construction drawings.

2.02 TEMPORARY EROSION CONTROL (Silt Fences and Turbidity Barriers)

A. General
   1. Temporary erosion control features shall consist of, but not be limited to, silt fences, floating turbidity barriers, and staked turbidity barriers.
   2. The work shall consist of furnishing, installing, maintaining, and removing temporary fences and barriers in accordance with the manufacturer's recommendations, these specifications, and the standard details.
   3. Turbidity barriers in waters of the State may be either floating or staked types or any combinations of types that will suit site conditions and meet erosion control and water quality requirements.
   4. The barrier type(s) will be at the Contractor's option unless otherwise specified in the plans.

B. Silt Fence
   1. Silt fence or sediment control fence shall consist of a geotextile fabric attached to posts.
   2. The geotextile fabric shall be a woven or non-woven fabric as specified herein.
   3. The silt fence shall be constructed in accordance with the standard details.

C. Staked Turbidity Barrier
   1. In addition to the requirements for a temporary silt fence contained herein, the fabric used for staked turbidity barrier shall have a double stitched hem at the top of the fabric into which has been sewn a braided nylon cord with a minimum diameter of 1/8 inch running the full length of that section of fabric.
   2. Supports for staked turbidity barriers shall be a minimum length of three feet seasoned two-inch by four-inch wood, 2-1/2 inch minimum diameter wood, or steel at least 1.33 pounds per linear foot.

D. Floating Turbidity Barrier
   1. Floating turbidity barrier, if applicable, shall be in accordance with the details shown.
   2. The type barrier used will be such as to minimize dispersion of turbid waters from the construction site.
   3. Alternate materials may be approved provided that compliance with applicable permit conditions and State water quality standards are maintained.

2.03 GEOTEXTILES

A. Filter Fabric
   1. The geotextile fabric shall be a woven or non-woven fabric consisting of long-chain polymeric filaments or yarns such as polypropylene, polyethylene, polyester, polyamides, or polyvinyl chloride formed into a stable network such that the filaments or yarns retain their relative position to each other.
   2. The base plastic shall contain stabilizers and/or inhibitors to make the filaments resistant to deterioration from ultraviolet light, heat exposure, and commonly encountered chemicals.
   3. The edges of the fabric shall be salvaged or otherwise finished to prevent the outer yarn from pulling away from the fabric.

B. The fabric shall conform to the following physical requirements:

PROPERTIES	TEST METHOD	ACCEPTABLE VALUES
Seam Strength	ASTM D1683	120 lbs. (min)
Mullen Burst	ASTM D3786	200 psi strength (min)
Puncture Strength	ASTM D3787	60 lbs. (min)
Trapezoidal Tear	ASTM D4533	50 lbs. strength (min)
Grab Tensile	ASTM D4632	120 lbs. strength (min)
Elongation (max)	ASTM D4632	25%
Filtration	ASTM D5141	75% efficiency (min)
Slurry Flow Rate	ASTM D5141	0.3 gpm/ sf (min)

C. Seams
   1. The seams of the fabric shall be sewn with thread of a material meeting the chemical requirements for the fabric.
   2. The minimum seam strength shall comply with the property requirements contained herein.

D. Shipment and Storage
   1. During shipment and periods of storage, the geotextile shall be protected from direct sunlight, ultraviolet rays, and temperatures greater than 140 degrees Fahrenheit, mud, dirt, dust, and debris. Stockpiled materials shall be kept covered at all times.

2.04 CONSTRUCTION EXIT STONE

A. Use sound, tough, durable stone resistant to the action of air and water. Slabby or shally pieces will not be acceptable. Aggregate size shall conform to FDOT No. 1 Coarse Aggregate (1.5 to 3.5-inch stone).

2.05 RIP RAP

B. Stone Rip Rap

1. Rip Rap Rubble Stone shall be in accordance with Section 530-2.2.2 (Rubble-Ditch Lining) of the FDOT Standard Specifications for Road and Bridge Construction, latest edition.

PART 3 – EXECUTION

3.01 GENERAL

A. The installation of temporary erosion control features shall be coordinated with the construction of the permanent erosion control features to the extent necessary to assure effective and continuous control of erosion and water pollution throughout the life of the contract.

B. The Contractor shall take sufficient precautions to prevent pollution of streams, canals, lakes, reservoirs, and other water impoundments, with fuels, oils, bitumens, calcium chloride, or other harmful materials. Also, the operations shall be conducted and scheduled so as to avoid pollution or siltation of such streams, etc.

C. Except as necessary for construction, excavated material shall not be deposited in rivers, streams, canals, or impoundments, or in a position close enough thereto to be washed away by high water or runoff.

D. Where de-watering methods are used, the water shall be treated by one or more of the following methods prior to discharge off-site or into environmentally sensitive areas:

1. Pumping into grassed swales or appropriate vegetated areas, sediment basins, or confined by an appropriate enclosure such as siltation curtains when other methods are not considered appropriate.
2. The contractor shall be responsible for obtaining and complying with permits required for de-watering.

E. The Contractor shall not disturb lands or waters outside the limits of construction, except as may be found necessary and authorized by the Owner.

F. The locations of and methods of operation in all detention areas, excavation areas, stockpile areas, and disposal areas shall be such that erosion during and after completion of the work will not likely result in detrimental conditions, siltation, or water pollution.

G. Limitation of Exposure or Erodible Earth

1. The Contractor shall limit the surface areas of unprotected erodible earth exposed by clearing and grubbing, excavation, or filling operations and shall provide immediate permanent or temporary erosion or pollution control measures to prevent contamination of any river, stream, lake, tidal water, reservoir, canal, or other impoundment or to prevent detrimental effects on property outside the project and damage to the project.
2. The limitation of area in which excavation and filling operations may be underway shall be commensurate with the contractor's capability and progress in keeping the finish grading, grassing, sodding, and other such permanent erosion control measures current in accordance with the accepted schedule.
3. Under no conditions shall the surface area or erodible earth exposed by clearing and grubbing operations or by excavation and filling operations exceed one-half acre without specific prior approval by the Owner. This limitation applies separately to clearing and grubbing operations and excavation and filling operations.
4. The Owner may increase or decrease the amount of surface area allowed to be exposed at any one time, on the basis of his analysis of conditions on the project.
5. Permanent erosion control features shall be incorporated into the project at the earliest practical time. Temporary erosion control features will be used to control erosion prior to the time it is practical to construct permanent control features or to provide immediate temporary control of erosion that develops during normal construction operations, but is not associated with permanent erosion control features on the project. In no case shall exposure of erodible earth be for more than five days without erosion control features being implemented.
6. Temporary erosion control features may be authorized for use in controlling erosion in areas where staged construction or other conditions not under the control of the Contractor preclude completion of a section of work in a continuous manner and in areas where construction operations which must be performed subsequently will cause damage to permanent erosion control features constructed.
7. When the item of Topsoil or Muck Blanket is included in the contract, the rate of construction of these items may be limited by the availability of topsoil or muck from the normal grading operations. The existence of this condition will be considered as precluding completion of a section or roadway in a continuous manner, and use of temporary erosion control features will be used in areas so affected.
8. The Contractor shall schedule operations such that the area of unprotected erodible earth exposed at any one time is not larger than the minimum area necessary for efficient construction operations, and the duration of exposed, uncompleted construction to the elements shall be as short as practicable.
9. Clearing and grubbing shall be so scheduled and performed that grading or utility construction operations can follow immediately thereafter, and grading operations shall be so scheduled and performed that permanent erosion control features can follow immediately thereafter if conditions on the project permit.

3.02 TEMPORARY EROSION CONTROL (Vegetation and Coverings)

A. Temporary vegetative erosion control features shall be installed in accordance with Section 01300.

B. Temporary coverings shall be installed in accordance with the manufacturer's recommendations.

3.03 TEMPORARY EROSION CONTROL (Silt Fences and Turbidity Barriers)

A. Temporary Silt Fence
   1. Temporary silt fence shall be erected at locations as shown on the plans, as dictated by the SWPPP, as approved by the Owner, or as required to prevent erosion.
   2. If required, the wire reinforcement shall be installed so that the filter fabric is on the upstream side of the fence, and both the wire fence and the filter fabric are on the upstream side of the posts.
   3. Posts shall be uniformly installed with approximately 20 degrees inclination toward the potential silt load (upstream) area.
   4. The silt fence shall be maintained in an effective condition at all times while in use.

B. Filter fabric shall be secured to the post or fence by suitable staples, tie wire, or hog rings in such a manner as to prevent tearing of the fabric. The bottom of the filter fabric shall be entrenched into the ground a minimum of eight inches to prevent water from flowing under the fence. Filter fabric shall be spliced together only at support posts with a minimum of six-inch overlap and securely sealed.

C. Staked Turbidity Barrier
   1. Staked turbidity barrier shall be securely fastened to wood or steel supports which are spaced at maximum intervals of six feet and driven a minimum of 12 inches into the ground.
   2. A minimum of three supports shall be used.
   3. The bottom of the fabric shall be entrenched into the existing ground a minimum of eight inches.
   4. The staked turbidity barrier shall be a minimum of 15 inches in height and shall not exceed 18 inches in height.

D. The support line sewn in the top hem of the filter fabric shall be used at each post location to secure the fabric to the post at an appropriate height.

E. Staked turbidity barriers shall be installed across ditch lines and at temporary locations as shown on the plans or approved by the Owner where continuous construction activities change the natural contour and drainage runoff.

F. Posts in staked turbidity barriers shall be installed in the vertical position unless otherwise directed by the Owner.

G. Floating Turbidity Barrier
   1. This work shall consist of the installation and removal of floating turbidity barriers to contain silt and other deleterious materials that may occur as the result of dredging, filling, or other construction activities in waters of the State.

2. The type of barrier used will be installed in accordance with the details contained in the plans, or, when details are not shown, in accordance with the SWPPP, or as approved by the Owner.
3. Alternate methods may be approved provided that compliance with applicable permit conditions and State water quality standards are maintained.

H. All temporary erosion control features and devices shall be removed and disposed by the Contractor when permanent erosion control features and devices (e.g., grassing, sodding, etc.) have reached the point of final acceptance.

I. Refer to the standard drawing of this manual for additional details.

3.04 RIP RAP

A. Unless shown otherwise on the Drawings and/or approved Erosion Control Plan, rip rap shall be placed where ordered by the Owner. Carefully compact backfill and place filter fabric under rip rap in wire baskets to prevent subsequent settlement and erosion.

B. Preparation of Foundations
1. The ground surface upon which the rip rap is to be placed shall be brought in reasonably close conformity to the correct lines and grades before placement is commenced.
2. Where filling of depressions is required, the new material shall be compacted with hand or mechanical tampers.

C. Placement of Filter Fabric
1. The surface to receive fabric shall be prepared to a relatively smooth condition free from obstructions, depressions and debris. The fabric shall be placed with the long dimension running up the slope and shall be placed to provide a minimum number of overlaps.
2. The strips shall be placed to provide a minimum width of one foot of overlap for each joint.
3. The filter fabric shall be anchored in place with securing pins of the type recommended by the fabric manufacturer. Pins shall be on or within 3-inches of the centerline of the overlap.
4. The fabric shall be placed so that the upstream strip overlaps the downstream strip.
5. The fabric shall be placed loosely so as to give and therefore avoid stretching and tearing during construction.
6. The fabric shall be protected at all times during constructions from clogging due to clay, silts, chemicals or other contaminants.
7. Any contaminated fabric or any fabric damaged during its installation or during placement of rip rap shall be removed and replaced with uncontaminated and undamaged fabric at no expense to the Owner.

D. Placement of Rip Rap

1. The rip rap shall be placed on a 6-inch layer of soil, crushed stone or sand overlaying the filter fabric. This 6-inch layer shall be placed to maximize the contact between the soil beneath the filter fabric and the filter fabric.
2. Rip rap shall be placed with its top elevation conforming with the natural slope of the stream bank and stream bottom.
3. Stone rip rap shall be dumped into place to form a uniform surface and to the thickness specified on the Drawings.
4. The thickness tolerance for the course shall be -6-inches and +12-inches. If the Drawings or Bid do not specify a thickness, the rip rap stone shall be placed to a thickness of not less than 12-inches.

3.05 INSPECTION AND MAINTENANCE

A. General
1. The Contractor shall, at his expense, provide routine maintenance of permanent and temporary erosion control features until the project is completed and accepted.
2. The Contractor shall inspect all erosion and sediment control facilities within 24 hours of a ¼" rain or greater or a minimum of once weekly. Any deficiencies shall be immediately corrected by the Contractor.

B. Silt Fences and Turbidity Barriers
1. The Contractor shall make a daily review of the location of silt fences and turbidity barriers to ensure that the silt fence or turbidity barriers are properly located for effectiveness and contain no breaches. Where deficiencies exist, additional silt fences or turbidity barriers shall be installed as directed.

C. Sediment deposits shall be removed when the deposit reaches approximately one-half of the volume capacity of the temporary silt fence or turbidity barrier as directed. Any sediment deposits remaining in place after the temporary silt fence or turbidity barrier is no longer required shall be dressed to conform with the finished grade, prepared and finished.

D. Inspections shall be made by qualified inspectors using Chapter 8 of the Florida Stormwater, Erosion and Sedimentation Control Inspection Manual. Referenced manual can be downloaded from:

http://www.floridadep.org/water/nonpoint/erosion.htm

1. All inspections shall be formally documented using the forms contained in the Appendix to this section of the specifications.

SECTION 02100 EROSION CONTROL AND ENVIRONMENTAL PROTECTION

STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

INSPECTION AND MAINTENANCE REPORT

PROJECT NAME:_____ PROJECT NO._____

INSPECTION DATE:_____ INSPECTOR_____

INSPECTOR'S QUALIFICATIONS:_____

_____

DATE OF LAST RAINFALL:_____

AMOUNT OF LAST RAINFALL:_____ INCHES

TYPE OF INSPECTION:

Monthly (Final Stabilization Completed) _____

Weekly (Disturbed Areas Pending Final Stabilization) _____

Response to 0.25 inch event _____

INSPECTION LOCATION(S): (Check all that are applicable)

Disturbed Areas _____

Point Source Surface Waters _____

Point Source MS4 _____

Construction Operation Areas _____

Vehicle Entry/Exit Points _____

Structural Controls _____

Sediment Basin(s) _____

Other (_____) _____

SECTION 02100 EROSION CONTROL AND ENVIRONMENTAL PROTECTION

INSPECTION SUMMARY

OVERALL RATING OF SWPPP COMPLIANCE: (circle one)

EXCELLENT GOOD FAIR POOR

SUMMARY OF CORRECTIVE ACTIONS REQUIRED TO COMPLY WITH APPROVED SWPPP:

_____

_____

_____

SUMMARY OF REQUIRED CHANGES TO THE SWPPP:

_____

_____

_____

REASONS FOR CHANGES TO THE SWPPP:

_____

_____

_____

_____

_____

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitted false information, including the possibility of fine and imprisonment for knowing violations.

Signature: _____

Title: _____

Date: _____

ROUTINE MAINTENANCE INSPECTION CHECKLIST FOR
BMPS FOR EROSION AND SEDIMENT CONTROL

Control Measure	Problems to look for	Possible Remedies
Vegetation	Rills or gullies forming	Check for top-of-slope diversion and install if needed.
	Bare Soil patches	Fill rills and regrade gullied slopes, revegetate.
	Sediment at toe of slope	Remove sediments, revegetate using site appropriate methods.
Dikes	Gully on slope below dike breach; wheel track or low spot in dike	Add soil to breaches or low spots and compact.
	Loose soil	Compact loose soil.
	Erosion of dike face	Line upslope face with riprap, or revegetate using site appropriate methods.
Swales	Gully on slope below swale	Repair breaches.
	Wheel track, low point (water ponded in swale)	Build up low areas with compacted soil or sandbags or rebuild swales w/positive slope.
	Sediment or debris in channel	Remove obstructions.
	Erosion of unlined channel surface	Mulch and install anchored sod or erosion control blanket; or line swale w/riprap; or install check dams/ or realign swale on gentler gradient; or divert some or all stormwater to a more stable facility.
	Erosion of channel lining	Install larger riprap; or reseed, mulch and anchor w/netting; or install check dams; or pave swale.
Pipe, slope drain or flume	Blocked inlet or outlet	Remove sediment and debris.

	Runoff bypassing inlet	Enlarge headwall or flare out entrance section.
	Erosion at outlet	Enlarge riprap apron and use larger riprap; or convey runoff to a more stable outlet.
Grassed waterways	Bare areas	Revegetate w/anchored sod or erosion control blanket; divert flow during establishment period.
	Channel capacity reduced to tall growth	Mow grass
Riprap lined waterway	Scour beneath stones	Install proper geotextile or graded bedding. Make sure edges of geotextile are buried.
	Dislodged stones	Replace w/larger stones.
Outlet protection	Erosion below outlet	Enlarge riprap apron; or line receiving channel below outlet; or convey runoff directly to a more stable outlet; make sure discharge point is on level or nearly level grade.
	Outlet scour	Install proper geotextile or graded bedding beneath riprap apron.
	Dislodged stones	Replace w/larger stones.
Sediment traps and basins `	Sediment level near outlet Elevation	In traps, remove sediment if less than 1 ft. (0.3 m) below outlet elevation; in basins, remove sediments if less than 2 ft (0.6 m) below top of riser.
	Obstructed outlet	Remove debris from trash rack.
	Basin not dewatering between storms	Clear holes. Clear or replace sediment-choked gravel surrounding dewatering hole or subsurface drain.
	Damaged embankments	Rebuild and compact damaged areas.
	Spillway erosion	Line spillway w/rock, geotextile or pavement.

	Outlet erosion	Make sure outlet is flush w/ground and on level grade. Install, extend or repair riprap apron as required; or convey discharge directly to a more stable outlet.
	Riser flotation	Anchor riser in concrete footing.
	Excessive discharge to and from basin or trap	Check runoff patterns for consistency w/plans. Reroute part of volume to another basin or enlarge the basin.
	Sediment storage zone fills too quickly	Increase size of basin; or stabilize more of the contributing area.
Straw bale barrier	Bale displacement	Anchor bales securely w/proper stakes or rebar. Check drainage area, slope length and gradient behind each barrier.
	Undercutting of bales	Entrench bales to proper depth, backfill, and compact the soil.
	Gaps between bales	Re-stake bales. Drive first stake in each bale at an angle to force it snug against the adjacent bale.
	Baling wire broken	Retie bale or replace w/fresh bale.
	Bale disintegrating	Replace w/fresh bale.
	Runoff escaping around barrier	Extend barrier or reposition in center of flow path.
	Sediment level near top of fence	Remove sediment when level reaches half of barrier height.
Silt Fence	Undercutting of fence	Entrench wire mesh and fabric to proper depth, backfill, and compact.
	Fence collapsing	Check post size and spacing, gauge of wire mesh and fabric strength. Check drainage area, slope length and gradient behind barrier. Correct any substandard condition.

	Torn fabric	Replace w/continuous piece of fabric from post to post, attach w/proper staples.
	Runoff escaping around fence.	Extend fence.
	Sediment level near top of fence	Remove sediment after each storm.
Check dam	Sediment accumulation	Entrench wire mesh and fabric to proper depth, backfill, and compact.
	Flow escaping around sides of check dam	Build up ends of dam and provide low center area for spillway.
	Displacement of sandbags, stones, or straw bales.	Check drainage areas and peak flows. Reinforce dam w/larger stones, etc.; or divert part of flow to another outlet.
Inlet protection	Flooding around or below Inlet	Remove accumulated sediment; or convert sediment barrier to an excavated sediment trap; or reroute runoff to a more suitable area.
	Undercutting of bales or silt fence, bale displacement, torn fabric, etc.	See remedies for straw bale barriers and silt fences.

SECTION 02100 EROSION CONTROL AND ENVIRONMENTAL PROTECTION

SITE STABILIZATION
INSPECTION SUMMARY

PROJECT: _____

DATE: _____

	Yes	No
Included in SWPPP	( )	( )

List Specific Area Inspected	Date Surface Disturbed	Stabilized? Yes/No	Stabilization Code (see below)	Deficiencies Noted:

Maintenance Required: _____

Plan Revisions Required: _____

Action Agency: _____

Corrective Action Suspense Date: _____

Stabilization Key	
Type	Code
Surface Roughening	A
Topsoiling	B
Temporary Seeding	C
Permanent Seeding	D
Mulching	E
Groundwater	F
Vegetative streambank	G

CONSTRUCTION OPERATION AREAS

INSPECTION SUMMARY

PROJECT: _____

DATE: _____

	Yes	No
Included in SWPPP	( )	( )

PARAMETER	Compliance			Deficiencies Noted
	Yes	No	N/A	
Equipment Maintenance and Repair Area				
Waste Collection and Disposal Practices				
Demolition Areas				
Washing Areas				
Storage of Construction Materials, Chemicals, etc.				
Sanitary Facilities				
Dust Control				
Dewatering Control				
Other:				

Corrective Action Required: _____

_____

Plan Revisions Required: _____

_____

Action Agency: _____

_____

Corrective Action Suspense Date: _____

SECTION 02100 EROSION CONTROL AND ENVIRONMENTAL PROTECTION

VEHICLE ENTRANCE / EXIT POINTS

PROJECT: _____

INSPECTION SUMMARY

DATE: _____

	Yes	No
Included in SWPPP	( )	( )

PARAMETERS	Yes	No	N/A	Deficiencies Noted
Installed Per Plans				
Aggregate PadClean				
Traffic Using Pad				
Evidence of Corner Cutting				
Evidence of Sediment on Road				
Functional Drainage				
Wheel Washing Implemented				

Maintenance Required: _____

_____

Plan Revisions Required: _____

_____

Action Agency: _____

_____

Corrective Action Suspense Date: _____

END OF SECTION 02100

SECTION 02110 CLEARING AND GRUBBING

PART 1 – GENERAL

1.01 SCOPE

A. Description of Work
   1. Provide all labor, material and equipment to perform all clearing and grubbing as required to perform all the construction on the Drawings and as specified herein.
   2. Clearing and grubbing includes, but is not limited to, removing from the project site, trees, stumps, roots, brush, structures, abandoned utilities, trash, debris and all other materials found on or near the surface of the ground in the construction area and understood by generally accepted engineering practice not to be suitable for construction of the type contemplated. Precautionary measures that prevent damage to existing features to remain are part of the Work.
   3. Clearing and grubbing operations shall be coordinated with temporary and permanent erosion and sedimentation control procedures.

1.02 QUALITY ASSURANCE

A. The Contractor shall comply with applicable codes, ordinances, rules, regulations and laws of local, municipal, state or federal authorities having jurisdiction over the Project.

B. All required permits of a temporary nature shall be obtained for construction operations by the Contractor.

1.03 JOB CONDITIONS

A. Location of Work
   1. The area to be cleared and grubbed is shown schematically on the Drawings and specified below.
   2. It includes all areas designated for construction.

1.04 PROTECTION

A. Streets, roads, adjacent property and other works to remain shall be protected throughout the Work, as defined in the General Conditions.

B. Existing trees, shrubs and bushes
   1. Trees shall be protected by fencing, barricades, or wrapping as may be required.
   2. Shrubs and bushes shall be protected by fences or barricades as may be required.

PART 2 – PRODUCTS

2.01 EQUIPMENT

A. The Contractor shall furnish equipment of the type normally used in clearing and grubbing operations including, but not limited to, tractors, trucks and loaders.

SECTION 02110 CLEARING AND GRUBBING

PART 3 – EXECUTION

3.01 GENERAL

A. It is the intent of these specifications that all desirable natural growth within the right-of-way and easement areas be preserved where practicable, and that all things which detract from the aesthetic value of the completed work, unnecessarily interfere with construction, or would unnecessarily interfere with future maintenance be removed.

B. The Contractor shall be responsible for preserving all things designated to be salvaged or to remain.

C. In areas where desirable natural growth is designated to remain, the Contractor shall thin or trim shrubbery and live trees to the extent consistent with the intent of these specifications.

D. Use of methods or equipment which might mar or destroy vegetation designated for preservation will not be permitted.

E. All clearing and grubbing necessary for setting construction stakes shall be completed a satisfactory distance ahead of grading operations.

3.02 SCHEDULING OF CLEARING

A. The Contractor shall clear at each construction site only that length of the right-of-way, permanent or construction easement, which would be the equivalent of one month's pipe laying. This length shall be determined from the Contractor's Progress Schedule.

B. The Owner may permit clearing for additional lengths of the pipe line provided that temporary erosion and sedimentation controls are in place and a satisfactory stand of temporary grass is established. Should a satisfactory stand of grass not be possible, no additional clearing shall be permitted beyond that specified above.

C. A satisfactory stand of temporary grass shall have no bare spots larger than one square yard. Bare spots shall be scattered and the bare area shall not comprise more than one percent of any given area.

3.03 CLEARING AND GRUBBING

A. All excavation and embankment areas associated with new structures, slabs, roadway, and general grading areas which are disturbed shall be cleared and grubbed. Each side of a pipeline shall be cleared and grubbed as required.

B. Surface objects, trees, stumps, roots, grass, weeds, deteriorated vegetation, brush, debris and other protruding or underground obstructions, not designated to remain, shall be cleared and grubbed. Undisturbed stumps and roots and non-perishable solid objects which will be a minimum of three feet below subgrade or slope of embankment may be left when authorized by the Owner.

C. Grubbing shall consist of completely removing roots, stumps, trash and other debris from all graded areas so that topsoil is free of roots and debris. Topsoil is to be left sufficiently clean so that further picking and raking will not be required.

D. All stumps, roots, foundations and planking embedded in the ground shall be removed and disposed of. Piling and butts of utility poles shall be removed to a minimum depth of two feet below the limits of excavation for structures, trenches and roadways or two feet below finish grade, whichever is lower.

E. Except in areas to be excavated, stump holes and other holes from which obstructions are removed shall be backfilled with suitable materials and thoroughly compacted.

F. Landscaping features shall include, but are not necessarily limited to, fences, cultivated trees, cultivated shrubbery, property corners, man-made improvements, subdivision and other signs within the right-of-way and easement. The Contractor shall take extreme care in moving landscape features and promptly re-establishing these features.

G. Surface rocks and boulders shall be grubbed from the soil and removed from the site if not suitable as rip rap.

H. All operations shall be conducted in such a manner as to prevent damage to anything that is to remain on the right-of-way or to adjacent property. The Contractor shall be responsible for all damages to existing improvements resulting from Contractor’s operations.

I. Any work pertaining to utility poles shall comply with the requirements of the appropriate utility.

J. All fences adjoining any excavation or embankment that, in the Contractor’s opinion, may be damaged or buried, shall be carefully removed, stored and replaced. Any fencing that, in the Owner’s opinion, is significantly damaged shall be replaced with new fence material.

K. The Contractor shall exercise special precautions for the protection and preservation of trees, cultivated shrubs, sod, fences, etc. situated within the limits of the construction area but not directly within excavation and/or fill limits. The Contractor shall be held liable for any damage the Contractor’s operations have inflicted on such property.

L. Following the clearing and grubbing operations, the Contractor shall slope the existing ground surface and fill depressions and stump holes to encourage drainage utilizing existing material within the limits of clearing and grubbing and to the specified grades.

M. After sloping the ground surface to ensure positive drainage over the entire site, the Contractor shall rake the entire area to remove surface roots and objects and to provide a final dressing for the project area.

N. Low hanging and unsound or unsightly branches on trees or shrubs to remain, but extending over the clearing and grubbing limits shall be trimmed.

3.04 STRIPPING

A. Contractor shall remove topsoil prior to the placement of new fill material. The depth of topsoil to be removed shall be that depth required to expose suitable subgrade material.

B. Contractor shall set aside a sufficient quantity of topsoil material to vegetate those areas requiring topsoil throughout the project. Said stockpile shall be located so as to not interfere with the work in progress. Any additional topsoil generated above and beyond the quantities needed for the project shall be hauled away at the Contractor's expense.

3.05 DISPOSAL OF MATERIAL

A. The debris resulting from the clearing and grubbing operation shall be hauled to a disposal site secured by the Contractor and shall be disposed of in accordance with all requirements of federal, state, county and municipal regulations.
   1. No debris of any kind shall be deposited in any stream or body of water, or in any street or alley.
   2. No debris shall be deposited upon any private property except with written consent of the property owner.
   3. A copy of written consent shall be provided to the County for permanent records.
   4. In no case shall any material or debris be left on the Project Site, abutting private properties, or buried on the Project Site.

B. No burning is allowed.

C. The use of herbicides or blasting in clearing and grubbing is specifically prohibited.

END OF SECTION 02110

SECTION 02200 SODDING

PART 1 – GENERAL

1.01 SCOPE

A. It is the intent of these specifications to provide supplemental information to the content of the construction drawings on the quality of materials, execution, measurement, etc. These specifications are general in nature and may contain products and requirements which are not applicable to the project. Discrepancies between these specifications and the construction drawings, either imagined or real, shall be brought to the attention of the Owner for clarification.

1.02 DESCRIPTION OF WORK

A. Sodding includes, but is not limited to, ground preparation, fertilization, sodding, watering, mowing and maintenance as required to promote growth.

1.03 QUALITY ASSURANCE

A. Codes and Standard
   1. Perform all work in compliance with applicable requirements of governing authorities having jurisdiction.

B. Testing
   1. An independent testing and inspection service will not be required for the work of this section.

C. Inspection
   1. Inspection shall be performed by the Owner or an independent inspector hired by the Owner.

PART 2 – MATERIALS

2.01 SOD

A. Grass sod shall be Bermuda, Centipede or St. Augustine as shown on the plans or as selected by Owner, and shall be well matted with grass roots.

B. The sod shall be harvested in rectangles, preferably 12 inch by 24 inch, shall be a minimum of two inches in thickness and shall be live, fresh and uninjured at the time of planting. It shall be reasonably free of weeds and other grasses and shall have a soil mat of sufficient thickness adhering firmly to the roots to withstand all necessary handling. The sod shall be planted as soon as possible after being dug and shall be shaded and kept moist until it is planted.

C. Dumping from vehicles will not be permitted.

D. Damaged sod will be rejected.
E. Replanting shall be done within 48 hours after time of harvesting or sod shall be kept damp until planted

2.02 WATER

A. The water used in the grassing operations may be obtained from any approved spring, pond, lake, stream or metered municipal water system.

B. The water shall be free of excess and harmful chemicals, acids, alkalies or any substance which might be harmful to plant growth or obnoxious to traffic.

C. Saltwater shall not be used.

PART 3 – EXECUTION

3.01 CONSTRUCTION

A. General
1. The limits of sod shall be as shown on the drawings, described herein or as directed by the Owner.
2. Areas which are disturbed due to construction activities but which are not shown within the limits of sod shall be stabilized in accordance with this specification at no cost to the Owner.
3. In these areas the Owner shall reserve the right to determine which method and materials shall be used for stabilization.

B. Preparation of Ground
1. The area over which the sod is to be planted shall be scarified or loosened to a suitable depth and then raked smooth and free from rocks or stones.
2. Where the soil is sufficiently loose, the Owner, at their discretion, may authorize the elimination of ground preparation.
3. No subsequent operations shall be commenced until the Owner has approved the condition of the prepared areas.
4. Water the soil before planting sod.

C. Fertilization
1. Fertilizer shall be spread at a rate per thousand square feet of area, in accordance with the following table:

5N-10P-5K	30 LBS.
6N-12P-2K	25 LBS.
7N-7P-6K	22 LBS.
8N-8P-8K	20 LBS.
10N-6P-4K	15 LBS.

10N-5P-5K	15 LBS.

2. Fertilizer shall be mixed in the soil to a depth of at least two inches by discing or harrowing.

D. Sodding
1. Soft spots and inequalities in grade shall be corrected before starting sod work.
2. Lay sod without voids, tamp or roll. Broom screen topsoil over entire area. Sod shall be thoroughly watered. The surface shall be true to finished grade lines, even and firm at all points.
3. Place sod with staggered joints closely butted, tamped or rolled to an even surface to the required finished grade. Avoid continuous seam along line of water flow in swales. Place sod in rows at right angles to slope.
4. In areas with slopes steeper than 4:1, the Contractor shall use sod staples, wooden stakes or other means approved by the Owner, to prevent movement of the sod during rainfall events.

E. Watering
1. The areas on which the sod is to be placed shall contain sufficient moisture, for optimum results. After being placed, the sod shall be kept in a moist condition to the full depth of the root zone for at least two weeks. Thereafter, the Contractor shall apply water as needed until the sod takes root and starts to grow. It is the Contractor's responsibility to furnish water for preparation, installation and maintenance of sod.

3.02 MAINTENANCE

A. The Contractor shall at his expense maintain the sodded areas in a satisfactory condition until final acceptance of the project. Such maintenance shall include mowing, repairing of any damaged areas and replacing areas in which the establishment of the grass stand does not appear to be developing satisfactorily.

B. Replanting or repair necessary due to the Contractor's negligence, carelessness or failure to provide routine maintenance shall be at the Contractor's expense. Replanting necessary due to factors determined to be beyond the control of the Contractor shall be paid under the appropriate contract pay items.

3.03 GUARANTEE

A. The Contractor shall guarantee all sodding for the duration of the project and for a minimum period of 90 days should the sodding occur near the completion date. During the guarantee period, the Contractor shall replace at no cost to the Owner, any sod required under the Contract that is poor sod, dies or is not established 90 days after sodding if the causes for such defects are traced to negligence or poor workmanship by the Contractor.

B. Any sod missing or defective due to the Contractor's negligence shall be furnished or replaced in a manner satisfactory to the Owner. In case of any doubt as to the condition and satisfactory establishment of the sod, the Owner may allow the sod to remain through another 60 day establishment after which time the sod in question, if found to be dead or in an unhealthy or badly impaired condition, shall be replaced by the Contractor at no cost to the Owner.

3.04 TESTING AND INSPECTION REQUIREMENTS

A. Areas to receive sod will be subject to a visual inspection by the Owner upon completion of ground preparation and prior to placement of sod.

B. Upon completion of sodding and prior to commencement of the guarantee period, the area will be subject to a visual inspection by the Owner.

C. At the end of the guarantee period, final inspection of the sod will be made by the Owner upon written notice requesting such inspection submitted by the Contractor at least three days before the anticipated inspection. All defects discovered shall be repaired or replaced by the Contractor before final acceptance.

END OF SECTION 02200

SECTION 02210 GRASSING (BY SEED)

PART 1 – GENERAL

1.01 SCOPE

A. It is the intent of these specifications to provide supplemental information to the contents of the construction drawings on the quality of materials, execution, measurement, etc. These specifications are general in nature and may contain products and requirements which are not applicable to the project. Discrepancies between these specifications and the construction drawings, either imagined or real, shall be brought to the attention of the Owner for clarification.

1.02 DESCRIPTION OF WORK

A. Seeding includes, but is not limited to:
   1. Ground preparation
   2. Fertilization
   3. Seeding
   4. Erosion Control
   5. Rolling
   6. Watering as required to provide a health stand of grass

1.03 QUALITY ASSURANCE

A. Codes and Standards
   1. Perform all work in compliance with applicable requirements of governing authorities having jurisdiction.

B. Inspection shall be performed by the Owner.

C. It will be the responsibility of the Contractor to coordinate all inspections. The Contractor shall notify the Owner and applicable agency inspectors 48 hours in advance of inspections.

1.04 SUBMITTALS

A. The following shall be submitted to the Owner for approval:
   1. Proposed seed mixes.
   2. Manufacturer’s data and installation procedures for erosion control blanket.

PART 2 – MATERIALS

2.01 SEED

A. General
   1. All seed shall meet the requirements of State Department of Agriculture and Consumer Services and all applicable State laws and shall be approved by the Owner before being sown. The seed shall have been harvested from the previous year's crop.
   2. When a low percentage of grass seed or native seed germination causes the quality of the seed to fall below the minimum pure live seed percentage as specified below, the

Contractor may elect, subject to the approval of the Owner, to increase the rate of application sufficiently to obtain the minimum germination rate specified. No payment will be made for the added seed.

B. Grass Seed
   1. Each of the species or varieties of seed shall be furnished and delivered in separate labeled bags. During handling and storage, the seed shall be cared for in such a manner that it will be protected from damage by heat, moisture, rodents and other causes.
   2. All permanent and temporary grass seed shall have been tested within a period of six months of the date of planting.
   3. All permanent and temporary grass seed shall have a minimum percent of purity and germination as follows:
      a. Argentine Bahia Grass Seed shall have a minimum pure seed content of 95% with a minimum germination of 80% (use only when approved in writing).
      b. Pensacola Bahia Grass Seed shall have a minimum pure seed content of 95% with a minimum active germination of 40% and a total germination of 80% including firm seed (use only when approved in writing).
      c. Bermuda Grass Seed shall be of common variety with a minimum pure seed content of 95% with a minimum germination of 85%.
      d. Annual Type Rye Grass Seed shall have a minimum germination of 90%.

2.02 MIXTURE

A. Grass seed shall be a mixture of 15 parts of rye, depending on season, and 85 parts of Bermuda or other types of grass and mixes as selected by the Owner.

B. The separate types of seed used shall be thoroughly dry mixed immediately before sowing.

C. Seed which has become wet shall not be used.

D. The Contractor shall submit mix designs for review and approval by the Owner prior to construction.

2.03 MULCH

A. Dry Mulch
   1. The mulch material used shall normally be dry mulch. Dry mulch shall be straw or hay, consisting of oat, rye or wheat straw, or of pangola, peanut, or coastal Bermuda grass hay.
   2. Only un-deteriorated mulch which can be readily cut into the soil shall be used.

B. Green Mulch
   1. Green mulch shall consist of live coastal Bermuda, or other approved type of grass, and shall be free from weeds and obnoxious or undesirable grasses.
   2. No green mulch which, in the Owner's opinion, has been allowed to become sufficiently dry as to lose its growth producing benefits, will be allowed to be used.

C. In the event that the subsequent stand of grass is found to be contaminated with weeds or other obnoxious or undesirable growth, and it can be determined that such growth was introduced with the green mulch, then the Contractor will be required to effectively eliminate such undesirable growth at his own expense.

2.04 EROSION CONTROL BLANKET

A. Erosion control blanket shall be "Curlex" as manufactured by American Excelsior, Type SC150 as manufactured by Tensar/North American Green, or approved equal, unless noted otherwise on the plans.

2.05 COMMERCIAL FERTILIZER

A. Commercial fertilizers shall comply with the state fertilizer laws.

B. The numeral designations for fertilizer indicate the minimum percentages (respectively) of:
1. total nitrogen,
2. available phosphoric acid and
3. water soluble potash, contained in the fertilizer.

C. Type I fertilizer (as hereinafter specified) shall be used unless Type II fertilizer or another designation is specifically called for on the Drawings or authorized by the Owner. Liquid fertilizer will not be permitted.

D. Type I Fertilizer
1. The chemical designation of this fertilizer shall be 12-8-8 with at least 50% of the nitrogen from a non-water-soluble organic source.
2. The nitrogen source may be a urea-formaldehyde source provided it is not derived from a waste product of the plastic industry.

E. Type II Fertilizer
1. The chemical designation of this fertilizer shall be 12-12-8 with at least 50% of the nitrogen shall be from a urea-formaldehyde source and at least 50% of the phosphoric acid shall be from regular superphosphate.

2.06 WATER FOR GRASSING

A. The water used in the grassing operations may be obtained from any approved spring, pond, lake, stream or metered municipal water system.

B. The water shall be free of excess and harmful chemicals, acids, alkalis or any substance which might be harmful to plant growth or obnoxious to traffic.

C. Saltwater shall not be used.

2.07 EQUIPMENT

SECTION 02210 GRASSING (BY SEED)

A. Fertilizer Spreader
   1. The device for spreading fertilizer shall be capable of uniformly distributing the material at the specified rate.

B. Seed Spreader
   1. The seed spreader shall be an approved mechanical hand spreader or other approved type of spreader.

C. Equipment for Cutting Mulch into Soil
   1. The mulching equipment shall be capable of cutting the specified materials uniformly into the soil and to the required controlled depth.
   2. Harrows will not be allowed.

D. Rollers
   1. A cultipacker, traffic roller or other suitable equipment will be required for rolling the grassed areas.

PART 3 – EXECUTION

3.01 CONSTRUCTION

A. General
   1. Fertilizing, seeding or mulching operations will not be permitted when wind velocities exceed 15 miles per hour.
   2. Seed shall be sown only when the soil is moist and in proper condition to induce growth.
   3. No seeding shall be done when the ground is unduly wet or otherwise not in a tillable condition.

B. Sequence of Operations
   1. The several operations involved in the Work shall proceed in the following sequence:
      a. Fertilizing and preparation of the ground, seeding, erosion control and rolling.
      b. Erosion control shall consist of spreading and cutting in of mulch or application of erosion control blanket.

C. Preparation of Area to be Seeded
   1. The ground to be seeded shall be prepared by disc harrowing and thoroughly pulverizing the soil reasonably smooth.
   2. It shall be reasonably free of large clods, roots and other material which will interfere with the Work and subsequent mowing and maintenance operations.
   3. No subsequent operations shall be commenced until the Owner has approved the condition of the prepared areas.

D. Application of Fertilizer
   1. The fertilizer shall be spread uniformly over the area to be seeded, at the rate of 500 to 600 pounds per acre.

2. On steep slopes or other areas where machine spreading may not be practicable, the spreading may be done by hand.
3. Immediately after the fertilizer is spread it shall be mixed with the soil to a depth of approximately four inches.

E. Seeding
1. While the soil is still loose and moist, the seed shall be scattered uniformly over the grassing area at a rate of 80 pounds per acre.
2. The seed shall be immediately mixed into the seed bed to a depth of one-half inch. The contractor may mix the fertilizer and seed into the seed bed in one operation.
3. When so directed by the Owner, seed of an approved quick growing species of grass, such as rye or Italian rye, shall be spread at a rate of 30 pounds per acre in conjunction with the permanent type seed mixture.

F. Mulching
1. Approximately two inches, loose thickness, of the mulch material shall be applied uniformly over the seeded area, and the mulch material cut into the soil with the equipment specified so as to produce a loose mulched thickness of three inches to four inches. Care shall be exercised so the materials are not cut too deeply into the soil.
2. When green mulch is used, it shall be incorporated into the soil no later than two days after being harvested, and no artificial watering of the mulch shall be done before it is applied.

G. Erosion Control Blanket
1. For slopes 4:1 or greater an erosion control blanket will be used in lieu of mulching unless noted otherwise on the plans or at the discretion of the Owner.
2. Blankets shall be laid and stapled in accordance with the manufacturer's recommendations.

H. Rolling
1. Immediately after completion of the seeding, the entire seeded and mulched area shall be rolled thoroughly with the equipment specified. At least two trips over the entire area will be required.
2. Areas which will receive an erosion control blanket in lieu of mulch, shall be rolled prior to installation of blanket.

I. Watering
1. The seeded areas shall be watered so as to provide optimum growth conditions for the establishment of the grass. In no case, however, shall the period of maintaining such moisture be less than two weeks after the planting.

3.02 MAINTENANCE

A. The Contractor shall, at his expense, maintain the planted areas in a satisfactory condition until final acceptance of the project.

B. Such maintenance shall include mowing, and the filling, leveling and repairing of any washed or eroded areas, as may be necessary.

C. The Owner, at any time, may require replanting of areas in which the establishment of the grass stand does not appear to be developing satisfactorily.

D. If a planted area must be replanted due to the Contractor's negligence, carelessness or failure to provide routine maintenance of such area, such replacement shall be at the Contractor's expense. If replanting is necessary due to factors determined to be beyond the control of the Contractor, payment for replacement will be made under the appropriate contract pay item(s).

3.03 GUARANTEE

A. The Contractor shall guarantee all seeded areas for the duration of the project and for a minimum period of 90 days, should seeding occur near the completion date. During the guarantee period, the Contractor shall replace at no cost to the Owner, any grass required under the Contract that dies or is not established 90 days after seeding, if the causes for such defects are traced to negligence or poor workmanship by the Contractor.

B. Any grass missing or defective due to the Contractor's negligence shall be furnished or replaced in a manner satisfactory to the Owner. In case of any doubt as to the condition and satisfactory establishment of the grass, the Owner may allow the seeded area to remain through another 60 day establishment period, after which time the grass in question, if found to be dead or in an unhealthy or badly impaired condition, shall be replaced by the Contractor at no cost to the Owner.

3.04 INSPECTION REQUIREMENTS

A. Areas to receive seed will be subject to a visual inspection by the Owner upon completion of ground preparation and prior to placement of seed and mulch or erosion control blanket.

B. Upon completion of the grassing and prior to commencement of the guarantee period, the area will be subject to a visual inspection by the Owner.

C. At the end of the guarantee period, final inspection of the grassed area will be made by the Owner upon written notice requesting such inspection submitted by the Contractor at least three days before the anticipated inspection.

D. All defects discovered shall be repaired or replaced by the Contractor before final acceptance.

END OF SECTION 02210

SECTION 02220 - EXCAVATING, BACKFILLING, AND GRADING FOR STRUCTURES

PART 1 – GENERAL

1.01 SCOPE OF WORK

A. This Section includes excavation, filling, and grading to attain the subgrades and grades indicated on the Drawings.

B. Supplemental foundation and site preparation notes are indicated on the Drawings. Extensive grubbing and site preparation will be required for this project.

C. Furnish and install temporary excavation support systems, including sheeting, shoring, and bracing, to ensure the safety of personnel and protect adjacent structures, piping, etc., in accordance with Federal, State and local laws, regulations, and requirements.

D. Furnish and install temporary dewatering and surface water control systems and operate to dewater and maintain in a dry condition. Control drainage into excavations and remove seepage water and rainwater.

E. All excavation and backfill for structures, utilities, and pavements shall be in accordance with the geotechnical engineering report. The geotechnical report for this project is included as **Appendix A**. Where discrepancies exist between this specification and the referenced geotechnical report, the referenced geotechnical report shall take precedence if more restrictive.

F. The CONTRACTOR shall be responsible for calculating the required cut and fill calculations for the entire site. All new fill or reuse of soils on the site for fill shall meet the requirements of Sections 02220 and 02221. All hauling costs and subsequent backfill and compaction shall be by the CONTRACTOR.

1.02 DELETED

1.03 QUALITY ASSURANCE

A. Codes and Standards: Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.

B. Testing and Inspection Service:
   1. The CONTRACTOR shall engage soil testing and inspection service for quality control testing during earthwork operations.

C. All excavation, trenching, sheeting, bracing shall comply with the requirements of OSHA excavation safety standards (29 CFR Part 1926.650 Subpart P), State of Florida “Trench Safety Act” (Part IV, Chapter 553 of the Florida Statutes) and local requirements. Where conflict between OSHA, State and local requirements exists, the most stringent requirements shall apply.

1.04 SUBMITTALS

A. Submit an excavation work plan that includes the proposed methods of construction, including earthwork operations, excavation limits, slopes, ramp access, fill material moisture conditioning and handling, compaction equipment, and material sources for the various portions of the work.

B. Coordinate this submittal with the requirements of dewatering and support of excavation submittals.

1.05 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)
   1. ASTM D698 – Test Method for Laboratory Compaction Characteristics of Soils Using Standard Efforts.
   2. ASTM D1557 - Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu ft (2,700kN-m/cu m)).
   3. ASTM D 2487 – Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).

B. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.06 QUALITY ASSURANCE

A. At all structures, prior to the placement of bedding material, concrete work mats, structural fill or structural concrete, coordinate with the soils testing laboratory to verify the suitability of the existing subgrade soil and to perform in-place soil density tests as required to verify that the compaction of the subgrade is sufficient.

B. Prior to and during the placement of backfill and fill coordinate with the soils testing laboratory to perform in-place soil density tests to verify that the backfill/fill material has been compacted in accordance with the compaction requirements specified elsewhere. The ENGINEER may designate areas to be tested.

1.07 DEFINITIONS

A. Where the phrase "in-the-dry" is used in this Section, it shall be defined to mean a soil condition such that the in-place moisture content of the soil at that time is no more than two percentage points above the optimum moisture content of that soil as determined by the laboratory test of the moisture-density relation appropriate to the specified level of compaction.

B. Where used in this Section "structures" refers to all buildings, wet wells, manholes and below grade vaults. Stormwater structures and duct banks are not considered structures in this context.

1.08 JOB CONDITIONS

A. The CONTRACTOR shall examine the site taking into consideration all conditions that may affect his work. The OWNER and ENGINEER will not assume responsibility for variations of sub-soil quality or conditions.

B. Existing Utilities: Locate existing underground utilities in the areas of work. If utilities are

to remain in place, provide adequate means of protection during earthwork operations.

1. Should unidentified, or incorrectly identified, piping or other utilities be encountered during excavation, consult the ENGINEER and the OWNER of such piping or utility immediately for directions.
2. Cooperate with OWNER and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility OWNER.
3. Demolish and completely remove from site existing underground utilities indicated to be removed.

C. Protection of Persons and Property

1. Barricade open excavations occurring as part of this work and post with warning lights. Operate warning lights as recommended by authorities having jurisdiction.
2. Protect structures, utilities, sidewalks, pavements, and other facilities from possible damage which may result from settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

PART 2 – PRODUCTS

2.01 SOIL MATERIALS

A. Definitions:

1. Backfill and Fill Materials: Satisfactory soil materials for this project are defined as a non-plastic, inorganic, granular soil having less than 12 percent material passing the No. 200 mesh sieve and containing less than 4 percent organic material.

PART 3 – EXECUTION

3.01 INSPECTION

A. Examine the areas and conditions under which excavating, filling, and grading are to be performed. Notify the ENGINEER of any unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected.

B. Examine and accept existing grade of all structures prior to commencement of work and report to ENGINEER if elevations of existing subgrade varies from elevations shown on Drawings.

3.02 EXCAVATION

A. Excavation consists of the removal and disposal of material encountered when establishing required grade elevations.

B. Excavation classifications: The following classifications of excavation will be made when unanticipated rock excavation or unclassified excavation is encountered in the work. Do not perform such work until material to be excavated has been cross-sectioned and classified by ENGINEER or specialized geotechnical consultant.

1. Authorized earth excavation includes removal and disposal of pavements and other obstructions visible on ground surface, underground structures and utilities indicated to be demolished and removed, material of any classification indicated in soil boring data on subsurface conditions, and other materials encountered that are not classified as rock excavation or unauthorized excavation.

2. Unauthorized excavation consists of removal of material beyond the limits needed to establish required grade and subgrade elevations without specific direction of ENGINEER. Unauthorized excavation, as well as remedial work directed by the ENGINEER shall be at the CONTRACTOR'S expense.
    a. Under footings, foundation bases, or retaining walls, fill unauthorized excavation by extending the indicated bottom elevation of the footing or base to the excavation bottom, without altering required top elevation. Lean (unreinforced) concrete fill may be used to bring bottom elevations to proper position, when acceptable to ENGINEER.
    b. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by ENGINEER.

C. Additional Excavation: When excavation has reached required subgrade elevations, notify the ENGINEER or RPR who will inspect conditions.
    1. If unsuitable bearing materials are encountered at the required subgrade elevations, carry excavations deeper and replace the excavated material as directed by the ENGINEER.

D. Stability of Excavations: Slope sides of excavations to comply with local codes and ordinances having jurisdiction or as shown on the Drawings. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.
    1. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.

E. Shoring and Bracing: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers and cross-braces, in good serviceable condition.
    1. Establish requirements for trench shoring and bracing to comply with local codes and authorities having jurisdiction. Provide design drawings of all shoring and bracing signed and sealed by a Registered Professional ENGINEER in the state of Florida.
    2. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.

F. Dewatering: The CONTRACTOR is solely responsible for all dewatering methods and providing proper equipment to perform such actions. Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.
    1. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations. Maintain groundwater table level a minimum of two-foot below excavation level.
    2. Convey water removed from excavations and rain water to collecting or run-off areas. Establish and maintain temporary drainage ditches and other diversions outside excavation limits for each structure. Do not use trench excavations as temporary drainage ditches.
    3. While dewatering for new construction near existing structures, depletion of the groundwater level underneath these existing structures may cause settlement. To avoid this settlement, the groundwater level under these structures shall be maintained by appropriate methods of construction as approved by the ENGINEER.

G. Material Storage: Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade, and shape stockpiles for proper drainage.
   1. Locate and retain soil materials away from edge of excavations.
   2. Dispose of excess soil material and waste materials as herein specified.
   3. All stockpiled materials shall be properly segregated based on usage and tested prior to use by the testing firm onsite.

H. Excavation for Structures: Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 feet, and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction, and for inspection, or as shown on the Drawings.
   1. In excavating for footings and foundations, take care not to disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive concrete.

I. Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.

3.03 COMPACTION

A. Unless otherwise specified in the geotechnical report, the prepared subgrade must meet the following minimum compaction requirements. In the event a discrepancy exists between this paragraph and the geotechnical report, the ENGINEER shall be notified immediately, and the strictest recommendations shall govern.
   1. Mat Foundation Structures: Mat foundation bearing soils should be compacted to at least 98 percent of the soils modified Proctor maximum density, to a depth of at least 12-inches below the foundation bearing level.
   2. Lawn or Unpaved Areas: Compact top 6-inches subgrade and each layer of backfill or fill.
   3. Walkways: Compact top 6-inches of subgrade to 98 percent maximum dry density.
   4. Pavements and Steps: Compact top 12-inches of subgrade to 98 percent maximum dry density.

3.04 STRUCTURAL BACKFILL AND FILL SOILS

A. General: Place material in layers to required subgrade elevations, for each area classification listed below.
   1. In excavations, use satisfactory excavated or borrow material.
   2. Under grassed areas, use satisfactory excavated or borrow material.
   3. Under walks and pavements, use subbase material.

B. Backfill excavations as promptly as work permits, but not until completion of the following:
   1. Acceptance by ENGINEER of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
   2. Inspection, testing, approval, and recording locations of underground utilities.
   3. Removal of concrete formwork.
   4. Removal of shoring and bracing, and backfilling of voids with satisfactory materials.
   5. Removal of trash and debris.

6. Permanent or temporary horizontal bracing is in place on horizontally supported walls. Layout and location of bracing shall consider loads of the structure as well as the effects of the soil and groundwater.

C. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow strip, or break-up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.
   1. When existing ground surface has a density less than that specified under "Compaction" for the particular area classification, break up the ground surface, pulverize, moisture-condition to the optimum moisture content, and compact to required depth and percentage of maximum density.

D. Placement and Compaction: Place structural backfill and fill materials in layers not more than 12-inches loose depth for material compacted by vibratory drum roller equipment as specified in the geotechnical report, and not more than 8-inches loose depth for material compacted if the roller is operated in the static mode. If hand-held compaction equipment is used, the lift thickness should be reduced further to 6-inches.
   1. Before compaction, moisten or aerate each layer as necessary to provide the optimum moisture content. Compact each layer to required percentage of the modified Proctor maximum dry density specified. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
   2. Place backfill and fill materials evenly adjacent to structures, to required elevations. Take care to prevent wedging action of backfill against structures by carrying the material uniformly around structure to approximately same elevation in each lift.
   3. Large compaction equipment shall not be used within 5 feet of walls.

3.05 GRADING

A. General: Uniformly grade areas within limits of grading under this Section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.

B. Grading Outside Building Lines: Grade areas adjacent to building lines, as shown on the Drawings, to drain away from structures and to prevent ponding. Finish surfaces free from irregular surface changes, and as follows:
   1. Lawn or Unpaved Areas: Finish areas to within not more than 0.10 feet above or below the required elevation.
   2. Walks: Shape surface of areas under walks to line, grade and cross-section, with finish surface not more than 0.10 feet above or below the required subgrade.

C. Grading Surface of Fill Under Building Slabs: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 1/2-inch when tested with a 10-foot straightedge.

D. Compaction:
   1. After grading, compact subgrade surfaces to the depth and percentage of modified Proctor maximum dry density and/or the standard maximum dry density specified.

3.06 FIELD QUALITY CONTROL

A. Quality Control Testing During Construction: Allow testing service to inspect and approve subgrades and fill layers before further construction work is performed.

B. If in the opinion of the ENGINEER, based on testing service reports and inspection, subgrade or fills which have been placed are below specified density, provide additional compaction and testing at no additional expense.

3.07 MAINTENANCE

A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.
   1. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

B. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

3.08 DISPOSAL OF SURPLUS AND WASTE MATERIAL

A. All surplus and/or unsuitable excavated material shall be disposed of 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 at an approved disposal facility. Any permit required for the hauling and disposing of this material beyond OWNER's property shall be obtained prior to commencing hauling operations.

END OF SECTION 02220

SECTION 02300 TRENCH SAFETY ACT COMPLIANCE

PART 1 – GENERAL

1.01 INTENT

A. The purpose and intent of this act is to provide for increased worker safety by requiring compliance with sufficient standards for trench safety.

1.02 REGULATORY REQUIREMENTS

A. State Standard: The Occupational Safety and Health Administration's excavation safety standards, 29, C.F.R. s. 1926.650 Subpart P, are hereby incorporated as the state standard. The Department of Labor and Employment Security may, by rule, adopt updated or revised versions of those standards, provided that the updated or revised versions are consistent with the intent expressed in this act and s. 553.72, and are not otherwise inconsistent with state law. Any rule adopted as provided in this section shall be complied with upon its effective date.

1.03 SUBMITTALS

A. The Contractor who will perform the excavation on the Project shall submit the following:
   1. A reference to the trench safety standards that will be in effect during the period of construction of the project.
   2. Written assurance by the Contractor performing the trench excavation that such contractor will comply with the applicable trench safety standards.
   3. A separate item identifying the cost of compliance with the applicable trench safety standards. The separate item identifying the cost of compliance with trench safety standards shall be based on the linear feet of trench to be excavated. The separate item for special shoring requirements, if any, shall be based on the square feet of shoring used. Every separate item shall indicate the specific method of compliance as well as the cost of that method.

1.04 COMPLIANCE

A. The Contractor performing trench excavation shall:
   1. As a minimum, comply with the excavation safety standards which are applicable to a project.
   2. Adhere to any special shoring requirements, if any, of the State of other political subdivisions which may be applicable to such a project.
   3. If any geotechnical information is available from the Owner, the Contractor, or otherwise, the contractor performing trench excavation, shall consider this information in the Contractor's design of the trench safety system which it will employ on the project. This paragraph shall not require the Owner to obtain geotechnical information.

END OF SECTION 02300

SECTION 02340 EARTHWORK FOR UTILITIES

PART 1 – GENERAL

1.01 SCOPE

A. The work under this Section consists of furnishing all labor, equipment and materials and performing all operations in connection with the trench excavation and backfill required to install the pipelines and associated structures shown on the Drawings and as specified.

B. Excavation shall include the removal of any trees, stumps, brush, debris or other obstacles which remain after the clearing and grubbing operations, which may obstruct the work, and the excavation and removal of all earth, rock or other materials to the extent necessary to install pipe and appurtenances in conformance with the lines and grades shown on the Drawings and as specified.

C. Backfill shall include the refilling and compaction of the fill in the trenches and excavations up to the surrounding ground surface or road grade at crossing.

D. The trench is divided into five specific areas:
   1. Foundation: The area beneath the bedding, sometimes also referenced to as trench stabilization and is required when the native trench bottom is unstable.
   2. Bedding: The bedding is directly underneath the pipe and brings the trench bottom to grade. The purpose of the bedding is to provide a firm, stable, and uniform support of the pipe.
   3. Haunching: The haunching area begins at the bottom of the pipe and ends at the springline of the pipe. This area is important in terms of limiting pipe deflection.
   4. Initial Backfill: The area above the haunching material and below a plane 12 inches above the top of the barrel of the pipe.
   5. Final Backfill: The area above the initial backfill to a level below that required for the trench restoration.

E. The choice of method, means, techniques and equipment rests with the Contractor, subject to the approval of the Engineer. The Contractor shall select the method and equipment for trench excavation and backfill depending upon the type of material to be excavated and backfilled, the depth of excavation, the amount of space available for operation of equipment, storage of excavated material, proximity of man-made improvements to be protected, available easement or right-of-way and prevailing practice in the area.

1.02 DESCRIPTION OF WORK

A. Codes and Standards
   1. Perform all work in compliance with applicable codes and requirements of governing authorities having jurisdiction.

B. Testing and Inspection
   1. Contractor must employ, at Contractor's expense, an independent testing laboratory approved by the Engineer.

2. Contractor will engage a geotechnical firm with a certified testing laboratory for quality control testing during earth work operations.
3. It will be the responsibility of the Contractor to coordinate all testing and inspections. The Contractor shall notify the Owner's Engineer, testing service, and applicable agency inspectors 48 hours in advance of testing and inspections.
4. The geotechnical firm will submit the following reports directly to Engineer: Test reports on borrow material; field density; optimum moisture-maximum density curves; graduation curves.
5. Density: All references to “maximum dry density” shall mean the maximum dry density defined by the “Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort” ASTM D 1557. Determination of the density of foundation, bedding, haunching, or backfill materials in place shall meet the requirements of ASTM D 1556, “Density of Soil in Place by the Sand Cone Method”, ASTM D 2937, “Density of Soil in Place by the Drive-Cylinder Method” or ASTM D 6938, “Nuclear Density Method”.
6. All costs associated with compaction testing ordered by the Engineer shall be paid for by the Contractor. The extent of testing required shall be reasonable, but shall also be dependent upon soil conditions, Contractor’s means and methods of operation, and regulatory requirements. As a minimum, compaction tests shall be performed in alternating fill lifts at a single location per each 500 LF of pipeline or 750 square yards of excavation, but in no case less than 3 test locations.

1.03 SAFETY

A. Perform all trench excavation and backfilling activities in accordance with the Occupational Safety and Health Act of 1970 (PL 91-596), as amended. The Contractor shall pay particular attention to the Safety and Health Regulations Part 1926, Subpart P “Excavation, Trenching & Shoring” as described in OSHA publication 2226. The Contractor is responsible for safety.

1.04 JOB CONDITIONS

A. Site Information
1. Any data provided regarding subsurface conditions are not intended as representations or warranties of accuracy or continuity between soil borings. It is expressly understood that Engineer and Owner will not be responsible for interpretations or conclusions drawn by Contractor from data provided by the Engineer and Owner.
2. Any data provided is made available for convenience of Contractor.
3. Additional test borings and other exploratory operations may be made by Contractor at no cost to Owner.

B. Underground Utilities
1. The plans show certain features of topography and certain underground utilities, but they do not purport to show in complete detail all such lines or obstructions. Such topography and notes on the plans were inserted from records available are for the Contractor's convenience only, and shall not be used as a basis for claims of extra compensation.

2. Whenever necessary to determine the location of existing pipes, valves, or other underground structures, the Contractor shall examine all available records and shall make all explorations and excavations for such purpose.
3. Any damage to existing facilities resulting from the Contractor's operations shall be immediately repaired by the Contractor at no cost to the Owner.

C. Existing Utilities
1. The Contractor shall be responsible to locate existing underground utilities in areas of work. If utilities are to remain in place, provide adequate means of support and protection during earthwork operations.
2. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate fully with Owner and utility companies in keeping respective services and facilities in operation.
3. Do not interrupt existing utilities serving facilities occupied and used by Owner or others during occupied hours, except when permitted in writing by Engineer, and then only after acceptable temporary utility services have been provided. Provide minimum of 48 hours' notice to Engineer and receive written notice to proceed before interrupting a utility.
4. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies for shut-off of services if lines are active.

D. Protection of Persons and Property
1. Open excavations occurring as part of this work shall be barricaded and posted with warning lights. Operate warning lights as recommended by authorities having jurisdiction.
2. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
3. Perform excavation by hand within drip line of large trees to remain and protect the root system from damage or dry out to the greatest extent possible. Maintain moist condition for root system and cover exposed roots with burlap.

PART 2 – MATERIALS

2.01 SOIL MATERIALS

A. Definitions
1. Satisfactory soil materials are defined as those complying with unified soil classification groups SP, SP-SM.
2. Unsatisfactory soil materials are defined as those complying with unified soil classification groups SC, SC-SM, SM, CL, ML, CH, MH and PT.
3. Unsatisfactory materials include but are not limited to those materials containing roots and other organic matter, trash, debris, frozen materials, and stones larger than two inches.

4. Unyielding material shall consist of rock and gravelly soils with stones greater than three inches.
5. Unstable material shall consist of material too wet to properly support the utility pipe, conduit, or appurtenance structure.

B. Bedding, Haunching, and Initial Backfill Material
1. Satisfactory soil materials free of clay, rock, or gravel larger than one inch in any dimension, debris, waste, vegetable, and other deleterious matter and less than 12% passing No. 200 sieve.

C. Final Backfill Material
1. In areas not subject to vehicular or pedestrian traffic, the final backfill material shall be general excavated earth materials, and shall not contain cinders, stumps, limbs, man-made wastes, other materials and shall not contain more than 33% broken rock, of which no stone of boulder shall weight more than 50 pounds.
2. If materials excavated from the trench are not suitable for use as final backfill material, as determined by the Engineer, provide select material conforming to the requirements of this Section.
3. In areas where the backfill is beneath a roadway or sidewalk and subject to vehicular or pedestrian traffic, the backfill shall meet the requirements for select backfill.

D. Trench Foundation Material
1. Crushed stone shall be utilized for trench foundation (trench stabilization) when required, and shall conform to the Florida Department of Transportation Specification 900 with the exception that slag or crushed slag shall not be used.
2. Stone sizes shall be No. 57.

E. Select Backfill Material
1. Select backfill shall be materials which meet the requirements as specified for bedding, haunching and initial backfill, including compaction requirements.

F. Select Granular Material
1. Select granular material shall consist of well-graded sand, gravel, crushed gravel, crushed stone or crushed slag composed of hard, tough, and durable particles and shall contain no more than 12% by weight of material passing a No. 200 mesh sieve and not less than 95% by weight passing the one inch sieve.
2. The maximum allowable aggregate size shall be one inch or the maximum size recommended by the pipe manufacturer, whichever is smaller.

G. Concrete
1. Concrete for bedding, haunching, initial backfill or encasement shall have a compressive strength of no less than 3,000 psi, with no less than 5.5 bags of cement per cubic yard and a slump between 3 and 5 inches. Where this requirement conflicts with other requirements in the project plans and specifications, the more stringent requirement shall apply.

2. Ready mixed-concrete shall be mixed and transported in accordance with ASTM C 94. Reinforcing steel shall conform to the requirements of ASTM A 615, Grade 60.

PART 3 – EXECUTION

3.01 EXCAVATION

A. Excavation includes excavation to the required subgrade elevations and includes excavation of pavements and other obstructions visible on ground surface, underground structures, utilities, and other items indicated to be demolished and removed, together with earth and other materials encountered.

B. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be at Contractor's expense.

C. Unsuitable Materials
1. Where muck, rock, clay or other material within the limits of the roadway or other work is unsuitable (unsatisfactory soils and materials) in its original position, the Contractor shall excavate each material to the cross sections indicated on the plans or as directed by the Engineer.
2. The unsuitable material shall be disposed off-site in accordance with applicable codes and regulations and the excavated area backfilled with suitable material to the lines, grades, and elevations indicated on the plans or as directed by the Engineer.

D. Stability of Excavations
1. Slope sides of excavations to comply with local codes and ordinances having jurisdiction.
2. Shore and brace where sloping is not possible because of space restrictions or instability of material excavated.
3. Maintain sides and slopes of excavations in safe condition until completion of backfilling

E. Dewatering
1. Excavation shall be free from water, at Contractor’s expense, before bedding, pipe, or structures are installed. To insure that bottom of trench can be adequately compacted, maintain groundwater level two feet below bottom of trench.
2. Provide all necessary pumps, under drains, well point systems, and other means for removing water from trenches and other parts of the work. Continue de-watering operations until the backfill has progressed to a sufficient depth over the pipe to prevent flotation or movement of the pipe in the trench and so that it is above the natural water table.
3. Water from the trenches and excavations shall be disposed in such a manner as will not cause injury to public health, to public or private property, to the work completed

or in progress, to the surface of the streets, or cause any interference with the use of same by the public.

4. The Contractor is responsible for obtaining any FDEP permits required for dewatering.

F. Trench Excavation

1. Top Soil and grass shall be stripped a minimum of 6 inches over the trench excavation site and stockpiled separately for replacement over the non-paved, finished grading areas.
2. Trenches shall be excavated to the lines and grades shown on the Drawings with the centerlines of the trenches on the centerlines of the pipes.

G. Trench Width for Pipeline

1. The sides of all trenches shall be as vertical as is practical from the bottom of the trench to a minimum of one foot above the top of the pipe. Unless otherwise indicated on the Drawings, the trench width shall be equal to the sum of the outside diameter of the pipe plus two feet.
2. Excavate the top portion of the trench to any width within the construction easement or right-of-way which will not cause unnecessary damage to adjoining structures, roadways, pavement, utilities, trees or private property. Where necessary to accomplish this, provide sheeting and shoring.
3. Where rock is encountered in trenches, excavate to remove boulders and stones to provide a minimum of 6 inches clearance between the rock and any part of the pipe or appurtenance.

H. Depth

1. The trenches shall be excavated to the required depth or elevation which allow for the placement of the pipe and bedding to the proposed grade or to provide minimum cover.
2. For sanitary sewer force mains, re-use water mains and potable water mains excavate trenches to provide a minimum cover of 36 inches. Within the right-of-way of highways, streets or roadways; also excavate to place the top of the pipe a minimum of 36 inches below the nearest pavement edge or drainage ditch.
3. Increase the depth of cover where specifically shown on the Drawings and where necessary to avoid interference with underground utilities and obstructions.
4. Where rock is encountered in trenches for pipelines, excavate to the minimum depth which will provide clearance below the pipe barrel of 8 inches for pipe 21 inches in diameter and smaller and 12 inches for larger pipe, valves and manholes. Remove boulders and stones to provide a minimum of 6-inches clearance between the rock and any part of the pipe, manhole or accessory.

I. Bottom Preparation

1. Trench bottom shall be accurately graded to provide uniform bearing and support for the bottom quadrant of each section of the pipe.
2. Bell holes shall be excavated to the necessary size at each joint or coupling to eliminate point bearing.

3. Stones of two inches or greater in any dimension, or as recommended by the pipe manufacturer, whichever is smaller, shall be removed to avoid point bearing.

J. Excavated Materials
1. Excavated materials shall be placed adjacent to the work to be used for backfilling as required. Top soil shall be carefully separated and lastly placed in its original location.
2. Excavated material shall be placed sufficiently back from the edge of the excavation to prevent caving of the trench wall, to permit safe access along the trench and not cause drainage problems. Excavated material shall be placed so as not to damage existing landscape features or man-made improvements.

K. Removal of Unyielding Material
1. Where unyielding material is encountered in the bottom of the trench, such material shall be removed four inches below the required grade and replaced with select materials.

L. Removal of Unstable Material
1. Where unstable material is encountered in the bottom of the trench, such material shall be removed to the proper grade as hereinbefore described.
2. When removal of unstable material is required due to the fault or neglect of the Contractor in his performance of the work, the resulting material shall be excavated and replaced by the Contractor without additional cost to the Owner.

M. Excavation for Appurtenances
1. Excavation for manholes, catch-basins, inlets, or similar structures shall be at least 12 inches clear between the outer structure surfaces and the face of the excavation, or support members shall be of sufficient size to permit placement and removal of forms for the full length and width of structure footings and foundations as shown.
2. Removal of unstable material shall be as specified above.
3. 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.
4. Excavation to the final grade level shall not be made until just before the concrete or masonry is to be placed.

3.02 SHEETING, BRACING AND SHORING

A. Sheeting, bracing and shoring shall be performed in the following instances:
1. Where sloping of the trench walls do not adequately protect persons within the trench from slides or cave-ins.
2. In wet, saturated, flowing or otherwise unstable materials.
3. Where necessary to prevent damage to adjoining buildings, structures, roadways, pavement, utilities, trees or private properties which are required to remain.
4. Where necessary to maintain the top of the trench within the available construction easement or right-of-way.

B. In all cases, excavation protection shall strictly conform to the requirements of the Occupational Safety and Health Act of 1970, as amended.

C. Timber
   1. Timber for shoring, sheeting, or bracing shall be sound and free of large or loose knots and in good, serviceable condition.
   2. Size and spacing shall be in accordance with OSHA regulations.

D. Steel Sheeting and Sheet Piling
   1. Steel sheet piling shall be the continuous interlock type. The weight, depth and section modulus of the sheet piling shall be sufficient to restrain the loads of earth pressure and surcharge from existing foundations and live loads.
   2. Procedure for installation and bracing shall be so scheduled and coordinated with the removal of the earth that the ground under existing structures shall be protected against lateral movement at all times.
   3. The Contractor shall provide closure and sealing between sheet piling and existing facilities.

E. Trench Shield
   1. A trench shield or box may be used to support the trench walls. The use of a trench shield does not necessarily preclude the additional use of bracing and sheeting. When trench shields are used, care must be taken to avoid disturbing the alignment and grade of the pipe or disrupting the haunching of the pipe as the shield is moved. When the bottom of the trench shield extends below the top of the pipe, the trench shield will be raised in 6-inch increments with specified backfilling occurring simultaneously. At no time shall the trench shield be “dragged” with the bottom of the shield extending below the top of the pipe or utility.

F. Remove bracing and sheeting in units when backfill reaches the point necessary to protect the pipe and adjacent property. Leave sheeting in place when in the opinion of the Engineer it cannot be safely removed or is within three feet of an existing structure, utility, or pipeline. Cut off any sheeting left in place at least two feet below the surface.

3.03 ROCK EXCAVATION

A. Definition of Rock
   1. Any material which cannot be excavated with conventional excavating equipment, and is removed by drilling and blasting, or mechanically fracturing by means other than a trench excavator, and occupies an original volume of at least one-half cubic yard

B. Blasting
   1. Provide licensed, experienced workmen to perform blasting.
   2. Conduct blasting operations in accordance with all existing ordinances and regulations.
   3. Protect all buildings and structures from the effects of the blast. Repair any resulting damage.

4. If the Contractor repeatedly uses excessive blasting charges or blasts in an unsafe or improper manner, the Engineer may direct the Contractor to employ an independent blasting consultant to supervise the preparation for each blast and approve the quantity of each charge.

C. Removal of Rock
1. Dispose of rock off site that is surplus or not suitable for use as rip rap or backfill.

D. The Contractor shall notify the Engineer prior to any blasting. Additionally, the Contractor shall notify the Owner and local fire department before any charge is set.

E. The Contractor shall conduct pre-blast and post-blast inspections of structures, including photographs or videos, and maintain a detailed written log.

3.04 BACKFILLING

A. General
1. Control soil compaction during backfilling operations providing minimum percentage of density specified for each area classification indicated below.

B. Percentage of Maximum Density Requirements
1. Compact soil to not less than the required percentages of maximum density determined in accordance with ASTM D 1557.

C. Replacement of Unyielding Material
1. Unyielding material removed from the bottom of the trench shall be replaced with satisfactory material placed in layers not exceeding six inches loose thickness.

D. Replacement of Unstable Material
1. Unstable material removed from the bottom of the trench or excavation shall be replaced with select granular material placed in layers not exceeding six inches loose thickness.

E. Bedding and Haunching
1. Prior to placement of bedding material, the trench bottom shall be free of any water, loose rocks, boulders or large dirt clods.
2. Bedding material shall be placed to provide uniform support along the bottom of the pipe and to place and maintain the pipe at the proper elevation. The initial layer of bedding placed to receive the pipe shall be brought to the grade and dimensions indicated on the Drawings. All bedding shall extend the full width of the trench bottom. The pipe shall be placed and brought to grade by tamping the bedding material or by removal of the excess amount of the bedding material under the pipe. Adjustment to grade line shall be made by scraping away or filling with bedding material. Wedging or blocking up of pipe shall not be permitted. Applying pressure to the top of the pipe, such as with a backhoe bucket, to lower the pipe to the proper elevation or grade shall

not be permitted. Each pipe section shall have a uniform bearing on the bedding for the length of the pipe, except immediately at the joint.

3. At each joint, excavate bell holes of ample depth and width to permit the joint to be assembled properly and to relieve the pipe bell of any load.
4. After the pipe section is properly placed, add the haunching material to the springline of the pipe. The haunching material shall be shovel sliced, tamped, vigorously chinked or otherwise consolidated to provide uniform support for the pipe barrel and to fill completely the voids under the pipe, including the bell hole. Prior to placement of the haunching material, the bedding shall be clean and free of any water, loose rocks, boulders or dirt clods.
5. The types of trench bedding are identified as follows:
    a. Class "A" (Bedding Factor – 2.8): Excavate the bottom of the trench flat at a minimum depth as shown on the Drawings, below the bottom of the pipe barrel. Lay pipe to line and grade on concrete block. Place concrete to the full width of the trench and to a height of one-fourth of the outside diameter of the pipe above the invert.
    b. Class "B" (Bedding Factor – 1.9): Excavate the bottom of the trench at a minimum depth as shown on the Drawings, below the bottom of the pipe barrel. The bottom of the trench shall be rounded such that at least the bottom quadrant of the pipe rests firmly on the bedding. The bedding shall be undisturbed soil if suitable or placed material. Haunching material shall then be carefully placed by hand and compacted to provide full support under and up to the centerline of the pipe.
    c. Class "C" (Bedding Factor – 1.5): Excavate the bottom of the trench at a minimum depth as shown on the Drawings, below the bottom of the pipe barrel. The bottom of the trench shall be rounded such that at least the bottom quadrant of the pipe rests firmly on the bedding. The bedding shall be undisturbed soil if suitable or placed material. Haunching material shall then be carefully placed by hand and compacted to provide full support under and up to a height of one-fourth the outside diameter of the pipe above the bottom of the pipe barrel.
6. PVC and HDPE pipe shall be installed with Class "B" bedding, unless shown otherwise herein or on the drawings. The bedding and haunching shall be hand tamped to achieve a compaction of approximately 90% maximum density.
7. Ductile Iron and other non-plastic pipes shall be installed with Class "C" bedding, unless shown otherwise herein or on the drawings. The bedding and haunching shall be hand tamped to achieve a compaction of approximately 90% maximum density.
8. Manholes: Excavate to a minimum of 12-inches below the planned elevation of the base of the manhole. Place and compact crushed stone bedding material to the required grade before constructing the manhole.

F. Initial Backfill

1. Initial backfill shall be placed to anchor the pipe, protect the pipe from damage by subsequent backfill and ensure the uniform distribution of the loads over the top of the pipe.

2. Initial backfill material shall be placed in layers of a maximum of six inches loose thickness and compacted with approved tampers to 95% maximum density and to a height of at least one foot above the utility pipe or conduit. The backfill shall be brought up evenly on both sides of pipe for the full length of the pipe. Backfill material in this portion of the trench shall consist of satisfactory material at a moisture content that will facilitate compaction, free from stones larger than two inches in any dimension, except where the pipe is coated or wrapped for protection against corrosion, the backfill material shall be free of stones larger than one inch in any dimension.
3. If materials excavated from the trench are not suitable for use as backfill materials, provide select backfill material conforming to the requirements of this section.

G. Concrete Encasement for Pipelines
1. Where concrete encasement is shown on the Drawings for pipelines, excavate the trench to provide a minimum of 4-inches clearance from the bell of the pipe. Lay the pipe to line and grade on concrete blocks. In lieu of bedding, haunching and initial backfill, place concrete to the full width of the trench and to a height of not less than 4 inches above the pipe bell. Do not backfill the trench for a period of at least 24 hours after concrete is placed.

H. Final Backfill
1. Backfill carefully to restore the ground surface to its original condition. For earth or vegetated areas, replace the top 6 inches of the trench with top soil that was stock piled during excavation.
2. Excavated material which is unsuitable for backfilling, excess material and rock shall be disposed of, at no additional cost to the Owner, in a manner approved by the Engineer.
3. If materials excavated from the trench are not suitable for use as backfill materials, provide select material conforming to the requirements of this Section.
4. After initial backfill material has been placed and compacted, backfill with final backfill material. Place backfill material in uniform layers, compacting each layer thoroughly as follows:
    a. In 6 inch layers, if using light power tamping equipment*
    b. In 12 inch layers, if using medium sized tamping equipment*
    c. In 24 inch layers, if using heavy tamping equipment*
    d. *The allowable layer thickness for different compaction equipment is dependent on the soil conditions. The Engineer of Record shall give project specific instruction related to the compaction equipment proposed for use by the contractor

I. Final backfill shall be compacted as follows:
1. Under proposed or existing pavement, dirt roads, sidewalks, or within four feet of pavement edge, compact to a minimum of 98% of the maximum density. Type of material and compaction effort may vary within the top 12” under areas designated for pavement replacement as reflected on the Drawings.

2. Around structures (manholes, inlets) compaction shall be 98% of the maximum density.
3. Seeded areas, or non-traffic areas, compact to a minimum of 90% of the maximum density.

J. Settlement
1. If trench settles, re-fill and grade the surface to conform to the adjacent surfaces.

3.05 ADDITIONAL MATERIAL

A. Where final grades above the pre-construction grades are required to maintain minimum cover, additional fill material will be as shown on the Drawings. Utilize excess material excavated from the trench, if the material is suitable. If excess excavated materials are not suitable, or if the quantity available is not sufficient, provide suitable fill material.

3.06 TESTING AND INSPECTION REQUIREMENTS

A. Quality Control Testing During Construction
1. Contractor shall engage geotechnical firm to inspect and approve subgrades and fill layers before further construction work is performed.
2. In alternating compacted fill lifts, make one field density test for every 500 linear feet horizontally or 750 square yards, but in no case less than three tests. The Engineer has the right to select the location of compaction test.
3. If, in the opinion of the Engineer, geotechnical firm reports indicate inspection, subgrade, or fill which have been placed are below specified density, the Contractor shall provide additional compaction and testing at no additional expense to the Owner.
4. The Contractor shall provide excavation as necessary for geotechnical personnel to conduct test.

3.07 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Off-Site Disposal
1. Remove all waste materials, including unacceptable excavated material, trash, and debris, and properly dispose at a location selected by the Contractor in accordance with local, state and federal criteria.

END OF SECTION 02340

SECTION 02400 WATER DISTRIBUTION SYSTEM

PART 1 – GENERAL

1.01 SCOPE

A. This Section describes products to be incorporated into the water distribution system and requirements for the installation and use of these items. Furnish all products and perform all labor necessary to fulfill the requirements of these Specifications.

B. It is the intent of these specifications to provide information supplemental to the contents of the construction drawings on the quality of materials, execution, measurement, etc. These specifications are general in nature and may contain products and requirements which are not applicable to the project. Discrepancies between these specifications and the construction drawings, either imagined or real, shall be brought to the attention of the Owner for clarification.

1.02 DESCRIPTION OF WORK

A. Extent of work is shown on the drawings.

B. Domestic water system work includes but is not limited to: Water mains, fire hydrants, valves, service connections and appurtenances.

C. Comply with the requirements of applicable sections for excavation and backfilling required in connection with water distribution system work.

D. Comply with requirements of Paragraph 2.13 of his section for concrete work required in connection with water distribution system work.

E. Contractor is advised that existing water mains may be of various pipe materials, including asbestos cement. The Contractor shall be responsible for protection of existing water mains during construction and shall be responsible for repairing any pipes damaged during construction. Repair sections shall be PVC or ductile iron. The Contractor shall comply with all work site, air emission, solid waste and personal safety and protection regulations as related to the excavation, exposure, cutting, handling, containment and disposal of existing water main pipe material.

F. The removal, encapsulation or enclosure, storage and disposal of pipe materials containing asbestos shall be in accordance with Sections 455.301 through 455.309 of the Florida State Statutes; American Water Works Association Manual of Water Supply Practices No. M16 “Work Practices for Asbestos – Cement Pipe”; 29 CFR 1910.19; 29 CFR 1926.1101, Appendix F; Asbestos NESHAP (40 CFR 61, Subpart M); 40 CFR 763, Appendix D; and all other industry and regulatory requirements.

1.03 QUALITY ASSURANCE

A. Codes and Standards: Perform all work in compliance with applicable requirements of governing authorities having jurisdiction and the applicable standards of the American Water Works Association (AWWA).

B. Testing and Inspection Service
   1. Employ, at Contractor's expense, testing laboratory to perform bacteriological testing of water mains.
   2. It will be the responsibility of the Contractor to coordinate all testing and inspections. The Contractor shall notify the Owner, testing service, and applicable agency inspectors 48 hours in advance of testing and inspections.
   3. Hydrostatic test shall be completed by the Contractor in the presence of the Owner or Owner’s representative.

C. The manufacturer shall provide written certification to the Owner that all products furnished comply with all applicable requirements of these Specifications.

1.04 SUBMITTALS

A. Prior to construction commencing, the Contractor shall submit for approval by the Owner manufacturer's certifications and cut sheets for the following items:
   1. Fire hydrant assemblies
   2. Valves
   3. Water main pipe
   4. Fittings
   5. Water services
   6. Water meters
   7. Tapping sleeves
   8. Other appurtenances

B. Qualifications: If requested by the Owner, submit evidence that manufacturers have consistently produced products of satisfactory quality and performance for a period of at least two years.

C. Test Reports: Submit Bacteriological Test Reports directly to the Owner’s Engineer from the testing services with copy to Contractor.

1.05 EXISTING UTILITIES AND OBSTRUCTIONS

A. The Drawings indicate utilities or obstructions that are known to exist according to the best information available to the Owner. The Contractor shall call the Sunshine State One Call of Florida, Inc. (1-800-432-4770), as required by Florida Law and all utilities, agencies or departments that own and/or operate utilities in the vicinity of the construction work site, at least 72 hours (three business days) prior to construction, to verify the location of the existing utilities.

B. Conflict with Existing Utilities
   1. Horizontal Conflict: Horizontal conflict shall be defined as when the actual horizontal separation between a utility, main, or service and the proposed water main does not permit safe installation of the water main by the use of sheeting, shoring, tie-back, supporting, or temporarily suspending service of the parallel or crossing facility. The Contractor may change the proposed alignment of the water main to avoid horizontal conflicts, if the new alignment remains within the available right-of-way or easement, complies with

regulatory agency requirements, and after a written request to, and subsequent approval by the Owner. If, in the opinion of the Owner, the water main's proposed location cannot be adjusted, thus requiring the relocation of an existing utility, the Owner will direct the Contractor to relocate the utility as part of the Contract with the costs of such relocation being paid for as part of a change order.

2. Vertical Conflict: Vertical conflict shall be defined as when the actual vertical separation between a utility, main, or service and the proposed water main does not permit the crossing without immediate or potential future damage to the utility, main, service, or the water main. The Contractor may change the proposed grade of the water main to avoid vertical conflicts if the changed grade maintains adequate cover and complies with regulatory agencies requirements after written request to and subsequent approval by the Owner. If, in the opinion of the Owner, the water main's proposed location cannot be adjusted, thus requiring the relocation of an existing utility, the Owner will direct the Contractor to relocate the utility as part of the Contract with the costs of such relocation being paid for as part of a change order.

C. Electronic Locator: Have available at all times an electronic pipe locator and a magnetic locator, in good working order, to aid in locating existing pipe lines or other obstructions.

D. Water Main Separation Requirements

1. Water mains constructed as part of this project shall be laid to provide a minimum horizontal distance of at least three feet between the outside of the water main and the outside of any existing or proposed vacuum-type sanitary sewer, storm sewer, storm water force main, or pipeline conveying reclaimed water. A horizontal distance of at least six feet shall be provided between the outside of the water main and the outside of any existing or proposed gravity-type sanitary sewer, pressure-type sanitary sewer, wastewater force main, or pipeline conveying reclaimed water. A horizontal distance of at least ten feet shall be provided between the outside of the water main and all parts of any existing or proposed “on-site sewage treatment and disposal system”.
2. Water mains constructed as part of this project, that will cross any existing or proposed gravity- or vacuum-type sanitary sewer or storm sewer will be laid so the outside of the water main is at least six inches above the other pipeline or at least 12 inches below the other pipeline. Water mains that will cross any existing or proposed pressure-type sanitary sewer, wastewater or storm water force main, or pipeline conveying reclaimed water will be laid so the outside of the water main is at least 12 inches above or below the other pipeline.
3. At the utility crossings described above, one full length of water main pipe will be centered above or below the other pipeline so the water main joints will be as far as possible from the other pipeline or the pipes will be arranged so that all water main joints are at least three feet from all joints in vacuum-type sanitary sewers, storm sewers, or storm water force mains, and at least six feet from all joints in gravity or pressure-type sanitary sewers, wastewater force mains, or pipelines conveying reclaimed water.

PART 2 – PRODUCTS

2.01 GENERAL

A. All materials shall be new and unused. They shall be of standard, first grade quality and intended for the use for which they are offered. Materials or equipment which, in the opinion of the Owner, are inferior or of a lower grade than indicated, specified, or required will not be accepted.

2.02 WATER MAINS

A. Ductile Iron Pipe (DIP)

1. Ductile iron pipe shall be manufactured in accordance with AWWA C151. All pipes, except specials, shall be furnished in nominal lengths of 18 to 20 feet. Sizes will be as shown on the Drawings. All pipes shall be Pressure Class 250 and have corresponding minimum wall thickness, unless otherwise specified or shown on the Drawings.
2. Pipe and fittings shall be cement lined in accordance with AWWA C104. Pipe and fittings shall be furnished with a bituminous outside coating.
3. Fittings shall be ductile iron and shall conform to AWWA C110 or AWWA C153 with a minimum rated working pressure of 250 psi.
4. Joints: Unless shown or specified otherwise, joints shall be push-on or restrained joint type for pipe and standard mechanical, push-on or restrained joints for fittings. Push-on and mechanical joints shall conform to AWWA C111. No field welding of restrained joint pipe will be permitted. Restraining gasket joints shall be assembled with American Fast-Grip gaskets or US Pipe FIELD LOK gasket.
5. Provide the appropriate gaskets for mechanical and flange joints. Gaskets for flange joints shall be made of 1/8-inch thick, cloth reinforced rubber; gaskets may be ring type or full face type. The gasket for a standard push-on or mechanical joint, shall be of BUNA-5, vulcanized styrene rubber (SBR) and in accordance with AWWA C111.
6. Bolts and Nuts
    a. Provide the necessary bolts for connections. All bolts and nuts shall be threaded in accordance with ANSI B1.1, Coarse Thread Series, Class 2A external and 2B internal fit. All bolts and nuts shall be made in the U.S.A.
    b. Bolts and nuts for mechanical joints shall be Tee Head Bolts and nuts of high strength low-alloy steel in accordance with ASTM A 242 to the dimensions shown in AWWA C111/ANSI A21.11.
    c. Bolts for exposed service shall be zinc plated, cold pressed, steel machine bolts conforming to ASTM A 307, Grade B. Nuts for exposed service shall be zinc plated, heavy hex conforming to ASTM A 563. Zinc plating shall conform to ASTM B 633, Type II.
7. Mechanical joint glands shall be ductile iron.
8. Thrust collars shall be welded-on ductile iron body type designed to withstand thrust due to 250 psi internal pressure on a dead end.
9. Ductile iron pipe shall be encased in polyethylene film where shown on the Drawings. Polyethylene film shall have a minimum thickness of 8 mils and shall meet the requirements of AWWA C105.
10. Acceptance will be on the basis of the Owner's inspection and the manufacturer's written certification that the pipe was manufactured and tested in accordance with the applicable standards.
11. Ductile iron pipe exterior shall have continuous blue stripe if applied during manufacturing, the stripe is parallel that runs parallel to the axis of the pipe, that is located at no greater than 90 degree intervals around the circumference of the pipe, and

that will remain intact during and after pipe installation. If tape or paint is used to stripe pipe during installation of the pipe, the tape or paint shall be applied in a continuous line that runs parallel to the axis of the pipe and that is located along the top of the pipe.

B. Polyvinyl Chloride (PVC) Pipe
   1. Smaller than 4-inch Pipe: All PVC pipe and fittings less than four inches in diameter shall be manufactured in accordance with ASTM D2241, with a standard dimension ratio (DR) of 21, rated pressure 200 psi, and bear the National Sanitation Foundation Seal for potable water pipe.
   2. 4-inch and larger Pipe: PVC pipe shall be manufactured in accordance with AWWA C900, latest edition. Pipe shall be pressure class 235 and must meet dimension requirements of dimension ratio (DR) 18 and shall bear the National Sanitation Foundation seal for potable water pipe.
   3. Joints: Joints shall be "push-on" and shall meet all requirements of ASTM D3139. Each bell shall be an integral wall section joint assembly using elastomeric gasket seals. All gaskets shall meet all requirements for performance as specified by ASTM F477.
   4. Pipe Marking: All pipe shall be marked as prescribed in ASTM D2241 (e.g., nominal pipe size, type of plastic pipe material, pipe dimension ratio, pressure rating, ASTM specification designation number, manufacturer's name and code), and the National Sanitation Foundation Seal for potable water.
   5. PVC Pipe for waterlines shall be blue.
   6. Acceptance will be on the basis of the Owner's inspection and the manufacturer's written certification that the pipe was manufactured and tested in accordance with the applicable standards, including the National Sanitation Foundation. Additionally, each piece of pipe shall be stamped "NSF Approved".

2.03 FITTINGS (3-inch and Larger)

A. General: Fittings three inches and larger shall be ductile iron manufactured in accordance with ANSI/ AWWA C110/ A21.10 or C153/ A21.53. The minimum pressure rating for fittings shall be 250 psi.

B. Coating: All fittings furnished with bituminous outside coating and shall be cement mortar lined and coated in accordance with AWWA C104.

C. Anchoring Devices
   1. All anchoring devices shall be suitable for use with mechanical joint fittings meeting AWWA C110 and/ or AWWA C111.
   2. All anchoring devices shall be constructed of ductile iron (at least ASTM A536 Grade 70-50-05) and manufactured in accordance with AWWA C110 and/ or C111.
   3. All anchoring devices shall have a sufficient number of set screws so as to properly restrain various fittings or pipes at the rated pressure without the need for additional thrust restraint.

D. Retainer Glands
   1. Mechanical joint restraint shall be incorporated in the design of the follower gland and shall include a restraining mechanism which, when actuated, imparts multiple wedging

action against the pipe, increasing its resistance as the pressure increases. Glands shall be manufactured of ductile iron conforming to ASTM A536. Dimensions of the gland shall be such that it can be used with the standardized mechanical joint bell and tee-head bolts conforming to ANSI A21.11 and ANSI/AWWA C153/ A21.53, latest revision. Twist-off nuts shall be used to insure proper actuating of the restraining devises.

2. Retainer glands for ductile iron pipe shall be Megalug Series 1100, as manufactured by EBAA Iron, Uni-Flange Series 1400, as manufactured by Ford Meter Box Company, or Star Pipe Products Star-Grip Series 3000.
3. Retainer glands for polyvinyl chloride pipe shall be Megalug Series 2000 PV, as manufactured by EBAA Iron, Inc.

E. Push-on Restraints
1. Push-on joint restraints shall be Fast-Grip Gasket by American Ductile Iron Pipe Co., or equal.
2. Bell harness restraints shall be Megalug Series 2500 by EBBA Iron or equal.

2.04 GATE AND TAPPING VALVES

A. Smaller than 2-Inches in Diameter: Gate valves shall be bronze, heavy duty, rising stem, wedge type with screwed or union bonnet. Valve ends shall be threaded type. Valves shall have a minimum 200 psi working pressure for water (125 psi working pressure for steam). Valves shall be made in the U.S.A. Gate valves shall be Crane No. 428 (threaded).

B. 2-Inches through 36-Inches in Diameter: Gate valves shall be resilient seat wedge encapsulated with EPDM rubber type conforming to the requirements of AWWA C509 or AWWA C515 rated for 200 psi working pressure.
1. Valves shall be provided with two O-ring stem seals with one O-ring located above and one O-ring below the stem collar. The area between the O-rings shall be filled with lubricant to provide lubrication to the thrust collar bearing surfaces each time the valve is operated. At least one anti-friction washer shall be utilized to further minimize operating torque. All seals between valve parts, such as body and bonnet, bonnet and bonnet cover, shall be flat gaskets or O-rings.
2. The valve gate shall be made of cast or ductile iron having a vulcanized, synthetic rubber coating, or a seat ring attached to the disc with retaining screws. Sliding of the rubber on the seating surfaces to compress the rubber will not be allowed. The design shall be such that compression-set of the rubber shall not affect the ability of the valve to seal when pressure is applied to either side of the gate. The sealing mechanism shall provide zero leakage at the water working pressure when installed with the line flow in either direction.
3. All internal ferrous surfaces shall be coated with epoxy to a minimum thickness of 4 mils. The epoxy shall be non-toxic, impart no taste to the water and shall conform to AWWA C550.
4. Stem nuts shall be independent of wedge and shall be of solid bronze conforming to ASTM B62.
5. All valves shall open by turning a two-inch square operating nut counterclockwise.
6. Gate Valve: Joints shall be mechanical joints and shall conform to AWWA C111, and all bolts and nuts for mechanical joints shall be high-strength, low-alloy steel in

accordance with AWWA C111. All gaskets shall be for a standard mechanical joint of BUNA-S (SBR Buna) in accordance with ANSI/ AWWA C111/ A21.4. All mechanical joint accessories shall be furnished with the valves.

7. All tapping valves shall have flange-by-mechanical joint ends.
8. All valves shall be furnished with operating nuts.
9. One operating wrench will be provided for each five valves furnished; at least one wrench shall be supplied.
10. All tapping valves shall be interchangeable with other makes of tapping sleeves.
11. Approved models are:
    a. American Flow Control Series 2500 Resilient Wedge Valve
    b. M & H C515
    c. Mueller Company A-2362-78 Resilient Wedge Gate Valve with Aqua Grip
    d. AVK Resilient Seated Gate Valve Series 65

2.05 BUTTERFLY VALVES

A. Butterfly valves shall be resilient seated, short body design, and shall be designed, manufactured, and tested in accordance with all requirements of AWWA C504 for Class 150B.

B. Valve bodies shall be ductile iron conforming to ASTM A 536, Grade 65-45-12 or ASTM A 126, Grade B cast iron. Shafts shall be ASTM A 276, Type 304 stainless steel, machined and polished. Valve discs shall be ductile iron, ASTM A 536, Grade 65-45-12 or ASTM A 126, Grade B cast iron. The valve shall have an EPDM seat.

C. Valves shall be installed with the valve shafts horizontal. Valves and actuators shall have seals on all shafts and gaskets on valve actuator covers to prevent the entry of water. Actuator mounting brackets shall be totally enclosed and shall have gasket seals.

D. Actuators
1. Valves shall be equipped with traveling nut, self-locking type actuators designed, manufactured and tested in accordance with AWWA C504. Actuators shall be capable of holding the disc in any position between full open and full closed without any movement or fluttering of the disc.
2. Actuators shall be furnished with fully adjustable mechanical stop-limiting devices. Actuators that utilize the sides of the actuator housing to limit disc travel are unacceptable.
3. Valve actuators shall be capable of withstanding a minimum of 450 foot pounds of input torque in either the open or closed position without damage.

E. Operators: Valves for buried service shall have a nut type operator and shall be equipped with a valve box and stem extension, as required.

F. Valve ends shall be mechanical joint type, except where flanged or restrained joint ends are shown. Flange joints shall meet the requirements of ANSI B16.1, Class 125.

G. Butterfly valves shall be manufactured by Mueller, M & H Valve, DeZurik, Val-Matic, or Pratt.

2.06 TAPPING SLEEVES

A. General
   1. Tapping sleeves shall be full circle, constructed of stainless steel and in two halves.
   2. All tapping sleeves shall be Smith Blair #662 or equal.

B. The Contractor shall be responsible for determining the outside diameter of the pipe to be connected to prior to ordering the sleeve.

2.07 TAPPING SADDLES

A. General
   1. Tapping saddles shall be constructed of heavy gray cast iron or ductile iron, with the attachment straps, nuts, and washers constructed of corrosion-resistant, alloy steel in accordance with AWWA C111.
   2. All tapping saddles shall be Smith Blair #317 or equal.
   3. Tapping saddles 3" and larger shall have a ¾" threaded test port with plug for pressure testing on the tapping saddle and the tap valve.

2.08 FIRE HYDRANT

A. All fire hydrants shall conform to the requirements of AWWA C502 for 150 psi working pressure. Hydrants shall be the compression type, closing with line pressure. The valve opening shall not be less than 5-1/4-inches.

B. In the event of a traffic accident, the hydrant barrel shall break away from the standpipe at a point above grade and in a manner which will prevent damage to the barrel and stem, preclude opening of the valve, and permit rapid and inexpensive restoration without digging or cutting off the water.

C. The means for attaching the barrel to the standpipe shall permit facing the hydrant a minimum of eight different directions.

D. Hydrants shall be fully bronze mounted with all working parts of bronze. Valve seat ring shall be bronze and shall screw into a bronze retainer.

E. All working parts, including the seat ring shall be removable through the top without disturbing the barrel of the hydrant.

F. The operating nut shall match those on the existing hydrants. The operating threads shall be totally enclosed in an operating chamber, separated from the hydrant barrel by a rubber O-ring stem seal and lubricated by a grease or an oil reservoir.

G. Hydrant shall be a non-freezing design and be provided with a simple, positive, and automatic drain which shall be fully closed whenever the main valve is opened.

H. Hose and pumper connections shall be breech-locked, pinned, or threaded and pinned to seal them into the hydrant barrel. Each hydrant shall have two 2-1/2-inch hose connections and one 4-1/2-inch pumper connection, all with National Standard threads and each equipped with cap and non-kinking chain.

I. Hydrants shall be furnished with a mechanical joint connection to the spigot of the 6-inch hydrant lead.

J. Minimum depth of bury shall be 3.5 feet. Provide extension section where necessary for proper vertical installation and in accordance with manufacturer's recommendations.

K. All outside surfaces of the barrel above grade shall be painted with enamel equal to Koppers Glamortex 501 in a color to be selected by the Owner.

L. Hydrants shall be traffic model and shall be American Flow Control B-84-B, Mueller Super Centurion, AVK Dry Barrel Hydrant Series 2780, or M & H Valve 929.

M. Placements of fire hydrants
   1. Residential area; spacing shall be every 500 ft.
   2. Rural area; spacing shall be every 1,000 ft., or determined on a case by case basis.

2.09 VALVE BOXES AND EXTENSION STEMS

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

B. Covers shall have "WATER VALVE" or "WATER" cast into them. Valve boxes shall be manufactured in the United States.

C. The stem assembly shall be of a telescoping design that allows for variable adjustment length. The material shall be galvanized square steel tubing. The stem assembly shall have a built-in device that prevents the stem assembly from disengaging at its fully extended length. The extension stem must be capable of surviving a torque test to 1000 ft-lb without failure. Valve box shall be equal to American’s trench adapter.

D. Valve box collars shall be poured in place concrete.

2.10 VALVE MARKERS

A. The Contractor shall provide a Carsonite Utility Markers or approved equivalent with U.V. resistant decal for each valve installed. Valve decal shall be stamped "CAUTION WATER VALVE”.

2.11 HYDRANT TEES

A. Hydrant tees shall be equal to ACIPCO A10180 or U.S. Pipe U-592.

2.12 ANCHOR COUPLINGS

A. Lengths and sizes shall be as shown on the Drawings. Anchor couplings shall be equal to ACIPCO A 10895 or U.S. Pipe U-591.

2.13 CONCRETE

A. Concrete shall have a compressive strength of not less than 3,000 psi, with not less than 5.5 bags of cement per cubic yard and a slump between 3 and 5-inches.
   1. For job mixed concrete, submit the concrete mix design for approval by the Owner.
   2. Ready-mixed concrete shall be mixed and transported in accordance with ASTM C 94. Reinforcing steel shall conform to the requirements of ASTM A 615, Grade 60. The thrust box shall not be poured over bolts or in such a way to prevent bolt removal.

2.14 DETECTION TAPE

A. Detection tape shall be composed of a solid aluminum foil encased in a protective plastic jacket.

B. Tapes shall be color coded in accordance with APWA color codes with the following legends: Water Systems, Safety Precaution Blue, "Caution: Water Line Buried Below". Colors may be solid or striped. Tape shall be permanently printed with no surface printing allowed.

C. Tape width shall be minimum 2-inches when buried less than 10-inches below the surface. Tape width shall be minimum 3-inches when buried greater than 10-inches and less than 20-inches.

D. Detection tape shall be equal to Lineguard Type III Detectable or Allen Systems Detectatape.

E. In addition, the Contractor shall furnish and install 10 gauge coated copper tracing wire.

2.15 FLUSHING HYDRANTS

A. Flushing hydrants shall be Safety-Guard Bacteriological Sampling Station model SG-BSS-01.

2.16 WATER SERVICES

A. It is the intent of these Specifications that the water service connections shall duplicate those presently provided by the Owner in order to be compatible with their service maintenance procedures. All materials shall be NSF 61 “Approved”.

B. All materials installed under this Section shall have the approval of the NSF for water services.

C. Residential Service
   1. Contractor will install water service lines between the water main and existing right-of-way, terminating at the right-of-way with a curb stop. Water service separations between storm sewer and sanitary sewer shall be the same as for water mains.
   2. Tubing: Water service tubing shall be polyethylene Class 200, SDR9 manufactured in accordance with AWWA C902.
   3. Curb Stop shall be B11-233W ball valve as manufactured by Ford Meter Box Company, Inc. Curb stop shall have wings for locking the valve in the closed position.
   4. Corporation Stop shall be Ford B-11-333.

5. Gate Valve
   a. Gate valves shall be bronze, heavy duty, rising stem, wedge type with screwed or union bonnet.
   b. Valve ends shall be threaded or solder type as appropriate.
   c. Valves shall have a minimum 200 psi working pressure for water (125 psi working pressure for steam).
   d. Valves shall be made in the U.S.A.
   e. Gate valves shall be equal to Crane No. 428 (threaded) or Crane No. 1334 (solder end).
6. Fittings shall be manufactured of brass, cast with full port of full open valve and machined in accordance with AWWA C800.
7. Service Saddle shall be Smith Blair 313 Iron, Double Strap.
8. Meter Box
   a. Meter boxes shall be plastic or polymer concrete. Material shall meet or exceed the following:

Tensile Strength	3,400 psi	(ASTM D 638)
Flexural Modulus	191,000 psi	(ASTM D 790)
Impact Strength, Izod	0.6 feet 16/inch	(ASTM D 256)
Deflection Temperatures	200 degrees F	(ASTM D 648)

   b. Plastic meter boxes shall be equal to Ametek, Plymouth Products Division or Brooks Products, Inc.
   c. Traffic rated polymer concrete meter boxes for driveways, roads and sidewalks shall be equal to Glasmaster Tuff Box Series.
   d. Meter box shall be fitted with a plastic cover with touch-read pads.
   e. Minimum dimensions shall be 10-3/4 x 16-inches top and 18-1/2 x 13-1/4-inches at bottom and 18-inches deep.
9. Water meters are not to be furnished; however, the water meter connection must be compatible with the water meters currently used by the Owner.
10. Backflow Preventers: Shall be furnished and installed by Contractor/Developer and be owned and maintained by Customer. Backflow preventer shall be Reduced Pressure Zone Type (RPZ).
    a. Backflow preventers shall be rated for operation with inlet water pressures up to 175 psig and water temperatures up to 140-1/2 degrees F.
    b. Backflow preventers shall be tested and certified in accordance with ASSE 1013 and AWWA C506 and C511.
    c. Provide with bronze body construction, rubber check valve and relief valve assemblies, and Clecon check seats.
    d. Provide bronze ball body valve test cocks.
    e. Provide bronze body strainer on the inlet of each backflow preventer.
    f. Acceptable Manufacturers: Watts Series 909, Wilkins, Hersey.
    g. Residential dual check valve backflow preventers shall be equal to Apollo Valve 4N-355-4A Dual Check Valve.
11. Locate wire shall be Number 10, coated.

D. Commercial Service

1. A commercial service shall be constructed similar to a watermain or residential service base on the size requirement. Regardless of size, a commercial service shall include a backflow preventer.
2. Provide isolation valves on the inlet and outlet of each backflow preventer for maintenance. These valves shall be quarter turn, full port, resilient seated, bronze ball valves.

2.17 VALVE AND METER VAULTS

A. Valve and meter vault walls shall be made up of precast concrete sections. The top and bottom sections shall also be precast unless shown otherwise or approved by the Engineer.

B. All coarse aggregate shall be made from 100 percent calcareous rocks. The contractor shall furnish manufacturer's certificate stating the type of aggregate used in the manufacture of the valve vault.

C. The materials shall conform to the following standards:
   1. Concrete shall be 4000 psi using ASTM C150 Type 11 cement.
   2. Wire mesh shall conform to ASTM A185.
   3. Reinforcing rods shall be ASTM A615 grade 60.

D. The top slab shall be cast with the access hatch in place. Access hatch shall be as specified on the drawings.

PART 3 – EXECUTION

3.01 HANDLING PIPE

A. General
   1. All material, unless otherwise directed, shall be unloaded at the job site and distributed at the site of the project by the Contractor.
   2. Materials shall be handled with care to avoid damage. In loading and unloading, pipe shall be lifted by hoists or slid or rolled on skids in such a manner as to avoid shock. Under no circumstances shall pipe be dropped.
   3. Pipe handled on skids must not be allowed to roll against pipe already on the ground.
   4. The Contractor shall be responsible for the safe handling of all materials. Damaged materials will be rejected by the Owner.

B. Pipe shall be handled so as to avoid damage to the coating and lining. If, however, any part of the coating or lining is damaged by the Contractor, the repair shall be made by the Contractor at his expense in a manner satisfactory to the Owner before installation.

C. Pipe shall be distributed on the site of the work parallel with and opposite or near the place it is to be laid in the trench, and with bell ends facing the directions in which the installation will proceed unless otherwise directed.

D. Pipe shall be distributed and placed in such a manner that will not interfere with traffic.

E. No pipe shall be strung further along the route than 1,000 feet beyond the area in which the Contractor is actually working without written permission from the Owner. The Owner reserves the right to reduce this distance to a maximum distance of 200 feet in residential and commercial areas based on the effects of the distribution to the adjacent property owners.

F. No street or roadway may be closed for unloading of pipe without first obtaining permission from the proper authorities. The Contractor shall furnish and maintain proper warning signs and obstruction lights for the protection of traffic along highways, streets and roadways upon which pipe is distributed.

G. No distributed pipe shall be placed inside drainage ditches.

H. Distributed pipe shall be placed as far as possible from the roadway pavement, but no closer than five feet from the roadway pavement, as measured edge-to-edge.

3.02 INSTALLATION OF PIPE

A. General
   1. Upon satisfactory installation of the pipe bedding, as specified in the "Earthwork for Utilities" section of these specifications, a continuous trough for the pipe barrel and recesses for the pipe joints shall be excavated by hand digging so that, when the pipe is laid in the trench true to line and grade, the pipe barrel will receive continuous, uniform support, and the joint will receive no pressure from the trench bottom.

B. The interior of all pipe shall be thoroughly cleaned of all foreign material before being lowered into the trench and shall be kept clean during laying operations by means of plugs or other approved methods.

C. All pipe, fittings, valves, and hydrants shall be carefully lowered into the trench, piece by piece, by means of hoisting apparatus, ropes, or other suitable tools or equipment, in such a manner as to prevent damage to pipe, pipe coating, and pipe lining. Under no circumstances shall pipe or accessories be dropped, dumped or rolled into the trench from finished ground level.

D. The gasket material for each joint shall be properly positioned before the pipe is lowered into the trench. The joining of the pipe shall proceed in accordance with the manufacturer's requirements.

E. Watertight plugs shall be installed in the open ends of the pipe at all times when pipe laying is not in progress. At no time shall trench water be permitted to enter pipe.

F. Cutting of pipe for inserting valves, fittings, or closure pieces shall be done in a neat and workmanlike manner without damage to the pipe. Wherever it is necessary to cut gray or ductile cast iron pipe which is equipped with a push-on joint type bell end, the cut end of the pipe shall be adequately beveled so as to prevent the edge of the cut pipe from cutting or tearing the gasket as the plain end is inserted into the bell of the adjoining pipe or fitting. All

field-cut pipe shall be beveled by the Contractor, and the pipe "short" shall be used as part of the pipeline construction.

G. Whenever necessary to deflect pipe after proper homing from a straight line, either in the vertical or horizontal plane to avoid obstructions, the maximum allowable deflection shall be in accordance with the following:

Push-on Joint Pipe

Size	Maximum Defection
4" thru 12"	3/4" per foot
16" thru 36"	1/2" per foot

1. Only after the pipe has been properly homed will it be allowed to deflect.

H. No pipe shall be laid in water or when the trench conditions or the weather is unsuitable for such work.

I. All water lines and services shall be located a minimum of 36 inches below grade unless noted otherwise on the drawings.

J. Any pipe which is disturbed or found to be defective after laying shall be removed and re-laid or replaced.

K. Prior to connecting new work to existing lines or appurtenances, the Contractor shall verify location and elevation of existing connection point and notify Owner of any conflicts or discrepancies.

L. Joints
1. Before laying the pipe, all lumps, blisters, and excess coal tar coating shall be removed from the bell and plain ends of each length of pipe. The pipe ends shall then be wire brushed and wiped until clean and dry. Where mechanical joints or push-on joints are specified, oil and grease also shall be removed. Pipe ends shall be kept clean until joints are made. The plain end of pipe for mechanical joints shall be lubricated with a soapy solution before installing the gaskets.
2. In making up the push-on type joint, the gasket shall be placed in the socket per manufacturer's recommendation. A thin film of lubricant (approved by the pipe manufacturer) shall then be applied to the inside surface of the gasket that will come in contact with the entering pipe. The plain end of the pipe to be entered shall be thoroughly cleaned and placed in alignment with the bell of the pipe to which it is to be joined. The joint shall be made by exerting sufficient force on the entering pipe so that the plain end is moved past the gasket until it seats as per manufacturer's recommendation.
    a. Pipe lubricant shall be Ease-On Pipe Joint Lubricant or equivalent.
    b. Shall be brushed over the gasket and the plain end of the pipe for push on joints and mechanical joints, where needed.
3. Backhoe buckets or excavation equipment are not to be applied directly to the pipe.

4. Mechanical joints shall be assembled in accordance with AWWA Standards. Mechanical joints shall be centered in the bells. Soapy water shall be brushed over the gasket just prior to installation. The gasket and gland shall be placed in position, the bolts inserted, and the nuts tightened by hand.
5. The bolts shall be tightened on opposite sides of the pipes by means of a torque wrench in such a manner that the gland shall be brought up evenly into the joint. The following range of bolt torques shall be applied:

Bolt Size (Inches)	Range of Torque
3/4" Diameter	85 to 95 ft.-lbs.
1" Diameter	95 to 100 ft.-lbs.

6. If effective seal is not obtained at a maximum torque listed above, the joint shall be disassembled and reassembled after thorough cleaning.
7. If a joint is defective, it shall be cut out and entirely replaced or, if permission is given by the Owner, it may be repaired by a suitable clamp.

M. Expediting of Work
1. Excavate, lay the pipe, and backfill as closely together as possible.
2. Do not leave un-joined pipe in the trench overnight.
3. Backfill and compact the trench as soon as possible after laying and jointing is completed. Cover the exposed end of the installed pipe each day at the close of work and at all other times when work is not in progress.
4. If necessary to backfill over the end of an uncompleted pipe or accessory, close the end with a suitable plug, either push-on, mechanical joint, restrained joint or as approved by the Owner.

N. Polyethylene Encasement
1. Installation shall be in accordance with AWWA C105 and the manufacturer's instructions.
2. All ends shall be securely closed with tape and all damaged areas shall be completely repaired to the satisfaction of the Owner.
3. Installation shall be at locations shown on the Drawings.

O. Conflict with Existing Utilities
1. Horizontal Conflict: Horizontal conflict shall be defined as when the actual horizontal separation between a utility, main, or service and the proposed water main does not permit safe installation of the water main by the use of sheeting, shoring, supporting, or temporarily suspending service of the parallel or crossing facility. The Contractor may change the proposed alignment of the water main to avoid horizontal conflicts if the new alignment remains within the available right-of-way or easement, complies with regulatory agency requirements and after a written request to and subsequent approval by the Owner. If, in the opinion of the Owner, the water main's proposed location cannot be adjusted, thus requiring the relocation of an existing utility, the Owner will direct the Contractor to relocate the utility as part of the Contract with the costs of such relocation being paid for as part of a change order.
2. Vertical Conflict: Vertical conflict shall be defined as when the actual vertical separation between a utility, main, or service and the proposed water main does not permit the crossing without immediate or potential future damage to the utility, main, service, or the

water main. The Contractor may change the proposed grade of the water main to avoid vertical conflicts if the changed grade maintains adequate cover and complies with regulatory agencies requirements after written request to and subsequent approval by the Owner. If, in the opinion of the Owner, the water main's proposed location cannot be adjusted, thus requiring the relocation of an existing utility, the Owner will direct the Contractor to relocate the utility as part of the Contract with the costs of such relocation being paid for as part of a change order.

P. Electronic Locator: Have available at all times an electronic pipe locator and a magnetic locator, in good working order, to aid in locating existing pipe lines or other obstructions.

Q. Water Main Separation Requirements

1. Water mains constructed as part of this project shall be laid to provide a minimum horizontal distance of at least three feet between the outside of the water main and the outside of any existing or proposed vacuum-type sanitary sewer, storm sewer, storm water force main, or pipeline conveying reclaimed water. A horizontal distance of at least six feet shall be provided between the outside of the water main and the outside of any existing or proposed gravity-type sanitary sewer, pressure-type sanitary sewer, wastewater force main, or pipeline conveying reclaimed water. A horizontal distance of at least ten feet shall be provided between the outside of the water main and all parts of any existing or proposed “on-site sewage treatment and disposal system”.
2. Water mains constructed as part of this project, that will cross any existing or proposed gravity- or vacuum-type sanitary sewer or storm sewer will be laid so the outside of the water main is at least six inches above the other pipeline or at least 12 inches below the other pipeline. Water mains that will cross any existing or proposed pressure-type sanitary sewer, wastewater or storm water force main, or pipeline conveying reclaimed water will be laid so the outside of the water main is at least 12 inches above or below the other pipeline.
3. At the utility crossings described above, one full length of water main pipe will be centered above or below the other pipeline so the water main joints will be as far as possible from the other pipeline or the pipes will be arranged so that all water main joints are at least three feet from all joints in vacuum-type sanitary sewers, storm sewers, or storm water force mains, and at least six feet from all joints in gravity or pressure-type sanitary sewers, wastewater force mains, or pipelines conveying reclaimed water.

3.03 INSTALLATION OF FITTINGS, VALVES AND TAPS

A. Fittings shall be handled with care to avoid damage. All fittings shall be loaded and unloaded by lifting, and under no circumstances shall fittings be dropped, skidded, or rolled. Under no circumstances shall fittings be placed against pipe or other fittings in such a manner that damage could result. Slings, hooks, or tongs used for lifting shall be padded in such a manner as to prevent damage to exterior surface or interior lining of fittings. If any part of the fittings' coating or lining is damaged by the Contractor, the repair or replacement shall be made by the Contractor at his expense and in a manner satisfactory to the Owner before installing. Fittings shall also be stored at all times in a safe manner to prevent damage and kept free of dirt, mud, or other foreign matter. All fitting gaskets shall be stored and placed in a cool location out of direct sunlight and out of contact with petroleum products. All gaskets shall be used on a first-in, first-out basis.

B. Fittings shall be set and joined to the pipe in a manner specified previously for joint assembly. When conditions warrant, fittings should be provided with special support trussing and blocking. Valves that are 12 inches and larger valves shall be provided with special support, such as treated timbers, crushed stone, concrete pads or a sufficiently tamped trench bottom so that the pipe will not be required to support the weight of the valve. Valves shall be installed in the closed position.

C. Prior to installation, valves shall be inspected for direction of opening, number of turns to open, freedom of operation, tightness of pressure-containing bolting and test plugs, cleanliness of valve ports and especially seating surfaces, handling damage and cracks. Defective valves shall be corrected or held for inspection by the Owner.

D. A valve box shall be provided on each underground valve. They shall be carefully set, centered exactly over the operating nut and truly plumbed. The valve box shall not transmit shock or stress to the valve. The bottom flange of the lower belled portion of the box shall be placed below the valve operating nut. This flange shall be set on brick, so arranged that the weight of the valve box and superimposed loads will bear on the base and not on the valve or pipe. Extension stems shall be installed where depth of bury places the operating nut in excess of 60-inches beneath finished grade so as to set the top of the operating nut 30-inches below finished grade. The valve box cover shall be flush with the surface of the finished area or such other level as directed by the Owner.

E. All valve boxes set in non-paved areas shall have concrete pads poured around the top section of the valve box. The pad shall be a 24 inch square and shall be centered on the valve box. All water valve covers shall be painted safety blue as prescribed by the American Public Works Association (APWA) uniform color code for utility systems. All valve covers shall be cast with the word WATER. A 2” brass monument will be set on the North East corner of each 24” poured pad of the valve box indicating the valve size, type, and number of turns required.

F. In no case shall valves be used to bring misaligned pipe into alignment during installation. Pipe shall be supported in such a manner as to prevent stress on the valve.

G. A valve marker shall be provided for each underground valve. Unless otherwise detailed on the Drawings or directed by the Owner, valve markers shall be installed 6 inches inside the right of way or easement. Raised pavement markers (RPM’s) shall be provided and installed along the appropriate roadway centerline for each in-line valve installed. RPM’s for in-line valves shall be Type I, two-way, and white in color.

H. Blow-Offs: Blow-offs shall not be connected to any sewer or submerged in any stream or be installed in any other manner that will permit back-siphoning of contaminated water.

I. The valve and valve box shall be installed so water department personnel can insert a valve key through the valve box and completely open and close the valve.

3.04 CONNECTIONS TO WATER MAINS

A. Make connections to existing pipe lines with tapping sleeves and valves, unless specifically shown otherwise on the Drawings.

B. Location
   1. Before laying pipe, locate the points of connection to existing water mains and uncover as necessary for the Owner to confirm the nature of the connection to be made.

C. Interruption of Services
   1. Make connections to existing water mains only when system operations permit. Operate existing valves only with the specific authorization and direct supervision of the Owner.

D. Testing
   1. The Owner or their Representative must be present for the pressure test of the tapping saddle and tapping valve before the tap is allowed.
   2. Test shall be done through the saddle and the test machine or the saddle and tap valve.

E. Tapping Saddles and Tapping sleeves
   1. Holes in the new pipe shall be machine cut, either in the field or at the factory. No torch cutting of holes shall be permitted. The coupon shall be delivered to the Owner or their Representative.
   2. Prior to attaching the saddle or sleeve, the pipe shall be thoroughly cleaned, utilizing a brush and rag, as required.
   3. Before performing field machine cut, the water tightness of the saddle or sleeve assembly shall be pressure tested. The interior of the assembly shall be filled with water. Then using a hydro-static hand pump, pump to a pressure of 150 psi to insure all air is expelled. No leakage shall be permitted for a period of thirty minutes.
   4. After attaching the saddle or sleeve to an existing main, but prior to making the tap, the interior of the assembly shall be disinfected. All surfaces to be exposed to potable water shall be swabbed or sprayed with a one percent hypochlorite solution.

F. Connections and Repairs
   1. Where connections or repairs are required, Contractor shall only use solid sleeves and provide all materials and labor necessary to make the connection or repair to the existing pipeline, excluding service lines 2” or smaller.

3.05 INSTALLATION OF FIRE HYDRANTS

A. Prior to installation, inspect all hydrants for direction of opening, nozzle threading, operating nut and cap nut dimensions, tightness of pressure-containing bolting, cleanliness of inlet elbow, handling damage and cracks. Defective hydrants shall be corrected or held for inspection by the Owner.

B. All hydrants shall stand plumb and shall have their nozzles parallel with or at right angles to the roadway, with pumper nozzle facing the roadway, except that hydrants having two-hose nozzles 90 degrees apart shall be set with each nozzle facing the roadway at an angle of 45 degrees.

C. Hydrants shall be set to the established grade, with the centerline of the lowest nozzle at least 12-inches above the ground or as directed by the Owner.

D. Each hydrant shall be connected to the main with a 6-inch branch controlled by an independent 6-inch valve. When a hydrant is set in soil that is pervious, drainage shall be provided at the base of the hydrant by first wrapping the weephole/drainhole with a felt/mesh material that will allow the hydrant to drain. Then place coarse gravel or crushed stone mixed with coarse sand from the bottom of the trench to at least 6-inches above the drain port opening in the hydrant to a distance of 12-inches around the elbow.

E. When a hydrant is set in clay or other impervious soil, a drainage pit 2 x 2 x 2 feet shall be excavated below each hydrant and filled with coarse gravel or crushed stone mixed with coarse sand under and around the elbow of the hydrant and to a level of 6-inches above the drain port.

F. Hydrants shall be located as shown on the Drawings or as directed by the Owner. In the case of hydrants that are intended to fail at the ground-line joint upon vehicle impact, specific care must be taken to provide adequate soil resistance to avoid transmitting shock moment to the lower barrel and inlet connection. In loose or poor load bearing soil, this may be accomplished by pouring a concrete collar approximately 6-inches thick to a diameter of 24-inches at or near the ground line around the hydrant barrel.

G. Raised pavement markers (RPM's) shall be provided and installed along the appropriate roadway centerline for each fire hydrant installed. RPM's for inline valves shall be Type I, two-way, and blue in color.

3.06 THRUST RESTRAINT

A. Retainer Glands
   1. Provide retainer glands at all points where hydraulic thrust may develop and on fire hydrants and all associated fittings, valves and related piping.
   2. Retainer glands shall be installed in accordance with the manufacturer's recommendations, particularly; the required torque of the set screws.
   3. The Contractor shall furnish a torque wrench to verify the torque on all set screws which do not have inherent torque indicators.

B. Thrust Collars
   1. Concrete collars shall be constructed as shown on the Drawings.
   2. The welded-on collar shall be attached to the pipe by the pipe manufacturer.
   3. Filter fabric shall be installed between the thrust collar and the adjacent soil.

C. Concrete Blocking
   1. Provide concrete blocking for all bends, tees, valves, and other points where thrust may develop, except where other exclusive means of thrust restraint are specifically shown on the Drawings. Filter fabric shall be installed between the concrete blocking and the adjacent soil.
   2. Form and pour concrete blocking at fittings as shown on the Drawings and as directed by the Owner. Pour blocking against undisturbed earth. Increase dimensions when required by over excavation

3.07 DETECTION TAPE AND LOCATE WIRE

A. Provide detection tape and locate wire for all water mains.

B. Locate wire shall not be wrapped around the pipe.

C. Locate wire shall be laid parallel to the 12 o'clock position of the main with at least 4" of separation.

D. Locate wire shall be looped into each valve box and pulled out a minimum of two feet from the top of the valve box.

3.08 WATER SERVICE CONNECTIONS

A. Water service connections shall be installed to the properties adjacent to the water transmission mains both to the same side of the roadway (Short Side Service) and to the opposite side of the roadway (Long Side Service) as directed by the Owner.

B. Water service connections installed under roadway shall be pulled through a casing. Casings shall be installed through a bored hole approximately equal in diameter to the external diameter of the casing. Minimum cover under roadway shall be four feet. At other locations, minimum cover shall be two feet.

C. Installation shall conform to the details for water service connections appearing schematically on the Drawings. Contractor shall provide any and all appurtenant work required to provide the intended water service connections.

D. Transfer Service
   1. Immediately before connecting to the relocated or existing meter, all service lines shall be flushed to remove any foreign matter.
   2. Any special fittings required to reconnect the existing meter, to the new copper service line, or the existing private service line, shall be provided by the Contractor.
   3. To minimize out of service time, the Contractor shall determine the connections to be made and have all the required pipe and fittings on hand before shutting off the existing service.
   4. After completing the connection, the new corporation stop shall be opened and all visible leaks shall be repaired.

E. Backflow preventers shall be provided on all water services. Please refer to Paragraph 2.16(C)10 for further backflow specifications.

F. GPS coordinates shall be provided for each service connection and lateral.

3.09 TESTING AND INSPECTION REQUIREMENTS

A. It will be the responsibility of the Contractor to coordinate all testing and inspections. The Contractor shall notify the Owner and applicable agency inspectors 48 hours in advance of testing and inspections.

SECTION 02400 WATER DISTRIBUTION SYSTEM

3.10 HYDROSTATIC TEST

A. All sections of the water main subject to internal pressure shall be pressure tested in accordance with AWWA C600. A section of main will be considered ready for testing after completion of all thrust restraint and backfilling.

B. All tests shall be in the presence of the Owner or their Representative.

C. Each segment of water main between main valves shall be tested individually.

D. Test Preparation
   1. Flush sections thoroughly at flow velocities, greater than 2.5 feet per second, adequate to remove debris from pipe and valve seats.
   2. Partially operate valves and hydrants to clean out seats.
   3. Provide temporary blocking, bulkheads, flanges and plugs as necessary, to assure all new pipes, valves and appurtenances will be pressure tested.
   4. Before applying test pressure, air shall be completely expelled from the pipeline and all appurtenances. Insert corporation cocks at highpoints to expel air as main is filled with water as necessary to supplement automatic air valves. Corporation stops shall be constructed as detailed on the Drawings with a meter box.
   5. Fill pipeline slowly with water. Provide a suitable pump with an accurate water meter to pump the line to the specified pressure.
   6. The differential pressure across a valve or hydrant shall equal the maximum possible, but not exceed the rated working pressure. Where necessary, provide temporary backpressure to meet the differential pressure restrictions.
   7. Valves shall not be operated in either the opening or closing direction at differential pressures above the rated pressure.

E. Test Pressure
   1. Test the pipeline at 150 psi or 1.5 times the operating pressure, whichever is greater, measured at the lowest point for at least two hours.
   2. Maintain the test pressure within 5 psi of the specified test pressure for the test duration (at least two hours).
   3. Should the pressure drop more than 5 psi at any time during the test period, the pressure shall be restored to the specified test pressure.
   4. Provide an accurate pressure gauge with graduation not greater than 5 psi.

F. Leakage
   1. Leakage shall be defined as the sum of the quantity of water that must be pumped into the test section, to maintain pressure within 5 psi of the specified test pressure for the test duration. Leakage shall be the total cumulative amount measured on a water meter.
   2. The Owner assumes no responsibility for leakage occurring through existing valves.

G. Test Results
   1. No test section shall be accepted if the leakage exceeds the limits determined by the following formula:

$$\mathbf{L = \frac{SD\sqrt{(P)}}{}}$$

133,200

Where: L = allowable leakage, in gallons per hour
S = Length of pipe tested, in feet
D = nominal diameter of the pipe, in inches
P = average test pressure during the leakage test in pounds per square inch (gauge)

As determined under Section 4 of AWWA C600.

Allowable leakage at various pressures and pipe sizes is shown in the Table below (from AWWA C600 – Table 4.A) for 1000' of Pipe: *

Avg.	Pipe Diameter (inches)												
Average Pressure (PSI)	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"	30"	36"
250	0.32	0.43	0.64	0.85	1.07	1.28	1.50	1.71	1.92	2.14	2.56	3.21	3.85
225	0.30	0.41	0.61	0.81	1.01	1.22	1.42	1.62	1.82	2.03	2.43	3.04	3.65
200	0.29	0.38	0.57	0.76	0.96	1.15	1.34	1.53	1.72	1.91	2.29	2.87	3.44
175	0.27	0.36	0.54	0.72	0.89	1.07	1.25	1.43	1.61	1.79	2.15	2.68	3.22
150	0.25	0.33	0.50	0.66	0.83	0.99	1.16	1.32	1.49	1.66	1.99	2.48	2.98
125	0.23	0.30	0.45	0.60	0.76	0.91	1.06	1.21	1.36	1.51	1.81	2.27	2.72
100	0.20	0.27	0.41	0.54	0.68	0.81	0.95	1.08	1.22	1.35	1.62	2.03	2.43

* If the water main section being tested contains lengths of various pipe diameters, the allowable leakage shall be the sum of the computed leakage for each diameter. The leakage test shall be repeated until the test section is accepted. All visible leaks shall be repaired regardless of leakage test results.

H. Completion
1. After a pipeline section has been accepted, relieve test pressure. Record type, size and location of all outlets on record drawings.

I. Re-Testing
1. Any alterations made to pipeline performed after initial testing shall be re-tested and passed again, regardless of initial test results.

J. Notification
1. Owner shall be notified 24-hours in advance prior to Contractor performing pressure and leakage testing.

3.11 DISINFECTING PIPELINE

A. After successfully pressure testing each pipeline section, disinfect in accordance with AWWA C651 for the continuous-feed method and these Specifications.

B. Specialty Contractor
   1. Disinfection shall be performed by an approved specialty contractor. Before disinfection is performed, the Contractor shall submit a written procedure for approval before being permitted to proceed with the disinfection. This plan shall also include the steps to be taken for the neutralization of the chlorinated water.

C. Chlorination
   1. Apply chlorine solution to achieve a concentration of at least 25 milligrams per liter free chlorine in new line. Retain chlorinated water for 24 hours.
   2. Chlorine concentration shall be recorded at every outlet along the line at the beginning and end of the 24 hour period.
   3. After 24 hours, all samples of water shall contain at least 10 milligrams per liter free chlorine. Re-chlorinate if required results are not obtained on all samples.

D. Disposal of Chlorinated Water
   1. Reduce chlorine residual of disinfection water to less than one milligram per liter if discharged directly to a body of water or to less than two milligrams per liter if discharged onto the ground prior to disposal.
   2. Treat water with sulfur dioxide or other reducing chemicals to neutralize chlorine residual.
   3. Flush all lines until residual is equal to existing system.

E. Bacteriological Testing
   1. After final flushing and prior to DEP approval and the water main being placed into service, the Contractor shall collect samples from the line and have tested for bacteriological quality in accordance with the rules of the Florida Department of Environmental Protection.
   2. The Contractor shall give Owner Utilities 48-hour written notice of the planned bacteriological testing to facilitate public notification, if required. A Owner representative must be present when samples are taken. Immediately after samples are taken, the Contractor shall give the samples to the Owner representative for handling. The Owner representative shall be responsible for delivering the samples to the laboratory for testing. The bacteriological samples shall be analyzed for both coliform and non-coliform growth. Testing shall be performed by a laboratory certified by the State of Florida and approved by the Owner.
   3. All sampling and testing costs shall be paid for by the Contractor prior to final acceptance.
   4. Re-chlorinate lines until required results are obtained.

END OF SECTION 02400

SECTION 02500 SEWER COLLECTION SYSTEM

PART 1 – GENERAL

1.01 SCOPE

A. This Section describes products to be incorporated into sewers and accessories and requirements for the installation and use of these items. Furnish all products and perform all labor necessary to fulfill the requirements of these Specifications.

1.02 DESCRIPTION OF WORK

A. Extent of sewer collection system work is shown on the drawings.

B. Sewer collection system work includes but is not limited to sanitary sewer mains, sewer laterals (services), manholes, frames, and covers.

1.03 QUALITY ASSURANCE

A. Codes and Standards
   1. Perform all work in compliance with applicable requirements of governing authorities having jurisdiction and the applicable standards of the American Water Works Association (AWWA), American National Standards Institute (ANSI), and the American Society for Testing and Materials (ASTM), latest editions.

B. Testing and Inspection
   1. Leakage testing and deflection shall be performed by the Contractor. General inspection and flashing lines shall be performed by the Owner.
   2. It will be the responsibility of the Contractor to coordinate all testing and inspections.
   3. The Contractor shall notify the Owner, testing service, and applicable agency inspectors 48 hours in advance of testing and inspections

1.04 SUBMITTALS

A. Prior to beginning construction, the Contractor shall submit manufacturer's certifications and cut sheets for approval by the Owner for the following applicable items: sanitary sewer pipe, fittings, service laterals, clean outs, manhole and manhole frames and covers.

PART 2 – PRODUCTS

2.01 GENERAL

A. All materials shall be in accordance with the Material Standard and shall, in no event, be less than that necessary to conform to the requirements of any applicable laws, ordinances, and codes.

B. All materials shall be new, unused, and correctly designed. They shall be of standard, first grade quality and intended for the use for which they are offered. Materials or equipment which, in the opinion of the Owner, are inferior or of a lower grade than indicated, specified, or required will not be accepted.

2.02 HDPE PIPE

A. Pipe: 12- through 30-inch pipe shall meet ASTM F2736. Pipe shall have a minimum pipe stiffness of 46 psi when tested in accordance with ASTM D2412. Manning's "n" value for use in design shall be 0.012.

B. Joints: Pipe shall have fused joints except transitions which are restrained mechanical joints.

C. Pipe Marking: All HDPE pipes for sewer shall have a green stripe at third points around the circumference of the pipe for its full length parallel to the centerline of the pipe.

D. Coatings: Not required

E. Cutting: HDPE sewer pipe may be field cut using hand or power saws in accordance with the manufacturer's recommendations. The raw spigot end thus formed shall be filed to remove gasket damaging burrs and to form a standard bevel.

F. Fittings: Fittings shall conform to ASTM F2736. Bell and spigot connections shall utilize a spun-on, welded or integral bell and spigot with gaskets meeting ASTM F477. Fitting joints shall meet the watertight joint performance requirements of ASTM D3212.

2.03 POLYVINYL CHLORIDE (PVC) PIPE

A. Pipe: PVC pipe shall be manufactured in accordance with ASTM D3034 and ASTM D1784. All PVC pipe shall meet the dimension requirements of standard dimension ratio (SDR) 35.

B. Joints: Joints for PVC sewer pipe shall be of the bell and spigot type conforming to ASTM D3212 using factory installed flexible elastomeric seals. The elastomeric seals shall conform to ASTM F477.

C. Pipe Marking: All pipe shall be marked as prescribed in ASTM D2241 (e.g., nominal pipe size, type of plastic pipe material, pipe dimension ratio, pressure rating, ASTM specification designation number manufacturer's name and code).

D. Coatings: Not required

E. Cutting: PVC sewer pipe may be field cut using hand or power saws in accordance with the manufacturer's recommendations. The raw spigot end thus formed shall be filed to remove gasket damaging burrs and to form a standard bevel.

F. Fittings: PVC sewer pipe fittings shall comply with ASTM D3034, ASTM 3212, and have elastomeric seals conforming to ASTM F477.

G. All PVC pipe for sewer shall be green, which shall be throughout the pipe well.

2.04 SOLID SLEEVES

A. Solid sleeves shall permit the connection of plain end ductile iron pipe and plain end PVC pipe. Solid sleeves shall meet the requirements of ANSI/AWWA C110 for long pattern and

have a minimum pressure rating of 250 psi. Solid sleeves shall have a mechanical or restrained joint as specified in this Section and as shown on the Drawings. Solid sleeves shall be provided with gaskets suitable for the type of pipe to be connected. Solid sleeves shall be used only in locations shown on the Drawings or at the direction of the Owner. Solid sleeves shall be manufactured by ACIPCO or U.S. Pipe.

2.05 FLEXIBLE ADAPTOR COUPLINGS (only used on gravity sewer lines)

A. Couplings for pipe sizes 15-inches in diameter and less shall be elastomeric plastic sleeves designed to connect pipes of same or dissimilar materials. Adapters shall provide a positive seal against infiltration and exfiltration and remain leak proof and root proof up to 4.3 psi. The adaptor manufacturer shall provide a full jacket stainless steel clamps and required accessories.

B. Couplings shall be products of Fernco with stainless steel shear ring and shall be installed in accordance with the manufacturer's recommendations.

PART 3 – EXECUTION

3.01 EXISTING UTILITIES AND OBSTRUCTIONS

A. The Drawings indicate utilities or obstructions that are known to exist according to the best information available to the Owner. The Contractor shall call the Sunshine State One Call of Florida, Inc. (1-800-432-4770), as required by Florida Law and all utilities, agencies or departments that own and/or operate utilities in the vicinity of the construction work site, at least 72 hours (three business days) prior to construction, to verify the location of the existing utilities.

B. Conflict with Existing Utilities
   1. Horizontal Conflict: Horizontal conflict shall be defined as when the actual horizontal separation between a utility, main, or service and the proposed sewer line does not permit safe installation of the sewer line by the use of sheeting, shoring, tie-back, supporting, or temporarily suspending service of the parallel or crossing facility. The Owner will determine if the alignment can be changed to avoid the conflict. If, in the opinion of the Owner, the sewer line's proposed location cannot be adjusted, thus requiring the relocation of an existing utility, the Owner will direct the Contractor to relocate the utility as part of the Contract with the costs of such relocation being paid for as part of a change order.
   2. Vertical Conflict: Vertical conflict shall be defined as when the actual vertical separation between a utility, main, or service and the proposed sewer line does not permit the crossing without immediate or potential future damage to the utility, main, service, or the sewer line. The Owner will determine if the grade can be adjusted to avoid the conflict. If, in the opinion of the Owner, the sewer line's proposed location cannot be adjusted, thus requiring the relocation of an existing utility, the Owner will direct the Contractor to relocate the utility as part of the Contract with the costs of such relocation being paid for as part of a change order.

C. Electronic Locator: The Contractor shall have available at all times an electronic pipe locator and a magnetic locator, in good working order, to aid in locating existing pipe lines or other obstructions.

D. Sewer Collection System Separation Requirements
   1. Newly constructed sewers and force mains shall be laid at least ten feet (outside to outside) horizontally from water mains. If there is no reasonable alternative, smaller horizontal separation distances may be allowed if one of the following conditions is met:
      a. The top of the sewer is installed at least 18 inches below the bottom of the potable water line.
      b. The sewer is encased in watertight carrier pipe or concrete.
      c. Both the sewer and the water main are constructed f lip-on or mechanical joint pipe complying with public water supply design standards and pressure tested to 150 psi to assure water tightness.
      d. Documentation is provided showing that another alternative will result in an equivalent level of reliability and public health protection.
   2. Newly constructed sewers and force mains shall be laid at least three feet (inside edge to inside edge) horizontally from any existing or proposed reclaimed water line.
   3. Newly constructed sewer pipes and force mains shall cross under water mains, unless there is no alternative. Sewers and force mains crossing water mains or reclaimed water lines shall be laid to provide a minimum vertical distance of 18 inches between the invert of the upper pipe and the crown of the lower pipe. The minimum vertical separation shall be maintained whether the water main is above or below the sewer. For sewer crossings, the crossing shall be arranged so that the sewer pipe joints are equidistant and as far as possible from the water main joints. Adequate structural support shall be provided for the sewer or force main to maintain line and grade. If there is no reasonable alternative, smaller vertical separation distances may be allowed if one of the following conditions is met:
      a. The sewer is encased in a watertight carrier pipe.
      b. The sewer is designed and constructed equal to water pipe and pressure tested to 150 psi to assure water tightness.
      c. Documentation is provided showing that another alternative will result in an equivalent level of reliability and public health protection.

3.02 PIPE DISTRIBUTION

A. Pipe shall be distributed and placed in such a manner that will not interfere with traffic.

B. No pipe shall be strung further along the route than 1,000 feet beyond the area in which the Contractor is actually working without written permission from the Owner. The Owner reserves the right to reduce this distance to a maximum distance of 200 feet in residential and commercial areas based on the effects of the distribution to the adjacent property owners.

C. No street or roadway may be closed for unloading of pipe without first obtaining permission from the proper authorities. The Contractor shall furnish and maintain proper warning signs and obstruction lights for the protection of traffic along highways, streets and roadways upon which pipe is distributed.

D. No sewer pipes shall be placed inside drainage ditches.

E. Sewer pipes shall be placed as far as possible from the roadway pavement, but no closer than five feet from the roadway pavement, as measured inside edge to inside edge.

3.03 INSTALLATION OF PIPE

A. General: Upon satisfactory installation of the pipe bedding, as specified in the "Earthwork for Utilities" section of these specifications, a continuous trough for the pipe barrel and recesses for the pipe joints shall be excavated by hand digging so that, when the pipe is laid in the trench true to line and grade, the pipe barrel will receive continuous, uniform support, and the joint will receive no pressure from the trench bottom.

B. HDPE Pipe: Installation shall be in accordance with the manufacturer's recommendations.

C. Polyvinyl Chloride Pipe: Installation shall be in accordance with the recommended practices in ASTM D2321.

D. Transportation: Care shall be taken during transportation of the pipe so that it is not cut, kinked, or otherwise damaged.

E. Handling Pipe Lengths: Ropes, fabric, or rubber-protected slings and straps shall be used when handling pipes.

F. Special Precautions: Polyvinyl chloride pipe connected to heavy fittings, manholes, and rigid structures shall be supported in such a manner that no subsequent relative movement between the pipe and the joint with the rigid structures is possible.

G. The interior of all pipe shall be thoroughly cleaned of all foreign material before being lowered into the trench and shall be kept clean during laying operations by means of plugs or other approved methods.

H. Pipe laying shall proceed up grade with spigot ends pointing in the direction of flow. Before pipe is joined, gaskets shall be cleaned of all dirt, stones and other foreign material. The spigot ends of the pipe shall be lubricated lightly with a lubricant specified by the pipe manufacturer and approved by the Owner. Sufficient pressure shall be applied to the pipe so as to properly seat the socket in the bell of the pipe. All pipe shall be laid straight, true to the lines and grades shown on the drawings in each manhole section.

I. Under no circumstances shall pipe be laid in water or when trench conditions or the weather is unsuitable for such work, except by permission of the Owner. At all times when work is not in progress, the exposed ends of all pipes shall be fully protected by a board or other approved stopper to prevent earth or other substances from entering the pipe.

J. Lowering Pipe Into Trench: Care shall be exercised when lowering pipe into the trench to prevent damage to, or twisting of, the pipe.

K. After each pipe is laid, it shall be partly backfilled and made secure before the next joint is laid.

L. Any pipe which is disturbed or found to be defective after laying shall be removed and relayed or replaced at the Contractor's expense. Sun bleached PVC Pipe is considered defective.

M. Whenever pipe laying is stopped for the night or for any other cause, the end of the pipe shall be securely closed with a stopper to prevent the entrance of water, mud, or other obstructing matter, and shall be secured in such a manner as to prevent the end pipe from being dislodged by sliding or other movement from the backfilling.

N. Interior Inspection: The Contractor shall inspect pipe to determine whether line displacement or other damage has occurred. The Contractor shall pull a 12" long mandrel through the pipe to make sure the pipe has not been damaged during compaction or has a belly in it. The Contractor shall make inspections after lines between manholes, or manhole locations have been installed and approximately two feet of backfill is in place and at completion of project. If inspection indicates poor alignment, debris, displaced pipe, infiltration or other defects, correct such defects to satisfaction of the Owner. Pipes 12" in diameter or larger shall be video recorded and the video shall be provided to the Owner in DVD form.

O. Prior to connecting new work to existing lines or appurtenances, the Contractor shall verify location and elevations of existing connection points and notify the Owner of any conflicts or discrepancies.

P. All sewer laterals shall be located a minimum of 36 inches below grade and at greater depths as required to provide service.

Q. Long radius wyes or tees of specified diameter shall be inserted in the sewer lines to provide service to each lot or wherever designated by the Owner.

R. Where new laterals are specified on the plans, or instructed to be installed by the Owner, they shall be laid to the edge of the right-of-way or as the Owner may direct. The location of the lateral at the right-of-way shall be recorded on the record drawings. In sewers over eight feet in depth, or where directed, stacks shall be carried up from the wye connections at a maximum angle of 45 degrees. The ends of the stacks or laterals shall be closed with plugs or covers. Materials for stacks and laterals shall be as shown on the details or designated in the proposal.

S. Wherever existing house laterals are encountered or identified by the Owner to be installed, they shall be replaced and connected to the existing lateral at the edge of right-of-way. A new PVC cleanout as shown on typical wye and lateral installation shall be installed. If necessary, the new lateral could be plugged with a pneumatic plug for pressure testing the sewer main; however, under no circumstances should the lateral be plugged for more than

one hour. Additionally, it shall be the Contractor's responsibility to notify the resident 24 hours prior to such outage. House laterals are not to be shared between houses.

T. Wherever house laterals are intercepted by the excavation for the new sewer, connection shall be maintained temporarily to the old sewer until the particular section of new sewer is completed, tested, and approved. The house lateral shall then be broken and reconnected to the new sewer through a wye which shall have been placed in the new sewer for that purpose.

U. The dead end of the house lateral shall be capped with a cover or plug as specified on the drawings. The covers or plugs shall have a factory-molded joint of the same type as used for the lateral pipe, and shall be of the same material. Record the location of all laterals at the right-of-way and place the information on the record drawings.

3.04 STORAGE AND HANDLING PIPE

A. Storage: Pipes shall be stored on level ground, preferably turf or sand, free of sharp objects which could damage the pipe.

B. Stacking of polyvinyl chloride pipe shall be limited to a height that will not cause excessive deformation of the bottom layers of pipes under anticipated temperature conditions. Where necessary, due to ground conditions, the pipe shall be stored on wooden sleepers, spaced suitably and of such width as not to allow deformation of the pipe at the point of contact with sleeper or between supports.

C. Handling Pipe: The handling of pipe shall be in such a manner that the pipe is not damaged by dragging it over sharp and cutting objects. Sections of the pipe with deep cuts and gouges shall be removed.

3.05 CLOSING ABANDONED UTILITIES

A. Close open ends of abandoned underground utilities which are indicated to remain in place. Provide sufficiently strong closures to withstand hydrostatic or earth pressure which may result after ends of abandoned utilities have been closed.

B. Close open ends of concrete or masonry utilities with not less than eight inch thick brick masonry bulkheads.

C. Close open ends of conduit with plastic plugs, or other acceptable methods suitable for size and type material being closed. Wood plugs are not acceptable

3.06 CONNECTION TO AN EXISTING MANHOLE

A. Connection to an existing manhole shall be made by mechanically coring into the wall structure of the manhole. Cored opening shall be sized to properly accommodate a rubber boot seal as specified in this Section. The manhole is to be lined if it is going to be used for a force main or a grinder station. The liner shall be epoxy or fiberglass. No house lateral shall be terminated unless it goes into a dead end manhole.

3.07 TESTING REQUIREMENTS

A. General

1. The Contractor shall perform one or more required tests and shall furnish all apparatus and materials needed for these tests, the cost of which shall be included in the appropriate bid item.
2. After backfilling has been completed, the pipes cleaned and before permanent paving has been installed, the Contractor shall complete required testing to ascertain that there are no broken pipes, leaking joints or deflected pipe sections. Pipes failing these tests shall be repaired or replaced by the Contractor to meet requirements of project documents.
3. The sewer lines and laterals shall be tested for leakage between manholes as the work progresses by one of the following methods as determined by the Owner. The low pressure air test will be used unless field conditions warrant otherwise.
    a. Infiltration Test
    b. Low Pressure Air Test
4. A deflection test, using a mandrel, will be required for PVC pipe in addition to the above leakage tests.
5. The Contractor shall check alignment by "flashing" the lines. For a pipe 12" or greater, a video of the pipe shall be provided to the Owner.
6. All tests will be witnessed by the Owner. The Contractor shall notify the Owner at least 24 hours in advance of testing.

B. Low Pressure air test Method

1. Low pressure air test of sewers and laterals shall be as specified hereinafter. Each manhole run will be tested separately as the construction progresses, before trench surface restoration, and preferably with not more than four manhole runs constructed ahead of testing.
2. Equipment shall be as manufactured by Cherne Industries, Inc., of Minneapolis, MN; or equal. Equipment used shall meet the following minimum requirements:
    a. Pneumatic plugs shall have a sealing length equal to or greater than the diameter of the pipe to be tested.
    b. Pneumatic plugs shall resist internal test pressures without requiring external bracing or blocking.
    c. All pneumatic plugs shall be seal tested before being used in the actual test installation. One length of pipe shall be laid on the ground and sealed at both ends with the pneumatic plugs to be used. Air shall be introduced into the plugs to 25 psig. The sealed pipe shall be pressurized, as noted below. The plugs must hold against this pressure without having to be braced.
    d. All air used shall pass through a single control panel.
    e. Three individual hoses shall be used for the following connections:
        1) One hose from control panel to pneumatic plugs for inflation.
        2) One hose from control panel to sealed line for introducing the low-pressure air.

3) One hose from sealed line to control panel for continually monitoring the air pressure rise in the sealed line.

3. Procedures

a. After a manhole reach of pipe including laterals has been backfilled in accordance with the specifications, the pipe cleaned, and the pneumatic plugs have been checked by the above procedure, the plugs shall be placed in the line at each manhole and inflated to 25 psig. Low-pressure air shall be introduced into this sealed line until the internal air pressure reaches 4 psig greater than the average ground water back pressure. At least two minutes shall be allowed for the air pressure to stabilize.

b. After the stabilization period the pressure can be reduced to 3.5 psig prior to starting the test., the air hose from the control panel to the air supply shall be disconnected. The portion of the sanitary sewer (line) being tested shall be termed "Acceptable," if the time required in minutes is greater than the times indicated in the following table for the pressure to decrease from 3.5 psig (greater than the average ground water back pressure) to 2.5 psig (greater than the average ground water back pressure) or drop 1 psig if the start pressure is greater than 3.5 psig.

Table 1 (from ASTM F1417)

Minimum Specified Time Required for a 1.0 psig Pressure Drop for Size and Length of Pipe Indicated for Q=0.0015

				Specification Time for Length (L) Shown, min:s							
Pipe Diameter In.	Minimum Time Min:s	Length For Min. Time, ft.	Time for Longer Lengths; s	100 ft.	150 ft.	200 ft.	250 ft.	300 ft.	350 ft.	400 ft.	450 ft.
4	3:46	597	0.380 L	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	0.854 L	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	298	1.520 L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24
10	9:26	239	2.374 L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48
12	11:20	199	3.418 L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38
15	14:10	159	5.342 L	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04
18	17:00	133	7.692 L	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41
21	19:50	114	10.470 L	19:50	26:10	34:54	43:37	52:21	61:00	69:48	78:31
24	22:40	99	13.674 L	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:33
27	25:30	88	17.306 L	28:51	43:16	57:41	72:07	86:32	100:57	115:22	129:48
30	28:20	80	21.366 L	35:37	53:25	71:13	89:02	106:50	124:38	142:26	160:15
33	31:10	72	25.852 L	43:05	64:38	86:10	107:43	129:16	150:43	172:21	193:53
36	34:00	66	30.768 L	51:17	76:55	102:34	128:12	153:50	179:29	205:07	230:46

c. In areas where a high groundwater table (groundwater back pressure) is known to exist, the Contractor shall install a 1/2 inch diameter capped pipe nipple, approximately 10 inches long, through the manhole wall on top of one of the sewer lines entering the manhole. This shall be done at the time the sewer line

is installed. Immediately prior to the performance of the Line Acceptance Test, the groundwater shall be determined by removing the pipe cap, blowing air through the pipe nipple into the ground so as to clear it, and then connecting a clear plastic tube to the nipple. The plastic tube shall be held vertically and a measurement of the height in feet of water over the invert of the pipe shall be taken after the water has stopped rising in this plastic tube. The height of water in the plastic tube in feet shall be divided by 2.31 to establish the pounds of groundwater back pressure that will be added to all readings. (For example, if the height of water is 11-1/2 feet, then the added groundwater back pressure shall be 5 psig. This increases the 3.5 psig to 8.5 psig, and the 2.5 psig to 7.5 psig. The allowable drop of one pound and the timing remain the same as defined in Table 1.) Should the Contractor desire to use an alternate method for establishing back pressure due to high water, details may be provided to the Owner for review and consideration of approval.

d. The Contractor shall keep records of all tests made. Copy of such records will be given to the Owner. Such records shall show date, line number and stations, operator, and such other pertinent information as required by the Owner.

C. Deflection Test – PVC only

1. General
   a. Deflection testing shall be performed on all portions of the PVC sewer system. This test shall be performed in sections between manholes at least 30 days after final backfilling has been completed.
   b. Deflection testing shall be performed in accordance with the procedure outlined below.
2. Maximum Deflection
   a. The maximum allowable deflection for all installed PVC sewer pipe shall not exceed 5% of the pipe's original internal diameter.
3. Test Apparatus
   a. All PVC sewer pipe shall be tested by the Contractor and at his expense for diametric deflection using a GO-NO-GO type mandrel or other approved method. The mandrel shall have an outside diameter of no less than 95% of the PVC pipe inside diameter. No allowances will be made for standard pipe deflections noted in the manufacturer's specifications. The size of mandrel shall be determined by the following: Pipe inside diameter x 0.95. Any section not allowing passage of said mandrel shall be deemed unacceptable. The Contractor shall, at his expense, determine the location and extent of the problem and make repairs or re-lay the line segment as determined by the Owner. This test procedure, in accordance with these Specifications, will be repeated after a problem has been corrected. This testing shall be accomplished prior to final acceptance.

Nominal Size	Average I.D.	Base I.D.	Minimum Mandrel Diameter

ASTM SDR 35			
8	7.920	7.665	7.28
10	9.900	9.563	9.08
12	11.780	11.361	10.79
15	14.426	13.898	13.20
ASTM F 679			
18	17.629	16.976	16.13
21	20.783	20.004	19.00
24	23.381	22.480	21.36
27	26.351	25.327	24.06

4. Deflection Testing Procedure
    a. Completely flush the line making sure the pipe is clean of any mud or debris that would hinder the passage of the mandrel.
    b. During the final flushing of the line, attach a floating block or ball to the end of the mandrel pull rope and float the rope through the line. (A braded nylon rope is recommended).
    c. After the rope is threaded through the line, connect the pull rope to the mandrel and place the mandrel in the entrance of the pipe.
    d. Connect a retrieval rope to the back of the mandrel to pull it back if necessary.
    e. Remove all the slack in the pull rope and place a tape marker on the rope at the ends of the pipe.
    f. Draw mandrel through the sewer line. If any irregularities or obstructions are encountered in the line, corrective action shall be taken as required.
    g. If a section with excessive deflection is found, it shall be located and excavated. The pipe shall be inspected for damage; if any damaged pipe is found, it shall be replaced at the Contractor's expense; if pipe is not damaged, replace and thoroughly tamp the haunching and initial backfill; replace remainder of backfill.
    h. Re-test this section for deflection.

D. Flashing Lines
    1. Upon completion, and in the presence of the Owner, the sewer lines shall be flashed between manholes. In each section of the sewer, a round circle of light, full diameter, shall remain constantly in plain view throughout the entire length. The test shall be applied for each section after the sewer is completed in all respects and before it is accepted.

E. Test Failures
    1. If the installation fails to meet the stated test requirements, the Contractor at his own expense shall determine the source of leakage, repair or replace all defective materials

and/ or workmanship failing to meet tests and shall retest same until it is proven that installation meets requirements of project documents as determined by the Owner.

2. In the event the test results are not within the allowable range of acceptance, the Contractor shall take whatever corrective action is necessary including replacement of the said pipe, etc., to bring the test results within the allowable range of acceptance.

END OF SECTION 02500

SECTION 02510 MANHOLES, WET WELLS, AND VALVE CHAMBERS

PART 1 – GENERAL

1.01 SCOPE

A. Description of Work
1. Provide all labor, materials, tools and equipment necessary to furnish and install manholes, wet wells and valve chambers as indicated on the Drawings, Construction Details and as herein specified.
2. Throughout this specification section where the word “manhole” is used it shall mean “manholes, wet wells, and valve chambers”.

B. Coordination
1. If pumps are proposed for installation in a wet well, the Contractor shall have the manufacturer of the pumps verify that the wet wells specified herein and detailed on the Drawings are of adequate size to suit his equipment.

1.02 MANHOLE TYPES

A. Manholes shall be made up of precast concrete sections; bottom section shall also be precast concrete or a single piece fiberglass with ballast ring.

B. Pumping station and valve chamber walls shall be precast concrete manhole sections. Top and bottom sections shall also be precast unless shown otherwise or approved by the Owner.

PART 2 – PRODUCTS

2.01 MORTAR

A. Composition of mortar shall conform to “Standard Specification for Mortar for Unit Masonry", ASTM C270, Type N and shall be a silica cement mortar only.

2.02 GROUT

A. Grout shall be "Masterflow 713 Plus" manufactured by BASF Building Systems, or "Non Shrink 5 Star Grout" manufactured by Five Star Products, Inc., or equal. Grout shall be capable of meeting test requirements of ASTM C827.

2.03 MANHOLE STEPS

A. There shall be no steps in manholes.

2.04 MANHOLE FRAMES, COVERS AND ACCESS HATCHES

A. General
1. Castings shall be traffic rated ductile iron, meeting ASTM A48, designed for H-20 loading as designated by AASHTO. A Pam-Rex, or equivalent, hinged lid with lock shall be used.
2. Castings shall be free from cracks, holes, swells and cold shuts. All manhole castings shall be made accurately to the pattern and to the dimensions as specified, and shall be

machined to secure perfectly flat and true to surfaces. All lids which "rock" and do not lie solid will not be accepted and must be replaced.

3. No plugging, burning in or filling will be allowed. Covers must fit the frames in any position.
4. The covers shall have non-penetrating pick holes.

B. Standard Type Manhole Frame and Cover
1. Standard manhole frame and covers shall be Pam-Rex with 24” clear opening as manufactured by Certainteed or equal.
2. A label saying “SANITARY” shall be cast on the cover.

C. Watertight Covers
1. Manholes at specific locations, subject to periodic flooding, as indicated on the Drawings, to be water tight, shall be equipped with a watertight frame and cover. A label saying "SANITARY" shall be cast on the cover. Lids will be bolted down against a rubber o-ring. Pam-Tight specifications, or equivalent, must be met.
2. Frame and Cover shall be watertight type with stainless steel bolts, machined bearing surfaces and flat gasket.

D. Access Hatches
1. Access hatches shall be provided for the pumping stations as specified on the drawings.
2. Access hatches, for valve chambers and in other locations that are indicated on the Drawings, shall be as specified on the drawings.

2.05 PRECAST CONCRETE MANHOLES AND COMPONENTS

A. Concrete
1. Provide all sanitary manholes constructed with Portland ASTM C150, Type 1 or 2 cement with a tricalcium aluminate content not to exceed 8 percent.
2. Mixed aggregate shall be a minimum of 50 percent crushed limestone.
3. Provide 3000 psi non-shrink grout.

B. Sections
1. The sections for manholes shall be a minimum of 4 feet in diameter for pipe sizes up to, and including 24 inches internal diameter. For pipes with an internal diameter between 24 and 36 inches, the manhole shall be 5 feet in diameter, unless otherwise noted.
2. The sections for the wet wells and valve chambers shall be of the size indicated on the details.
3. The Sections shall conform to the requirements of "Standard Specification for Precast Reinforced Concrete Manhole Sections" (ASTM C478), except that the joints shall be of the tongue and groove joint type and sealed with a preformed flexible plastic gasket. No other type of manhole joint will be accepted. Face of tongue and groove shall be sloped and not perpendicular to manhole wall.

C. Risers and Top Sections

1. The top of base walls, the ends of reinforced concrete risers and the bottom ends of precast tops shall be so formed that when risers and tops are assembled with the base, they will make a continuous manhole. The tongue and groove joints shall be of such design as will permit effective joining and placement without irregularities in the interior wall surface of the manhole.
2. Precast barrels shall consist of riser and top sections. The top section of manholes 6 feet or greater in depth shall be an eccentric conical top section with thickened upper walls with the smallest inside diameter equal to 24 inches, to receive the manhole frame and cover. Top sections of manholes less than 6 feet in depth shall be flat concrete slabs. No more than two lift holes shall be cast in each riser or top section. Lift holes shall be non-penetrating.
3. Precast riser and top sections shall be designed, manufactured, tested, finished and marked in accordance with this specification and “Standard Specification for Precast Reinforced Concrete Manhole Sections" (ASTM C478).

D. Precast Manhole Bases

1. The bases shall be integrally cast and shall consist of a manhole bottom and a wall which shall extend a minimum of 6 inches above the top of the highest inflowing sewer. The top of the base section shall be carefully formed to receive the tongue of the barrel section. There shall be a minimum distance of 4 inches between the invert of the lowest outflowing sewer and floor of the precast base to provide for construction of a formed invert and bench wall within the manhole. No more than two lift holes shall be cast in the bases. Lift holes shall be non-penetrating.
    a. Manholes 4 feet in diameter shall have a bottom at least 8 inches thick and a wall at least 5 inches thick.
    b. Manholes 5 feet in diameter shall have a bottom at least 8 inches thick and a wall at least 6 inches thick.

E. Joint Material

1. The joint material shall be a preformed flexible plastic gasket such as Ram-Nek manufactured by the Henry Company or equal. It shall consist of hydrocarbon plastic and vulcanized rubber and shall be capable of meeting the following conditions:
    a. Hydrocarbon plastic content 50-70% by weight per ASTM D297
    b. Volatile matter 2.0% max. by weight per ASTM D6
    c. Specific gravity @ 77 deg. F: 1.20 to 1.35 per ASTM D71
    d. Ductility@ 77 deg. F: 5.0 cm min. per ASTM D113
    e. Softening Point, ring and ball: 320 deg. F min. per ASTM D36
    f. Penetration, cone 77 deg. F, 150 gm, 5 sec.: 50-120 per ASTM D217
    g. Flash point, C.O.C.: 600 deg. F min. per ASTM D92
    h. Fire point, C.O.C.: 625 deg. F min. per ASTM D92
    i. Inert mineral filler: 30-50% by weight
    j. Material, when in place, shall not leak at joints while being subjected to 10 psig test for a 24-hr. period.
    k. No sagging of vertical and overhead 1 inch wide joints shall be detected while being subjected to temperature of 135 deg. F for period of 5 days.

l. No visible deterioration of compound when immersed separately in solution of acid, alkalis and saturated hydrogen sulfide, for a period of 30 days.

2. Sealing compound shall be supplied in extruded rope-form of suitable cross-section and of such sizes as to seal the joint space when the sections are set in place. The sealing compound shall be protected by a suitable removable two-piece wrapper. The two-piece wrapper shall be so designed that one-half may be removed longitudinally without disturbing the other half to facilitate application of the sealing compound.

3. Joints of manholes shall not be sealed with grout.

F. Non-penetrating lifting holes

1. Lifting holes shall be constructed using plastic inserts cast into the manhole, stopping short of extending all the way through the wall.

2. Plastic inserts and lifting eyes shall be as manufactured by Press-Seal Gasket Corporation or equal.

G. Pipe Connections to Precast Manhole Bases and/or Sections

1. A flexible pipe-to-manhole connector shall be provided with the manhole. Preformed rubber boots and fasteners shall be equal to those manufactured by Kor-N-Seal or Press Seal Gasket Corporation. The connector shall provide a water tight seal and accommodate ground movement to prevent pipe shear. All clamps and miscellaneous metal shall be type 304 stainless steel. Connectors shall be installed in accordance with manufacturer's recommendations. No inlet or outlet piping in manholes, valve chambers or wet wells shall be at a manhole section joint. A minimum space of 6 inches from the joint shall be provided.

2.06 RECTANGULAR PRECAST MANHOLES

A. Rectangular precast manholes shall be constructed to the sizes detailed on the Drawings.

B. Manholes shall be designed in accordance with the Building Code requirements of ACI 318 and AASHTO H-20 traffic loading.

C. The materials shall conform to the following standards:

1. Concrete shall be 4000 psi using ASTM C150 Type II cement
2. Wire mesh shall conform to ASTM A185
3. Reinforcing rods shall be ASTM A615 grade 60

2.07 FIBERGLASS STRUCTURES

A. Wetwells and manholes shall be one piece units manufactured to meet or exceed all applicable sections of ASTM D3753.

B. Structures shall be suitable for continuous immersion in raw municipal sewage. This shall include concentrations of H^2S found in municipal sewer systems and sulfuric acid.

C. Structures shall be manufactured of 100% premium resin and chopped glass. The structures shall be tested by the manufacturer to a minimum of 80% of the resin manufacturer's specific hardness for fully cured resin in accordance with Barcol Hardness.

D. Materials used for construction of the structure shall have the following average material properties:
   1. Tensile Modulus – 900,000 psi
   2. Flexural Modulus – 900,000 psi
   3. Tensile Strength – 10,000 psi
   4. Compressive Strength – 20,000 psi
   5. Poisson's Ratio – 0.33

2.08 PUMP STATIN WETWELL

A. All wetwells shall be 6 feet in diameters, and larger. 4 foot and 5 foot diameter wetwells shall be used only for special grinder pump applications as approved by the Owner on a case by case basis. The minimum wall thickness for concrete wetwells with liners as follows:

Diameter	Wall Thickness
4'-0"	5"
5'-0"	6"
6'-0"	7"
8'-0"	9"
10'-0"	12"
12'-0"	12"

B. All wetwells shall be precast concrete with a full protective liner designed to accommodate the peak hour development flow from all contributing areas.

C. The wetwell shall have a minimum of 4 feet from the lowest invert to the wetwell bottom.

D. The pumps station wetwell size and control equipment shall be designed to limit the pumping cycles of each pump to a maximum of 5 starts per hour for duplex stations and 3 starts per hour for triplex stations.

E. All pump stations shall have a single gravity-flow influent pipe discharging into the wetwell.

F. Multiple gravity pipelines and force mains upstream shall all terminate at a separate manhole before flowing into the pump station wetwell.

2.09 VALVE CHAMBER

A. A precast valve chamber shall be constructed adjacent to the wetwell.

B. The valve chamber shall have a 2 inch PVC drain installed at a 2 percent slope and with a Tideflex valve installed in the wetwell.

C. The pump out connection shall be equipped with a gate valve and a male aluminum quick-coupler; 4 inch for 4 inch or smaller valve assemblies, 6 inch for all others.

2.10 ENTRANCE HATCHES

A. The lift station wetwell and valve chamber shall be equipped with an aluminum access cover of adequate size to permit easy removal and installation of sewage pumps and equipment.

B. The wetwell access cover shall be a minimum 36” x 48” single or double door.

C. The valve pit access cover shall be a minimum 48” x 48” double door.

D. All access covers shall be constructed of aluminum with a minimum load rating of 300 lbs./sq.ft. and equipped with stainless steel hinges, a recessed lifting handle which lies flush with the door surface, and a stainless steel staple which may be used to secure the door with a padlock when closed. The doors shall have a raised diamond thread pattern to provide a skid-resistant surface and shall open to 90 degrees and lock automatically in that position, with a handle to release the doors for closing.

E. The hatch assemblies shall be as manufactured by U.S. Foundry, Halliday, or an approved equivalent.

PART 3 – EXECUTION

3.01 GENERAL

A. Ground Water
1. All ground water shall be kept away from newly poured concrete until concrete has properly set, and a watertight job is obtained. Manholes which admit ground water after completion, must be repaired to the satisfaction of the Owner.

B. Line and Grade
1. Where manholes occur in pavements, set top of frame and covers flush with finished surface (not necessarily level). Where manholes occur in dirt roads, set top of frame and cover 6 inches below finished surface. Elsewhere set top of frame and cover 3" above final grade, unless otherwise indicated.
2. Care shall be taken to have all pipes to and from manholes laid to correct lines and grades as established for the project.

C. Drop Manholes
1. Where shown, drop manholes shall be constructed in accordance with the details shown on the Drawings.

3.02 PRECAST MANHOLES

A. Handling

1. All precast manhole components shall be lifted and moved by use of lifting eyes that are slipped into the insert which are cast into the manhole. The lift system shall not damage the precast manhole.
2. All damage to precast sections shall be thoroughly repaired in the presence of the Owner's representative. Repair and patching of minor breaks shall be done by chipping and scarifying the defective area before application of grout. Sufficient time shall be allowed for curing before the precast sections are joined. Cast-in-place concrete bases shall be specially formed and keyed to accommodate the bottom precast section.

B. Site Inspection of Precast Sections
1. Precast sections not conforming to any of the specification requirements shall be rejected. In addition, individual manhole sections may be rejected due to any of the following:
    a. Fractures or cracks passing through the wall, except for a single end crack that does not exceed the depth of the joint.
    b. Defects that indicate imperfect proportioning, mixing, and molding.
    c. Surface defects indicating honey-combed or open texture.
    d. Damaged or cracked end, where such damage would prevent making a satisfactory joint.
    e. Any continuous crack having a surface width of 0.01 inch (0.25 mm) or more and extending for a length of 12 inches (305 mm) or more, regardless of position in the section wall.

C. Bitumastic Coating (Outside Only)
1. Prior to setting the precast sections in place each section shall have the exterior concrete surface blown free of all dirt and debris and brushed clean and then coated with bitumastic. As an alternative, the bitumastic coating may be applied at the manufacturer's plant in accordance with this Specification.
2. The coating shall be Bitumastic 50 as manufactured by Carboline Co., or equal.
3. At least three coats shall be applied giving a total minimum dry film thickness (DFT) of 32.0 mils.
4. After installation, damaged surfaces including plugged lifting holes, shall be recoated in accordance with the coating manufacturer's recommendation to give the required minimum 32.0 mils DFT.
5. The Contractor shall provide a certification to the Owner stating that he has installed the exterior manhole, wetwell and valve chamber coatings in accordance with the manufacturer's recommendations, and that there is a minimum 32.0 mils DFT of material on all component structures.

D. Placement
1. Manhole sections shall not be set by wedging or placing shims to secure proper level and manholes shall not be backfilled without the approval from the Owner.

E. Masonry Work

1. The top of all precast manholes may be brought to proper grade for receiving manhole frames after paving has been replaced on paved streets by using HDPE plastic rings, traffic rated. In lieu of the HDPE plastic rings, precast manholes may be brought to grade by the use of no more than two precast concrete extension rings. The total depth of the rings shall not exceed 6 inches. The construction shall be performed by experienced and qualified laborers only. All work shall be laid plumb, straight, square and true. Where manholes are installed in areas with sloped pavement, the manhole ring and cover shall be set flush and in the same plane as the finished surface (not level). Rings shall be laid in full beds of mortar necessary to ensure cover is flush with finished pavement surface. All joints shall be full and not more than 1/2 inch in thickness. The Contractor shall set in place and bond in the masonry all necessary steps and miscellaneous items specified elsewhere. The masonry walls shall be parged on the outside with a one-half inch coat of Portland cement mortar.
2. All mortar shall be a mixture of non-shrink grout.
3. Masonry shall not be constructed during cold weather (air temperature below 40 deg. F) unless necessary precautions are observed as permitted by the Owner.
4. Concrete collar, to be constructed around frame and cover after adjustment. Concrete strength shall be 3,000 psi.

3.03 FLOW CHANNELS AND BENCH WALLS

A. The method of constructing flow channels and bench walls is dependent on which manhole base (i.e. manhole, wetwell, or valve chamber) has been installed.

B. In precast bases, the flow channels and bench walls in each manhole shall be carefully formed of mortar and concrete. Precast inverts will not be accepted unless specifically approved by the Owner.

C. The minimum depth of flow channel shall be equal to 3/4 the diameter of the largest sewer in the manhole to which it connects. The channel shall be graded to give a smooth, uninterrupted flow through the manhole.

D. Bench walls shall be pitched a minimum of 1 inch but not more than 2 inches per foot from the inside periphery of the manhole to the edge of the flow channel.

3.04 TESTING

A. Manholes shall be constructed to be completely watertight. The contractor shall test the manhole by one of the following methods:
   1. Infiltration Test: If the manhole is located below the groundwater table, the inverts shall be plugged and the infiltration into the manhole shall be measured after a 24-hour period. If any visible infiltration has occurred into the manhole, visible by wet walls or any accumulation on the bench, the infiltration shall be considered excessive.
   2. Exfiltration test: If the manhole is above the current groundwater table, an exfiltration test will be conducted. All incoming sewer lines shall be plugged and the manhole filled with water to a level above the highest section joint and allowed to stand for three hours to compensate for potential absorption by dry concrete. After the soaking period,

water shall be added as required to raise the water to a level that is above the highest joint section. If the water level drop exceeds 1/8" per vertical foot of manhole depth in 24 hours, the manhole shall have failed the test.

B. As an alternative to infiltration and exfiltration test, concrete sewer manholes could be tested in accordance with test procedure described in ASTM C1244.

END OF SECTION 02510

SECTION 02700 PAVING AND STORM DRAIN

PART 1 – GENERAL

1.01 PAVING

A. All paving construction materials and methods, including but not limited to subgrade, base, and surface, shall be in accordance with the Florida Department of Transportation Standard Specifications for Road and Bridge Construction, Latest Edition, except as amended herein, and as shown on the Drawings.

1.02 STORM DRAIN

A. All storm drain facilities, construction materials and methods, including but not limited to pipe, curbing, concrete wall, bumper blocks, trenching and backfill shall be in accordance with the Florida Department of Transportation Standard Specifications for Road and Bridge Construction, Latest Edition, except as amended herein, and as shown on the Drawings.

END OF SECTION 02700

DIVISION 8

DOORS AND WINDOWS

SECTION 08 71 00 DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY:

A. Section Includes: Finish Hardware for door openings, except as otherwise specified herein.

1. Door hardware for steel (hollow metal) doors.
2. Door hardware for aluminum doors.
3. Door hardware for wood doors.
4. Door hardware for other doors indicated.
5. Keyed cylinders as indicated.

B. Related Sections:
1. Division 06: Rough Carpentry.
2. Division 08: Aluminum Doors and Frames
3. Division 08: Hollow Metal Doors and Frames.
4. Division 08: Wood Doors.
5. Division 26 Electrical
6. Division 28: Electronic Security

C. References: Comply with applicable requirements of the following standards. Where these standards conflict with other specific requirements, the most restrictive shall govern.

1. Builders Hardware Manufacturing Association (BHMA)
2. NFPA 101 Life Safety Code
3. NFPA 80 – Standard for Fire Doors and Other Opening Protectives, 2013
4. ANSI-A156.xx- Various Performance Standards for Finish Hardware
5. UL10C – Positive Pressure Fire Test of Door Assemblies
6. ANSI-A117.1 – Accessible and Usable Buildings and Facilities 2009
7. DHI /ANSI A115.IG – Installation Guide for Doors and Hardware
8. Florida Building Code 2020, 7th Edition

D. Intent of Hardware Groups

1. Should items of hardware not definitely specified be required for completion of the Work, furnish such items of type and quality comparable to adjacent hardware and appropriate for service required.
2. Where items of hardware are not definitely or correctly specified, but are required for completion of the Work, a written statement of such omission, error, or other discrepancy must be submitted to Architect, prior to date specified for receipt of bids for clarification by addendum. Otherwise, furnish such items in the type and quality established by this specification, and appropriate to the service intended.

E. Allowances

1. Refer to Division 01 for allowance amount and procedures.

F. Alternates

1. Refer to Division 01 for Alternates and procedures.

1.2 SUBSTITUTIONS:

A. Comply with Division 01.

1.3 SUBMITTALS:

A. Comply with Division 01.

B. Special Submittal Requirements: Combine submittals of this Section with Sections listed below to ensure the "design intent" of the system/assembly is understood and can be reviewed together.

C. Product Data: Manufacturer's specifications and technical data including the following:

1. Detailed specification of construction and fabrication.
2. Manufacturer's installation instructions.
3. Wiring diagrams for each electric product specified. Coordinate voltage with electrical before submitting.
4. Submit 6 copies of catalog cuts with hardware schedule.
5. Provide 9001-Quality Management and 14001-Environmental Management for products listed in Materials Section 2.2

D. Shop Drawings - Hardware Schedule: Submit 6 complete reproducible copy of detailed hardware schedule in a vertical format.

1. List groups and suffixes in proper sequence.
2. Completely describe door and list architectural door number.
3. Manufacturer, product name, and catalog number.
4. Function, type, and style.
5. Size and finish of each item.
6. Mounting heights.
7. Explanation of abbreviations and symbols used within schedule.
8. Detailed wiring diagrams, specially developed for each opening, indicating all electric hardware, security equipment and access control equipment, and door and frame rough-ins required for specific opening.

E. Templates: Submit templates and "reviewed Hardware Schedule" to door and frame supplier and others as applicable to enable proper and accurate sizing and locations of cutouts and reinforcing.

1. Templates, wiring diagrams and "reviewed Hardware Schedule" of electrical terms to electrical for coordination and verification of voltages and locations.

F. Samples: (If requested by the Architect)

1. 1 sample of Lever and Rose/Escutcheon design, (pair).
2. 3 samples of metal finishes

G. Contract Closeout Submittals: Comply with Division 01 including specific requirements indicated.

1. Operating and maintenance manuals: Submit 3 sets containing the following.

    a. Complete information in care, maintenance, and adjustment, and data on repair and replacement parts, and information on preservation of finishes.
    b. Catalog pages for each product.
    c. Name, address, and phone number of local representative(s) for each manufacturer.
    d. Parts list for each product.

2. Copy of final hardware schedule, edited to reflect, "As installed".
3. Copy of final keying schedule
4. As installed “Wiring Diagrams” for each piece of hardware connected to power, both low voltage and 110 volts.
5. One set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

1.4 QUALITY ASSURANCE

A. Comply with Division 01.

1. Exterior Openings Severe Windstorm Components testing: Listed and labeled by a testing and inspecting agency acceptable to authority having jurisdiction, based on testing according to ANSI A250.13. Further compliance with Florida Building Codes for Hurricane (NOA) for Exterior Openings.
2. Statement of qualification for distributor and installers.
3. Statement of compliance with regulatory requirements and single source responsibility.
4. Distributor's Qualifications: Firm with 3 years of experience in the distribution of commercial hardware.

    a. Distributor to employ full time Architectural Hardware Consultants (AHC) for the purpose of scheduling and coordinating hardware and establishing keying schedule.
    b. Hardware Schedule shall be prepared and signed by an AHC.

5. Installer's Qualifications: Firm with 3 years of experience in the installation of similar hardware to that required for this Project, including specific requirements indicated.
6. Regulatory Label Requirements: Provide testing agency label or stamp on hardware for labeled openings.

    a. Provide UL listed hardware for labeled and 20-minute openings in conformance with requirements for class of opening scheduled.
    b. Underwriters Laboratories requirements have precedence over this specification where conflict exists.

7. Single Source Responsibility: Except where specified in hardware schedule, furnish products of only one manufacturer for each type of hardware.

B. Review Project for extent of finish hardware required to complete the Work. Where there is a conflict between these Specifications and the existing hardware, notify the Architect in writing and furnish hardware in compliance with the Specification unless otherwise directed in writing by the Architect.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping: Comply with Division 01.

1. Deliver products in original unopened packaging with legible manufacturer's identification.
2. Package hardware to prevent damage during transit and storage.
3. Mark hardware to correspond with "reviewed hardware schedule".
4. Deliver hardware to door and frame manufacturer upon request.

B. Storage and Protection: Comply with manufacturer's recommendations.

1.6 PROJECT CONDITIONS:

A. Coordinate hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing, security, and similar requirements indicated, as necessary for the proper installation and function, regardless of omissions or conflicts in the information on the Contract Documents.

B. Review Shop Drawings for doors and entrances to confirm that adequate provisions will be made for the proper installation of hardware.

1.7 WARRANTY:

A. Refer to Conditions of the Contract

B. Manufacturer’s Warranty:

1. Closers: Ten years
2. Exit Devices: Three Years
3. Locksets & Cylinders: Three years
4. All other Hardware: Two years.

1.8 OWNER’S INSTRUCTION:

A. Instruct Owner’s personnel in operation and maintenance of hardware units.

1.9 MAINTENANCE:

A. Extra Service Materials: Deliver to Owner extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Division 01 Closeout Submittals Section.

1. Special Tools: Provide special wrenches and tools applicable to each different or special hardware component.
2. Maintenance Tools: Provide maintenance tools and accessories supplied by hardware component manufacturer.
3. Delivery, Storage and Protection: Comply with Owner’s requirements for delivery, storage and protection of extra service materials.

B. Maintenance Service: Submit for Owner’s consideration maintenance service agreement for electronic products installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. The following manufacturers are approved subject to compliance with requirements of the Contract Documents. Approval of manufacturers other than those listed shall be in accordance with Division 01.

Item:	Manufacturer:	Approved:
Hinges	Stanley	McKinney, Hager
Continuous Hinges	National Guard Products	Select, ABH
Locksets	Best 9K, 45H Series	Sargent, Dorma
Cylinders	Best 1E-74, 12E Series	
Exit Devices	Precision 2000 Series	Von Duprin 98, Dorma 9000
Closers	Dorma 8900 Series	Norton 7500, Best HD8000
Access Control System	By Access Control Provider	
Automatic Operators	Dorma ED100 Series	
Push/Pull Plates	Trimco	Burns, Rockwood
Protection Plates	Trimco	Burns, Rockwood
Door Stops	Trimco	Burns, Rockwood
Flush Bolts	Trimco	ABH, Burns
Coordinator & Brackets	Trimco	ABH, Burns
Threshold & Gasketing	National Guard	Reese, K.N. Crowder

2.2 MATERIALS:

A. Hinges: Shall be Five Knuckle Ball bearing hinges

1. Template screw hole locations
2. Bearings are to be fully hardened.
3. Bearing shell is to be consistent shape with barrel.
4. Minimum of 2 permanently lubricated non-detachable bearings on standard weight hinge and 4 permanently lubricated bearing on heavy weight hinges.
5. Equip with easily seated, non-rising pins.
6. Non-removable pin screws shall be slotted stainless steel screws.
7. Hinges shall be full polished, front, back and barrel.
8. Hinge pin is to be fully plated.
9. Bearing assembly is to be installed after plating.
10. Sufficient size to allow 180-degree swing of door
11. Furnish five knuckles with flush ball bearings
12. Provide hinge type as listed in schedule.
13. Furnish 3 hinges per leaf to 7-foot, 6-inch height. Add one for each additional 30 inches in height or fraction thereof.
14. Tested and approved by BHMA for all applicable ANSI Standards for type, size, function, and finish
15. UL10C listed for Fire rated doors.

B. Geared Continuous Hinges:

1. Tested and approved by BHMA for ANSI A156.26-1996 Grade 1
2. Anti-spinning through fastener

3. UL10C listed for 3-hour fire rating
4. Non-handed
5. Lifetime warranty
6. Provide Fire Pins for 3-hour fire ratings
7. Sufficient size to permit door to swing 180 degrees

C. Mortise Type Locks and Latches:

1. Tested and approved by BHMA for ANSI A156.13, Series 1000, Operational Grade 1, Extra-Heavy Duty, Security Grade 2 and be UL10C.
2. Furnish UL or recognized independent laboratory certified mechanical operational testing to 4 million cycles minimum.
3. Provide 9001-Quality Management and 14001-Environmental Management.
4. Fit ANSI A115.1 door preparation
5. Functions and design as indicated in the hardware groups
6. Solid, one-piece, 3/4-inch (19mm) throw, anti-friction latchbolt made of self-lubricating stainless steel
7. Deadbolt functions shall have 1 inch (25mm) throw bolt made of hardened stainless steel
8. Latchbolt and Deadbolt are to extend into the case a minimum of 3/8 inch (9.5mm) when fully extended
9. Auxiliary deadlatch to be made of one-piece stainless steel, permanently lubricated
10. Provide sufficient curved strike lip to protect door trim
11. Lever handles must be of forged or cast brass, bronze or stainless-steel construction and conform to ANSI A117.1. Levers that contain a hollow cavity are not acceptable
12. Lock shall have self-aligning, thru-bolted trim
13. Levers to operate a roller bearing spindle hub mechanism
14. Mortise cylinders of lock shall have a concealed internal setscrew for securing the cylinder to the lockset. The internal setscrew will be accessible only by removing the core, with the control key, from the cylinder body.
15. Spindle to be designed to prevent forced entry from attacking of lever
16. Provide locksets with 7-pin removable and interchangeable core cylinders
17. Each lever to have independent spring mechanism controlling it
18. Core face must be the same finish as the lockset.

D. Cylindrical Type Locks and Latch sets:

1. Provide locksets tested and approved by BHMA/ANSI A156.2, Series 4000, Operational Grade 1, Extra-Heavy Duty.
2. Provide locksets listed by Underwriters Laboratories for use on fire rated single or double swinging doors.
3. Provide locksets that meet the design and operation of the cylindrical lock to meet the accessible requirements of ANSI A117.1 and ADA–Americans with Disabilities Act.
4. Provide locksets that meet Florida Building Code and Miami-Dade County Code:
   a. 9/16” latch throw – Listed by Florida Building Code and Miami-Dade County at ± 75 PSF for single doors.
   b. 3/4” latch throw – Listed by Florida Building Code and Miami Dade County at ± 80 PSF for single doors and ± 50 PSF for double doors.
5. Provide locksets that are listed with the California State Fire Marshal.
6. Provide locksets made in a manufacturing facility to compliant with ISO 9001-Quality Management and ISO 14001-Environmental Management.

7. Provide locksets that meet or exceed 50 Million cycle test verified by third party testing agency.
8. Provide locksets with the following mechanical features
    a. Locksets outside locked lever must withstand minimum 1400 inch-pounds of torque. In excess of that, a replaceable part will shear. Key from outside and/or inside lever will still operate lockset.
    b. Locksets shall fit modified ANSI A115.2 door preparation.
    c. 2-3/4 inch (70 mm) backset, standard.
    d. Door thickness – Available for 1-3/8" to 2-1/4" doors.
    e. Latch to have single piece tail-piece construction.
    f. Chassis – Critical latch and chassis components to be brass or corrosion-treated steel.
    g. Lock shall allow the lever handle to move 45 degrees from parallel to the horizontal plane without engaging the latchbolt assembly.
    h. Hub, side plate, shrouded rose, locking pin to be a one-piece casting with a shrouded locking lug.
    i. Locksets to have anti-rotational studs that are thru-bolted.
    j. Provide sufficient curved strike lip to protect door trim at single doors. At pairs of doors, provide 7/8" Lip to Center Strike.
    k. Each lever to have independent spring mechanism.
    l. Lever springs to be contained in the main lock hub.
    m. Outside lever sleeve to be seamless, of one-piece construction made of a hardened steel alloy.
    n. Keyed lever to be removable only after core is removed, by authorized control key.
9. Locksets to have the capability of supporting manufacturers' conventional core as well as large and small interchangeable cores.
10. Provide core face with the same finish as the lockset.
11. Provide functions and design as indicated in the hardware groups.

E. Exit Devices:

1. Exit devices to meet or exceed BHMA for ANSI 156.3, Grade 1.
2. Exit devices to be tested and certified by UL or by a recognized independent laboratory for mechanical operational testing to 10 million cycles minimum with inspection confirming Grade 1 Loaded Forces have been maintained.
3. Exit devices chassis to be investment cast steel, zinc dichromate.
4. Exit devices to have stainless steel deadlocking 3/4" latch bolt.
5. Exit devices to be equipped with sound dampening on touch bar.
6. Non-fire rated exit devices to have cylinder dogging.
7. Non-fire rated exit devices to have 1/4" minimum turn hex key dogging.
8. Touchpad to be "T" style constructed of architectural metal with matching metal end caps.
9. Touch bar assembly on wide style exit devices to have a ¼" clearance to allow for vision frames.
10. All exposed exit device components to be of architectural metals and "true" architectural finishes.
11. Provide strikes as required by application.
12. Fire exit hardware to conform to UL10C and UBC 7-2. UL tested for Accident Hazard.
13. The strike is to be black powder coated finish.
14. Exit devices to have field reversible handing.
15. Provide heavy duty vandal resistant lever trim with heavy duty investment cast stainless steel components and extra strength shock absorbing overload springs. Lever shall not require resetting. Lever design to match locksets and latch sets.

16. Provide 9001-Quality Management and 14001-Environmental Management.
17. Vertical Latch Assemblies to have gravity operation, no springs.

F. Door Closers shall:

1. Tested and approved by BHMA for ANSI 156.4, Grade 1
2. UL10C certified
3. Provide 9001-Quality Management and 14001-Environmental Management.
4. Closer shall have extra-duty arms and knuckles
5. Conform to ANSI 117.1
6. Maximum 2-7/16 inch case projection with non-ferrous cover
7. Separate adjusting valves for closing and latching speed, and backcheck
8. Provide adapter plates, shim spacers and blade stop spacers as required by frame and door conditions
9. Full rack and pinion type closer with 1-1/2" minimum bore
10. Mount closers on non-public side of door, unless otherwise noted in specification
11. Closers shall be non-handed, non-sized and multi-sized.

G. Automatic Operators:

Basis of Design: Model: DORMA, ED Series ED100 (Basis of Design) An Integrated, self-learning automatic swing door operator with an advanced CPU, a multistage gearbox with real time adaptive software and available user interface.

1. Automatic Door Configuration:
   a. Configuration: Single swing door or pair of doors swinging.
   b. Traffic Pattern: as shown on drawings
   c. Mounting: Surface applied
2. Control Features
3. Power-hold Close
4. Built in Lock Delay
5. On-Off-Hold Open switch control to control door function, (Automatic-Hold Open- Exit Only)
6. On-Off Power Switch
7. Fire Alarm Integration
8. Field Adjustable Handing
9. Push and Go
10. Power Assist Opening Activation
11. Intergraded Connections for Monitored Safety Sensors and other accessories.
12. Integrated access control
13. Door Control Features
14. Wind Load and Stack Pressure microprocessor monitored with power boost to ensure secure opening and closing in changing conditions.
15. Door Weight Max. ED 100 220 lbs.
16. Header Size: Narrow header at 4" height by 6" depth
17. ACTIVATION DEVICES
    a. Activation Device:
    b. Access control activator: as selected by architect.
18. ELECTRICAL
    a. Electrical 115 V AC +/- 10% 50/60 Hz 6.6 A max.
19. ALUMINUM FINISHES

a. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

20. Anodized Finish:
    Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm.
21. Be listed under UL10C and UL325.
22. Be capable of functioning on doors weighing up to 350 lb.
23. Conform to ANSI A156.10 and A156.19 and be suitable for use in both full energy and low energy applications.
24. Be non-handed.
25. Incorporate the following adjustment capabilities: opening force, closing force, open speed, close speed, and open check speed.
26. Incorporate a non-ferrous cover not exceeding 6 inches square in section.
27. Incorporate a separate On-Off-Hold Open switch.
28. Be microprocessor controlled and incorporate a position encoder.
29. Readily function with standard activation and safety sensors, provide activation devices as required.
30. Function as a manual door closer without power applied and shall power open/ spring close with power applied.
31. Function with 115 VAC electrical service for operator and standard low voltage connections for activation.

H. Push Plates: Provide with four beveled edges ANSI J301, 0.050" thickness, size as indicated in hardware set. Furnish oval-head countersunk screws to match finish.

I. Pulls with plates: Provide with four beveled edges ANSI J301, 0.050" thickness Plate s with ANSI J401 Pull as listed in hardware set. Provide proper fasteners for door construction.

J. Kickplates: Provide with four beveled edges ANSI J102, 10 inches high by width less 2 inches on single doors and 1 inch on pairs of doors. Furnish oval-head countersunk screws to match finish.

K. Mop plates: Provide with four beveled edges ANSI J103, 6 inches high by width less 1 inch on single doors and 1 inch on pairs of doors. Furnish oval-head countersunk screws to match finish.

L. Door Bolts: Flush bolts for wood or metal doors.

1. Provide a set of Automatic bolts, Certified ANSI/BHMA 156.3 Type 25 for hollow metal label doors.
2. Provide a set of Automatic bolts, Certified ANSI/BHMA 156.3 Type 27 at wood label doors.
3. Manual flush bolts, Certified ANSI/BHMA 156.16 at openings, where allowed local authority.
4. Provide Dust Proof Strike, Certified ANSI/BHMA 156.16 at doors with flush bolts without thresholds.

M. Coordinator and Brackets: Provide a surface mounted coordinator when automatic bolts are used in the hardware set.

1. Coordinator, Certified ANSI/BHMA A1156.3 Type 21A for full width of the opening.
2. Provide mounting brackets for soffit applied hardware.
3. Provide hardware preparation (cutouts) for latches as necessary.

N. Power Supply: Provide power supply for (MLR) Electric Latch Retraction exit devices

1. UL Listed, UL294, ULC S-319
2. Input 120 VAC
3. Input Fire alarm Termination
4. Output Power, 2 filtered & regulated 24 volts DC outputs @ 2 AMPS, Holding current 200mA, 1 filtered & regulated 24 Volts DC auxiliary output @ 0.8 Amps.
5. Output, 2 normal open relay outputs, Outputs can be wired for 2 different modes:
   - One second delay prior to relay output
   - Positive confirmation of latch retraction prior to signaling the operator when used in conjunction with MLR exit device sensor wires.
6. Battery Backup: Built in charger for sealed lead acid or gel batteries. Batteries provided by Access Control Provider.

O. Quick Connect Power Transfer: Power transfer device shall be a stainless-steel housing and rigid tube. Secure and inconspicuous channel is to bring power from the frame to the door.
1. Tube shall contain 12-wire bundle with Quick Connect Connectors one 4-wire connector consisting of two 18AWG wires and two 24AWG wires and one 8-wire connector with 8 24AWG wires.

P. Quick Connect Wire Harnesses: The Quick Connect wire harness shall have of one 4-wire connector and one 8-wire connector. The 4-wire connector has two 18AWG and two 24AWG wires. The 8-wire connector has eight 24AWG wires. The maximum size hole needed to pass through the quick connect plug is 1” (25MM).

Q. Seals: All seals shall be finished to match adjacent frame color. Seals shall be furnished as listed in schedule. Material shall be UL listed for labeled openings.

R. Weatherstripping: Provide at head and jambs only those units where resilient or flexible seal strip is easily replaceable. Where bar-type weatherstrip is used with parallel arm mounted closers install weatherstrip first.

1. Weatherstrip shall be resilient seal of Silicone.
2. UL10C Positive Pressure rated seal set when required.

S. Door Bottoms/Sweeps: Surface mounted or concealed door bottom, where listed in the hardware sets.

1. Door seal shall be resilient seal of Silicone.
2. UL10C Positive Pressure rated seal set when required.

T. Thresholds: Thresholds shall be aluminum beveled type with maximum height of 1/2" for conformance with ADA requirements. Furnish as specified and per details. Provide fasteners and screws suitable for floor conditions.

U. Silencers: Furnish silencers on all interior frames, 3 for single doors, 2 for pairs.

2.3 FINISH:

A. Designations used in Schedule of Finish Hardware - 3.05, and elsewhere to indicate hardware finishes are those listed in ANSI/BHMA A156.18 including coordination with traditional U.S. finishes shown by certain manufacturers for their products

B. Powder coat door closers to match other hardware, unless otherwise noted.

C. Aluminum items shall be finished to match predominant adjacent material. Seals to coordinate with frame color.

2.4 KEYS AND KEYING:

A. Provide keyed brass construction cores and keys during the construction period. Construction control and operating keys and core shall not be part of the Owner's permanent keying system or furnished in the same keyway (or key section) as the Owner's permanent keying system. Permanent cores and keys (prepared according to the accepted keying schedule) will be furnished to the Owner.

B. Cylinders, removable and interchangeable core system: Best CORMAX™ Patented 7-pin.

C. Permanent keys and cores: Stamped with the applicable key mark for identification. These visual key control marks or codes will not include the actual key cuts. Permanent keys will also be stamped "Do Not Duplicate."

D. Transmit Grand Masterkeys, Master keys and other security keys to Owner by Registered Mail, return receipt requested.

E. Furnish keys in the following quantities:

1. 1 each Grand Master keys
2. 4 each Master keys
3. 2 each Change keys each keyed core
4. 15 each Construction Master keys
5. 1 each Control keys

F. The Owner, or the Owner's agent, will install permanent cores and return the construction cores to the Hardware Supplier. Construction cores and keys remain the property of the Hardware Supplier.

G. Keying Schedule: Arrange for a keying meeting, and programming meeting with Architect Owner and hardware supplier, and other involved parties to ensure locksets and locking hardware, are functionally correct and keying and programming complies with project requirements. Furnish 3 typed copies of keying and programming schedule to Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of conditions: Examine doors, frames, related items and conditions under which Work is to be performed and identify conditions detrimental to proper and or timely completion.

1. Do not proceed until unsatisfactory conditions have been corrected.

3.2 HARDWARE LOCATIONS:

A. Mount hardware units at heights indicated in the following publications except as specifically indicated or required to comply with the governing regulations.

1. Recommended Locations for Builder's Hardware for Standard Steel Doors and Frames, by the Door and Hardware Institute (DHI).

2. Recommended locations for Architectural Hardware for flush wood doors (DHI).

3. WDMA Industry Standard I.S.-1A-04, Industry Standard for Architectural wood flush doors.

3.3 INSTALLATION:

A. Install each hardware item per manufacturer's instructions and recommendations. Do not install surface mounted items until finishes have been completed on the substrate. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

B. Conform to local governing agency security ordinance.

C. Install Conforming to ICC/ANSI A117.1 Accessible and Usable Building and Facilities.

1. Adjust door closer sweep periods so that from the open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the landing side of the door.

D. Installed hardware using the manufacturers fasteners provided. Drill and tap all screw holes located in metallic materials. Do not use "Riv-Nuts" or similar products.

3.4 FIELD QUALITY CONTROL AND FINAL ADJUSTMENT

A. Contractor/Installers, Field Services: After installation is complete, contractor shall inspect the completed door openings on site to verify installation of hardware is complete and properly adjusted, in accordance with both the Contract Documents and final shop drawings.

1. Check and adjust closers to ensure proper operation.

2. Check latch set, lockset, and exit devices are properly installed and adjusted to ensure proper operation.

a. Verify levers are free from binding.
b. Ensure latch bolts and dead bolts are engaged into strike and hardware is functioning.

3. Report findings, in writing, to architect indicating that all hardware is installed and functioning properly. Include recommendations outlining corrective actions for improperly functioning hardware if required.

3.5 SCHEDULE OF FINISH HARDWARE:

Manufacturer List

Code	Name
AD	Adams Rite
BE	Best Access Systems
BY	By Related Section
DM	Dorma Door Controls
NA	National Guard
PR	BEST Precision Exit Devices
ST	BEST Hinges and Sliding
TR	Trimco

Option List

Code	Description
36"	36" Door Width
3RO	Prefix option for 2000 Apex Series
B4E-HEAVY-KP	BEVELED 4 EDGES - KICK PLATES
C	Quick Connect Wiring System
C181	CAM-ADAMS RITE MS CAM
C4	CAM-STANDARD CAM
CA-03	Cylinder Attachment Kit (Rim/SVR Device)
CD	CYLINDER DOGGING
CSK	COUNTER SINKING OF KICK and MOP PLATES
DP89	Drop Plate for PA for Top Rail <5 3/4"
EPT-Prep	EPT Prep
FL	Fire Exit Hardware
HC	Hurricane Code Device
LAR	Length as required
LBR	LESS BOTTOM ROD
MLR	MOTORIZED LATCH RETRACTION
NCA-03	Cylinder Attachment Kit(24/2500 Devices)
RQE	REQUEST TO EXIT
SNB (2)	SEX BOLTS (2)
TDS	TOUCHBAR MONITORING DOUBLE SWITCH
VIB	Double Visual Indictor Option
WS	Wind Storm Listed (Miami-Dade/Florida)

Finish List

Code	Description
26D	Satin Chrome
32D	Satin Stainless Steel
626	Satin Chromium Plated
628	Satin Aluminum, Clear Anodized
630	Satin Stainless Steel
689	Aluminum Painted
AL	Aluminum
CL	Clear
Silver	Silver

Hardware Sets

Set #01

Doors: 100A

2	Pivot Set	By Aluminum Door & Frame Provider		BY
2	Elec. Exit Device w/ Pull Trim	By Aluminum Door & Frame Provider		BY
1	Rim Cylinder-Exit Trim	12E-72 PATD	626	BE
2	Closer w/ Spr Stop-Drop Brkt	8916 S-DS DP89	689	DM
2	Power Transfer	EPT-12C		PR
1	Perimeter Gasketing	By Aluminum Door & Frame Provider		BY
1	Threshold	By Aluminum Door & Frame Provider		BY
1	Power Supply-Access Control	By Access Control Provider		BY
2	Door Position Switch	By Access Control Provider		BY
2	Push Button Release	By Access Control Provider		BY
	NOTE: (Located at Admin/Recep 101 & Dispatch 104)			
1	Integrated Buzzer & Camera	By Access Control Provider		BY
1	Card Reader	By Access Control Provider		BY

NOTE: Activating remote release switch in Reception or Dispatch or presenting valid credential to card reader retracts motorized latch bolt of electrified exit device on active leaf, allowing entry. Door Position Switches monitor door status. Request-to-Exit Switches in exit devices signal Access Control System for authorized opening of either leaf upon exiting. Doors remain secure upon fire alarm or loss of power. Free egress is possible through either leaf at all times. Coordinate wiring and electrical requirements with Aluminum Door and Frame Supplier, Electrical Contractor and Security Contractor.

Set #02

Doors: 200A, 500

2	Pivot Set	By Aluminum Door & Frame Provider		BY
2	Power Transfer	EPT-12C		PR
2	Elec. Exit Device w/ Pull Trim	By Aluminum Door & Frame Provider		BY
1	Rim Cylinder-Exit Trim	12E-72 PATD	626	BE

2	Double Auto-Operator	ED100LE PUSH ARM	CL	DM
2	Auto-Operator Actuator	DX3339-187 Jamb Mounted Style	630	DO
1	Perimeter Gasketing	By Aluminum Door & Frame Provider		BY
1	Threshold	By Aluminum Door & Frame Provider		BY
1	Power Supply-Access Control	By Access Control Provider		BY
2	Door Position Switch	By Access Control Provider		BY
2	Push Button Release	By Access Control Provider		BY
1	Integrated Buzzer & Camera	By Access Control Provider		BY
1	Card Reader	By Access Control Provider		BY

NOTE: Activating remote release switch in Reception or Dispatch or presenting valid credential to card reader retracts motorized latch bolt of electrified exit device on active leaf and enables automatic operator actuator on outside, allowing manual or hands-free entry. Activating actuator on inside retracts latch bolt of exit device and signals automatic operator to cycle the door open. Door Position Switches monitor door status. Request-to-Exit Switches in exit devices signal Access Control System for authorized opening of either leaf upon exiting. Doors remain secure upon fire alarm or loss of power. Free egress is possible through either leaf at all times. Coordinate wiring and electrical requirements with Aluminum Door and Frame Supplier, Electrical Contractor and Security Contractor.

Set #03

Doors: 300

2	Continuous Hinge	By Aluminum Door & Frame Provider		NA
2	Power Transfer	EPT-12C		PR
2	Elec. Exit Device w/ Pull Trim	By Aluminum Door & Frame Provider		BY
1	Rim Cylinder-Exit Trim	12E-72 PATD	626	BE
2	Closer w/ Spr Stop-Drop Brkt	8916 S-DS DP89	689	DM
1	Perimeter Gasketing	By Aluminum Door & Frame Provider		BY
1	Threshold	By Aluminum Door & Frame Provider		BY
1	Power Supply-Access Control	By Access Control Provider		BY
2	Door Position Switch	By Access Control Provider		BY
2	Push Button Release	By Access Control Provider		BY
1	Card Reader	By Access Control Provider		BY

NOTE: Presenting valid credential to card reader retracts motorized latch bolt of electrified exit device on active leaf, allowing entry. Door Position Switches monitor door status. Request-to-Exit Switches in exit devices signal Access Control System for authorized opening of either leaf upon exiting. Doors remain secure upon fire alarm or loss of power. Free egress is possible through either leaf at all times. Coordinate wiring and electrical requirements with Aluminum Door and Frame Supplier, Electrical Contractor and Security Contractor.

Set #04

Doors: 503, 514, 515B, 515C

2	Continuous Hinge	By Aluminum Door & Frame Provider		NA
2	Exit Device w/ Pull Trim	By Aluminum Door & Frame Provider		BY
1	Rim Cylinder-Exit Trim	12E-72 PATD	626	BE
2	Closer w/ Spr Stop-Drop Brkt	8916 S-DS DP89	689	DM

1	Perimeter Gasketing	By Aluminum Door & Frame Provider		BY
1	Threshold	By Aluminum Door & Frame Provider		BY

Set #05

Doors: 313, 314

1	Continuous Hinge	HD1100A 83" EPT-Prep		NA
1	Power Transfer	EPT-12C		PR
1	Elec Exit Device-Storeroom	3RO C HC MLR TDS 2103 X 4903A	630	PR
1	Rim Cylinder-Exit Trim	12E-72 PATD	626	BE
1	Closer w/ Spr Stop-Drop Brkt	8916 S-DS DP89	689	DM
1	Perimeter Gaskets	2525 C x LAR		NA
1	Threshold	896 S x LAR	AL	NA
1	Wiring Harness	WH-26P		ST
1	Wiring Harness	WH-192P		ST
1	Power Supply-Access Control	By Access Control Provider		BY
1	Door Position Switch	By Access Control Provider		BY
1	Card Reader	By Access Control Provider		BY

NOTE: Presenting valid credential to card reader retracts motorized latch bolt of electrified exit device, allowing entry. Door Position Switch monitors door status. Request-to-Exit Switch in exit device signals Access Control System for authorized opening of the door upon exiting. Door remains secure upon fire alarm or loss of power. Free egress is possible at all times. Coordinate wiring and electrical requirements with Electrical Contractor and Security Contractor.

Set #06

Doors: 320C

3	Full Mortise Hinge	CB168 4.5" x 4.5"	26D	ST
1	Power Transfer	EPT-12C		PR
1	Elec Exit Device-Storeroom	3RO C FL TDS E2103 X 4908A	630	PR
1	Closer w/ Spr Stop	8916 S-DS	689	DM
1	Kick Plate	K0050 8" x 2" LDW B4E CSK	630	TR
1	Mop Plate	KM050 6" x 1" LDW B4E CSK	630	TR
1	Door Sweep	198 NA x LAR		NA
	NOTE: (Mount on Pull side of Door)			
1	Saddle Threshold	513 x LAR	AL	NA
1	Perimeter Gaskets	5050C x LAR		NA
1	Wiring Harness	WH-26P		ST
1	Wiring Harness	WH-192P		ST
1	Power Supply-Access Control	By Access Control Provider		BY
1	Door Position Switch	By Access Control Provider		BY
1	Card Reader	By Access Control Provider		BY

NOTE: Presenting valid credential to card reader temporarily unlocks lever trim of electrified exit device, allowing entry. Door Position Switch monitors door status. Request-to-Exit Switch in exit device signal Access Control System for authorized opening of the door upon exiting. Doors remain secure upon fire alarm or loss of power. Free egress is possible through either leaf at all times.

Coordinate wiring and electrical requirements with Aluminum Door and Frame Supplier, Electrical Contractor and Security Contractor.

Set #07

Doors: 203A, 224, 303, 102, 103A, 103B, 123B

1	Pivot Set	By Aluminum Door & Frame Provider		BY
1	Power Transfer	EPT-12C		PR
1	Elec. Exit Device w/ Pull Trim	By Aluminum Door & Frame Provider		BY
1	Rim Cylinder-Exit Trim	12E-72 PATD	626	BE
1	Closer w/ Spr Stop-Drop Brkt	8916 S-DS DP89	689	DM
1	Perimeter Gasketing	By Aluminum Door & Frame Provider		BY
1	Threshold	By Aluminum Door & Frame Provider		BY
1	Power Supply-Access Control	By Access Control Provider		BY
1	Door Position Switch	By Access Control Provider		BY
1	Card Reader	By Access Control Provider		BY

NOTE: Presenting valid credential to card reader retracts motorized latch bolt of electrified exit device, allowing entry. Door Position Switch monitor door status. Request-to-Exit Switch in exit device signals Access Control System for authorized opening of the door upon exiting. Door remains secure upon fire alarm or loss of power. Free egress is possible at all times. Coordinate wiring and electrical requirements with Aluminum Door and Frame Supplier, Electrical Contractor and Security Contractor.

Set #08

Doors: 209A, 209B, 215

1	Continuous Hinge	HD1100A 83"		NA
1	Deadlock	MS1850SN	628	AD
1	Mortise Cylinder	1E-76 PATD C181	626	BE
1	Mortise Thumb Turn	1EA-6A4	626	BE
1	Push Pull Bar Set	1741 36"	630	TR
1	Closer w/ Stop & Drop Plate	8916 IS DP89	689	DM
1	Perimeter Gasketing	By Aluminum Door & Frame Provider		BY

Set #09

Doors: 302, 423, 501, 502, 101

3	Full Mortise Hinge	CB179 4.5" x 4.5"	26D	ST
1	Lockset-Office	45H-7AT15H PATD	626	BE
1	Closer w/ Stop	8916 IS	689	DM
1	Kick Plate	K0050 8" x 2" LDW B4E CSK	630	TR
1	Mop Plate	KM050 6" x 1" LDW B4E CSK	630	TR
1	Wall Bumper	1270CV	626	TR
1	Door Sweep	198 NA x LAR		NA
1	Perimeter Gaskets	5050C x LAR		NA

Set #10

Doors: 201A, 201B

3	Full Mortise Hinge	CB179 4.5" x 4.5"	26D	ST
1	Lockset-Office	45H-7AT15H PATD	626	BE
1	Closer w/ Stop	8916 DS	689	DM
1	Kick Plate	K0050 8" x 2" LDW B4E CSK	630	TR
1	Wall Bumper	1270CV	626	TR
1	Perimeter Gaskets	5050C x LAR		NA

Set #11

Doors: 207, 208, 210, 211, 212, 213, 216, 217, 219, 221, 222, 227, 231, 307, 309, 310, 401, 402, 404, 408A, 410, 412, 127, 118A, 124A, 128A, 129A

3	Full Mortise Hinge	CB179 4.5" x 4.5"	26D	ST
1	Lockset-Office	45H-7AT15H PATD	626	BE
1	Kick Plate	K0050 8" x 2" LDW B4E CSK	630	TR
1	Wall Bumper	1270CV	626	TR
1	Perimeter Gaskets	5050C x LAR		NA

Set #12

Doors: 429

3	Full Mortise Hinge	CB179 4.5" x 4.5"	26D	ST
1	Lockset-Office	45H-7AT15H PATD	626	BE
1	Closer w/ Stop	8916 IS	689	DM
1	Kick Plate	K0050 8" x 2" LDW B4E CSK	630	TR
1	Mop Plate	KM050 6" x 1" LDW B4E CSK	630	TR
1	Wall Bumper	1270CV	626	TR
1	Door Sweep	198 NA x LAR		NA
1	Perimeter Gaskets	5050C x LAR		NA
1	Saddle Threshold	513 x LAR	AL	NA

Set #13

Doors: 408B

3	Full Mortise Hinge	CB179 4.5" x 4.5"	26D	ST
1	Lockset-Office	45H-7AT15H PATD	626	BE
1	Closer w/ Stop	8916 DS	689	DM
1	Kick Plate	K0050 8" x 2" LDW B4E CSK	630	TR
1	Mop Plate	KM050 6" x 1" LDW B4E CSK	630	TR
1	Wall Bumper	1270CV	626	TR
1	Door Sweep	198 NA x LAR		NA
1	Perimeter Gaskets	5050C x LAR		NA
1	Saddle Threshold	513 x LAR	AL	NA

Set #14

Doors: 204A, 204B, 311, 411, 413, 420, 421A, 424B, 504, 509, 519, 107A, 108

3	Full Mortise Hinge	CB179 4.5" x 4.5"	26D	ST
1	Lockset-Storeroom	45H-7D15H PATD	626	BE
1	Closer w/ Stop	8916 IS	689	DM
1	Kick Plate	K0050 8" x 2" LDW B4E CSK	630	TR
1	Wall Bumper	1270CV	626	TR
1	Perimeter Gaskets	5050C x LAR		NA

Set #15

Doors: 336, 427

3	Full Mortise Hinge	CB179 4.5" x 4.5"	26D	ST
1	Lockset-Storeroom	45H-7D15H PATD	626	BE
1	Closer w/ Stop	8916 IS	689	DM
1	Kick Plate	K0050 8" x 2" LDW B4E CSK	630	TR
1	Wall Bumper	1270CV	626	TR
1	Perimeter Gaskets	5050C x LAR		NA
1	Door Sweep	198 NA x LAR		NA
1	Saddle Threshold	513 x LAR	AL	NA

Set #16

Doors: 305

3	Full Mortise Hinge	CB179 4.5" x 4.5"	26D	ST
1	Lockset-Storeroom	45H-7D15H PATD	626	BE
1	Kick Plate	K0050 8" x 2" LDW B4E CSK	630	TR
1	Wall Bumper	1270CV	626	TR
1	Perimeter Gaskets	5050C x LAR		NA

Set #17

Doors: 521B

3	Full Mortise Hinge	CB179 4.5" x 4.5"	26D	ST
1	Lockset-Storeroom	45H-7D15H PATD	626	BE
1	Closer w/ Friction Hold Open	8916 FHP	689	DM
1	Kick Plate	K0050 8" x 2" LDW B4E CSK	630	TR
1	Wall Bumper	1270CV	626	TR
1	Perimeter Gaskets	5050C x LAR		NA

Set #18

Doors: 106, 107B, 405B, 406A, 425A, 425B, 430A, 430B, 431

1	Continuous Hinge	HD1100A 83"		NA
1	Lockset-Storeroom w/ Deadbolt	45H-7TD15H PATD WS	626	BE
1	Closer w/ Spr Stop-Drop Brkt	8916 S-DS DP89	689	DM
1	Kick Plate	K0050 8" x 2" LDW B4E CSK	630	TR
1	Perimeter Gaskets	2525 C x LAR		NA
1	Drip Cap	16 A x +4" ODW		NA
1	Door Sweep	101 VA x LAR		NA
1	Threshold	896 S x LAR	AL	NA

Set #19

Doors: 226, 332, 419, 432, 520, 521A

2	Continuous Hinge	HD1100A 83"		NA
2	Manual Flush Bolt	3917-12	626	TR
1	Lockset-Storeroom w/ Deadbolt	45H-7TD15H PATD WS	626	BE
2	Closer w/ Stop & Hold	8916 S-DST	689	DM
1	Coordinator	3094B2	Silver	TR
2	Mounting Bracket	3096	Silver	TR
1	Astragal	By Metal Door Provider		BY
2	Kick Plate	K0050 8" x 1" LDW B4E CSK	630	TR
1	Perimeter Gaskets	2525 C x LAR		NA
1	Drip Cap	16 A x +4" ODW		NA
2	Door Sweep	101 VA x LAR		NA
1	Threshold	896 S x LAR	AL	NA

Set #20

Doors: 409A

1	Continuous Hinge	HD1100A 83"		NA
1	Lockset-Storeroom w/ Deadbolt	45H-7TD15H PATD WS	626	BE
1	Closer w/ Spr Stop	8916 S-DS	689	DM
1	Kick Plate	K0050 8" x 2" LDW B4E CSK	630	TR
1	Perimeter Gaskets	2525 C x LAR		NA
1	Drip Cap	16 A x +4" ODW		NA
1	Door Sweep	101 VA x LAR		NA
1	Threshold	896 S x LAR	AL	NA

Set #21

Doors: 518, 315, 316

1	Continuous Hinge	HD1100A 83"		NA
1	Lockset-Storeroom w/ Deadbolt	45H-7TD15H PATD WS	626	BE
1	Closer w/ Stop	8916 IS	689	DM
1	Perimeter Gaskets	2525 C x LAR		NA
1	Drip Cap	16 A x +4" ODW		NA

1	Door Sweep	101 VA x LAR		NA
1	Threshold	896 S x LAR	AL	NA

Set #22

Doors: 218, 312, 317, 318, 416, 109, 115, 116

3	Full Mortise Hinge	CB179 4.5" x 4.5"	26D	ST
1	Passage Set	45H-0N15H	626	BE
1	Closer w/ Stop	8916 IS	689	DM
1	Kick Plate	K0050 8" x 2" LDW B4E CSK	630	TR
1	Mop Plate	KM050 6" x 1" LDW B4E CSK	630	TR
1	Perimeter Gaskets	5050C x LAR		NA

Set #23

Doors: 301, 308, 320A, 320B

3	Full Mortise Hinge	CB168 4.5" x 4.5"	26D	ST
1	Passage Set	45H-0N15H	626	BE
1	Closer w/ Spr Stop	8916 S-DS	689	DM
1	Kick Plate	K0050 8" x 2" LDW B4E CSK	630	TR
1	Mop Plate	KM050 6" x 1" LDW B4E CSK	630	TR
1	Wall Bumper	1270CV	626	TR
1	Perimeter Gaskets	5050C x LAR		NA
1	Door Sweep	198 NA x LAR		NA

Set #24

Doors: 319

3	Full Mortise Hinge	CB179 4.5" x 4.5"	26D	ST
1	Passage Set	45H-0N15H	626	BE
1	Kick Plate	K0050 8" x 2" LDW B4E CSK	630	TR
1	Perimeter Gaskets	5050C x LAR		NA

Set #25

Doors: 304A, 304B, 403, 505, 508A, 119

3	Full Mortise Hinge	CB179 4.5" x 4.5"	26D	ST
1	Lockset-Classroom	45H-7R15H PATD	626	BE
1	Closer w/ Stop	8916 IS	689	DM
1	Kick Plate	K0050 8" x 2" LDW B4E CSK	630	TR
1	Mop Plate	KM050 6" x 1" LDW B4E CSK	630	TR
1	Perimeter Gaskets	5050C x LAR		NA

Set #26

Doors: 516A, 516B, 517

3	Full Mortise Hinge	CB179 4.5" x 4.5"	26D	ST
1	Lockset-Classroom	45H-7R15H PATD	626	BE
1	Closer w/ Stop & Hold	8916 ISH	689	DM
1	Kick Plate	K0050 8" x 2" LDW B4E CSK	630	TR
1	Mop Plate	KM050 6" x 1" LDW B4E CSK	630	TR
1	Perimeter Gaskets	5050C x LAR		NA

Set #27

Doors: 131, 118B, 124B, 128B, 129B

3	Full Mortise Hinge	CB179 4.5" x 4.5"	26D	ST
1	Semi-Auto Flush Bolt	3825L	626	TR
	NOTE: (Top mounted on Inactive Leaf)			
1	Lockset-Classroom	9K3-7R15C PATD	626	BE
2	Wall Bumper	1270CV	626	TR
	NOTE: (As required)			
1	Perimeter Gaskets	5050C x LAR		NA

Set #28

Doors: 334, 335

3	Full Mortise Hinge	CB179 4.5" x 4.5"	26D	ST
1	Lockset-Classroom	45H-7R15H PATD	626	BE
1	Closer w/ Stop	8916 IS	689	DM
1	Kick Plate	K0050 8" x 2" LDW B4E CSK	630	TR
1	Mop Plate	KM050 6" x 1" LDW B4E CSK	630	TR
1	Perimeter Gaskets	5050C x LAR		NA
1	Door Sweep	198 NA x LAR		NA
1	Saddle Threshold	513 x LAR	AL	NA

Set #29

Doors: 333

6	Full Mortise Hinge	CB179 4.5" x 4.5"	26D	ST
2	Manual Flush Bolt	3917-12	626	TR
1	Lockset-Classroom	45H-7R15H PATD	626	BE
2	Closer w/ Stop & Hold	8916 S-DST	689	DM
1	Coordinator	3094B2	Silver	TR
2	Mounting Bracket	3096	Silver	TR
2	Kick Plate	K0050 8" x 1" LDW B4E CSK	630	TR
2	Mop Plate	KM050 6" x 1" LDW B4E CSK	630	TR
1	Perimeter Gaskets	5050C x LAR		NA
2	Door Sweep	198 NA x LAR		NA
1	Saddle Threshold	513 x LAR	AL	NA
1	Astragal	By Metal Door Provider		BY

Set #30

Doors: 506A, 506B

6	Full Mortise Hinge	CB179 4.5" x 4.5"	26D	ST
1	Lockset-Classroom	45H-7R15H PATD	626	BE
2	Closer w/ Stop & Hold	8916 S-DST	689	DM
2	Kick Plate	K0050 8" x 1" LDW B4E CSK	630	TR
2	Mop Plate	KM050 6" x 1" LDW B4E CSK	630	TR
1	Perimeter Gaskets	5050C x LAR		NA

Set #31

Doors: 508B

3	Full Mortise Hinge	CB179 4.5" x 4.5"	26D	ST
1	Lockset-Communicating	45H-7G15H PATD	626	BE
1	Closer w/ Stop	8916 IS	689	DM
1	Kick Plate	K0050 8" x 2" LDW B4E CSK	630	TR
1	Wall Bumper	1270CV	626	TR
1	Perimeter Gaskets	5050C x LAR		NA

Set #32

Doors: 206, 223, 230, 232, 104, 117, 125, 126, 123A

3	Full Mortise Hinge	CB179 4.5" x 4.5"	26D	ST
1	Power Transfer	EPT-12C		PR
1	Electromechanical Lock	45HW-7DEU15H PATD C RQE	626	BE
1	Closer w/ Stop	8916 IS	689	DM
1	Kick Plate	K0050 8" x 2" LDW B4E CSK	630	TR
1	Mop Plate	KM050 6" x 1" LDW B4E CSK	630	TR
1	Wall Bumper	1270CV	626	TR
1	Perimeter Gaskets	5050C x LAR		NA
1	Wiring Harness	WH-50P		ST
1	Wiring Harness	WH-192P		ST
1	Power Supply-Access Control	By Access Control Provider		BY
1	Door Position Switch	By Access Control Provider		BY
1	Card Reader	By Access Control Provider		BY

NOTE: Presenting valid credential to card reader temporarily unlocks outside lever of electrified lockset, allowing entry. Door Position Switch monitors door status. Request-to-Exit Switch in lockset signals Access Control System for authorized opening of the door upon exiting. Door remains secure upon fire alarm or loss of power. Free egress is possible at all times. Coordinate wiring and electrical requirements with Electrical Contractor and Security Contractor.

Set #33

Doors: 200C, 233, 200B

3	Full Mortise Hinge	CB179 4.5" x 4.5"	26D	ST
1	Power Transfer	EPT-12C		PR
1	Electromechanical Lock	45HW-7DEU15H PATD C RQE	626	BE
1	Closer w/ Spr Stop	8916 S-DS	689	DM
1	Kick Plate	K0050 8" x 2" LDW B4E CSK	630	TR
1	Mop Plate	KM050 6" x 1" LDW B4E CSK	630	TR
1	Wall Bumper	1270CV	626	TR
1	Perimeter Gaskets	5050C x LAR		NA
1	Wiring Harness	WH-50P		ST
1	Wiring Harness	WH-192P		ST
1	Power Supply-Access Control	By Access Control Provider		BY
1	Door Position Switch	By Access Control Provider		BY
1	Push Button Release	By Access Control Provider		BY
	NOTE: (To be located @ Admin 201 and to control Dr.#200C)			
1	Card Reader	By Access Control Provider		BY

NOTE: Presenting valid credential to card reader temporarily unlocks outside lever of lockset, allowing entry. Door 200C may be released remotely by activating remote release switch. Door Position Switch monitors door status. Request-to-Exit Switch in lock set signals Access Control System for authorized opening of door upon exiting. Door remains secure upon fire alarm or loss of power. Free egress is possible at all times. Coordinate wiring and electrical requirements with Electrical Contractor and Security Contractor.

Set #34

Doors: 120, 121, 122

3	Full Mortise Hinge	CB179 4.5" x 4.5"	26D	ST
1	Power Transfer	EPT-12C		PR
1	Elec Lockset-Fail Safe	45HW-7WEL15H PATD C	626	BE
1	Closer w/ Stop	8916 IS	689	DM
1	Kick Plate	K0050 8" x 2" LDW B4E CSK	630	TR
1	Mop Plate	KM050 6" x 1" LDW B4E CSK	630	TR
1	Wall Bumper	1270CV	626	TR
1	Perimeter Gaskets	5050C x LAR		NA
1	Wiring Harness	WH-50P		ST
1	Wiring Harness	WH-192P		ST
1	Power Supply-Access Control	By Access Control Provider		BY
1	Door Position Switch	By Access Control Provider		BY

NOTE: Both sides of lockset are normally locked. Turning key in outside or inside cylinder retracts latch bolt. Door Position Switch monitors door status. Electric lock is fail-safe, and automatically unlocks levers on both sides upon fire alarm or loss of power. Free egress is only possible during fire alarm condition or loss of power. Coordinate wiring and electrical requirements with Electrical Contractor, Security Contractor and Fire Alarm Contractor.

Set #35

Doors: 330J, 330K, 407A

1	Continuous Hinge	HD1100A 83" EPT-Prep		NA
1	Power Transfer	EPT-12C		PR
1	Elec Lockset-Storeroom	45HW-7DEU15H PATD C RQE WS	626	BE
1	Closer w/ Spr Stop	8916 S-DS	689	DM
1	Kick Plate	K0050 8" x 2" LDW B4E CSK	630	TR
1	Perimeter Gaskets	2525 C x LAR		NA
1	Drip Cap	16 A x +4" ODW		NA
1	Door Sweep	101 VA x LAR		NA
1	Threshold	896 S x LAR	AL	NA
1	Wiring Harness	WH-50P		ST
1	Wiring Harness	WH-192P		ST
1	Power Supply-Access Control	By Access Control Provider		BY
1	Door Position Switch	By Access Control Provider		BY
1	Card Reader	By Access Control Provider		BY

NOTE: Presenting valid credential to card reader temporarily unlocks outside lever of lockset, allowing entry. Door Position Switch monitors door status. Request-to-Exit Switch in lock set signals Access Control System for authorized opening of door upon exiting. Door remains secure upon fire alarm or loss of power. Free egress is possible at all times. Coordinate wiring and electrical requirements with Electrical Contractor and Security Contractor.

Set #36

Doors: 228, 229, 417, 418, 510, 511, 512, 513, 110, 112

3	Full Mortise Hinge	CB191 4.5" x 4.5"	32D	ST
1	Push Plate	1001-9	630	TR
1	Pull Plate	1014-3B	630	TR
1	Closer w/ Stop	8916 IS	689	DM
1	Kick Plate	K0050 8" x 2" LDW B4E CSK	630	TR
1	Mop Plate	KM050 6" x 1" LDW B4E CSK	630	TR
1	Wall Bumper	1270CV	626	TR
1	Perimeter Gaskets	5050C x LAR		NA

Set #37

Doors: 205, 220, 422, 130

3	Full Mortise Hinge	CB179 4.5" x 4.5"	26D	ST
1	Privacy Set w/ Indicator	45H-0L15H VIB	626	BE
1	Closer w/ Stop	8916 IS	689	DM
1	Kick Plate	K0050 8" x 2" LDW B4E CSK	630	TR
1	Mop Plate	KM050 6" x 1" LDW B4E CSK	630	TR
1	Coat Hook	3072	630	TR
1	Wall Bumper	1270CV	626	TR
1	Door Sweep	198 NA x LAR		NA

1	Perimeter Gaskets	5050C x LAR		NA

Set #38

Doors: 214, 320, 324, 325, 105, 111, 113, 114

3	Full Mortise Hinge	CB179 4.5" x 4.5"	26D	ST
1	Privacy Set w/ Indicator	45H-0L15H VIB	626	BE
1	Kick Plate	K0050 8" x 2" LDW B4E CSK	630	TR
1	Mop Plate	KM050 6" x 1" LDW B4E CSK	630	TR
1	Coat Hook	3072	630	TR
1	Wall Bumper	1270CV	626	TR
1	Door Sweep	198 NA x LAR		NA
1	Perimeter Gaskets	5050C x LAR		NA

Set #39

Doors: 322, 323, 326, 327, 328

3	Full Mortise Hinge	CB179 4.5" x 4.5"	26D	ST
1	Privacy Set w/ Indicator	45H-0L15H VIB	626	BE
1	Kick Plate	K0050 8" x 2" LDW B4E CSK	630	TR
1	Mop Plate	KM050 6" x 1" LDW B4E CSK	630	TR
1	Wall Bumper	1270CV	626	TR
1	Door Sweep	198 NA x LAR		NA
1	Perimeter Gaskets	5050C x LAR		NA

Set #40

Doors: 428, 329, 331

3	Full Mortise Hinge	CB179 4.5" x 4.5"	26D	ST
1	Privacy Set w/ Indicator	45H-0L15H VIB	626	BE
1	Closer w/ Stop	8916 IS	689	DM
1	Kick Plate	K0050 8" x 2" LDW B4E CSK	630	TR
1	Mop Plate	KM050 6" x 1" LDW B4E CSK	630	TR
1	Coat Hook	3072	630	TR
1	Wall Bumper	1270CV	626	TR
1	Door Sweep	198 NA x LAR		NA
1	Perimeter Gaskets	5050C x LAR		NA
1	Saddle Threshold	513 x LAR	AL	NA

Set #41

Doors: 306

3	Full Mortise Hinge	CB179 4.5" x 4.5"	26D	ST
1	Privacy Set w/ Indicator	45H-0L15H VIB	626	BE
1	Closer w/ Stop	8916 IS	689	DM
1	Kick Plate	K0050 8" x 2" LDW B4E CSK	630	TR

1	Mop Plate	KM050 6" x 1" LDW B4E CSK	630	TR
1	Coat Hook	3072	630	TR
1	Wall Bumper	1270CV	626	TR
1	Door Sweep	198 NA x LAR		NA
1	Perimeter Gaskets	5050C x LAR		NA

Set #42

Doors: 225, 225B42

3	Full Mortise Hinge	CB179 4.5" x 4.5"	26D	ST
1	Lockset-Storeroom	45H-7D15H PATD	626	BE
1	Closer w/ Stop	8916 IS	689	DM
1	Kick Plate	K0050 8" x 2" LDW B4E CSK	630	TR
1	Door Sweep	198 NA x LAR		NA
1	Perimeter Gaskets	5050C x LAR		NA

Set #43

Doors: 426, 414A, 414B

3	Full Mortise Hinge	CB179 4.5" x 4.5"	26D	ST
1	Exit Device-Classroom	3RO FL 2108 X V4908A	630	PR
1	Rim Cylinder-Exit Trim	12E-72 PATD	626	BE
1	Closer w/ Spr Stop	8916 S-DS	689	DM
1	Kick Plate	K0050 8" x 2" LDW B4E CSK	630	TR
1	Door Sweep	198 NA x LAR		NA
1	Perimeter Gaskets	5050C x LAR		NA
1	Saddle Threshold	513 x LAR	AL	NA

Set #44

Doors: 100B

1	Continuous Hinge	HD1100A 83" EPT-Prep		NA
1	Power Transfer	EPT-12C		PR
1	Exit Device-Storeroom	3RO C MLR TDS 2403 36" NCA-03	630	PR
1	Door Pull	1191-4	630	TR
1	Rim Cylinder-Exit Trim	12E-72 PATD	626	BE
1	Closer w/ Spr Stop-Drop Brkt	8916 S-DS DP89	689	DM
1	Perimeter Gasketing	By Aluminum Door & Frame Provider		BY
1	Wiring Harness	WH-26P		ST
1	Wiring Harness	WH-192P		ST
1	Power Supply-Exit Device	RPSMLR2BB		PR
1	Power Supply-Access Control	By Access Control Provider		BY
1	Door Position Switch	By Access Control Provider		BY
1	Push Button Release	By Access Control Provider		BY
1	Card Reader	By Access Control Provider		BY

NOTE: Activating remote release switch or presenting valid credential to card reader retracts motorized latch bolt of electrified exit device, allowing entry. Door Position Switch monitors door

status. Request-to-Exit Switch in exit device signals Access Control System for authorized opening of the door upon exiting. Doors remain secure upon fire alarm or loss of power. Free egress is possible at all times. Coordinate wiring and electrical requirements with Electrical Contractor and Security Contractor.

Set #45

Doors: 400, 424

1	Continuous Hinge	HD1100A 83"		NA
1	Exit Device-Storeroom	3RO 2403 36" CD NCA-03	630	PR
1	Rim Cylinder-Exit Trim	12E-72 PATD	626	BE
1	Mortise Cyl-Cyl Dogging	1E-74 PATD C4	626	BE
1	Door Pull	1191-4	630	TR
1	Closer w/ Spr Stop-Drop Brkt	8916 S-DS DP89	689	DM
1	Perimeter Gasketing	By Aluminum Door & Frame Provider		BY
1	Drip Cap	16 A x +4" ODW		NA
1	Door Sweep	101 VA x LAR		NA
1	Threshold	896 S x LAR	AL	NA

Set #46

Doors: 507B, 415

1	Continuous Hinge	HD1100A 83"		NA
1	Exit Device-Classroom	3RO HC 2108 X V4908A CD	630	PR
1	Rim Cylinder-Exit Trim	12E-72 PATD	626	BE
1	Mortise Cyl-Cyl Dogging	1E-74 PATD C4	626	BE
1	Closer w/ Spr Stop-Drop Brkt	8916 S-DS DP89	689	DM
1	Kick Plate	K0050 8" x 2" LDW B4E CSK	630	TR
1	Door Sweep	101 VA x LAR		NA
1	Perimeter Gaskets	2525 C x LAR		NA
1	Threshold	896 S x LAR	AL	NA

Set #47

Doors: 507A

6	Full Mortise Hinge	CB179 4.5" x 4.5"	26D	ST
1	Exit Device-Exit Only	2201 CD LBR	630	PR
1	Exit Device-Classroom	2208 X V4908A CD LBR	630	PR
1	Rim Cylinder-Exit Trim	12E-72 PATD	626	BE
2	Mortise Cyl-Cyl Dogging	1E-74 PATD C4	626	BE
2	Closer w/ Stop & Hold	8916 S-DST	689	DM
2	Kick Plate	K0050 8" x 1" LDW B4E CSK	630	TR
1	Perimeter Gaskets	5050C x LAR		NA
1	Astragal Set	9115 A x LAR		NA

Set #48

Doors: 515A

6	Full Mortise Hinge	CB179 4.5" x 4.5"	26D	ST
2	Exit Device-Classroom	2208 X V4908A CD LBR	630	PR
2	Rim Cylinder-Exit Trim	12E-72 PATD	626	BE
2	Mortise Cyl-Cyl Dogging	1E-74 PATD C4	626	BE
2	Closer w/ Friction Hold Open	8916 FHP	689	DM
2	Kick Plate	K0050 8" x 1" LDW B4E CSK	630	TR
1	Perimeter Gaskets	5050C x LAR		NA
1	Astragal Set	9115 A x LAR		NA

Set #49

Doors: 330A, 330B, 330C, 330D, 330E, 330F, 330G, 330H, 405A, 405C, 406B, 406C, 407B, 409B, 421B, 425C, 425D, 426A, 426B, 430C, 430D, 430E, 430F

NOTE: Balance of hardware devices to hang, secure, close and gasket opening as supplied by Overhead Door Provider.

OPENING LIST

Police Station

Opening	Hdw Set
100A	01
100B	44
101	09
102	07
103A	07
103B	07
104	32
105	38
106	18
107A	14
107B	18
108	14
109	22
110	36
111	38
112	36
113	38
114	38
115	22
116	22
117	32
118A	11
118B	27
119	25
120	34
121	34
122	34

123A	32
123B	07
124A	11
124B	27
125	32
126	32
127	11
128A	11
128B	27
129A	11
129B	27
130	37
131	27

City Hall

Opening	**Hdw Set**
200A	02
200B	33
200C	33
201A	10
201B	10
203A	07
204A	14
204B	14
205	37
206	32
207	11
208	11
209A	08
209B	08
210	11
211	11
212	11
213	11
214	38
215	08
216	11
217	11
218	22
219	11
220	37
221	11
222	11
223	32
224	07
225	42
225B	42
226	19
227	11

228	36
229	36
230	32
231	11
232	32
233	33

Fire Station

Opening	**Hdw Set**
300	03
301	23
302	09
303	07
304A	25
304B	25
305	16
306	41
307	11
308	23
309	11
310	11
311	14
312	22
313	05
314	05
315	21
316	21
317	22
318	22
319	24
320	38
320A	23
320B	23
320C	06
322	39
323	39
324	38
325	38
326	39
327	39
328	39
329	40
330A	49
330B	49
330C	49
330D	49
330E	49
330F	49
330G	49

330H	49
330J	35
330K	35
331	40
332	19
333	29
334	28
335	28
336	15

Public Works

Opening	**Hdw Set**
400	45
401	11
402	11
403	25
404	11
405A	49
405B	18
405C	49
406A	18
406B	49
406C	49
407A	35
407B	49
408A	11
408B	13
409A	20
409B	49
410	11
411	14
412	11
413	14
414A	43
414B	43
415	46
416	22
417	36
418	36
419	19
420	14
421A	14
421B	49
422	37
423	09
424	45
424B	14
425A	18
425B	18

425C	49
425D	49
426	43
426A	49
426B	49
427	15
428	40
429	12
430A	18
430B	18
430C	49
430D	49
430E	49
430F	49
431	18
432	19

Community Center

Opening	**Hdw Set**
500	02
501	09
502	09
503	04
504	14
505	25
506A	30
506B	30
507A	47
507B	46
508A	25
508B	31
509	14
510	36
511	36
512	36
513	36
514	04
515A	48
515B	04
515C	04
516A	26
516B	26
517	26
518	21
519	14
520	19
521A	19
521B	17

END OF SECTION 08 71 00

DIVISION 26

ELECTRICAL

SECTION ~~16992~~ 260800 – COMMISSIONING OF ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Requirements for the CONTRACTOR to provide commissioning and installation services.

B. Requirements for the CONTRACTOR to provide labor, materials, tools, and testing equipment to commission controls, networking, and communications related equipment and systems.

C. Requirements for the CONTRACTOR to perform associated testing of electrical systems, wiring, equipment, and grounding.

1.03 CITED STANDARDS

A. National Fire Protection Association (NFPA):
   1. 70, National Electrical Code (NEC)
   2. 70E Standard for Electrical Safety in the Workplace 2012

B. The Institute of Electrical and Electronics Engineers (IEEE)

C. International Society of Automation (ISA)

1.04 NOTED RESTRICTIONS

A. Commissioning of any system shall not begin until permission is granted by the ENGINEER and OWNER.

B. Comply with NFPA 70E.

C. The OWNER shall have the option to witness and participate in the entire commissioning and integration process.

1.05 QUALITY CONTROL

A. The Integrator shall submit weekly and monthly commissioning progress reports to the ENGINEER. The report formats shall be developed by the Integrator.

B. Test Equipment Traceability:
   1. The Integrator shall have a calibration program which maintains applicable test instrumentation and equipment within rated accuracy and within their calibration time limits.
   2. Equipment and instruments used to evaluate electrical performance shall be calibrated to a secondary standard traceable to the National Institute of Standards and Technology (NIST).
   3. Test equipment operating instructions and procedures shall be with the test equipment.
   4. A copy of test equipment calibration certificate or calibration sticker must be with equipment at all times to be available for inspection.

1.06 SUBMITTALS

A. The following submittals shall be made during commissioning:
   1. Progress reports

B. A commissioning report shall be submitted upon the completion of commissioning activities to notify the OWNER and ENGINEER of the milestone and the readiness for Site Acceptance Testing (SAT). The commissioning report shall include, but not be limited to, the following:
   1. Completed commissioning checklists
   2. Completed punch lists
   3. Calibration data sheets
   4. Drawings and manuals
   5. Training

PART 2 – PRODUCTS

2.01 GENERAL

A. Where equipment is to be retained but rewired that equipment and associated wiring shall be subjected to testing new equipment and wiring procedures.

B. The start-up service personnel must follow job site electrical safety requirements, installation standards and electrical testing standards. Adhere to OSHA safety practices for the entirety of commissioning.

C. OWNER designated representatives may witness all integrated system commissioning activities.

D. In addition to the requirements of this section, the installation and commissioning will comply with all applicable requirements of the RFP.

2.02 PRODUCT NAME

A. A partial list of systems and equipment to be commissioned shall include but not limited to:
   1. Panel devices
   2. All modifications and associated devices
   3. PLC
   4. OIT
   5. Communication equipment
   6. Remote Access for pump station monitoring data
   7. Graphic Displays in OIT

PART 3 – EXECUTION

3.01 GENERAL

A. The commissioning and installation shall be considered complete by the ENGINEER upon successful installation of control equipment and execution of the commissioning requirements listed herein. The Integrator shall be granted permission to begin the Site Acceptance Testing.

B. CONTRACTOR shall be responsible for any damage to equipment or material due to improper testing or commissioning and shall replace or restore to original condition any damaged equipment or material.

C. All systems, equipment, and rooms shall be commissioned in a complete manner as possible to ensure a complete working control system, network and communication system.

D. The intent of commissioning is to start-up equipment or systems and prepare them for performance site acceptance testing. Care should be taken to ensure continuous and reliable operation of the booster pumping station systems at all times.

E. Commissioning of all systems listed to include but not be limited to:
   1. All wire, cable, equipment, and systems installed or connected under control systems upgrade contract shall be tested to assure proper installation, setting, connection, and functioning in accordance with the drawings, specifications, and the manufacturer's recommendations. The intent herein is that field testing be extensive and complete as specified, to provide assurance of correct installation and operation of equipment.
   2. All tests and inspections recommended by the equipment manufacturer shall be included, whether required by these specifications or not, unless specifically waived in writing by the ENGINEER.

3.02 COMMISSIONING AND SYSTEM INTEGRATION

A. Commissioning shall be performed with all inter-related systems operating. In general, integrated system commissioning shall be operated through all modes of

operation (normal, emergency, interruption to the incoming services, manual operations). Verification of each mode in the sequences of operation is required.

B. If a problem is detected while conducting commissioning, the problem will be identified and reported to the CONTRACTOR for diagnosis and correction. The failed portion shall be repeated after the repairs are completed.

C. A combination punch list/checklist shall be maintained by the Integrator in spreadsheet format to monitor and track equipment commissioning and installation. The spreadsheet shall be an integral part of the weekly report documentation and must be included with final report.

3.03 CERTIFICATION

A. Notification of Completion of Work
   1. Prior to acceptance of Work, the OWNER shall request from the CONTRACTOR a written notification certifying that:
      a. Work has been completed in accordance with Contract Documents.
      b. Work has been inspected for compliance with Contract Documents.
      c. Work is ready for final inspection and site acceptance testing.

B. Final Walk-Thru
   1. After receipt of the notification of completion of work, the ENGINEER or Project Manager will conduct a final walk-thru with the participation of the OWNER, CONTRACTOR, ENGINEER and other appropriate project team members to verify the status of the completion

C. Final Punch List
   1. Should the ENGINEER consider that the Work is incomplete or defective:
      a. The OWNER will notify the CONTRACTOR in writing, by form of a final punch list, listing the incomplete or defective Work.
      b. The CONTRACTOR will take immediate steps to remedy the stated deficiencies and send a second or subsequent written certification to the ENGINEER stating that the Work is complete.
      c. The ENGINEER or Project Manager will re-inspect the Work.
   2. Upon satisfaction that all the work is complete and all items in the Final Punch List addressed to the satisfaction of the ENGINEER, the OWNER and CONTRACTOR will sign-off on the final punch list indicating concurrence that the work is complete.

D. Manuals and Records
   1. After final walk-thru and sign-off on the final punch list have been achieved the CONTRACTOR releases to the OWNER the following manuals and records kept, updated and/or developed during the project:
   2. Final documentation as specified in Section 16900.
   3. Training session forms.
   4. Copies of all punch lists.

3.04 TRAINING

A. After the completion of commissioning and installation, designated OWNER personnel shall be trained in the operation and maintenance of all equipment and systems related to the project.

B. Training shall consist of a formal one (1) day session wherein all procedures necessary to operate and maintain equipment and systems on a continuing basis are explained in full detail. Hands-on operations and maintenance tasks shall be executed to ensure that all aspects of the training are fully understood.

C. Training shall be conducted on-site by the CSI and shall be offered to accommodate up to twelve (12) persons.

D. Training times shall be determined and coordinated by the OWNER.

END OF SECTION 16992