

1.13 SAFETY AND HEALTH REQUIREMENTS

- A. The Contractor shall comply in every respect with all Federal, State and local safety and health regulations. Copies of the Federal Regulations may be obtained from the U.S. Department of Labor, Occupational Safety and Health Administration.
- B. The Contractor shall provide all barricades and flashing warning lights or other devices necessary to warn pedestrians and area traffic.
- C. Personnel working in contact with sewage flow or surfaces carrying wastewaters or sludges shall be immunized as recommended by the State of Florida Health Department.

1.14 ULTIMATE DISPOSITION OF CLAIMS BY ONE CONTRACTOR ARISING FROM ALLEGED DAMAGE BY ANOTHER CONTRACTOR

- A. During the progress of the work, other Contractors may be engaged in performing other work or may be awarded other Contracts for additional work on this project. In that event, the Contractor shall coordinate the work to be done hereunder with the work of such other Contractors and the Contractor shall fully cooperate with such other Contractors and carefully fit its own work to that provided under other Contracts as may be directed by the City. The Contractor shall not commit or permit any act which will interfere with the performance of work by any other Contractor.
- B. If the Engineer determines that the Contractor is failing to coordinate his work with the work of the other Contractors as the City directed, then the City shall have the right to withhold any payments otherwise due hereunder until the Contractor completely complies with the City's directions.
- C. If the Contractor notifies the Engineer in writing that another Contractor is failing to coordinate his work with the work of this Contract as directed, the Engineer will promptly investigate the charge. If the Engineer finds it to be true, the City will promptly issue such directions to the other Contractor with respect thereto as the situation may require and issue a response to the Contractor in writing. The City, the Engineer, nor any of their agents shall not, however, be liable for any damages suffered by the Contractor by reason of the other Contractor's failure to promptly comply with the directions so issued by the City, or by reason of another Contractor's default in performance, it being understood that the City does not guarantee the responsibility or continued efficiency of any Contractor.

1.15 LIMITS OF WORK AREA

- A. The Contractor shall provide for the storage of equipment, materials, and accumulated construction debris off-site. Responsibility for protection and safekeeping of equipment and materials at or near the sites will be solely that of the Contractor and no claim shall be made against the City by reasons of any act of an employee or trespasser.
- B. The Contractor shall secure all storage areas used for the project work. If required, Contractor shall submit a temporary fencing plan and permits for all storage areas used for the project work.
- C. The Contractor shall provide a phasing and staging plan that results in minimal impact to the site and nearby residences and provides for continual pedestrian and vehicular access.

1.16 WEATHER CONDITIONS

- A. No work shall be done when the weather is unsuitable. The Contractor shall take necessary precautions (in the event of impending severe weather, including hurricanes, tropical storms or major rain/wind storms) to protect all work, materials, or equipment from damage or deterioration due to floods, driving rain, and/or wind. The City reserves the right, to order that additional protection measures over and beyond those proposed by the Contractor, be taken to safeguard all components of the Project.
- B. The mixing and placing of concrete or pavement courses, the laying of masonry, and installation of sewers and water mains and stormwater pipes shall be stopped during rainstorms, if ordered by the Engineer; and all freshly placed work shall be protected by canvas or other suitable covering in such manner as to prevent running water from coming in contact with it. Sufficient coverings shall be provided and kept ready at hand for this purpose. The limitations and requirements for mixing and placing concrete or laying of masonry, in cold weather shall be as described elsewhere in these Specifications.

1.17 WEATHER DAYS

- A. A "Weather Day" is defined as a normal work day during which the Contractor was unable to perform critical path work for a continuous period of more than four (4) hours during that day.
- B. The Contractor shall be required to submit a record of rain delay in accordance with the contract documents and within 48 hours of the occurrence of the event to the Engineer and the Owner for review.
- C. Weather Days must be reported in the Progress Schedule Update Narrative Report and substantiated with the amount of rainfall obtained from the nearest City identified rain gauge and a description of the activity that was interrupted.

1.18 HURRICANE PRECAUTIONS

- A. During such periods of time as are designated by the United States Weather Bureau as being a hurricane watch or warning, the Contractor, at no cost to the City, shall take all precautions necessary to secure the Project site in response to all threatened storm events.
- B. Compliance with any specific hurricane watch or warning precautions will not constitute additional work.
- C. Suspension of the Work caused by an impending or actual storm event will entitle the Contractor to additional Contract Time equivalent to the time lost as a result of the threatened or actual storm event and shall not give rise to a claim for compensable delay.
 - 1. In the event of a threatened storm that does not occur, the Contract Time will be equivalent to the time between United States Weather Bureau notice of a watch or warning and the lifting of same.

2. In the event of an actual storm event, the Contract Time will be equivalent to the time between United States Weather Bureau notice of a watch or warning and the time required to establish safe working conditions.

1.19 USE OF FACILITIES BEFORE COMPLETION

- A. The City reserves the right to enter and use any portion of the constructed facilities before final completion of the whole work to be done under this Contract. However, only those portions of the facilities which have been completed to the City's satisfaction may be placed into service. The City will issue only one Certificate of Substantial Completion to the Contractor covering the entire project regardless of when each portion of the facilities is placed into service.
- B. It shall be the City's responsibility to prevent premature connections to or use of any portion of the installed facilities by private or public parties, persons or groups of persons, before the City issues his Certificate of Substantial Completion covering that portion of the work to be placed in service.
- C. Consistent with the approved progress schedule, the Contractor shall cooperate with the City to accelerate completion of those facilities, or portions thereof, which have been designated for early use by the City.

1.20 UTILITY LOCATIONS

- A. As far as possible, all existing utility lines in the project area have been shown on the plans. However, Fort Lauderdale does not guarantee that all lines are shown, or that said lines are in their true location. It shall be the Contractor's responsibility to identify and locate all underground or overhead utility lines or equipment affected by the project. No additional payment will be made to the Contractor because of discrepancies in actual and plan location of utilities.
- B. The Contractor shall notify each utility company involved at least thirty (30) days prior to the start of construction to arrange for positive underground location, relocation, or support of its utility where that utility may be in conflict with or endangered by the proposed construction. Relocation of water mains or other utilities for the convenience of the Contractor shall be paid for by the Contractor. All charges by utility companies for temporary support of its utilities shall be paid for by the Contractor. All cost of permanent utility relocations to avoid conflict shall be the responsibility of the Contractor and the utility company involved.
- C. The Contractor shall schedule and coordinate the Work in such a manner that it is not delayed by the utility companies relocating or supporting their utilities. No compensation will be paid to the Contractor for any loss of time or delay.
- D. All overhead, surface or underground structures and/or utilities encountered are to be carefully protected from damage or displacement. All damage to said structures and/or utilities is to be completely repaired within a reasonable time; needless delay will not be tolerated. The City reserves the right to remedy any damage by ordering outside parties to make repairs at the expense of the Contractor. All repairs made by the Contractor are to be made to the satisfaction of the utility owner and shall be inspected by a representative of the utility owner and the Engineer.

- E. The Contractor should be aware of the Sunshine State One Call Center, which has a free locating service for contractors and excavators:
 - 1. Within forty-eight hours before excavating, dial toll free 811, and a locator will be dispatched to the Work location. Contractor shall reasonably notify other utility companies not notified by Sunshine State One Call Center.
- F. In the event that during the course of the Work Contractor encounters subsurface or concealed conditions or unknown physical conditions of an unusual nature at the Project site which differ materially from those shown on the Contract Documents, which are not marked in the field by locating services or Utility Department, and which differ from those ordinarily encountered and generally recognized as inherent in Work of the character called for in the Contract Documents, Contractor, without disturbing the conditions and before performing any Work affected by such conditions, shall, within twenty-four (24) hours of their discovery, notify City and Engineer in writing of the existence of the aforesaid conditions. Engineer and City shall, within two (2) business days after receipt of Contractor's written notice, investigate the site conditions identified by Contractor. Should Engineer determine that the conditions of the Project site are not so materially different to justify a change in the terms of the Contract, Engineer shall so notify City and Contractor in writing, stating the reasons, and such determination shall be final and binding upon the parties hereto.
- G. No request by Contractor for a change to the Contract Price or Time under this provision shall be allowed if the Contractor has not given written notice in strict accordance with these provisions, or if it is made after the date certified by the Engineer as the date of Substantial Completion.

1.21 ENVIRONMENTAL PROTECTION

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

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

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SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 THE REQUIREMENT

- A. Payment for various items of the Bid Schedule, as further specified herein, shall include all compensation to be received by the Contractor for furnishing all tools, equipment, supplies, and manufactured articles, and for all labor operations and incidentals appurtenant to the items of work being described, as necessary to complete the various items of the Work all in accordance with requirements of the Contract Documents, including all appurtenances thereto, and including all costs of permits and cost of compliance with the regulations of public agencies having jurisdiction, including Safety and Health Requirements of the Occupational Safety and Health Administration of the U.S. Department of Labor (OSHA). No separate payment will be made for any item that is not specifically set forth in the Bid Schedule, and all costs therefore shall be included in the prices named in the Bid Schedule for the various appurtenance items of work.

- B. Payment for the various items of the Bid Schedule shall constitute full compensation for Contractor's superintendent at the job site full-time during construction, for furnishing and installing all pipe and structures complete in place including but not limited to bends, tees, outlets, fittings, blind flanges and specials, including connections to existing pipelines shown on the Drawing; including surveying both horizontal and vertical control for construction of the roadways, structures, pipeline and appurtenances; including all earthwork, excavation (including rock) as shown on the Drawing, removal and disposal of waste, unsuitable and excess material, furnishing and installing pipe bedding material, all backfill and compaction of native material, and dewatering and necessary bypass pumping and/or diverting flow as required; including potholing to verify locations of existing utilities in advance of construction; the restoration of interfering portions of existing service and utility lines that are not included in other bid items and shown on the Drawing, including replacement of sewer lines with ductile iron pipe where the minimum vertical clearances are not met for the sewer line shown; restraint of pipe shown on the Drawing and grouting of pipe joints; including providing the water for pressure testing, cleaning the pipe and disinfection (for potable water mains), and disposal of the water as required when completed; furnishing, installation, and removal of test heads, cleanup; and restoration of all improvements incidental to construction for which there are no other bid items; including but not limited to, sprinkler systems, drainage systems, guardrails, landscaping, fences, curbs and gutters, and all other work not included in other bid items.

- C. Payment shall also include providing the necessary equipment and labor to pothole and verify depths and locations of existing utilities at least two weeks ahead of construction to avoid conflicts with the design alignment and grade of the proposed infrastructure. Conflicts with utilities shown on the Drawing which result from the Contractor's negligence to pothole sufficiently ahead of construction (a minimum of two days ahead of construction of the pipeline or as approved by the Engineer) shall be resolved by the Contractor at no additional cost to the Owner. Unmarked utilities damaged during construction will be paid under unit prices in the Bid Package for similar work, if and as approved by the Engineer.

- D. Payment for all bid items shall constitute full compensation for the complete installation of each bid item including but not limited to excavation (including rock), dewatering and necessary bypass pumping and/or diverting flow, backfill and compaction. The work shall include for all bid items to be completed, tested and ready for acceptance by the appropriate government agency.
- E. No separate payment for pavement restoration will be made unless specifically shown on the plans or directed by the Engineer. All bid items shall include pavement restoration.
- F. The Contractor's attention is called to the fact that the quotations for the various items of Work are intended to establish a total price for completing the Work in its entirety. Should the contractor feel that the cost for any item of Work has not been established by the Schedule of Prices Bid for this Section, it shall include the cost for that Work in some other applicable bid item, so that its proposal for the project does reflect its total price for completing the Work in its entirety.

1.02 MEASUREMENT - GENERAL

- A. Weighing, measuring, and metering devices used to measure quantity of materials for Work shall be suitable for purpose intended and conform to tolerances and Specifications as specified in National Institute of Standards and Technology, Handbook 44.
- B. Materials that are specified for measurement by the cubic yard measured in the vehicle shall be hauled in vehicles of such type and size that actual contents may be readily and accurately determined. Unless all vehicles are of uniform capacity, each vehicle must bear a plainly legible identification mark indicating its water level capacity. Vehicles shall be loaded to at least their water level capacity. Loads hauled in vehicles not meeting above requirements or loads of a quantity less than the capacity of the vehicle, measured after being leveled off as above provided, will be subject to rejection, and no compensation will be allowed for such material.
- C. Where measurement of quantities depends on elevation of existing ground, elevations obtained during construction will be compared with those shown on Drawing. Variations of 1 foot or less will be ignored, and profiles shown on Drawing will be used for determining quantities. Variations greater than one foot will be considered in adjusting quantities.
- D. Units of measure shown on Bid Form shall be as follows, unless specified otherwise. All methods of measurement shall be approved by the City.

Item	Method of Measurement
AC	Acre – Field Measure or Calculation based on survey
AL	Allowance
CY	Cubic Yard - Field Measure within limits specified or shown, or measured in vehicle by volume, as specified
EA	Each - Field Count

Item	Method of Measurement
GAL	Gallon - Field Measure
HR	Hour
LB	Pound(s) - Weight Measure
LF	Linear Foot - Field Measure
LOT	Each Lot
LS	Lump Sum - Unit is one; no measurement will be made
SF	Square Foot
SY	Square Yard
TON	Ton - Weight Measure by Scale (2,000 pounds)

1.03 SCHEDULE OF PRICES BID

A. General Payment Items

1. Item 1 – All Work Associated with the Mobilization and Demobilization (7.5%): The lump sum price for this item shall be full compensation for mobilization and demobilization activities. This includes, but is not limited to, Performance and Payment Guarantee and insurance, scheduling, project coordination, Contractor staging area, Contractor and Engineer Field Offices, labor associated with permit acquisition, temporary facilities, audio-visual documentation of the existing conditions (sidewalks, curbs, driveways, fences, vegetation, pavement markings, etc.), distribution of flyers to the affected residents and businesses, project signs, finish grading, site cleanup and site restoration, and all other activities necessary to prepare and complete the contract work. The payment for mobilization and demobilization shall not exceed 7.5% of the sum of Bid Item Nos. 5 through 105. Partial payments for mobilization and demobilization shall be made as follows:

Construction % Complete	Allowable % of Lump Sum for Mobilization/Demobilization
After NTP	2.5
10	22.5
25	50
50	75
100	100

2. Item 2 – All Work Associated with the Maintenance of Traffic: The lump sum price for this item shall be full compensation for all labor, equipment, material, and work required for maintenance of traffic in accordance with FDOT Standards and/or

Broward County and/or the City of Fort Lauderdale. This item includes, but is not limited to, preparation and submittal of maintenance of traffic plans (MOTs), addressing comments regarding MOTs from agencies with jurisdiction, providing personnel as required to direct traffic (flaggers, crossing guards, local police, etc.), all temporary signage and striping, message boards, barricades, temporary barrier walls, drums, cones, providing signs, lights, installing temporary fencing and walkways as required to maintain pedestrian traffic, installing temporary steel plates for vehicular traffic and all other work incidental to the maintenance of traffic as required by FDOT Standards and/or Broward County and/or the requirements of the City of Fort Lauderdale and the Contract Documents.

3. Item 3 – All Work Associated with the GIS Database Additions and Record Drawings: The lump sum price for this bid item shall be full compensation for the preparation and addition of the proposed infrastructure data to the existing City GIS Database, This includes but not be limited to all necessary adjustments to the implemented data to create a seamless addition to the existing infrastructure, and preparation and submittal of Record Drawings in accordance with the Contract Documents. See Section 01320 for complete description of Record Drawing submittal.
4. Item 4 – All Work Associated with the Prevention, Control, & Abatement of Erosion and Water Pollution: The lump sum price indicated for this bid item shall be full compensation for all labor, equipment, and material necessary for preparation, submittal, approval, and implementation of the NPDES Permit Application (Notice of Intent and Notice of Termination), reporting by a person holding a certification as an FDEP NPDES Construction Site Inspector, preparing a Stormwater Pollution Prevention Plan (SWPPP) and implementation of Best Management Practices (BMP) and environmental pollution protection throughout construction as outlined in the Contract Documents and required by the City.

B. Pump Station

1. Item 5 – Stormwater Pump Station: The lump sum price for this item shall be full compensation for all labor, equipment, and material for all work necessary and required for the construction of the Stormwater Pump Station (inside the fence) as required in the Contract Documents. This item includes, but is not limited to, all general, civil, mechanical, structural, electrical and control building, generator, electrical, instrumentation and control, testing of all materials and equipment associated with the pump station construction., startup services, removal of existing fence, and sitework required for a complete and operable system. This item includes all work not defined in other bid items for the project.
2. Item 6 – Vibration and Noise Monitoring Pump Station: The lump sum price for this item shall be full compensation for all labor, equipment, and material for all work necessary and required for vibration monitoring during the Stormwater Pump Station construction as required in the Contract Documents. This item includes, but is not limited to, all general, generator, electrical, and equipment required for vibration and noise monitoring. This item includes all work not defined in other bid items for the project.

C. Drainage

1. Item 7 – Remove and Dispose of Existing Drainage Structure: The unit price for this item shall be full compensation for all labor, equipment, and material required to remove and dispose of existing drainage structures on a per unit basis. This item includes, but is not limited to, locating, verifying, and protecting existing utilities, saw cutting and removing existing paving and sidewalks, curbing, excavating, dewatering and necessary bypass pumping and/or diverting flow, installing temporary sheeting and shoring, removing and disposing of unsuitable material, removal and disposal of existing drainage structure, backfilling and compacting fill material, placing structural asphalt, providing temporary restoration including pavement and temporary asphalt, pavement markings and striping, and all associated restoration work.
2. Item 8 – Remove and Dispose of Existing Drainage Pipe & Exfiltration up to 24” Diameter: The unit price for this item shall be full compensation on a per linear foot basis for all labor, equipment, and material required to remove and dispose of existing storm drainpipes. This item includes, but is not limited to, locating, verifying and protecting existing utilities, saw cutting and removing existing paving and sidewalks, curbing, excavating, dewatering and necessary bypass pumping and/or diverting flow, installing temporary sheeting and shoring, removing and disposing of unsuitable material, removal and disposal of existing pipe, backfilling and compacting fill material, placing structural asphalt, providing temporary restoration including pavement and temporary asphalt, pavement markings and striping, and all associated restoration work.
3. Items 9 through 20 – Furnish and Install Catch Basins: The unit price for this item shall be full compensation for all labor, equipment, and materials required to furnish and install catch basins all in accordance with the Contract Documents on a per unit basis. This item includes, but is not limited to, locating, verifying, and protecting existing utilities, saw cutting and removing of existing pavement and sidewalks, curbing, excavating (including rock), dewatering and necessary bypass pumping and/or diverting flow, installing temporary sheeting and shoring, removing and disposal of unsuitable material, removing and disposal of plants, shrubs/bushes, and trees, temporary bracing of existing adjacent structures, construction and installation of the reinforced concrete catch basins, plugged openings (bricks and expanding grout as approved by Engineer), backfill and compaction, base pad, mud work, frames, grates, rims, covers, sealing pipe inlets and outlet, concrete top slabs, all appurtenant items, and associated restoration work.
4. Items 21 through 33 – Furnish and Install Manholes: The unit price for this item shall be full compensation for all labor, equipment, and materials required to furnish and install manholes, including conflict manholes, all in accordance with the Contract Documents on a per unit basis. This item includes, but is not limited to, locating, verifying, and protecting existing utilities, saw cutting and removing of existing pavement and sidewalks, curbing, excavating (including rock), dewatering and necessary bypass pumping and/or diverting flow, installing temporary sheeting and shoring, removing and disposal of unsuitable material, removing and disposal of plants, shrubs/bushes, and trees, temporary bracing of existing adjacent structures, construction and installation of the reinforced concrete manholes, plugged openings (bricks and expanding grout as approved by Engineer), backfill and compaction, base pad, corbel tops, mud work, filter fabric, frames, rims, covers, rain guards, all appurtenant items, and associated restoration work.

5. Item 34 – Furnish and Install Concrete Collar for Catch Basin: The unit price for this item shall be full compensation for all labor, equipment, and materials required to furnish and install concrete collars for catch basins all in accordance with the Contract Documents on a per unit basis. This item includes, but is not limited to, saw cutting and removing of existing pavement and sidewalks, curbing, excavating (including rock), dewatering and necessary bypass pumping and/or diverting flow, removal and disposal of unsuitable materials, removing and disposal of plants, shrubs/bushes, and trees, compaction, stabilization of subgrade, formwork, furnishing and setting expansion joint material, concrete, backfilling, disposal of excess material, removing and disposal of plants, shrubs/bushes, and trees, all appurtenant items and associated restoration work.

6. Item 35 – Furnish and Install Asphalt Collar for Catch Basin: The unit price for this item shall be full compensation for all labor, equipment, and material required to furnish and install asphalt collars for catch basins all in accordance with the Contract Documents on a per unit basis. This item includes, but is not limited to, saw cutting and removing of existing pavement and sidewalks, curbing, excavating (including rock), dewatering and necessary bypass pumping and/or diverting flow, removal and disposal of unsuitable materials, removing and disposal of plants, shrubs/bushes, and trees, compaction, stabilization of subgrade, limerock base, primer, tack coat, cleaning of existing pavement, installation of asphalt as shown on the Contract Documents, backfilling, disposal of excess material, removing and disposal of plants, shrubs/bushes, and trees, all appurtenant items and associated restoration work.

7. Items 36 through 43 – Furnish and Install High Performance Polypropylene Storm Pipe Drainage Pipe: The unit price for this item shall be full compensation on a per linear foot basis for all labor, equipment, and material required to furnish, transport, store, and install high performance polypropylene storm pipe all in accordance with the Contract Documents. The item includes, but it is not limited to, locating, verifying, and protecting existing utilities, saw cutting and removing of existing pavement and sidewalks, excavating (including rock), dewatering and necessary bypass pumping and/or diverting flow, necessary bypass pumping and/or diverting flow, installing temporary sheeting and shoring, removing and disposal of unsuitable material within and below the pipe trench, removing and disposal of plants, shrubs/bushes, and trees, joint material, pipe bedding, backfilling and compacting fill material, providing temporary restorations including pavement and pavement markings and striping, pipe flushing, all testing, all appurtenant items, and associated incidental restoration work. Drainage pipe installed at depths greater than (10) feet are noted as such in the bid item description. Measurement for payment shall be the linear feet of pipe installed along the horizontal centerline of the pipe in place, not including through structures, all in accordance with the requirements of the Contract Documents.

8. Items 44 – Furnish and Install 72-inch RCP Drainage Pipe: The unit price for this item shall be full compensation on a per linear foot basis for all labor, equipment, and material required to furnish, transport, store, and install reinforced concrete pipe all in accordance with the Contract Documents. The item includes, but it is not limited to, locating, verifying, and protecting existing utilities, saw cutting and removing of existing pavement and sidewalks, excavating (including rock), dewatering and necessary bypass pumping and/or diverting flow, necessary bypass pumping and/or diverting flow, installing temporary sheeting and shoring, removing and disposal of unsuitable material within and below the pipe trench, removing and disposal of

plants, shrubs/bushes, and trees, joint material, pipe bedding, backfilling and compacting fill material, providing temporary restorations including pavement and pavement markings and striping, pipe flushing, all testing, all appurtenant items, and associated incidental restoration work. Drainage pipe installed at depths greater than (10) feet are noted as such in the bid item description. Measurement for payment shall be the linear feet of pipe installed along the horizontal centerline of the pipe in place, not including through structures, all in accordance with the requirements of the Contract Documents.

9. Item 45 through 47 – Furnish and Install Elliptical RCP Drainage Pipe: The unit price for this item shall be full compensation on a per linear foot basis for all labor, equipment, and material required to furnish, transport, store, and install elliptical reinforced concrete pipe all in accordance with the Contract Documents. The item includes, but it is not limited to, locating, verifying, and protecting existing utilities, saw cutting and removing of existing pavement and sidewalks, excavating (including rock), dewatering and necessary bypass pumping and/or diverting flow, necessary bypass pumping and/or diverting flow, installing temporary sheeting and shoring, removing and disposal of unsuitable material within and below the pipe trench, removing and disposal of plants, shrubs/bushes, and trees, joint material, pipe bedding, backfilling and compacting fill material, providing temporary restorations including pavement and pavement markings and striping, pipe flushing, all testing, all appurtenant items, and associated incidental restoration work. Drainage pipe installed at depths greater than (10) feet are noted as such in the bid item description. Measurement for payment shall be the linear feet of pipe installed along the horizontal centerline of the pipe in place, not including through structures, all in accordance with the requirements of the Contract Documents.

10. Item 48 – Connect to an Existing Structure by Core Drilling or Removing Knockout Plug: The unit price for this item shall be full compensation for all labor, equipment, and materials required to core drill an existing structure and connect a proposed pipe all in accordance with the Contract Documents. This item includes, but is not limited to, locating, verifying, and protecting existing utilities, saw cutting and removing of existing pavement and sidewalks, curbing, excavating (including rock), dewatering and necessary bypass pumping and/or diverting flow, installing temporary sheeting and shoring, removing and disposal of unsuitable material, cleaning and desilting and sealing the existing structure, core drilling or removing the existing knockout plug where applicable, grouting, construction of the connection, temporary bracing of existing structures, mud work, backfilling and compacting fill material, temporary restoration including pavement and pavement markings and striping, testing, all appurtenant items, and associated incidental restoration work. This item does not cover connecting to an existing structure through an existing opening in the structure.

11. Item 49 – Connect an Existing Pipe to a New Structure: The unit price for this item shall be full compensation for all labor, equipment, and materials required to core drill the new structure and connect the existing pipe. This line items includes up to two connections on each new structure in accordance with the Contract Documents. This item includes, but is not limited to, locating, verifying, and protecting existing utilities, saw cutting and removing of existing pavement and sidewalks, curbing, excavating (including rock), dewatering and necessary bypass pumping and/or diverting flow, installing temporary sheeting and shoring, removing and disposal of unsuitable material, cleaning and desilting and sealing the existing structure, core drilling or

removing the existing knockout plug where applicable, grouting, construction of the connection, temporary bracing of existing structures, mud work, backfilling and compacting fill material, temporary restoration including pavement and pavement markings and striping, testing, all appurtenant items, and associated incidental restoration work.

12. Item 50 – Connect Proposed Pipe to Existing Pipe: The unit price for this item shall be full compensation for all labor, equipment, and materials required to connect a proposed pipe to an existing pipe all in accordance with the Contract Documents. This item includes, but is not limited to, locating, verifying, and protecting existing utilities, saw cutting and removing of existing pavement and sidewalks, curbing, excavating (including rock), dewatering and necessary bypass pumping and/or diverting flow, installing temporary sheeting and shoring, removing and disposal of unsuitable material, removal and disposal of portions of the existing pipe, construction of the connection, backfilling and compacting fill material, temporary restoration including pavement and pavement markings and striping, testing, all appurtenant items, and associated incidental restoration work.

D. Maintenance of Existing Drainage

1. Items 51 – Heavy Desilt / Water Jetting Existing Drainage Pipe 20-inch Diameter and smaller: The unit price for this item shall be full compensation on a per linear foot basis for all labor, equipment, and materials required to clean and televise the existing stormwater pipe within the project limits. This item includes, but is not limited to, initial field investigation to identify site conditions or access issues requiring special arrangements and/or City notification/coordination; system dewatering using plugs and hoses as needed along with necessary maintenance of traffic and safety precautions where the hoses cross streets or driveways; cleaning to remove foreign material from the sewer lines for clear viewing of the interior surface of the pipe during video inspection and to restore the sewer to near original carrying capacity; video documentation of the location and extent of displaced joints, cracks or breaks in pipe, and other defects that may permit groundwater infiltration and/or ingress of soil from around the exterior of pipe; and, submittal of video in digital format to the City. Payment shall be made at the unit price at the conclusion of cleaning/televising and after video is reviewed and accepted by the City. Measurement for payment for cleaning/televising of drainage pipe will be based upon the number of linear feet of such pipe as determined by measurement along the centerline of the pipe in place, not including through structures. The Contractor shall notify and provide documentation acceptable to the City if contaminated materials are suspected within the pipe.
2. Item 52 – Heavy Desilt / Water Jetting Existing Drainage Pipe (24-inch to 30-inch diameter): The unit price for this item shall be full compensation on a per linear foot basis for all labor, equipment, and materials required to clean and televise the existing stormwater pipe within the project limits on a per unit basis. This item includes, but is not limited to, initial field investigation to identify site conditions or access issues requiring special arrangements and/or City notification/coordination; system dewatering using plugs and hoses as needed along with necessary maintenance of traffic and safety precautions where the hoses cross streets or driveways; cleaning to remove foreign material from the sewer lines for clear viewing of the interior surface of the pipe during video inspection and to restore the sewer to near original carrying capacity; video documentation of the location and extent of

displaced joints, cracks or breaks in pipe, and other defects that may permit groundwater infiltration and/or ingress of soil from around the exterior of pipe; and, submittal of video in digital format to the City. Payment shall be made at the unit price at the conclusion of cleaning/televising and after video is reviewed and accepted by the City. Measurement for payment for cleaning/televising of drainage pipe will be based upon the number of linear feet of such pipe as determined by measurement along the centerline of the pipe in place, not including through structures. The Contractor shall notify and provide documentation acceptable to the City in the event that contaminated materials are suspected within the pipe.

3. Item 53 – Heavy Desilt / Water Jetting Existing Drainage Pipe (30-inch and greater diameter): The unit price for this item shall be full compensation on a per linear foot basis for all labor, equipment, and materials required to clean and televise the existing stormwater pipe within the project limits on a per unit basis. This item includes, but is not limited to, initial field investigation to identify site conditions or access issues requiring special arrangements and/or City notification/coordination; system dewatering using plugs and hoses as needed along with necessary maintenance of traffic and safety precautions where the hoses cross streets or driveways; cleaning to remove foreign material from the sewer lines for clear viewing of the interior surface of the pipe during video inspection and to restore the sewer to near original carrying capacity; video documentation of the location and extent of displaced joints, cracks or breaks in pipe, and other defects that may permit groundwater infiltration and/or ingress of soil from around the exterior of pipe; and, submittal of video in digital format to the City. Payment shall be made at the unit price at the conclusion of cleaning/televising and after video is reviewed and accepted by the City. Measurement for payment for cleaning/televising of drainage pipe will be based upon the number of linear feet of such pipe as determined by measurement along the centerline of the pipe in place, not including through structures. The Contractor shall notify and provide documentation acceptable to the City in the event that contaminated materials are suspected within the pipe.
4. Item 54 – Heavy Desilt / Water Jetting Existing Drainage Structure: The unit price for this item shall be full compensation on a per unit basis for each structure including all labor, equipment, and materials required to clean and televise the existing stormwater structure within the project limits on a per unit basis. This item includes, but is not limited to, initial field investigation to identify site conditions or access issues requiring special arrangements and/or City notification/coordination; system dewatering using plugs and hoses as needed along with necessary maintenance of traffic and safety precautions where the hoses cross streets or driveways; cleaning to remove foreign material from the sewer lines for clear viewing of the interior surface of the pipe during video inspection and to restore the sewer to near original carrying capacity; video documentation of the location and extent of displaced joints, cracks or breaks in pipe, and other defects that may permit groundwater infiltration and/or ingress of soil from around the exterior of pipe; and, submittal of video in digital format to the City. Payment shall be made at the unit price at the conclusion of cleaning/televising and after video is reviewed and accepted by the City. Measurement for payment for cleaning/televising of drainage structure will be based upon a unit price per each structure. The Contractor shall notify and provide documentation acceptable to the City in the event that contaminated materials are suspected within the pipe.

5. Items 55 – Heavy Desilt / Water Jetting and CCTV of Existing 72 Inch Drainage Pipe Drainage Structures from Broward Blvd to New River Outfall: The unit price for this item shall be full compensation on a per linear foot basis for all labor, equipment, and materials required to clean and televise the existing stormwater pipe within the project limits. This item includes, but is not limited to, initial field investigation to identify site conditions or access issues requiring special arrangements and/or City notification/coordination; system dewatering using plugs and hoses as needed along with necessary maintenance of traffic and safety precautions where the hoses cross streets or driveways; cleaning to remove foreign material from the sewer lines for clear viewing of the interior surface of the pipe during video inspection and to restore the sewer to near original carrying capacity; video documentation of the location and extent of displaced joints, cracks or breaks in pipe, and other defects that may permit groundwater infiltration and/or ingress of soil from around the exterior of pipe; and, submittal of video in digital format to the City. Payment shall be made at the unit price at the conclusion of cleaning/televising and after video is reviewed and accepted by the City. Measurement for payment for cleaning/televising of drainage pipe will be based upon the number of linear feet of such pipe as determined by measurement along the centerline of the pipe in place, not including through structures. The Contractor shall notify and provide documentation acceptable to the City if contaminated materials are suspected within the pipe.

E. Stormwater Force Main

1. Item 56 – Furnish and Install DIP Stormwater Force Main (30"): The unit price for this item shall be full compensation on a per linear foot basis for all labor, equipment, and material required to furnish, transport, store and install cement lined ductile iron stormwater force main and fittings as shown on the drawings and described herein for which payment is not provided under other bid items to be paid on a per unit basis. This item includes, but is not limited to, locating, verifying and protecting existing utilities, saw cutting and removing existing paving, sidewalks, curbing, excavating (including rock), dewatering and necessary bypass pumping and/or diverting flow, installing temporary sheeting, shoring, removing unsuitable material within and below the pipe trench, disposing of unsuitable material, installing the new pipe along with all restrained joints, tracer wire, joint material, and pipe bedding material, backfilling and compacting fill material, providing temporary restorations including pavement and pavement markings and striping, pipe flushing, pipe pigging, testing, and surveying. Measurement for payment shall be the linear feet of pipe installed with appurtenances as determined by measurement along the horizontal centerline of the pipe in place, through all fittings and valves, in accordance with the requirements of the Contract Documents. For partial payment, the schedule shall be as follows:
 1. - 75% of the unit price for pipeline installed, backfilled, and compacted to grade including pavement restoration up to and including the first lift of asphalt.
 - 2- 100% of the unit price upon completion of all testing and temporary restoration.
2. Item 57 - Furnish and Install 2" Air Release Valve with Vault. The unit price for this item shall be per unit basis for all labor, equipment, and material required to furnish, transport, store and installation of combination air release valves with underground

vaults and access lids at high points of force main; depicted in drawings but adjusted as needed to be at high point of stormwater force main. This item includes, but is not limited to, locating, verifying and protecting existing utilities, saw cutting and removing existing paving, sidewalks, excavating (including rock), dewatering and necessary bypass pumping and/or diverting flow, installing temporary sheeting, shoring, removing unsuitable material within and below the pipe trench, disposing of unsuitable material, installing the new air release valve vault and 2-inch ARV, and pipe bedding material, backfilling and compacting fill material, providing temporary restorations including pavement and pavement markings and striping, pipe flushing, pipe pigging, post-construction testing, and surveying.

F. Utility Relocations

1. Items 58 through 64 Furnish and Install Potable Water Main (Ductile Iron, Cement Lined, Restrained): The unit price for this item shall be full compensation on a per linear foot basis for all labor, equipment, and material required to furnish, transport, store and install ductile iron, cement lined potable water main and fittings as shown on the drawings and described herein for which payment is not provided under other bid items paid on a per unit basis. This item includes the cost of furnishing and installing pipe, fittings, and restraints. This item includes, but is not limited to, locating, verifying and protecting existing utilities, saw cutting and removing existing paving, sidewalks, curbing, excavating (including rock), dewatering and necessary bypass pumping and/or diverting flow, installing temporary sheeting, shoring, removing unsuitable material within and below the pipe trench, disposing of unsuitable material, installing the new pipe along with all restrained joints, tracer wire installation, joint material, and pipe bedding material, backfilling and compacting fill material, providing temporary restorations including pavement and pavement markings and striping, pipe flushing, pipe pigging, main disinfection, testing, and surveying and removing and disposing of existing potable water main, wastewater mains, as well as other miscellaneous pipe. This item shall include cost of connecting to existing main, post restraining existing main as needed per City requirements, coordination and shut down of existing water mains, cutting, removal, and disposal of existing piping, and construction of the connection including all required pipe accessories not included in other bid items. Measurement for payment shall be the linear feet of pipe installed as determined by measurement along the horizontal centerline of the pipe in place, through all fittings and valves, in accordance with the requirements of the Contract Documents.. For partial payment, the schedule shall be as follows:

1. - 75% of the unit price for pipeline installed, backfilled, and compacted to grade including pavement restoration up to and including the first lift of asphalt.
- 2- 100% of the unit price upon completion of all testing and temporary restoration.

2. Items 65 - Furnish & Install Polyvinyl Chloride Gravity Sanitary Sewer (10"): Measurement for payment to furnish and install 10" PVC gravity sanitary sewer will be based upon linear feet of such sanitary sewer pipe furnished and installed to the depths as shown in the plans, and as determined by measurement along the horizontal centerline of the pipe in place, all in accordance with the requirements of the Contract Documents. Payment for furnishing and installing 10" PVC gravity

sanitary sewer will be made at the unit price each, named in the Bid Schedule which price shall constitute full compensation for the sanitary sewer pipe installed including but not limited to, locating, verifying and protecting existing utilities, saw cutting and removing existing paving, sidewalks, excavating (including rock), dewatering and necessary bypass pumping and/or diverting flow, installing temporary sheeting, shoring, providing temporary plugging and rerouting of existing sanitary sewer flows, cutting, removal and proper disposal of the existing sanitary sewer pipe, installation of new pipe complete with coupling devices, pipe bedding material, backfilling and compacting fill material, providing temporary restorations including pavement and pavement markings and striping, pipe cleaning, testing, and surveying.

3. Items 66 through 68 – Furnish and Install Gate Valves: The unit price for this item shall be full compensation for all labor, equipment, and material required to furnish, transport, store and install the restrained joint gate valves shown on the drawings to be paid on a per unit basis. This item includes, but is not limited to, coordination and shut down of existing mains, cutting removal and disposal of existing piping, furnishing and installing valve boxes, valve box extensions, operating nut extensions, restraining devices, excavation (including rock), removal and disposal of unsuitable material, dewatering and necessary bypass pumping and/or diverting flow, backfill, compaction, concrete collars, restoration, and any other items required for a complete and satisfactory installation. This item does NOT include installation of gate valves already paid for under other bid items.

4. Item 69 through 72 – Replace Existing Water Services: The unit price for this item shall be full compensation for all labor, equipment, and materials to replace an existing water service connection (single services and or double services to be) paid on a per unit basis. This item includes, but is not limited to, locating, verifying, and protecting existing utilities; saw cutting and removing of existing pavement and sidewalks, curbing; excavating, dewatering and necessary bypass pumping and/or diverting flow; reconnection to water main, tapping saddle and valve, corporation stop, saddles, service tubing, casing (for long side services), repair clamps, splicing, plugs, plugging existing corporation at main, pipe preparation; backfilling and compacting fill material; temporary restoration including pavement and pavement markings and striping; post-construction testing, all appurtenant items, and associated incidental restoration work. This item will be used for existing water services that must be relocated in order to facilitate the proposed stormwater improvements installation or existing water services that fail due to no fault of the Contractor. It will be the Contractor's responsibility to replace, at no additional cost to the City, existing water services damaged or broken due to lack of reasonable care during construction of the proposed improvements. Payment for this item will be made only as directed by the Engineer.

5. Item 73 – Replace Existing Sewer Laterals: The unit price for this item shall be full compensation for all labor, equipment, and materials to replace an existing sanitary sewer lateral (single service and double services) to be paid on a per unit basis. This item includes, but is not limited to, maintenance of existing service; locating, verifying, and protecting existing utilities; saw cutting and removing of existing pavement and sidewalks, curbing; excavating (including rock), dewatering and necessary bypass pumping and/or diverting flow, backfill, and compaction; removal and disposal of existing pipe and fittings; installation of piping, fittings, reconnection

to main and house service; temporary restoration including pavement and pavement markings and striping; testing, all appurtenant items, and associated incidental restoration work. This item will be used for replacement of existing sanitary sewer laterals that are in conflict with proposed storm drain installation or existing sanitary sewer laterals that fail due to no fault of the Contractor. It will be the Contractor's responsibility to replace, at no additional cost to the City, existing sanitary sewer laterals damaged or broken due to lack of reasonable care during construction of the proposed improvements. Payment for this item will be made only as directed by the Engineer.

6. Item 74 – Relocate Existing Fire Hydrant Assembly: Measurement for payment to install (relocate) existing fire hydrant assembly will be based upon actual quantity, each, of such named fire hydrants furnished and installed, all in accordance with the requirements of the Contract Documents. Payment for furnishing and installing fire hydrant assembly will be made at the unit price each, named in the Bid Schedule, as shown on the drawings and as described herein for which payment is not provided under other bid items and which price shall constitute full compensation for the fire hydrant assembly installation including but not limited to locating, verifying, and protecting existing utilities; saw cutting and removing of existing pavement and sidewalks, curbing; dewatering, excavating (including rock), removal of unsuitable materials, installing temporary sheeting and shoring; coordination and shut down of existing water mains; cutting, removal, and disposal of existing piping; installation of fire hydrant, valve, valve box, valve box extensions, operating nut extensions, concrete pad, restraining devices, backfill, compaction and restoration of areas disturbed by the operation including pavement and pavement markings and striping; testing, all appurtenant items, and associated incidental restoration work and any other items required for a complete and satisfactory installation

7. Item 75 – Remove and Replace Fire Hydrant Assembly: Measurement for payment to furnish and install fire hydrant assembly will be based upon actual quantity, each, of such named fire hydrants furnished and installed, all in accordance with the requirements of the Contract Documents. Payment for furnishing and installing fire hydrant assembly will be made at the unit price each, named in the Bid Schedule, as shown on the drawings and as described herein for which payment is not provided under other bid items and which price shall constitute full compensation for the fire hydrant assembly installation including but not limited to locating, verifying, and protecting existing utilities; saw cutting and removing of existing pavement and sidewalks, curbing; dewatering and necessary bypass pumping and/or diverting flow, excavating (including rock), removal of unsuitable materials, installing temporary sheeting and shoring; coordination and shut down of existing water mains; cutting, removal, and disposal of existing piping; installation of fire hydrant, valve, valve box, valve box extensions, operating nut extensions, concrete pad, restraining devices, backfill, compaction and restoration of areas disturbed by the operation including pavement and pavement markings and striping; testing, all appurtenant items, and associated incidental restoration work and any other items required for a complete and satisfactory installation.

8. Item 76 - Subsurface utility investigations (potholing) to locate and classify utilities needed for design changes: The unit price for this item shall be per unit basis for all labor and equipment required for subsurface utility investigations (potholing) to locate and classify utilities outside the Contractor's obligation to pothole in

accordance to the Permit Set. This item includes, but is not limited to, surveying, locating, verifying, and protecting existing utilities, saw cutting and removing existing paving, providing temporary restorations including pavement.

9. Items 77 through 81 - Furnish and Install Temporary Line Stops as needed for utility connections: The unit price for this item shall be per unit basis for all labor and equipment required for temporary line stop type valves used for isolating sections of existing water line, including tapping, saddles, fittings, supporting existing utilities and pressure testing.

G. Paving and Restoration

1. Item 82 – Remove and Dispose of Existing Concrete Pavement: Measurement for payment of concrete pavement removal and disposal will be based upon the number of square yards of such concrete pavement (such as sidewalk, pavers, driveways, etc.) removed and disposed of, as detailed in the Drawings, all in accordance with the requirements of the Contract Documents. Payment for maintenance and protection of traffic, including but not limited to temporary striping and marking, pavement truing and leveling as required, shall be made under the maintenance and protection of traffic item named in the Bid Schedule.
2. Item 83 – Remove and Dispose of Existing Asphalt Pavement: Measurement for payment of asphalt pavement removal and disposal will be based upon the number of square yards of such concrete pavement removed and disposed of, as detailed in the Drawings, all in accordance with the requirements of the Contract Documents. Payment for maintenance and protection of traffic, including but not limited to temporary striping and marking, pavement truing and leveling, as required, shall be made under the maintenance and protection of traffic item named in the Bid Schedule.
3. Items 84 and 85 – Furnish and Install Concrete Sidewalks,: Measurement for payment for furnishing and installing sidewalks will be based upon the actual number of square yards of such sidewalks constructed as shown in the drawings, all in accordance with the requirements of the Contract Documents. Payment for furnishing and installing sidewalks will be made at the unit price per square yard named in the Bid Schedule, which price shall constitute full compensation for completing said work, including all earthwork, compaction and stabilization of limerock base, subgrade, construction of the sidewalk, furnishing and setting for expansion joint material, backfilling of sidewalk, disposal of excess material, handrail where protection is needed, and the appurtenant items for which separate payment is not specifically included in the Bid Schedule. This item does NOT include replacement of sidewalk already paid for under other bid items. Use of this bid item for payment shall be subject to approval from Engineer.
4. Item 86 – Furnish and Place Asphalt (12-inch thick Stabilization Type B, 8-inch thick Optional Base Group 6, 2-inch thick Superpave Asphalt (SP 12.5), and 1-inch thick Asphalt Concrete Friction Course (SP 9.5)): Measurement for payment of asphalt pavement will be based upon the number of square yards of such asphalt pavement, actually constructed, as detailed in the Drawings, all in accordance with the requirements of the Contract Documents. Payment for placement of asphalt pavement will be made at the unit price per square yard for such placement as named and at the thickness indicated in the Bid Schedule which price will constitute

full compensation for applying a tack coat and furnishing, placing and compacting the asphalt surface, complete in place to the cross section and thicknesses shown on the Drawings; including restoration of traffic loop detectors, replacing speed humps where applicable, adjustment of finished grades of valve boxes, manholes, and catch basins, and all cleanup of the area disturbed by this construction. Payment for maintenance and protection of traffic, including but not limited to temporary striping between lifts of asphalt, as required, shall be made under the maintenance and protection of traffic item named in the Bid Schedule.

5. Items 87 and 88 – Mill Existing Asphalt (Up to 2” in depth) and Resurfacing Asphalt (min 1.5” thick SP 9.5): Measurement for payment for milling existing asphalt and resurfacing will be based upon the number of square yards of such materials actually milled and resurfaced in accordance with the requirements of the Contract Documents. Payment for milling and resurfacing existing asphalt will be made at the unit price per square yard up to 1.5-inch depth, which price shall constitute full compensation for milling, hauling off and disposing of the milled material, resurfacing, pavement markings and signage, and for any other appurtenant items needed for milling and resurfacing asphalt for which separate payment is not specifically included in the Bid Schedule. All asphalted travel ways located within the boundaries of the Progresso Village neighborhood are to be milled and resurfaced that are not being replaced with new asphalt. The Progresso Village neighborhood is located east of I-95 and bounded by NW 9th Ave. on the west, State Road 838 (W Sunrise Blvd.) on the north, and State Road 842 (Broward Blvd. to the south).

6. Item 89 – Restoration of Pavement Markings: Measurement for payment of restoration of pavement markings shall be full compensation on a lump sum basis for all labor, equipment, and materials required to restore pavement markings in accordance with the requirements of the Contract Documents. Restoration includes the removal of existing markings where necessary, surface preparation, and the placement of new markings in accordance with the specified dimensions, materials, and colors. Payment for maintenance and protection of traffic, including shall be made under the maintenance and protection of traffic item named in the Bid Schedule.

7. Items 90 through 92 – Restoration of Driveways/Parking Areas (1.5" thick SP-9.5 Asphalt including 6" limerock base and compacted subgrade): Measurement for payment for restoration of driveways/parking areas will be based upon the actual number of square yards of such driveways/parking areas restored as shown in the Drawings, all in accordance with the requirements of the Contract Documents. Payment for restoration of driveways/parking areas will be made at the unit price per square yard named in the Bid Schedule, which price shall constitute full compensation for completing said work, including but not limited to all limerock, earthwork, compacting, subgrade, reconstruction of the driveway/parking area to the same depth and material as the existing one, furnishing and setting for expansion joint material, disposal of excess material, and the appurtenant items, such as mailboxes, for which separate payment is not specifically included in the Bid Schedule. No payment will be made for restoration of driveways outside the limits shown on the drawings or not approved in writing by the Engineer.

Asphalt Driveways/Parking Areas:

Asphalt to be minimum 1.5-inch thickness, SP-9.5 asphalt, and 6-inch limerock

base with compacted 6-inch subgrade.

Concrete Driveways/Parking Areas:

Concrete to be minimum 6-inch thickness with 12-inch compacted subgrade.

Paver Driveways/Parking Areas:

Pavers to match existing shape and color as closely as possible with 1-inch sand bed and 12-inch compacted subgrade.

8. Item 93 – Clearing and Grading Swale: Measurement for payment for clearing and grading swale will be based upon the number of square yards of swale actually cleared and graded all in accordance with the requirements of the Contract Documents. Payment for clearing and grading will be made at the unit price per square yard of clearing and grading named in the Bid Schedule which price shall constitute full compensation, including earthwork, importing of fill material, removal and disposal of excess material including but not limited to brush, bollards, and protection of trees to remain.
9. Items 94 – Remove and Replace Type “F” Curb and Gutter: Measurement for payment for removing, furnishing and installing curb and/or gutter (in kind for type removed during construction) will be based upon the number of linear feet of such curb and/or gutter actually constructed as determined by measurement along the centerline of the curb in place, and as shown on the drawings, all in accordance with the requirements of the Contract Documents. Payment for furnishing and installing curb and/or gutter will be made at the unit price per linear foot of curb and/or gutter named in the Bid Schedule, which shall constitute full compensation for complete installation including grading, placing 4” limerock pad, forming, saw cutting of pavement and cleanup of all areas disturbed by this construction. This item does NOT include replacement of curb and/or gutter already paid for under other bid items. Use of this bid item for payment shall be subject to approval from Engineer.

H. Landscaping

1. Items 95 through 99 – Furnish and Install Landscaping: The unit price for this item shall be full compensation on a lump sum basis for all labor, equipment, and materials required to furnish and install sod (Argentine Bahia or St. Augustine grass), and trees and shrubs as listed in the plans, in accordance with the Contract Documents. This item includes excavation, backfilling, guy stakes, protection, compaction, grading, topsoil, sod, watering, fertilizing, disposal offsite of suitable or unsuitable materials, and all other appurtenances required for a complete installation. This bid item also includes full compensation for all labor, equipment, and materials to remove and relocate existing trees and bushes and shrubs. Removal and relocation of trees shall include procuring the services of a Licensed Landscape Architect or Certified Arborist, obtaining of appropriate tree removal permits, spading of tree, root pruning, replanting, maintenance, backfill and the removal and disposal of all vegetative matter associated with the removal or relocation of trees as required by the Contract Documents or directed by the Engineer.
2. Item 100 – Furnish and Install Root Barrier: The unit price for this item shall be full compensation on a linear foot basis for all labor, equipment, and materials required

to furnish and install a vegetation root barrier in accordance with the requirements of the Contract Documents.

3. Item 101 – Furnish and Install Tree Protection (Existing Trees): The lump sum price for this bid item shall be full compensation for protection of existing trees and landscaping, including all aspects of protection, trimming, pruning, fertilizing, and watering, furnished in accordance with Contract Documents. This item also includes the preparation and submittal of a tree disposition and landscape plan as well as the process for submitting and gaining approval of this plan.
4. Items 102 through 104 Remove and Reinstall Mailboxes, Signs, Lamps The per unit price for this bid item shall be full compensation for all labor, equipment, and materials to remove and reinstall existing mailboxes, street signs, and solar lamp post throughout the project area.

I. Outfall

1. Item 105 – 72” RCP Outfall CIPP (Cured in Place Pipe) Rehabilitation This work will be performed, if necessary, as determined by the CCTV inspection report. This work will be measured and paid for at the unit price per linear foot of liner as delineated by the pipe size and depth brackets named in the Bid Schedule. Measurement shall be made based on the horizontal projection of the centerline of the permanently installed liner between drainage structures, measured to the nearest foot from the inside wall of structure to the inside wall of structure for each section lined. Each unit price bid shall include, but not limited to, all necessary or required resident and business notifications, preparation of the existing outfall, including blocking or plugging incoming lines; removal, transportation and disposal of material generated by preparation; post-lining television surveys; chemical joint sealing if necessary; pipe lining; the cost of obtaining a water meter; cleaning; sample collection; grouting to eliminate infiltration at liner ends; cleanup; documentation and reporting; and all labor, materials and equipment required to provide a complete and acceptable liner installation.

NONPAYMENT FOR REJECTED OR UNUSED PRODUCTS

A. Payment will not be made for following:

1. Loading, hauling, and disposing of rejected material.
2. Quantities of material wasted or disposed of in manner not called for under Contract Documents.
3. Rejected loads of material, including material rejected after it has been placed by reason of failure of Contractor to conform to provisions of Contract Documents.
4. Material not unloaded from transporting vehicle.
5. Defective Work not accepted by City.
6. Material remaining on hand after completion of Work.

1.04 PARTIAL PAYMENT FOR STORED MATERIALS AND EQUIPMENT

- A. Partial Payment: Payment for stored materials and equipment shall only be made with submittal of "paid" receipts. No partial payments will be made for materials and equipment delivered or stored unless Shop Drawing or preliminary operation and maintenance manuals are acceptable to Engineer.
- B. Final Payment: Will be made only for products incorporated in Work; remaining products, for which partial payments have been made, shall revert to Contractor unless otherwise agreed, and partial payments made for those items will be deducted from final payment.

1.05 ALLOWANCES

- A. The allowances shall be used only at the discretion of and as ordered by the City.
- B. Any portion of these allowances that remain after all authorized payments have been made will be withheld from contract payments and will remain with the City.
- C. Allowance Accounts
 - 1. Permits, License and Fees Allowance: The allowance account for this item shall be full compensation for all permits, licenses, and fees required of the Contractor from the various agencies having jurisdiction over the construction of the project. The allowance shown is an estimate of the fees required. Payment will be based on the actual permit, license or fee paid directly to the agency, documented by paid receipts, and specifically excluding any labor, markups, overhead and profit, administration, or other costs involved in obtaining the permits, licenses, or fees. Fees specifically excluded from this allowance include, but are not limited to, re-inspection fees and expired permit fees. Any portion of this fund remaining after all authorized payments have been made will be withheld from contract payment and will remain with the City of Fort Lauderdale.
 - 2. Undefined Conditions Allowance: The allowance account for this item shall include work associated with undefined conditions or conflicts developing from undefined conditions including, but not limited to, removal, relocation and replacement of gas, cable, telephone, and fiber optic utilities in conflict with proposed utilities, structures, or work during construction. All work authorized for payment shall be authorized in writing by the City. Amount to be paid per undefined conditions or conflicts shall be negotiated or agreed to by both parties.
 - 3. Additional Testing By Request Of Owner: The allowance account for this item shall be full compensation for payment of testing requested by the City or Engineer. The allowance shown is an estimate of the fees required. Payment will be based on the actual fees paid directly to the testing laboratory, documented by paid receipts, and specifically excluding any labor, markups, overhead and profit, administration, or other costs involved in paying fees. The cost of any required test or laboratory analysis with the Contractor fails shall be paid for by the Contractor. Any portion of this fund remaining after all authorized payments have been made will be withheld from contract payment and will remain with the City of Fort Lauderdale.
 - 4. Contaminated Soil and/or Groundwater Services: The allowance account for this item shall be full compensation for all labor, equipment, material, and work required

for the sampling, testing, removal, treatment, and discharge of contaminated groundwater or contaminated sediments as required by all applicable regulatory agencies. This item includes, but is not limited to, preparing a sampling plan, collecting and preserving samples, performing laboratory analyses, preparing reports, dewatering and necessary bypass pumping and/or diverting flow, providing and operating treatment units, discharging treated groundwater, and all other work required to complete this task in conformance with applicable regulatory requirements. Any portion of this fund remaining after all authorized payments have been made will be withheld from contract payment and will remain with the City of Fort Lauderdale.

5. FPL Allowance: The allowance account for this item shall be full compensation for all fees associated with obtaining electrical power from FPL. Payment will be based on the actual fee paid directly to the agency, documented by paid receipts, and specifically excluding any labor, markups, overhead and profit, administration, or other costs involved in payment of the fees. This allowance account shall also include additional work required by the Contractor for accommodating FPL service requirements not shown on the Contract Documents. All work authorized for payment shall be authorized in writing by the City. Amount to be paid shall be negotiated or agreed to by both parties. Any portion of this fund remaining after all authorized payments have been made will be withheld from contract payment and will remain with the City of Fort Lauderdale.
6. Emergency Pumping During Storm Event The allowance account for this item shall be full compensation for installation, operation, maintenance, and removal of the bypass pumps during Emergency Flood protection events. This item will be used at the discretion of the City and within the vicinity of the project site. Payment will be based on the actual costs paid to the equipment rental company with a fixed 10% markup for Contractor's overhead and profit. Any other costs associated with this item shall be negotiated and agreed to by both parties. Any portion of the funds remaining after all authorized payments have been made will be withheld from the contract payment and will remain with the City of Fort Lauderdale.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -

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SECTION 01070

ABBREVIATIONS

PART 1 - GENERAL

1.1 THE REQUIREMENT

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

1.2 ABBREVIATIONS AND ACRONYMS

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

PROJECT NO. 11843 PROGRESSO VILLAGE STORM WATER IMPROVEMENTS

ASA	Acoustical Society of America
ASAE	American Society of Agriculture Engineers
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers
ASLE	American Society of Lubricating Engineers
ASME	American Society of Mechanical Engineers
ASMM	Architectural Sheet Metal Manual
ASSE	American Society of Sanitary Engineers
ASTM	American Society for Testing and Materials
AWPA	American Wood Preservers Association
AWPI	American Wood Preservers Institute
AWS	American Welding Society
AWWA	American Water Works Association
BCRED	Broward County Resilient Environment Department
BHMA	Builders Hardware Manufacturer's Association
CMA	Concrete Masonry Association
CRSI	Concrete Reinforcing Steel Institute
DIPRA	Ductile Iron Pipe Research Association
EIA	Electronic Industries Association
EPA	Environmental Protection Agency
ETL	Electrical Test Laboratories
FBC	Florida Building Code
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FS	Federal Specifications
IEEE	Institute of Electrical and Electronics Engineers
IES	Illuminating Engineering Society

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

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -

SECTION 01090

REFERENCE STANDARDS

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. Titles of Sections and Paragraphs: Captions accompanying specification sections and paragraphs are for convenience of reference only, and do not form a part of the Specifications.
- B. Applicable Publications: Whenever in these Specifications references are made to published specifications, codes, standards, or other requirements, it shall be understood that wherever no date is specified, only the latest specifications, standards, or requirements of the respective issuing agencies which have been published as of the date of the opening of bids, shall apply; except to the extent that said standards or requirements may be in conflict with applicable laws, ordinances, or governing codes. No requirements set forth herein or shown on the Drawings shall be waived because of any provision of, or omission from, said standards or requirements.
- C. Specialists, Assignments: In certain instances, Specification text requires (or implies) that specific work is to be assigned to specialists or expert entities, who must be engaged for the performance of that work. Such assignments shall be recognized as special requirements over which the Contractor has no choice or option. These requirements shall not be interpreted so as to conflict with the enforcement of building codes and similar regulations governing the Work; also they are not intended to interfere with local union jurisdiction settlements and similar conventions. Such assignments are intended to establish which party or entity involved in a specific unit of work is recognized as "expert" for the indicated construction processes or operations. Nevertheless, the final responsibility for fulfillment of the entire set of contract requirements remains with the Contractor.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Without limiting the generality of other requirements of the specifications, all work specified herein shall conform to or exceed the requirements of all applicable codes.
- B. References herein to "Building Code" shall mean the Florida Building Code (FBC) Broward Edition. The latest edition of the code as approved and used by the local agency as of the date of the opening of bids, as adopted by the agency having jurisdiction, shall apply to the Work herein, including all addenda, modifications, amendments, or other lawful changes thereto.
- C. In case of conflict between codes, reference standards, Drawings and the other Contract Documents, the most stringent requirements shall govern. All conflicts shall be brought to the attention of the Engineer for clarification and directions prior to ordering or providing any materials or labor. The Contractor shall follow the most stringent requirements.

- D. Applicable Standard Specifications: The Contractor shall construct the Work specified herein in accordance with the requirements of the Contract Documents and the referenced portions of those referenced codes, standards, and Specifications listed herein.
- E. References herein to "OSHA Regulations for Construction" shall mean Title 29, Part 1926, Construction Safety and Health Regulations, Code of Federal Regulations (OSHA), including all changes and amendments thereto.
- F. References herein to "OSHA Standards" shall mean Title 29, Part 1910, Occupational Safety and Health Standards, Code of Federal Regulations (OSHA), including all changes and amendments thereto.

PART 1 - PRODUCTS

(NOT USED)

PART 2 - EXECUTION

(NOT USED)

- END OF SECTION -

SECTION 01200

PROJECT MEETINGS

PART 1 - GENERAL

1.01 PRECONSTRUCTION CONFERENCE

- A. A preconstruction conference will be held after award of contract and prior to the Notice to Proceed. The Engineer shall prepare and distribute the meeting agenda and shall preside at the meeting. The Engineer shall record and distribute minutes of the proceedings and decisions.
- B. A separate preconstruction meeting may be required on site with the Department of Sustainable Development – Engineering.
- C. The Contractor shall provide a Project Superintendent and a dedicated Project Manager specific to this project as a supervisor to oversee proper performance of the Work. The Project Manager shall attend all meetings and have the authority to make decisions on behalf of the General Contractor. The Project Manager shall be responsible for all coordination, document handling, submittal review and processing, quality control, and project scheduling. The Project Manager, once approved by the City and the Engineer shall not be replaced without prior consent by the City and Engineer.
 - 1. The Project Manager and Project Superintendent shall be direct employees of the Prime Contractor.
 - 2. The Project Manager and Project Superintendent shall fluently speak, read and write in English.
- D. Attendance:
 - 1. City
 - 2. Engineer
 - 3. Program Manager
 - 4. Contractor's Project Manager
 - 5. Contractor's Project Superintendent
 - 6. Major Subcontractors
- E. Minimum Agenda:
 - 1. Tentative construction and submittal schedules
 - 2. Critical work sequencing
 - 3. Designation of responsible personnel

4. Processing of Field Decisions and Change Orders
5. Adequacy of distribution of Contract Documents
6. Submittal of Shop Drawings and samples
7. Procedures for maintaining record documents
8. Use of site and City's requirements
9. Major equipment deliveries and priorities
10. Safety and first aid procedures
11. Security procedures
12. Housekeeping procedures
13. Processing of Partial Payment Requests
14. General regard for community relations

1.02 PRELIMINARY CPM SCHEDULE REVIEW MEETING

- A. The Contractor shall participate in a Preliminary CPM Schedule Review Meeting in accordance with the requirements of Section 01300.

1.03 PROGRESS MEETINGS

- A. Progress meetings will be held weekly at the Field Office during the performance of the work of this Contract. Additional meetings may be called as progress of work dictates. Day and time of progress meetings will be scheduled at the Preconstruction Meeting.
- B. Engineer will prepare and distribute agenda, preside at meetings and record minutes of proceedings and decisions. Engineer will distribute copies of minutes to participants.
- C. Attendance:
 1. City
 2. Engineer
 3. Program Manager
 4. Contractor's Project Manager
 5. Contractor's Project Superintendent
 6. Subcontractors, as pertinent to the agenda
- D. Minimum Agenda:
 1. Review and approve minutes of previous meetings.
 2. Review progress of Work since last meeting.

3. Review proposed 30-60 day construction schedule.
4. Note and identify problems which impede planned progress.
5. Develop corrective measures and procedures to regain planned schedule.
6. Revise construction schedule as indicated and plan progress during next work period.
7. Maintaining of quality and work standards.
8. Complete other current business.
9. Schedule next progress meeting.

1.04 NIEGHBORHOOD ASSOCIATION MEETINGS

- A. The Contractor shall attend meetings with the local Neighborhood Associations and other stakeholders as requested by the City. Contractor shall be prepared to provide information on construction schedule, scope of work, impacts to local residents, and other coordination items. Meetings shall be held quarterly throughout the duration of construction.

1.05 BROWARD COUNTY TRAFFIC ENGINEERING SCHOOL SAFETY COORDINATOR

- A. Thirty (30) days prior to the commencement of construction, the Contractor shall notify the "School Safety Coordinator" at Broward County Traffic Engineering Division to set up a pre-work meeting.

1.06 OTHER MEETINGS

- A. The Contractor shall attend and participate in other meetings as required during execution of the Work. These meetings may include, but are not limited to, the following:
 1. Meetings requested by regulatory agencies having jurisdiction over the project
 2. Meetings with utility entities for coordination purposes throughout the construction period
 3. Meetings with other stakeholders including City officials, residents, and businesses
 4. Coordination meetings with other Contractors conducting work at the site

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -

SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.01 THE REQUIREMENT

- A. This section specifies the means of all submittals. All submittals, whether their final destination is to the City, Engineer, or other representatives of the City, shall be directed through the Engineer. A general summary of the types of submittals and the number of copies required is as follows:

<u>Copies to Engineer</u>	<u>Type of Submittal</u>
E	Progress Schedule
E	Construction Schedule
E	Schedule of Payment Items
4 + E	Progress Payment Applications
3 + E	Shop Drawings
2 + E	Warranties
E	Audio Visual Preconstruction Record
E	Project Photographs
2 + E	Certificates of Compliance
2*	Product Samples
3 + E	Operation and Maintenance Manual
3 + E	Record Drawings
E	As Built GIS Database
2 + E	Elevation Certificates for New Buildings – Certified by Surveyor

E – Electronic submittal in pdf format.

* Unless otherwise required in the specific Section where requested.

- B. All submittals shall also be submitted to Engineer electronically.

1.02 SUBMITTAL PROCEDURES

- A. The Contractor shall transmit each submittal with a form acceptable to the Engineer, clearly identifying the project Contractor, the enclosed material and other pertinent information specified in other parts of this section. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.
- B. Revise and resubmit submittals as required, identify all changes made since previous submittals. Resubmittals shall be noted as such.
- C. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.
- D. All electronic submittals shall be digitally submitted to the Engineer through the construction project management system Procore (www.procore.com). All submittals shall be numbered, labeled and dated. See the attached Procore Guidelines at the end of this specification section for additional information.

1.03 CONSTRUCTION PROGRESS SCHEDULE

- A. The Contractor shall have the capability of preparing and utilizing the specified construction progress scheduling techniques. A statement of capability shall be submitted in writing to the Engineer with the issuance of the First Notice-to-Proceed by the City and will verify that either the Contractor's organization has in-house capability qualified to use the technique or that the Contractor employs a consultant who is so qualified. Capability shall be verified by description of the construction projects to which the Contractor or its consultant has successfully applied the scheduling technique and which were controlled throughout the duration of the project by means of systematic use and updating of the construction progress schedule, the network analysis and associated reports. The submittal shall include the name of the individual on the Contractor's staff who will be responsible for the construction progress schedule, and associated reports and for providing the required updating information of same. The Contractor shall submit its proposed progress (baseline) schedule to the Engineer for review and comment in accordance with the Contract Documents. The Engineer shall have the authority to determine acceptability/correctness of the schedule logic and activity interrelationships. The use of extraneous, nonworking activities and activities which add restraints to the construction schedule shall not be accepted. Baseline schedules that do not meet their contract completion dates shall not be accepted.
- B. The Contractor's progress schedule (baseline and monthly updates) shall be computer generated and resource loaded. Each computer-generated construction progress schedule and associated report shall include the following tabulations: a list of activities in numerical order, a list of activity precedence, schedules sequenced by Early Start Date, Total Float, and Late Start Date. Each schedule, and report shall include the following minimum items:
1. Activity Numbers
 2. Estimated Duration
 3. Activity Description
 4. Early Start Date (Calendar Dated)
 5. Early Finish Date (Calendar Dated)
 6. Latest Allowable Start Date (Calendar Dated)
 7. Latest Allowable Finish Date (Calendar Dated)
 8. Status (whether critical)
 9. Total Float and Free Float
 10. Resource Plots
- C. In addition, each construction progress schedule, network analysis and report shall be prefaced with the following summary data:
1. Contract Name and Number

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

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

- Q. Review and acceptance of the construction progress schedule, and related reports, by the Engineer is advisory only and shall not relieve the Contractor of the responsibility for accomplishing the Work within the contract completion date. Omissions and errors in the construction progress schedule, and related reports shall not excuse performance less than that required by the Contract and in no way make the Engineer an insurer of the Contractor's success or liable for time or cost overruns flowing from any shortcomings in the construction progress schedule, and related reports.
- R. The Contractor shall present and discuss the proposed schedule at the preconstruction conference.
- S. The construction progress schedule shall be based upon the precedence diagramming method of scheduling and shall be prepared in the form of a horizontal bar chart showing in detail the proposed sequence of the Work and identifying all construction activities included but not limited to yard piping, all structures and treatment units and all related Work specified herein to be performed under the Contract. The schedule shall be time scaled, identifying the first day of each week, with the estimated date of starting and completion of each stage of the Work in order to complete the project within the contract time. The project critical path shall be clearly identified in color or by other means acceptable to the Engineer.
- T. The progress schedule shall be plotted on 22 inch by 34 inch and 11 inch by 17 inch paper and shall be revised and updated monthly, depicting progress through the last day of the current month and scheduled progress through completion. Up to date hard copies of the schedule shall be submitted along with the application for monthly progress payments for the same period.
- U. The construction progress schedule shall be developed and maintained using Primavera and Primavision software as manufactured by Primavera Systems, Inc., or equal.
- V. The Contractor shall produce a 3-week Look Ahead Schedule for construction meetings on a bi-weekly basis or as determined by City.

1.04 SCHEDULE OF PAYMENT ITEMS

- A. The Contractor shall submit a Schedule of Payment Items for review in accordance with the Contract Documents. The schedule shall contain the installed value of the component parts of Work for the purpose of making progress payments during the construction period and shall directly correlate on an item by item basis (unless otherwise accepted by the Engineer) to each individual activity detailed in the construction progress schedule. The sum of all scheduled items shall equal the total value of the Contract. Reference section entitled "Measurement and Payment" for further details.
- B. The Contractor shall expand or modify the above schedule and materials listing as required by the Engineer's initial or subsequent reviews.

1.05 PROGRESS PAYMENT APPLICATIONS

- A. Applications for payments shall be made to the Engineer for review in accordance with Article 7 of the Construction Agreement.

1.06 SHOP DRAWINGS

- A. The Contractor shall submit electronic copies of shop drawings in Adobe Portable Document Format (PDF) format for review by all general, civil, mechanical, structural, architectural, electrical and instrumentation related improvements, including details, piping layout and appurtenances, wiring, color selection charts, materials and equipment fabricated especially for this Contract, and materials and equipment for which such Drawings are specified or specifically requested by the Engineer.
- B. Within one week of shop drawing approval (Furnish as Submitted or Furnish as Corrected), Contractor shall provide three (3) color hard copies of each shop drawing. Contractor may be required to submit certain sheets in large format to ensure all portions of shop drawing are legible. Engineer shall distribute electronic and hard copies to the City.
- C. Shop drawings shall show the principal dimensions, weight, structural and operating features, space required, clearances, type and/or brand of finish or shop coat, grease fittings, etc., depending on the subject of the Drawings.
- D. When so specified, or if considered by the Engineer to be acceptable, the manufacturer's specifications, catalog data, descriptive matter, illustrations, etc. may be submitted for review in place of shop drawings. In such case, the requirements shall be as specified for shop drawings, insofar as applicable.
- E. Time delays caused by rejection of submittals are not cause for extra charges to the City or time extensions.
- F. Requirements: The Contractor shall be responsible for the prompt submittal of all shop drawings so that there shall be no delay to the Work due to the absence of such drawings. Electronic copies of all shop drawings shall be submitted as directed by the Engineer during the preconstruction meeting. Shop drawings shall be submitted as a single, complete, and searchable image format document in PDF format with bookmarks for shop drawings consisting of multiple sections and/or more than 20 pages total.
- G. All shop drawings shall be submitted to the Engineer through the Contractor. Each shop drawing shall be individually submitted. The Contractor is responsible for obtaining shop drawings from subcontractors and returning reviewed shop drawings to them. All Drawings shall be clearly marked with the name of the project, City, Contractor, specification section number and building, equipment, or structure to which the drawing applies. Drawings shall be suitably numbered stamped and signed by the Contractor. Each shop drawing shall be accompanied by a transmittal form listing the information identified above.
- H. All submissions shall be dated and properly referenced to the specifications section and Contract Drawing number. The submittal number shall match the following submittal numbering system (or an equivalent system as approved by the Engineer):
 1. Submittal Numbering System
 - a. Package ID: The package number will reflect the CSI (specification) section number as it appears in the specifications.

- b. Subgroup ID: The submittal number will include the CSI number followed by the submittal number and a sequential letter indicating resubmittal number.

2. Example:

<u>Package</u>	<u>Submittal</u>	<u>Description</u>
03300	03300-001	Concrete Admixture A, First Submittal
	03300-001A	Concrete Admixture A, Second Submittal
	03300-001B	Concrete Admixture A, Third Submittal
	03300-002	Concrete Admixture B, First Submittal

- I. Product Data: Where manufacturer's publications in the form of catalogs, brochures, illustrations, or other data sheets are submitted in lieu of prepared shop drawings, such submission shall specifically indicate the particular item offered. Identification of such items and relative pertinent information shall be made with indelible ink. Submissions showing only general information will not be accepted.
- J. Product data shall include materials of construction, dimensions, performance characteristics, capacities, wiring diagrams, piping and controls, etc.
- K. Warranties: When warranties are called for, a sample of the warranty shall be submitted with the shop drawings. The sample warranty shall be the same form that will be used for the actual warranty. Actual warranties shall be originals and notarized.
- L. Contractor's Review: Only submittals which have been checked and corrected should be submitted to the Contractor by its subcontractors and vendors. Prior to submitting shop drawings to the Engineer, the Contractor shall check thoroughly all such shop drawings to satisfy itself that the subject matter thereof conforms to the Drawings and Specifications in all respects. Shop drawings which are correct shall be marked with the date, checker's name and indications of the Contractor's approval, and then shall be submitted to the Engineer. Other shop drawings submitted to the Engineer will be returned to the Contractor unreviewed.
- M. Contractor's Responsibility: The Engineer's review of shop drawings will be general and shall not relieve the Contractor of the responsibility for details of design, dimensions, etc., necessary for proper fitting and construction of the Work required by the Contract and for achieving the specified performance.
- N. Contractor's Modifications: For submissions containing departures from the Contract Documents, the Contractor shall include proper explanation in their letter of transmittal. Should the Contractor submit for review equipment that requires modifications to the structures, piping, layout, etc. detailed on the Drawings, or specified, Contractor shall also submit for review details of the proposed modifications. If such equipment and modifications are accepted, the Contractor, at no additional cost to the City, shall do all Work necessary to make such modifications.
- O. Substitutions: Whenever a particular brand or make of material, equipment, or other item is specified, or is indicated on the Drawings, it is for the purpose of establishing a standard of quality, design, and type desired and to supplement the detailed

specifications. Any other brand or make which is equivalent to that specified or indicated may be offered as a substitute subject to the following provisions:

1. The Contractor shall submit for each proposed substitution sufficient details, complete descriptive literature, and performance data together with samples of the materials, where feasible, to enable the Engineer to determine if the proposed substitution is equal, in all respects including, but not limited to, quality, performance, ease of maintenance, availability of spare parts, and experience record.
 2. The Contractor shall submit certified tests, where applicable, by an independent laboratory attesting that the proposed substitution is equal.
 3. A list of installations where the proposed substitution is equal. Such listing shall cover a minimum of the previous three years and will furnish project names and contact phone numbers.
 4. Where the acceptance of a substitution requires excessive review by the Engineer, revision or redesign of any part of the Work, all such additional review costs, revisions and redesign, and all new drawings and details required therefore, shall be at the Contractor's expense.
 5. In all cases the Engineer shall be the sole judge as to whether a proposed substitution is to be accepted. The Contractor shall abide by the Engineer's decision when proposed substitute items are judged to be unacceptable and shall in such instances furnish the item as specified. No substitute items shall be used in the Work without written acceptance of the Engineer.
 6. Acceptance of any proposed substitution shall in no way release the Contractor from any of the provisions of the Contract Documents.
 7. 7. The City may require, at Contractor's expense, a special performance guarantee or other surety with respect to any substitute.
- P. Complete Submittals: Each submittal shall be complete in all aspects incorporating all information and data required to evaluate the products' compliance with the Contract Documents. Partial or incomplete submissions shall be returned to the Contractor without review.
- Q. Engineer's Review: The Engineer will review and return by email the reviewed shop drawings within 15 calendar days of receipt of such shop drawings. Reviewed shop drawings will be returned to the Contractor by email and marked with the appropriate box checked either "FURNISH AS SUBMITTED", "FURNISH AS CORRECTED" or "REVISE AND RESUBMIT".
- R. Work Prior to Review: No material or equipment shall be purchased, fabricated especially for this Contract, or delivered to the project site until the required shop drawings have been submitted, processed, reviewed by the Engineer and marked either "FURNISH AS SUBMITTED" or "FURNISH AS CORRECTED". All materials and Work involved in the construction shall be as represented by said shop drawings.

- S. The Contractor shall not proceed with any portion of the Work (such as the construction of foundations) for which the design and details are dependent upon the design and details of equipment for which submittal review has not been completed.

1.07 WARRANTIES

- A. Warranties called for in the Contract Documents shall be originals and submitted to the City through the Engineer. When warranties are required, they shall be submitted prior to request for payment.
- B. When advance copies of warranties are requested, they shall be submitted with, and considered as shop drawings.

1.08 CERTIFICATES

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

1.09 PRODUCT SAMPLES

- A. Contractor shall furnish for review all product samples as required by the Contract Documents or requested by the Engineer to determine compliance with the specifications.
- B. Samples shall be of sufficient size or quantity to clearly illustrate the quality, type, range of color, finish or texture and shall be properly labeled to show complete project identification, the nature of the material, trade name of manufacturer and location of the Work where the material represented by the sample will be used.
- C. Samples shall be checked by the Contractor for conformance to the Contract Documents before being submitted to the Engineer and shall bear the Contractor's stamp certifying that they have been so checked. Transportation charges on samples submitted to the Engineer shall be prepaid by the Contractor.
- D. The Engineer's review will be for compliance with the Contract Documents, and its comments will be transmitted to the Contractor with reasonable promptness.
- E. Acceptable samples will establish the standards by which the completed Work will be judged.

1.10 OPERATION AND MAINTENANCE MANUALS

- A. General: The Contractor shall furnish and deliver to the Engineer three (3) complete Operation and Maintenance (O&M) Manuals for the substantial, complete systems including instructions, technical bulletins, and any other printed matter such as diagrams, prints or drawings, containing full information required for the proper operations, maintenance, and repair of all Contractor furnished equipment. Also included shall be a spare parts diagram and complete spare parts list. These requirements are a prerequisite to the operation and acceptance of equipment. Each O&M Manual shall be bound together in appropriate three-ring hard cover binders. A detailed table of contents shall be provided for each Manual. Provide an appropriate label on the binder edge. Provide tabs and separate sections for operation, maintenance, spare parts, etc.

- B. Written operations and maintenance instructions are required for all equipment items supplied for this project. The amount of detail shall be commensurate with the complexity of the equipment item. Extensive pictorial cuts of equipment are required for operator reference in servicing.
- C. Information not applicable to the specific piece of equipment installed on this project shall be struck from the Manual by the Contractor. Information provided shall include a source of replacement parts and names of service representatives, including addresses and telephone numbers.
- D. When written instructions include shop drawings and other information previously reviewed by the Engineer, only those editions which were accepted by the Engineer, and which accurately depict the equipment installed, shall be incorporated in the O&M Manual.
- E. Maintenance and Lubrication Schedules: The Contractor shall include in the O&M Manual, for all Contractor furnished mechanical and electrical equipment including switchgear and motor control centers, instrumentation, valves, gates, etc., complete maintenance and lubrication schedules. Separate forms shall be submitted for each piece of equipment. Sample forms are included at the end of this section. As an alternate to the forms, the Contractor may submit an electronic copy of the manufacturer's recommended preventive maintenance requirements.
- F. The Contractor shall include in the O&M Manual, for all Contractor furnished pumps and motors, complete data sheets. Separate forms shall be submitted for each different type and size of pump and motor. Sample forms are included at the end of this section.
- G. The Contractor shall also furnish and deliver to the Engineer three (3) USB drives with all O&M manuals in an electronic format suitable for downloading into the City O&M database system. All manuals and drawings for the vendor provided equipment, sub-system or system shall be in Adobe Portable Document Format (PDF) format. They shall be PDF Formatted Text and Graphics (formerly Normal) or PDF Searchable Image (formerly Image+Text). If submitted in Searchable Image format, they shall be Optical Character Recognized (OCR'ed) at a 95 percent confidence level, using Adobe Acrobat Capture 3.x or an equivalent product. There shall be links from all Table of Contents entries to the actual occurrence in the body of the manual. Bookmarks shall be created for all linked Table of Contents entries. This requirement applies to all equipment to be furnished on this project.

1.11 RECORD DRAWINGS

- A. Requirements for record drawings shall be in accordance with Section 01320.

1.12 AS BUILT GIS DATABASE

- A. Requirements for the As-Built GIS Database updates shall be in accordance with Section 01320.

1.13 ELEVATION CERTIFICATES (FOR NEW BUILDINGS)

- A. Two copies of Elevation Certificates for each new building, certified by a registered surveyor, shall be submitted to the Engineer prior to the request for certificate of

completion / certificate of occupancy from the City of Fort Lauderdale Building Department.

1.14 AUDIO-VISUAL PRECONSTRUCTION RECORD

- A. General: Prior to commencing work, the Contractor shall have a continuous color audio-video recording taken of the entire Project, including adjacent work areas, plant site and all other areas that will be disturbed by the Contractor's operations, to serve as a record of preconstruction conditions. No construction shall begin prior to review and acceptance of the recordings covering the respective, affected construction area by the Engineer. The Engineer shall have the authority to reject all or any portion of the recording not conforming to the specifications and order that it be redone at no additional charge. The Contractor shall reschedule unacceptable coverage within five days after being notified. The Engineer shall designate those areas, if any, to be omitted from or added to the audio-video coverage. Recordings shall not be performed more than ninety days prior to construction in any area. Recording format shall be MP4 audio-video, minimum 1280 x 720 resolution, and playable using Windows Media Player. CDs and/or DVDs will not be accepted. All flash drives and written records shall become property of the City.
- B. Services: The Contractor shall engage the services of a professional electrographer. The color recording shall be prepared by a responsible commercial firm known to be skilled and regularly engaged in the business of preconstruction color audio-video documentation. The electrographer shall furnish to the Engineer a list of all equipment to be used for the audio-video recording, i.e., manufacturer's name, model number, specifications and other pertinent information. Additional information to be furnished by the electrographer is the names and addresses of two references that the electrographer has performed color audio-video recordings for on projects of a similar nature within the last twelve months.
- C. Equipment: All equipment, accessories, materials and labor to perform this service shall be furnished by the Contractor.
1. The total audio-video system shall reproduce bright, sharp, clear pictures with accurate colors and shall be free from distortion, tearing, rolls or any other form of imperfection. The audio portion of the recording shall reproduce the commentary of the camera operator with proper volume and clarity, and be free from distortion and interruptions.
 2. When conventional wheeled vehicles are used, the distance from the camera lens to the ground shall not be less than twelve feet. In some instances, audio-video coverage may be required in areas not accessible by conventional wheeled vehicles. Such coverage shall be obtained by walking or special conveyance acceptable to the Engineer.
- D. Recorded Information - Audio: Each recording shall begin with the current date, project name and municipality and be followed by the general location; i.e., process structure, or area, viewing side and direction of progress. The audio track shall consist of an original live recording. The recording shall contain the narrative commentary of the electrographer, recorded simultaneously with the electrographer fixed elevation video record of the zone of influence of construction.

- E. Recorded Information - Video: All video recordings must, by electronic means, display continuously and simultaneously, generated with the actual recording, transparent digital information to include the date and time of recording. The date information shall contain the month, day and year. The time information shall contain the hours, minutes, and seconds. Additional information shall be displayed periodically. Such information shall include, but not be limited to, project name, process structure or area, and the viewing side. This transparent information shall appear on the extreme upper left hand third of the screen.
- F. Conditions for Recording: All recording shall be done during times of good visibility. No recording shall be done during precipitation, mist or fog. The recording shall only be done when sufficient sunlight is present to properly illuminate the subjects of recordings and to produce bright, sharp video recordings of those subjects.
- G. Video Coverage: Video coverage shall include all surface features located within the zone of influence of construction supported by appropriate audio coverage. Such coverage shall include, but not be limited to, existing driveways, sidewalks, curbs, pavement, landscaping, fences, signs and interior and exterior of existing structures affected by the work and the exteriors of structures adjacent to the work, and any other on-site area that will be occupied or impacted by the Contractor or any of their subcontractors or suppliers within the area covered.

1.15 PROJECT PHOTOGRAPHS

- A. The Contractor shall engage and pay for the services of a photographer for ground level progress pictures each month during the course of the construction activities. The photographer's periodic visits and work shall be coordinated with the City. A total of 25 progress photographs in electronic format of completed work is required each month. A photograph (picture) shall be defined as one image. Meta data shall include the following information:
 - 1. Location
 - 2. Name/number of structure
 - 3. Photo Number
 - 4. Date photograph was taken
 - 5. Description
 - 6. Name of photographer
 - 7. Owner's witness
- B. Digital images of each photograph shall be submitted electronically to the Engineer with the Contractor's monthly estimate.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

<u>EQUIPMENT LUBRICATION SCHEDULE</u>			
EQUIPMENT ITEM:			
EQUIPMENT ID NO.:			
EQUIPMENT LOCATION:			
EQUIPMENT MANUFACTURER:			
ADDRESS:			
PHONE:			
SERVICE REPRESENTATIVE:			
ADDRESS:			
PHONE:			
MAINTENANCE REQUIREMENTS:			
<u>Maintenance Operation</u>	<u>Frequency Running Time / Calendar</u>	<u>Lubricant</u>	<u>Description / Type / Special Tools</u>

Page _____ of _____

NOTE: Use additional sheets as required

<u>EQUIPMENT MAINTENANCE SCHEDULE</u>			
EQUIPMENT ITEM:			
EQUIPMENT ID NO.:			
EQUIPMENT LOCATION:			
EQUIPMENT MANUFACTURER:			
ADDRESS:			
PHONE:			
SERVICE REPRESENTATIVE:			
ADDRESS:			
PHONE:			
MAINTENANCE REQUIREMENTS:			
<u>Maintenance Operation</u>	<u>Frequency Running Time / Calendar</u>	<u>Lubricant</u>	<u>Description / Type / Special Tools</u>

Page _____ of _____

NOTE: Use additional sheets as required.

- END OF SECTION -

SECTION 01312

FIELD ENGINEERING

PART 1 - GENERAL

1.01 REQUIREMENTS

- A. Contractor shall provide and pay for field Engineering and Survey services required for the project.
- B. Identify existing control points and property line corner stakes indicated on the Drawings, as required.

1.02 QUALIFICATIONS OF SURVEYOR

- A. Qualified Registered Professional Surveyor & Mapper, acceptable to the City and the Engineer.

1.03 SURVEY REFERENCE POINTS

- A. Location and elevation of benchmarks are shown on the Drawings. Identify basic horizontal and vertical control points for the construction project including:
- B. Permanent coordinate reference points with horizontal and vertical control, located and staked as shown on the plans.
- C. Contractor's Responsibilities:
 - 1. Provide survey and layout required to layout the Work.
 - 2. Check and establish exact location of existing facilities prior to construction of new facilities and any connections thereto.
 - 3. In event of discrepancy in data or benchmarks, request clarification before proceeding with Work.
 - 4. Retain professional land surveyor or civil engineer registered in state of Florida who shall perform or supervise engineering surveying necessary for construction staking and layout.
 - 5. Maintain complete accurate log of survey Work as it progresses as a Record Document.
 - 6. On request of City, submit documentation.
 - 7. Provide competent employee(s), tools, stakes, and other equipment and materials as City may require to:
 - 8. Establish control points, lines, and easement boundaries.
 - 9. Check layout, survey, and measurement Work performed by others.
 - 10. Measure quantities for payment purposes.

- D. The Contractor shall locate and protect control points prior to starting site construction work and preserve all permanent reference points during construction.
 - 1. Make no changes or relocations without prior written notice to City.
 - 2. Report to Engineer when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
 - 3. Contractor's surveyor shall replace project control points which may be lost or destroyed. Replacements shall be established based on original survey control.
- E. Contractor shall be responsible for performing survey and preparing As-Built drawings for all other portions of the work in accordance with Section 01320 – Project Record Documents.

1.04 PROJECT SURVEY REQUIREMENTS

- A. Contractor's surveyor shall establish a minimum of two permanent benchmarks on site, referenced to data established by survey control points.
- B. Contractor shall establish lines and levels, locate and lay out, prepare a Horizontal and Vertical Control Plan for the purpose of construction staking by instrumentation and similar appropriate means:
 - 1. Stakes for grading and fill placement.
 - 2. Controlling lines and levels as required.
- C. From time to time, verify layouts by same methods.
- D. Horizontal and vertical control plan shall be made available to City in AutoCAD Civil 3D 2019 format or most current release.
- E. Any plan released to the Contractor via electronic media is for as-built use only. They have not been geometrically calculated by a Surveyor. This applies to all aspects of the plans including, but not limited to, right-of-way, road utilities and drainage.

1.05 RECORDS

- A. Maintain a complete, accurate log of all control and survey work as it progresses.
- B. On completion of construction work, prepare a certified survey showing all dimensions, locations and elevations of project.

1.06 SUBMITTALS

- A. Submit name and address of Professional Surveyor & Mapper and Professional Engineer to City and Engineer.
- B. On request of City or Engineer, submit documentation to verify accuracy of field engineering work.
- C. Submit certificate signed by Registered Engineer or Professional Surveyor & Mapper certifying that elevation and locations of work are in conformance, or non-conformance, with Contract Documents.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

- END OF SECTION -

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SECTION 01320

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall submit Project Record Documents, including As Builts and As Built GIS Database updates as specified herein.
- B. Maintain at the site of the Owner a record copy of:
 - 1. Drawings
 - 2. Specifications
 - 3. Addenda
 - 4. Change Orders and other modifications to the Contract
 - 5. Approved Shop Drawings, Product Data and Samples
 - 6. Field Test Records
 - 7. Stormwater Pollution Prevention Plan (SWPPP)
 - 8. Broward County Resilient Environmental Department - Hazardous Material Management Facility License (Fuel Storage Tank)
 - 9. Broward County Resilient Environmental Department - Environmental Assessment & Remediation Dewatering
 - 10. City of Fort Lauderdale - Development Review Committee (DRC)
 - 11. City of Fort Lauderdale - Development Services Division
 - a. Building Permit
 - b. Electrical Permit
 - c. Plumbing Permit
 - d. Engineering (Right of Way)
 - e. Flood
 - f. Mechanical
 - g. Structural

1.02 MAINTENANCE OF DOCUMENTS AND SAMPLES

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

1.03 MARKING DEVICES

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

1.04 RECORDING

- A. Label each document, "PROJECT RECORD" in neat large printed letters, or by rubber stamp.
- B. Record information concurrently with construction progress. Do not conceal any work until required information is recorded.
- C. Drawings: Legibly mark to record actual construction: (hard copy and ACAD format)
 - 1. Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - 2. Location of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure.
 - 3. Field changes of dimension and detail.
 - 4. Changes made by Field Order or by Change Order.
 - 5. Details not on original Contract Drawings.
- D. Specifications and Addenda; Legibly mark each Section to record:
 - 1. Manufacturer, trade name, catalog number, and supplier of each produce and item of equipment actually installed.
 - 2. Changes made by Field Order or by Change Order.

1.05 AS-BUILT AND RECORD DRAWINGS

- A. The term 'As-Built Drawing' refers to drawings signed and sealed by a Florida registered surveyor and mapper (PSM) provided by the Contractor. As-built information

will be provided to the Engineer of Record for review. Contractor will prepare record drawings based on as-built information.

- B. The as-built drawings cover sheet will be signed, sealed and dated by the PSM. The cover sheet will include the PSM's name, business name, PSM number, address and telephone number and contain the following statement:
- "I hereby certify that the as-built location information of the potable water, reclaimed water, wastewater and drainage facilities shown on these drawings conforms to the minimum technical standards for land surveying in the State of Florida, Chapter 5J-17.050(10)(i) (Florida Administrative Code), as adopted by the Department of Agriculture and Consumer Services, Board of Professional Surveyors and Mappers, and that said as-builts are true and correct to the best of our knowledge and belief."
- C. As-builts will contain the information on the design drawings, plus the following additional requirements:
1. As-builts are to document changes between the design and construction. All information that is incorrect due to changes during construction will be corrected. Incorrect or no longer relevant information will be erased or struck through. Any facilities constructed in a horizontal or vertical location materially different (one-tenth foot horizontal, one-tenth foot vertical) than the design location will have their design location struck through and will be redrafted at the constructed location. Design drawing dimensioning to water and wastewater facilities will be corrected as necessary.
 2. Drawings will be a complete set including cover sheet, index (if one was included in the approved design drawings) and any other sheets included in the approved design set. Standard detail sheets are not necessary.
 3. Drawings will include the Minimum As-Built and Record Drawing Contents described in the 's of Fort Lauderdale minimum standards.
- D. The Contractor shall maintain full size (24"x36" or 22"x34") field drawings to reflect the "as-built" items of Work as the Work progresses. Upon completion of the work the Contractor shall prepare a record set of "AS-BUILT" Drawings on full-size, reproducible material and an electronic file in .DWG format (AutoCAD, latest Version). One set of full size design Drawings on reproducible material will be furnished to the Contractor by the design Engineer at the current square foot price. An electronic file of the design Drawings will be furnished to the Contractor by the Engineer at no additional cost (for as-built purposes only). No additional payment will be made for those "as-built" Drawings.
- E. The cost of maintaining record changes, and preparation of the As-Built Drawings shall be included in the unit prices bid for the affected items. Upon completion of the Work, the Contractor shall furnish the Owner's Project Manager the reproducible As-Built Drawings and electronic files. The completed As-Built Drawings shall be delivered to the Owner's Project Manager at least 48 hours prior to final inspection of the Work. The Final Inspection will not be conducted unless the As-Built Drawings are in the possession of the Owner's Project Manager.

- F. The completed As-Built Drawings shall be certified by a Professional Surveyor and Mapper registered in the State of Florida. This certification shall consist of the surveyor's embossed seal bearing the registration number, the surveyor's signature and date on each sheet of the drawing set. In addition, the key sheet, cover sheet or first sheet of the plans set shall list the business address and telephone number of the surveyor. The final as-builts shall also be submitted using state plane coordinates. (NAVD 1988 for vertical; NAD '83 with '90 adjustment for horizontal).
- G. Representative items of Work that should be shown on the record Drawings as verified, changed or added are shown below:
1. Plans:
 - a. Structure types, location with grade of rim and flow-line elevations.
 - b. Pipe type, length, size and elevations.
 - c. Utility type, length, size and elevation in conflict structures.
 - d. All maintenance access structures, valves and hydrants within right-of-way.
 - e. Spot (critical) elevations at plateaued intersections. (P.C., P.T., and mid point of all intersections, etc.)
 - f. Sewer laterals shall be stationed between maintenance access structures.
 2. Pavement Marking and Signing Plans: Sign location where installed if different from plans.
 3. Water and Sewer Plans: Location (horizontal and vertical) of all pipe lines, structures, fittings, services, valves and appurtenances, and water main / sanitary sewer pipe crossings.
- H. The Contractor shall submit an electronic set of progress As-Built Drawings with each application for payment. These Drawings shall accurately depict the Work completed and for which payment is being requested.
- I. The term 'Record Drawing' refers to the final drawing set signed and sealed by the Engineer of Record. The Engineer of Record will prepare or have prepared record drawings based on as-built information provided by the PSM and from information provided by the Engineer's staff. The Engineer of Record shall retain the signed and sealed 'as-built' drawings provided by the PSM with the other project records for possible review by Owner upon request. Record Drawings shall meet the requirements of the Contract Documents.
- J. As-Built and Record Drawings shall include the following contents at a minimum.
1. The amount of information required on as-built and record drawings will require the drawing author to organize its presentation in order to make the drawings readable. On occasion, it may be necessary to put stormwater, water, and wastewater information on separate sheets, and/or use a table to show coordinate information.
 2. Show the location of easements used by the stormwater, water, and wastewater facilities.

3. Indicate pipe joint locations where stormwater, water, wastewater or reclaimed water piping crosses.
4. Indicate the length of gravity stormwater and wastewater piping and actual slope between manhole centers.
5. Show all abandoned in place facilities including the extent and method of abandonment.
6. Show elevations to the nearest tenth of a foot for:
 - a. Top of pipe for elevations at vertical deflection points and every 200 feet along straight runs.
 - b. Top of pipe of stormwater, water, or wastewater facilities where they cross all other facilities (drainage, telephone, cable TV, electric, etc.)
7. Show elevations to the nearest one hundredth of a foot for:
 - a. Manholes (MH) rims.
 - b. Inverts of every gravity wastewater and stormwater pipe and force main connections to MH.
 - c. Lift station top of slab, bottom of wet well, influent pipe invert and control set points.
8. Coordinates will be provided for Owner maintained facilities, including:
 - a. Water mains, force mains and reclaimed water mains at deflection points and every 200 feet along straight runs.
 - b. The center of each MH, fitting, valve, blow off, hydrant, water meter box, wastewater cleanout, lift station wetwell, double detector check or other non-pipe water or wastewater facility.
 - c. The location of each connection to existing facilities.
 - d. The corners (vertices) of all easements being granted to the Owner as a part of the project.
 - e. Other locations designated by Owner.
9. Show the changed location of any non-water/wastewater/stormwater features so they are at the visually correct location relative to Owner maintained facilities.
10. Drawings shall include color photographs of all connections to existing Owner infrastructure as well as all critical utility crossings and where specifically required on the design drawings. The pictures will be taken with a GPS camera that automatically geotags the picture. A maximum of six photographs per sheet is acceptable. Each photograph shall have a minimum size of 8"x10". Photographs shall have a density of 3.0 megapixel or greater. Plot resolution is to be minimum 300 dots per inch. Photographs shall normally be taken from a point between four feet (4') and six feet (6') above the subject infrastructure and shall show good detail

in both shadow and sunlit areas. Include a measuring device in the photo for scale and where applicable to indicate the depth or separation of the utilities. A symbol (i.e. an arrow) is to be used in the plan views indicating the location and direction of view for each photograph submitted. The symbol must include the photograph number. A caption under each photograph shall include the following information:

- a. Photograph number
 - b. Photograph description
 - c. Date of photograph
 - d. Location and direction of view (for example 201 NW 34 Street looking North)
 - e. State plane coordinates
 - f. All photographs included in the drawings will also be provided to Owner in JPEG format on CD or DVD media. The CD or DVD will be labeled with the Owner project name and number. Individual photo files will be named using the same photograph number contained in the drawings.
11. The size and material of the piping shall be verified by the survey crew at the time of as-built.
12. As-builts of all drainage lines shall include the following information:
- a. Rims, inverts, length of piping between structures, length of exfiltration trench, and weir elevations if applicable.
 - b. The size and material of the piping shall be verified by the survey crew at the time of as-built.
13. As-builts for the edge of pavement and sidewalk locations shall include horizontal locations and shall indicate all deviations from the design plans.
14. All rock as-builts for parking lot, roadways and swales areas shall consist of the following:
- a. Rock elevations at all high and low points, and at enough intermediate points to confirm slope consistency and every 50' for roadways.
 - b. Rock as-builts shall be taken at all locations where there is a finish grade elevation shown on the design plans.
 - c. All catch basin and maintenance access structure rim elevations shall be shown.
 - d. Elevations around island areas will also be required.
 - e. As-builts shall be taken on all paved and unpaved swales prior to placement of asphalt and/or topsoil/sod, at enough intermediate points to confirm slope consistency and conformance to the plan details.

- f. Note: Rock as-builts required prior to paving. Engineer shall review rock as-builts within five days of receipt.
- 15. Lake and canal bank as-builts shall include a key sheet of the lake for the location of cross sections. Lake and canal bank cross sections shall be plotted at a minimum of every 100 lf, unless otherwise specified. As-builts shall consist of the location and elevation of the top of bank, edge of water and the deep cut line, with the distance between each shown on the drawing.
- 16. Retention area as-built elevations shall be taken at the bottom of the retention area and at the top of bank. If there are contours indicated on the design plans, then they shall be as-built as well.
- 17. If a change is made via field order or deviation to any structure, pipeline, etc., a new location shall be noted on the as-builts. The Owner's Project Manager may request additional as-built information to verify horizontal or vertical locations.

1.06 AS BUILT GIS DATABASE REQUIREMENTS

- A. The Contractor shall submit updates to the Owner's GIS database cataloging the constructed stormwater infrastructure. Updates shall be in accordance with the Owner's latest geodatabase and corresponding Geodatabase Data Dictionary. The Geodatabase Data Dictionary is provided as an attachment to this specification.
- B. Contractor shall enter location and attribute information collected from survey field work and final As-Built Drawings into an Owner issued geodatabase template. The Owner shall provide a template in Microsoft Excel format to be used for data entry. This template will adhere to the Owner's geodatabase schema for feature classes, related tables, and domain tables. The asset types to be collected and delivered shall include, but not limited to, the following assets:
 - 1. Control valves
 - 2. Exfiltration trenches
 - 3. Gravity mains
 - 4. Pressurized mains
 - 5. Inlets
 - 6. Manholes
 - 7. Network structures (including pump stations or pipe ends)
 - 8. Inline valves
 - 9. Outfalls
- C. Attribute types shall be coordinated with the Owner but shall adhere to the requirements of the Owner's Geodatabase Data Dictionary.

1.07 SUBMITTAL

- A. Submittals of final As-Built Drawings shall be made with monthly payment applications and at the completion of the entire project. At Contract closeout, deliver all Record Documents to Owner's Project Manager, for presentation to the Owner.
- B. A complete set of As-Built Drawings shall be prepared and delivered to the Owner's Project Manager. Work shall be performed by a Registered Professional Surveyor and Mapper shall include, but not be limited to the following:
 - 1. Valve boxes, splice boxes, pull boxes, all underground utilities-waterlines, electrical runs, irrigation system, storm drainage pipe and structures, sanitary sewer lines and structures, finished necessary grades, benches, curbs, fences, walls, signs, light fixtures and other items as necessary in accordance with Owner Record Plan/As-Built plan requirements.
- C. Submittal of the draft As-Built GIS Database shall be done electronically. The Engineer will review the Excel file for completeness. The Owner shall provide written comments on the submittal. The Contractor shall provide a written response for each comment. The Contractor shall make revisions to the Excel file and submit both the responses to the comments and the revised database file for review by the Engineer and the Owner. Should further modifications of GIS database file be required, the Contractor shall make these modifications at no additional cost to the Owner.
- D. Accompany all submittals with transmittal letters in duplicate, containing:
 - 1. Date.
 - 2. Project title and number.
 - 3. Contractor's name and address.
 - 4. Title and number of each Record Document.
 - 5. Signature of Contractor or authorized representative.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

- END OF SECTION -

SECTION 01400

QUALITY CONTROL

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. Testing Laboratory Services

1. Laboratory testing and checking and all certifications required by the Specifications, including the cost of transporting all samples and test specimens, shall be provided by the Contractor unless otherwise indicated in the Specifications. Payment for laboratory services shall be made from the Allowance item entitled "Laboratory Testing Fees". Payment shall be made based on the actual cost of service upon submission of paid invoices.
2. The Contractor shall retain the services of an independent, certified testing laboratory to perform all testing required by the Contract Documents and by permitting agencies. The Contractor shall submit the name of the testing laboratory and evidence of all appropriate certifications for approval by the Engineer and the City.
3. In the case of a conflict between this Specification Section and the Contractor's Quality Management Plan, the more stringent requirement between the two documents shall govern.
4. Procedure
 - a. The Contractor shall plan and conduct his operations to permit taking of field samples and test specimens, as required, and to allow adequate time for laboratory tests.
 - b. The collection, field preparation and storage of field samples and test specimens shall be performed by the Contractor as required by the Specifications and as directed by the City.
5. Supplementary and Other Testing
 - a. Nothing shall restrict the Contractor from conducting tests he may require. Should the Contractor at any time request the City to consider such test results, the test reports shall be certified by an independent testing laboratory acceptable to the City. Testing of this nature shall be conducted at no additional cost to the City.

1.02 OBSERVATION AT PLACE OF MANUFACTURE

- A. Unless otherwise specified, all products, materials, and time and equipment shall be subject to observation by the Engineer at the place of manufacture.
- B. The presence of the Engineer at the place of manufacture however, shall not relieve the Contractor of the responsibility for furnishing products, materials, and equipment

which comply with all requirements of the Contract Documents. Compliance is a duty of the Contractor, and said duty shall not be avoided by any act or omission on the part of the Engineer.

1.03 SAMPLING AND TESTING

- A. Unless otherwise specified, all sampling and testing shall be in accordance with the methods prescribed in the current standards of the ASTM, as applicable to the class and nature of the article or materials considered; however, the City reserves the right to use any generally-accepted system of sampling and testing which, in the opinion of the Engineer, will ensure the City that the quality of the work is in full accord with the Contract Documents.
- B. Any waiver by the City of any specific testing or other quality assurance measures, whether or not such waiver is accompanied by a guarantee of substantial performance as a relief from the specified testing or other quality assurance requirements as originally specified, and whether or not such guarantee is accompanied by a performance bond to assure execution of any necessary corrective or remedial Work, shall not be construed as a waiver of any requirements of the Contract Documents.
- C. Notwithstanding the existence of such waiver, the Engineer reserves the right to make independent investigations and tests and failure of any portion of the Work to meet any of the requirements of the Contract Documents, shall be reasonable cause for the Engineer to require the removal or correction and reconstruction of any such Work in accordance with the General Conditions.
- D. Materials to be tested include, but are not necessarily limited to the following:
 - 1. cement,
 - 2. concrete aggregate,
 - 3. concrete,
 - 4. bituminous paving materials,
 - 5. structural and reinforcing steel,
 - 6. waterproofing,
 - 7. select backfill, subgrade, base material, crushed stone or gravel and sand,
 - 8. water during pipeline disinfection and bacteriological testing

1.04 SITE INVESTIGATION AND CONTROL

- A. The Contractor shall verify all dimensions in the field and shall check field conditions continuously during construction. The Contractor shall be solely responsible for any inaccuracies built into the Work due to its failure to comply with this requirement.
- B. The Contractor shall inspect related and appurtenant Work and shall report in writing to the Engineer any conditions which will prevent proper completion of the Work. Failure to report any such conditions shall constitute acceptance of all site conditions, and any

required removal, repair, or replacement caused by unsuitable conditions shall be performed by the Contractor within the scope of the Project.

1.05 OBSERVATION AND TESTING

- A. The work or actions of the testing laboratory shall in no way relieve the Contractor of its obligations under the Contract. The laboratory testing work will include such observations and testing required by the Contract Documents, existing laws, codes, ordinances, etc. The testing laboratory will have no authority to change the requirements of the Contract Documents, nor perform, accept or approve any of the Contractor's Work.
- B. The Contractor shall allow the Engineer ample time and opportunity for field observation and testing materials and equipment to be used in the Work. The Contractor shall advise the Engineer promptly upon placing orders for materials and equipment so that arrangements may be made, if desired, for observation before shipment from the place of manufacture. The Contractor shall at all times furnish the Engineer and its representatives, facilities including labor, and allow proper time for inspecting and testing materials, equipment, and installation. The Contractor must anticipate that possible delays may occur in the execution of its work due to the necessity of materials and equipment being inspected and accepted for use. The Contractor shall furnish, at its own expense, all samples of materials required by the Engineer for testing, and shall make its own arrangements for providing water, electric power, or fuel for the various observations and tests of structures and equipment.
- C. The Contractor shall furnish the services of representatives of the manufacturers of certain equipment, as prescribed in other Sections of the Specifications. The Contractor shall also place his orders for such equipment on the basis that, after the equipment has been tested prior to final acceptance of the work, the manufacturer will furnish the City with certified statements that the equipment has been installed properly and is ready to be placed in functional operation. Tests and analyses required of equipment shall be paid for by the Contractor, unless specified otherwise in the Section which covers a particular piece of equipment.
- D. Where other tests or analyses are specifically required in other Sections of these Specifications, the cost thereof shall be borne by the party (City or Contractor) so designated in such Sections. The City will bear the cost of all tests, observations, or investigations undertaken by the order of the Engineer for the purpose of determining conformance with the Contract Documents if such tests, observations, or investigations are not specifically required by the Contract Documents, and if conformance is ascertained thereby. Whenever nonconformance is determined by the Engineer as a result of such tests, observations, or investigations, the Contractor shall bear the full cost thereof or shall reimburse the City for said cost. In this connection, the cost of any additional tests and investigations, which are ordered by the Engineer to ascertain subsequent conformance with the Contract Documents, shall be borne by the Contractor.
- E. Significance of Tests
 - 1. Test results shall be binding on both the Contractor and the City, and shall be considered irrefutable evidence of compliance or noncompliance with the Specification requirements, unless supplementary testing shall prove, to the

satisfaction of the City, that the initial samples were not representative of actual conditions.

F. Supplementary and Other Testing

1. Nothing shall restrict the Contractor from conducting tests he may require. Should the Contractor at any time request the City to consider such test results, the test reports shall be certified by an independent testing laboratory acceptable to the City. Testing of this nature shall be conducted at the Contractor's expense.

1.06 RIGHT OF REJECTION, IMPERFECT WORK, EQUIPMENT, OR MATERIALS

- A. The Engineer, acting for the City, shall have the right, at all times and places, to reject any articles or materials to be furnished hereunder which, in any respect, fail to meet the requirements of the Contract Documents, regardless of whether the defects in such articles or materials are detected at the point of manufacture or after completion of the Work at the site, or during the subsequent guarantee period. If the Engineer or its representative, through an oversight or otherwise, has accepted materials or Work which is defective, or which is contrary to the Contract Documents, such materials, no matter in what stage or condition of manufacture, delivery, or erection, may be subsequently rejected by the Engineer for the City. Any defective or imperfect work, equipment, or materials furnished by the Contractor which is discovered shall be removed immediately even though it may have been overlooked by the Engineer and estimated for payment. Satisfactory work or materials shall be substituted for that rejected.
- B. The Contractor shall promptly remove rejected articles or materials from the site of the Work after notification of rejection. All costs of removal and replacement of rejected articles or materials as specified herein shall be borne by the Contractor.
- C. The Engineer may order tests of imperfect or damaged work, equipment, or materials to determine the required functional capability for possible acceptance, if there is no other reason for rejection. The cost of such tests shall be borne by the Contractor; and the nature, tester, extent and supervision of the tests will be as determined by the Engineer. If the results of the tests indicate that the required functional capability of the work, equipment, or material was not impaired, consistent with the final general appearance of same, the work, equipment, or materials may be deemed acceptable. If the results of such tests reveal that the required functional capability of the questionable work, equipment, or materials has been impaired, then such work, equipment, or materials shall be deemed imperfect and shall be replaced. The Contractor may elect to replace the imperfect work, equipment, or material in lieu of performing the tests.

1.07 OTHER CONSTRUCTION CONSIDERATIONS

- A. Sleeves and Openings: The Contractor shall provide all openings, chases, etc., to fit its own work and that of any other subcontractors and Contractor's. All such openings or chases shown on the Contract Drawings, or reasonably implied thereby, or as confirmed or modified by acceptable shop, setting or erecting drawings, shall be provided by the Contractor.
- B. Where pipes or conduits are to pass through slabs or walls, or where equipment frames or supports are to be installed as integral part of an opening, the sleeves,

openings, forms or frames shall be furnished by the installer of the pipes, conduits or equipment, but shall be placed by the Contractor. Where hanger inserts, anchor bolts and similar items are to be embedded in concrete as an integral part of a slab or wall, they shall be furnished by the installer of the pipe or other equipment requiring the hanger, etc., but shall be placed by the Contractor.

- C. Weather Conditions: Work that may be affected by inclement weather shall be suspended until proper conditions prevail. In the event of impending storms, the Contractor shall take necessary precautions to protect all work, materials and equipment from exposure.
- D. Fire Protection: The Contractor shall take all necessary precautions to prevent fires at or adjacent to the Work, including its own buildings and trailers. Adequate fire extinguisher and hose line stations shall be provided throughout the work area.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

3.01 BUOYANCY

- A. The Contractor shall be completely responsible for any tanks, pipelines, utility access, foundations or similar improvements that may become buoyant during the construction operations due to groundwater levels. Should there be any possibility of buoyancy, the Contractor shall take the necessary steps to prevent damage due to floating or flooding, and shall repair or replace said improvements at no additional cost to the City.

- END OF SECTION -

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SECTION 01430

OPERATION AND MAINTENANCE DATA

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. Detailed information for the preparation, submission, and Engineer's review of Operations and Maintenance (O&M) Data, as required by individual Specification sections.

1.02 DEFINITIONS

- A. Preliminary Data: Initial and subsequent submissions for Engineer's review.
- B. Final Data: Engineer-accepted data, submitted as specified herein.
- C. Maintenance Operation: As used on Maintenance Summary Form is defined to mean any routine operation required to ensure satisfactory performance and longevity of equipment. Examples of typical maintenance operations are lubrication, belt tensioning, adjustment of pump packing glands, and routine adjustments.

1.03 SEQUENCING AND SCHEDULING

- A. Equipment and System Data:
 - 1. Preliminary Data:
 - a. Do not submit until Shop Drawing for equipment or system has been reviewed and approved by Engineer.
 - b. Submit prior to shipment date.
 - 2. Final Data: Submit Compilation Formatted and Electronic Media Formatted data prior to initiation of Functional Testing as specified in the Section entitled "Equipment Testing and Startup".
- B. Materials and Finishes Data:
 - 1. Preliminary Data: Submit at least 15 days prior to request for final inspection.
 - 2. Final Data: Submit within 10 days after final inspection.

1.04 DATA FORMAT

- A. Prepare preliminary data in the form of an instructional manual. Prepare final data in data compilation format and on electronic media, as specified herein.
- B. Instructional Manual Format:
 - 1. Binder: Commercial quality, permanent, three-ring or three-post binders with durable plastic cover.

2. Size: 8-1/2 inches by 11 inches, minimum.
 3. Cover: Identify manual with typed or printed title "OPERATION AND MAINTENANCE DATA" and list:
 - a. Project title.
 - b. Designate applicable system, equipment, material, or finish.
 - c. Identity of separate structure as applicable.
 - d. Identity of equipment name, number and Specification section.
 4. Title Page:
 - a. Contractor name, address, and telephone number.
 - b. Subcontractor, Supplier, installer, or maintenance contractor's name, address, and telephone number, as appropriate.
 - 1) Identify area of responsibility of each.
 - 2) Provide name and telephone number of local source of supply for parts and replacement.
 5. Table of Contents:
 - a. Neatly typewritten and arranged in systematic order with consecutive page numbers.
 - b. Identify each product by product name and other identifying numbers or symbols as set forth in Contract Documents.
 6. Paper: 20-pound minimum, white for typed pages.
 7. Text: Manufacturer's printed data, or neatly typewritten.
 8. Three-hole punch data for binding and composition; arrange printing so that punched holes do not obliterate data.
 9. Material shall be suitable for reproduction, with quality equal to original. Photocopying of material will be acceptable, except for material containing photographs.
- C. Data Compilation Format:
1. Compile all Engineer-accepted preliminary O&M data into a hard-copy, hard-bound set.
 2. Each set shall consist of the following:
 - a. Binder: Commercial quality, permanent, three-ring or three-post binders with durable plastic cover.
 - b. Cover: Identify each volume with typed or printed title "OPERATION AND MAINTENANCE DATA, VOLUME NO. ___ OF ___," and list:

- 1) Project title.
 - 2) Contractor's name, address, and telephone number.
 - 3) If entire volume covers equipment or system provided by one Supplier include the following:
 - a) Identity of general subject matter covered in manual.
 - b) Identity of equipment number and Specification section.
 - c. Provide each volume with title page and typed table of contents with consecutive page numbers. Place contents of entire set, identified by volume number, in each binder.
 - d. Table of contents neatly typewritten, arranged in a systematic order:
 - 1) Include list of each product, indexed to content of each volume.
 - 4)** Designate system or equipment for which it is intended.
 - 5) Identify each product by product name and other identifying numbers or symbols as set forth in Contract Documents.
 - f. Section Dividers:
 - 1) Heavy, 80 pound cover weight, tabbed with numbered plastic index tabs.
 - 2) Fly-Leaf:
 - a) For each separate product, or each piece of operating equipment, with typed description of product and major component parts of equipment.
 - b) List with Each Product:
 - (1) Name, address, and telephone number of Subcontractor, Supplier, installer, and maintenance contractor, as appropriate.
 - (2) Identify area of responsibility of each.
 - (3) Provide local source of supply for parts and replacement.
 - c) Identity of separate structure as applicable.
 - g. Assemble and bind material, as much as possible, in same order as specified in the Contract Documents.
- D. Electronic Media Format: All Final O&M data shall also be submitted in whole in electronic format on digital CD or DVD media. Electronic O&M manuals shall contain information in standard formats (Adobe, PDF, Word, AutoCAD, HTML, etc.) and shall be easily accessible through the use of standard, "off-the-shelf" software such as an Internet browser. Hypertext links shall be embedded throughout the text for ease of navigation between references.

1.05 SUBMITTALS

A. Informational:

1. Data Outline: Submit 2 copies of a detailed outline of proposed organization and contents of Final Data prior to preparation of Preliminary Data.
2. Preliminary Data:
 - a. Submit 4 copies for Engineer's review.
 - b. If data meets conditions of the Contract:
 - 1) One copy will be returned to Contractor.
 - 2) One copy will be forwarded to Resident Project Representative.
 - 3) One copy will be retained in Engineer's file.
 - 4) One copy will be retained by the City.
 - c. If data does not meet conditions of the Contract:
 - 1) All copies will be returned to Contractor with Engineer's comments (on separate document) for revision.
 - 2) Engineer's comments will be retained in City's and Engineer's files.
 - 3) Resubmit 4 copies revised in accordance with Engineer's comments.
3. Final Data - Hardcopies: Submit 3 copies in format specified herein.
4. Final Data - Electronic Media Format: Submit 3 copies in format specified herein.

1.06 DATA FOR EQUIPMENT AND SYSTEMS

A. Content for Each Unit (or Common Units) and System:

1. Product Data:
 - a. Include only those sheets that are pertinent to specific product.
 - b. Clearly annotate each sheet to:
 - 1) Identify specific product or part installed.
 - 6) Identify data applicable to installation.
 - 7) Delete references to inapplicable information.
 - c. Function, normal operating characteristics, and limiting conditions.
 - d. Performance curves, engineering data, nameplate data, and tests.
 - e. Complete nomenclature and commercial number of replaceable parts.

- f. Original manufacturer's parts list, illustrations, detailed assembly drawings showing each part with part numbers and sequentially numbered parts list, and diagrams required for maintenance.
 - g. Spare parts ordering instructions.
 - h. Where applicable, identify installed spares and other provisions for future work (e.g., reserved panel space, unused components, wiring, terminals).
2. As-installed, color-coded piping diagrams.
 3. Charts of valve tag numbers, with the location and function of each valve.
 4. Drawings: Supplement product data with Drawings as necessary to clearly illustrate:
 - a. Format:
 - 1) Provide reinforced, punched, binder tab; bind in with text.
 - 2) Reduced to 8-1/2 inches by 11 inches, or 11 inches by 17 inches folded to 8-1/2 inches by 11 inches.
 - 3) Where reduction is impractical, fold and place in 8-1/2-inch by 11-inch envelopes bound in text.
 - 4) Identify Specification section and product on Drawings and envelopes.
 - b. Relations of component parts of equipment and systems.
 - c. Control and flow diagrams.
 5. Coordinate drawings with Project record documents to assure correct illustration of completed installation.
 6. Instructions and Procedures: Within text, as required to supplement product data.
 - a. Format:
 - 1) Organize in consistent format under separate heading for each different procedure.
 - 2) Provide logical sequence of instructions for each procedure.
 - 3) Provide information sheet for City's personnel, including:
 - a) Proper procedures in event of failure.
 - b) Instances that might affect validity of guarantee or Bond.
 - b. Installation Instructions: Including alignment, adjusting, calibrating, and checking.
 - c. Operating Procedures:
 - 1) Startup, break-in, routine, and normal operating instructions.

- 2) Test procedures and results of factory tests where required.
 - 3) Regulation, control, stopping, and emergency instructions.
 - 4) Description of operation sequence by control manufacturer.
 - 8) Shutdown instructions for both short and extended duration.
 - 9) Summer and winter operating instructions, as applicable.
 - 10) Safety precautions.
 - 11) Special operating instructions.
 - d. Maintenance and Overhaul Procedures:
 - 1) Routine maintenance.
 - 12) Guide to troubleshooting.
 - 13) Disassembly, removal, repair, reinstallation, and re-assembly.
- B. Content for Each Electric or Electronic Item or System:
1. Description of Unit and Component Parts:
 - b. Function, normal operating characteristics, and limiting conditions.
 - c. Performance curves, engineering data, nameplate data, and tests.
 - d. Complete nomenclature and commercial number of replaceable parts.
 - e. Interconnection wiring diagrams, including control and lighting systems.
 2. Circuit Directories of Panelboards:
 - a. Electrical service.
 - b. Controls.
 - c. Communications.
 3. List of electrical relay settings, and control and alarm contact settings.
 4. Electrical interconnection wiring diagram, including control and lighting systems.
 5. As-installed control diagrams by control manufacturer.
 6. Operating Procedures:
 - a. Routine and normal operating instructions.
 - b. Sequences required.
 - c. Safety precautions.
 - d. Special operating instructions.

7. Maintenance Procedures:
 - a. Routine maintenance.
 - b. Guide to troubleshooting.
 - c. Adjustment and checking.
 - d. List of relay settings, control and alarm contact settings.
8. Manufacturer's printed operating and maintenance instructions.
9. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.

C. Maintenance Summary:

1. Compile individual Maintenance Summary for each applicable equipment item, respective unit or system, and for components or sub-units.
2. Format:
 - a. Use Maintenance Summary Form bound with this Section or electronic facsimile of such.
 - b. Each Maintenance Summary may take as many pages as required.
 - c. Use only 8-1/2-inch by 11-inch size paper.
 - d. Complete using typewriter or electronic printing.
3. Include detailed lubrication instructions and diagrams showing points to be greased or oiled; recommend type, grade, and temperature range of lubricants and frequency of lubrication.
4. Recommended Spare Parts:
 - a. Data to be consistent with manufacturer's Bill of Materials/Parts List furnished in O&M manuals.
 - e. "Unit" is the unit of measure for ordering the part.
 - f. "Quantity" is the number of units recommended.
 - g. "Unit Cost" is the current purchase price.

1.07 DATA FOR MATERIALS AND FINISHES

A. Content for Architectural Products, Applied Materials, and Finishes:

1. Manufacturer's data, giving full information on products:
 - a. Catalog number, size, and composition.
 - h. Color and texture designations.
 - i. Information required for reordering special-manufactured products.

2. Instructions for Care and Maintenance:

- a. Manufacturer's recommendation for types of cleaning agents and methods.
- j. Cautions against cleaning agents and methods that are detrimental to product.
- k. Recommended schedule for cleaning and maintenance.

B. Content for Moisture Protection and Weather Exposed Products:

1. Manufacturer's data, giving full information on products:

- a. Applicable standards.
- b. Chemical composition.
- c. Details of installation.

2. Instructions for inspection, maintenance, and repair.

1.08 SUPPLEMENTS

A. The supplements listed below, following "END OF SECTION," are part of this Specification.

- 1. Forms: Maintenance Summary Form.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

- END OF SECTION -

CITY OF FORT LAUDERDALE

MAINTENANCE SUMMARY FORM

PROJECT: _____ CONTRACT NO.: _____

1. EQUIPMENT ITEM _____

2. MANUFACTURER _____

3. EQUIPMENT/TAG NUMBER(S) _____

4. WEIGHT OF INDIVIDUAL COMPONENTS (OVER 100 POUNDS) _____

5. NAMEPLATE DATA (hp, voltage, speed, etc.) _____

6. MANUFACTURER'S LOCAL REPRESENTATIVE _____

a.

Name _____

Telephone No. _____

b.

Address _____

7. MAINTENANCE REQUIREMENTS

Maintenance Operation Comments	Frequency	Lubricant (If Applicable)
List briefly each maintenance operation required and refer to specific information in manufacturer's standard maintenance manual, if applicable. (Reference to manufacturer's catalog or sales literature is not acceptable.)	List required frequency of each maintenance operation.	Refer by symbol to lubricant required.

PROJECT NO. 11843 PROGRESSO VILLAGE STORM WATER IMPROVEMENTS

Maintenance Operation Comments	Frequency	Lubricant (If Applicable)

8. LUBRICANT LIST

Reference Symbol	Shell	Standard Oil	Gulf	Arco	Or Equal
List symbols used in No. 7. above.	List equivalent lubricants, as distributed by each manufacturer for the specific use recommended.				

9. RECOMMENDED SPARE PARTS FOR CITY'S INVENTORY.

Part No.	Description	Unit	Quantity	Unit Cost
<i>Note: Identify parts provided by this Contract with two asterisks.</i>				

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SECTION 01510

TEMPORARY UTILITIES

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. It shall be the Contractor's responsibility to provide equipment that is adequate for the performance of the Work under this Contract within the time specified. All equipment shall be kept in satisfactory operating condition, shall be capable of safely and efficiently performing the required Work, and shall be subject to review by the City's representative at any time within the duration of the Contract. All Work hereunder shall conform to the applicable requirements of the OSHA Standards for Construction.
- B. The Contractor shall provide for utilities and services for its own operations. The Contractor shall furnish, install and maintain all temporary utilities during the contract period including removal upon completion of the Work.

1.02 POWER AND LIGHTING

- A. Power: The Contractor shall provide all necessary power required for its operations under the Contract, and shall provide and maintain all temporary power lines required to perform the Work in a safe and satisfactory manner.
- B. Construction Lighting: All Work conducted at night or under conditions of deficient daylight shall be suitably lighted to ensure proper Work and to afford adequate facilities for inspection and safe working conditions. Temporary lighting shall be maintained during nonworking periods if the area is subject to access by the public or City's personnel.
- C. Electrical Connections: All temporary connections for electricity shall be subject to review by the Engineer and the power company representative, and shall be removed in like manner at the Contractor's expense prior to final acceptance of the Work.
- D. Separation of Circuits: Unless otherwise permitted by the Engineer, circuits separate from lighting circuits shall be used for all power purposes.
- E. Construction Wiring: All wiring for temporary electric light and power shall be properly installed and maintained and shall be securely fastened in place. All electrical facilities shall conform to the requirements of Subpart K of the OSHA Safety and Health Standards for Construction.

1.03 WATER SUPPLY

- A. General: Except as noted otherwise, the Contractor shall make arrangements for and pay for all costs for all water used during construction including general construction used, testing, Contractor's trailer and Engineer's trailer. The Contractor shall provide and maintain all piping, fittings, adapters, and valving as may be required.

- B. If a temporary connection is made to a potable water system on-site (e.g., a fire hydrant), the Contractor must install a back flow prevention device and a meter, obtained from the City. The Contractor shall provide temporary piping for the metering and use of potable water. The cost of the water for the testing will be charged to the Contractor at the standard City rates including deposits, monthly charges and usage charges.
- C. Water Connections: The Contractor shall not make connection to, or draw water from, any fire hydrant or pipeline without first obtaining permission of the authority having jurisdiction over the use of said fire hydrant or pipeline and from the agency owning the affected water system. For each such connection made, the Contractor shall first attach to the fire hydrant or pipeline a valve and a meter, if required by the said authority, of a size and type acceptable to said authority and agency.
- D. Removal of Water Connections: Before final acceptance of the Work on the project, all temporary connections and piping installed by the Contractor shall be entirely removed, and all affected improvements shall be restored to their original condition, or better, to the satisfaction of the Engineer and to the agency owning the affected utility.
- E. Fire Protection: The construction, and all other parts of the Work shall be connected with the Contractor's water supply system and shall be adequately protected against damage by fire. Hose connections and hose, water casks, chemical equipment, or other sufficient means shall be provided for fighting fires in the temporary structures and other portions of the Work, and responsible persons shall be designated and instructed in the operation of such fire apparatus so as to prevent or minimize the hazard of fire. The Contractor's fire protection program shall conform to the requirements of Subpart F of the OSHA Standards for Construction and all local Fire Department Requirements.

1.04 TEMPORARY SANITARY FACILITIES

- A. The Contractor shall provide and maintain adequate and clean sanitary facilities for the construction work force and visitors. The facilities shall comply with local codes and regulations and be situated in an acceptable location.

1.05 CONFINED SPACES

- A. The Contractor shall provide and maintain a safe working environment in confined spaces. The Contractor shall follow the applicable requirements of the OSHA Standards for Construction and NIOSH Publications for working in confined spaces.

1.06 TEMPORARY VENTILATION

- A. The Contractor shall provide and maintain adequate ventilation for a safe working environment. In addition, forced air ventilation shall be provided for the curing of installed materials, humidity control and the prevention of hazardous accumulations of dust, gases or vapors.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -

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SECTION 01520

CONSTRUCTION CONSTRAINTS

PART 1 - GENERAL

1.01 THE REQUIREMENT

- A. The intent of this Section is to outline the minimum requirements necessary to provide continuous public services throughout the construction period.
- B. Work under the Contract shall be scheduled and performed in such a manner as to result in the least possible disruption to the operation of existing water, wastewater, and stormwater transmission facilities and nearby residents and businesses.
- C. The Contractor has the option of providing additional temporary facilities that can eliminate a constraint, provided it is done without cost to the City (including additional City labor) and provided that all requirements of these Specifications are fulfilled. Work not specifically covered in the following paragraphs may, in general, be done at any time during the contract period, subject to the operating requirements and constraints and construction requirements outlined hereinafter. All references to days in this Section shall be consecutive calendar days.

1.02 CONNECTION OF EXISTING SYSTEMS

- A. All connections to existing systems shall be performed in such a manner that no damage and minimal interruption is caused to the existing installation. Any damage caused to existing installations shall be repaired or replaced by the Contractor at no additional cost to the City.
- B. The Contractor shall note that some of the work in this Contract will require the Contractor to connect to existing pipelines and structures. The Contractor shall be responsible for the proper containment and disposal of wastewater, or other materials drained from existing pipelines and structures during construction, unless otherwise specifically noted to be performed by the City.
- C. The Contractor shall contain such wastewater or other materials (in accordance with all applicable codes) and shall dispose of such within the existing collection system as approved by the City. The Contractor shall be responsible for the prevention of wastewater or other material spills within the Work.

1.03 OPERATION REQUIREMENTS

- A. Coordination with Private Property Owners: Stormwater work is located in City of Fort Lauderdale right-of-way areas. Work is also adjacent to private residences and public access areas. The Contractor shall coordinate work with the City and shall minimize impacts to private property owners and public access areas. Contractor shall replace surrounding ground affected including but not limited to pavers, sidewalks, sod, landscape and bring it to original or better conditions.

- B. Sequence of certain major events and identification of time constraints for removing existing facilities from active service and installation of new facilities are described below. No phase of work (or tasks within a phase) shall preclude or be performed in parallel with a subsequent phase unless specifically defined so in these documents. In all cases, work in each phase shall be accepted for satisfactory use, subject to the City's approval, prior to the Contractor proceeding to the next phase of construction.
- C. Critical events in the sequence of construction are specified herein. The outlined sequence of construction does not include all items necessary to complete the Work, but is intended to identify the sequence of critical events necessary to eliminate disruption to the public and to the City's facilities. It shall be understood by the Contractor that the critical events identified are not all inclusive and that additional items of work not shown may be required. The sequence of construction is a precedence requirement and does not attempt to schedule the Contractor's work.

1.04 SEQUENCE OF CONSTRUCTION

A. Mobilization / Site Preparation

1. Mobilize for work – video roadways, swales and adjacent area, establish field offices, obtain permits, develop and submit construction schedule, submit shop drawing schedule and begin shop drawing submittals and procurement of materials.
2. For interfering utilities, construct new utilities up to tie-in points, perform tests, make final connections with minimum amount of shut down time. After acceptance of new utilities, remove existing interfering underground utilities and structures. Provide temporary services as required to maintain continuous operation.

B. Detailed Construction

1. Project Notification shall be performed in accordance with the requirements of Section 01580.
2. The Contractor shall be responsible for all damages/claims resulting from its activities on the surrounding neighborhood and its residents.
3. Construction of the storm drainage system and force main may not begin before construction of the pump station begins.
4. The Contractor shall divide the overall project area into contiguous areas (Work Areas), each comprising no more than 2,000 linear feet of open cut installation. The Contractor may undertake work that results in disturbance of existing conditions (e.g. any excavations, interruption of normal traffic, etc.), in only one identified Work Area at a time and must complete all work, including restoration of all utility services, driveway/sidewalk repairs, and temporary asphalt, with the exception of final milling and resurfacing of roadway pavement within that area prior to moving to the next construction area. Upon request of the Contractor, contingent upon satisfactory demonstration of timely and adequate restoration, the City and Engineer may grant approval for the Contractor to exceed the 2,000 linear feet limitation of open cut construction at any given time.

5. After proposed improvements are installed, the Contractor shall restore the first and second lifts of asphalt (temporary patch) within 14 days after installation of buried piping/structures.
6. Final milling and resurfacing of the entire roadway (for all areas where pipe or structures are installed) shall be completed in a maximum of two sections, after completion of pipeline testing, acceptance, and complete pavement restoration of all Work Areas.
7. With approval from the City the Contractor may choose to implement two Work Areas within the project limits at the same time. It is required that the two Work Areas must have a minimum of three City blocks separation between them until one of the Work Areas is deemed substantially complete. Additional materials and equipment required for this approach shall be the responsibility of the Contractor at no additional cost to the City.
8. The Contractor shall be responsible for all damages/claims resulting from its activities on the surrounding neighborhood, its residents, and businesses.
9. The Contractor shall provide pedestrian access to all businesses and residences within the project limits at all times.
10. Construction within a Work Area shall be scheduled so that all improvements are completed at one time and impacted residents/businesses are only disrupted for one time period.
11. The Contractor shall be responsible for the removal and replacement of miscellaneous street furnishings which shall include, but are not necessarily limited to, the following: benches, newspaper racks, telephones, bus shelters, trash receptacles, mailboxes, etc. in order to complete construction as necessary.
12. Construction activities related to pipeline installations along **NW 9th Street, NW 1st Avenue, NW 2nd Avenue, NW 3rd Avenue (north of NW 9th Street), and NW 4th Avenue (north of NW 9th Street)** shall not commence until the Broward County Environmental Resources Permit modification has been received, which is anticipated within 120 calendar days from the issuance of the NTP. If said permit modification is received prior to 120 calendar days from the issuance of the NTP, the Contractor may commence activities related to the construction of these pipeline installations upon written authorization from the City and otherwise in accordance with these Specifications the Contract Documents.
13. Construction activities east of NW 3rd Avenue and north of NW 7th Street shall not commence until the Broward County Environmental Resources Permit modification has been received, which is anticipated within 120 calendar days from the issuance of the NTP. If said permit modification is received prior to 120 calendar days from the issuance of the NTP, the Contractor may commence activities related to the construction of the project upon written authorization from the City and otherwise in accordance with these Specifications the Contract Documents.

C. Final Site Work and Closeout

1. Final grading, milling and resurfacing, sodding, landscaping, miscellaneous work, demobilization and related closeout activities shall be as defined elsewhere in the Contract Documents.

1.05 CONSTRUCTION CONSTRAINTS

A. Construction Dewatering

1. All dewatering equipment such as pumps, air compressors, generators, etc. proposed for use during construction in residential areas shall be provided with noise enclosures suitable to meet the requirements of the City of Fort Lauderdale Noise Ordinance.
2. The Contractor is responsible for draining and dewatering all existing utilities impacted by the work as required to complete the relocation, demolition, bypass, or tie-in connections. Contractor is responsible for disposal of the contents of each line.
3. Additional requirements for construction dewatering are defined on the Drawings.
4. Contractor is responsible for noise mitigation and adhering to the City's noise ordinance.

B. Work in City of Fort Lauderdale Right-of-Way

1. Contractor shall coordinate with City of Fort Lauderdale Engineering Department prior to start of restoration.
2. At any time, the entire length of the project area shall remain unobstructed and open to through traffic for each section. Access for emergency vehicles shall be maintained at all times to all homes and businesses. Excavation must be backfilled or barricaded at the end of each workday to prevent hazardous conditions. If a trench, excavation, or structure is to be left open, it must be covered with a steel plate and barricaded at the end of each workday or when work will be suspended for more than eight (8) hours.
3. Transportation provisions for handicapped or disabled residents shall be made by the Contractor if construction temporarily prevents access to homes. Constant access shall be provided for residents on the Special Needs List.
4. The Contractor shall also make provisions with local bus, school bus, garbage collection, mail delivery, and other agencies for continuation of service. A traffic maintenance plan indicating detours, schedules, and alternate routes which has been approved by the Engineer, the City, and Broward County Traffic Engineering Division shall be submitted to all affected agencies for coordination and routing purposes.
5. Pipe and material shall not be strung out along installation routes for longer than two (2) weeks prior to installation.
6. A safe walk route for all schools within the vicinity of the construction zone shall be maintained during the arrival and dismissal of school. Contractor shall not block bus access to schools during school hours.

C. Maintenance of Existing Facilities

1. It may be necessary to interrupt the operation of the existing water and/or sewer system. In all cases where the Contractor must cause an interruption, the Contractor shall prepare and submit to the Engineer seven (7) working days prior to commencing work, a complete description of the proposed procedure and a guaranteed time schedule. At least 24 hours prior to the time proposed for starting the Work, the Contractor will be notified by the Engineer whether or not the Work will be permitted as proposed.
2. The Engineer reserves the right to require the Contractor to work 24 hours per day in all cases where interference with operation of the system may result in dangerous health hazards or offensive conditions.
3. In no case will the Contractor be permitted to interfere with the existing system until all materials, supplies, equipment, tools and incidentals necessary to complete the work are on site. Backup equipment and/or materials on key items shall be required on work necessitating interference with the existing system.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

3.01 COORDINATION WITH EXISTING UTILITIES AND OTHER AGENCIES

- A. The Contractor shall notify all utilities in writing with a copy to the City/Engineer prior to construction commencement. The Contractor shall cooperate with these utility owners as necessary to minimize service interruptions.

- END OF SECTION -

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SECTION 01525

MAINTENANCE OF TRAFFIC

PART 1 - GENERAL

1.01 GENERAL

- A. The Contractor shall maintain pedestrian and vehicular traffic within the limits of the projects for the duration of the construction period, including any temporary suspensions of the work, construct and maintain detours, provide facilities for access to adjacent residences, schools, bus pick up and drop off locations, common grounds, businesses, etc., along the project, furnish, install and maintain traffic control and safety devices during construction, furnish and install work zone pavement markings for maintenance of traffic in construction areas and provide any other special requirements for safe and expeditious movement of pedestrian and vehicular traffic in accordance with the Contract Documents. Maintenance of Traffic includes all facilities, devices and operations as required for safety and convenience of the public within the work zones, and shall include provisions for pedestrian, residential, and school student traffic as well as vehicular traffic.

The Contractor shall not maintain traffic over those portions of the project where no work is to be accomplished or where construction operations will not affect existing roads. Do not obstruct or create a hazard to any traffic during the performance of the work, and repair any damage to existing pavement open to traffic.

- B. Beginning Date of Contractor's Responsibility: The Contractor shall maintain traffic starting the day work begins on the project. No work shall commence without approved and constructed Traffic Control Plans in place.
- C. Worksite Traffic Supervisor: The Contractor shall provide a Worksite Traffic Supervisor. Requirements are as follows:
1. Ensure that the Worksite Traffic Supervisor is available on a 24-hour per day basis, participates in all changes to traffic control and reviews the project on a day-to-day basis.
 2. Ensure that the Worksite Traffic Supervisor is present to direct the initial setup of the traffic control plan and any changes. Provide the Worksite Traffic Supervisor with all equipment and materials needed to set up, and maintain traffic control and handle traffic-related situations.
 3. Ensure that the Worksite Traffic Supervisor immediately corrects all safety deficiencies. Do not allow minor deficiencies that are not immediate safety hazards to remain uncorrected for more than 24-hours.
 4. Ensure that the Worksite Traffic Supervisor is available within 45 minutes after notification of an emergency situation and is prepared to positively respond to repair the work zone traffic control or to provide alternate traffic arrangements.

5. The City may disqualify and remove from the project a Worksite Traffic Supervisor that fails to comply with the provisions of this specification. The City may suspend all activities, except traffic and erosion control and such other activities that are necessary for project maintenance and safety, for failure to comply with these provisions.
6. Ensure that the Worksite Traffic Supervisor performs a drive-through inspection and observes traffic flow as soon as the work zone is activated and in each subsequent phase of work as they are opened to traffic. Provide to the Engineer and City a report that includes a listing of any deficiencies and proposed corrective measures.
7. Ensure that the Worksite Traffic Supervisor conducts within the limits of the project, daily daytime and weekly night time inspections within the limits of the project for projects with predominate daytime work activities and daily nighttime and weekly daytime inspections for projects with predominate nighttime work, of all traffic control devices, traffic flow, pedestrian, bicyclist, student, bus rider, school, residence and business accommodations.
8. Advise the project personnel of the schedule of these inspections and give them the opportunity to join in the inspection as is deemed necessary. Submit a comprehensive weekly report to the Engineer and City and include the condition of all traffic control devices (including pavement markings) being used. The inspection report shall also include assurances that pedestrians are accommodated with a safe travel path around work sites and safely separated from mainline traffic, that existing or detoured bicyclist paths and bus routes and stops are being maintained satisfactorily throughout the project limits, that existing residences in the work areas are being provided with adequate access for vehicular and pedestrian traffic at all times and that existing businesses in the work areas are being provided with adequate entrances for vehicular and pedestrian traffic during business hours. The Worksite Traffic Supervisor shall sign the report and certify that all of the above issues are being handled in accordance with the Contract Documents. If deficiencies are noted, the Worksite Traffic Supervisor shall note such deficiencies and include the proposed corrective actions in the report and implement immediate corrective action.
9. Longitudinal Channelizing Barricade Requirements
 - a. Plastic water filled barricades shall be high impact, UV resistant and constructed of polyethylene.
 - b. All plastic water filled barricades for traffic and safety control shall be suitable for traffic channeling and control, lane delineation, crowd control, identification of parking areas and other similar approved uses.
 - c. Please note that the use of standard barricades, chain link fencing, temporary plywood walls / handrails, and other similar types of installations shall not be considered acceptable.

D. Traffic Control Plan

1. The Contractor is responsible for preparing a Traffic Control Plan (TCP) to be signed and sealed by a licensed Florida Engineer competent and trained in the preparation of TCP. The licensed Florida Engineer (TCPE) signing and sealing the Traffic Control Plan shall review all of the reports from the Worksite Traffic Supervisor and inspect the installation for compliance with his approved plan upon the initial installation and for each subsequent phase of the plan. The Contractor shall provide the Engineer and City with an inspection report from the TCPE indicating compliance with his approved TCP. The TCP shall meet the requirements of the Manual on Uniform Traffic Control Devices (MUTCD) Part VI, and the following jurisdictional agencies.
 - a. City of Fort Lauderdale Transportation and Mobility
 - b. City of Fort Lauderdale Department of Sustainable Development
 - c. City of Fort Lauderdale Fire Department
 - d. City of Fort Lauderdale Police Department
 - e. School Board of Broward County
2. Standards: FDOT Design Standards (DS) are the minimum standards for the use in the development of all traffic control plans. The MUTCD Part VI is the minimum national standard for traffic control for highway construction, maintenance, and utility operations. Follow the basic principles and minimum standards contained in these documents for the design, application, installation, maintenance, and removal of all traffic control devices, warning devices and barriers which are necessary to protect the public and workers from hazards within the project limits.
3. The Contractor shall provide sufficient time in the construction schedule to develop and obtain approval for each TCP.
4. The Contractor shall include provisions for detouring pedestrians and providing maintenance of traffic plans and conveyances that meet current ADA (Americans with Disabilities Act) requirements.
5. The Contractor shall submit approved maintenance of traffic plans and schedules for the development, review, approval and implementation of the maintenance of traffic plan in accordance with the Contract Documents and Section 01300, "Submittals".

PART 2 - PRODUCTS

2.01 BARRICADES

- A. Composition: All barricades shall be constructed of ISO 9000 quality manufactured 100% recyclable LLDPE (Equistar 625) polyethylene.
- B. Colors: All barricades shall be safety orange.

- C. Length: Each barricade shall be 45-inches in length.
- D. Height: Each barricade shall be 42-inches.
- E. Base width: Each barricade shall have a total base width of 23.5-inches.
- F. Wall thickness: Minimum wall thickness shall be 0.2-inches (5mm).
- G. Weight: Each barricade shall have a maximum dry weight of 44 lbs (22.7kg) and a maximum full weight of 760 lbs.
- H. Barricades shall be designed to allow end-to-end installation with no visible gaps between units.
- I. Barricades shall be graffiti / vandal-proof and have interlocking capability.
- J. DOT Performance Evaluations: Barricades shall meet NCHRP-350 Test 3-71 and 1-10 requirements. Written certification to this effect must be provided.
- K. FHWA Certification Letter WZ-8: Barricades shall be suitably accepted for Category II Traffic Control Device service at 62.5 mph.
- L. Application of force for tipping: When filled, barricades shall resist tipping when a point force of up to 255.8 lbs is applied to the top edge.
- M. Barricades shall be equipped with a pre-molded attachment area suitable for installation of flashing lights.
- N. Barricades shall be pre-molded and be equipped with requisite stainless steel tamper proof hardware as necessary to readily accept interchangeable signage, including but not be limited to: directional, reflective and/or advertising types of signage.
- O. Barricades shall be equipped with a tamper proof fill and drain caps, designed to be removed only by use of special tools.
- P. Barricades shall be Model MB 42 x 45 LBC as manufactured by Off-the-Wall or approved equal.

PART 3 - EXECUTION

- A. Maintenance of Roadway Surfaces: Maintain all lanes that are being used for the maintenance of traffic, including those on detours and temporary facilities, under all weather conditions. Keep the lanes free of dust, dirt, muck, potholes and rutting. Provide the lanes with the drainage facilities necessary to maintain a smooth riding surface under all weather conditions.
- B. Number of Traffic Lanes:
 - 1. Maintain one lane of traffic in each direction.

2. Maintain two lanes of traffic in each direction at existing four (or more) lane cross roads.
 3. Construct each lane used for maintenance of traffic at least as wide as the traffic lanes existing in the area before commencement of construction. Do not allow traffic control and warning devices to encroach on lanes used for maintenance of traffic.
 4. The Engineer may allow the Contractor to restrict traffic to one-way operation for short periods of time provided that the Contractor employs adequate means of traffic control and does not unreasonable delay traffic, and conforms to the approved requirements in the TCP. The Contractor shall include as a part of the TCP the estimated periods of one-way traffic operations and estimation of reasonable time delays and shall obtain the prior approval of the City Engineer having jurisdiction for these time periods and time delays. The Contractor shall include the TCP as a part of his Plan of Operation and MOT plan and in accordance with Section 01300, "Submittals".
- C. Crossings and Intersections: Provide and maintain adequate accommodations for intersecting and crossing traffic. Do not block or unduly restrict any road or street crossing the project unless approved by the Engineer and City Engineer. Maintain all existing actuated or traffic responsive mode signal operations for main and side street movements for the duration of the Contract. Restore any loss of detection within twelve (12) hours. Use only detection technology approved by the Engineer to restore detection capabilities. Before beginning any construction, provide the Engineer a plan for maintaining detection devices for each intersection and the name(s) and phone numbers of persons that can be contracted when signal operation malfunctions.
- D. Access for Residences and Businesses: Provide continuous access to all residences and all places of business, adjacent schools, common property and community facilities.
- E. Safe Walk Route: The safe walk route for all school students within the vicinity of the construction zone shall be maintained during the times students are arriving at or leaving school. If the current walking surface cannot be maintained, a temporary road-rock four-foot walkway shall be created in accordance with Broward County requirements. Accommodations shall be made immediately by the Contractor for the disabled persons.
- F. Protection of the Work from Injury by Traffic: Where traffic would be injurious to a base, surface course, or structure constructed as a part of the work, maintain all traffic outside the limits of such areas until the potential for injury no longer exists.
- G. Flagger: Provide trained flaggers as required by approved TCPs. State certified school crossing guards or off duty police officers shall be required to cross students at any locations other than those currently used.
- H. Use of High Visibility Safety: Provide personnel with appropriate high visibility safety garments. Ensure that these garments be worn whenever the workers are within fifteen (15) feet of the edge of the travel way and during nighttime operations. Workers operating machinery or equipment in which loose clothing could become entangled during operation shall be required to wear appropriate high visibility clothing that will not

be subject to entanglement such as orange shirts or jackets. Require Contractor personnel to wear reflective orange vest/garment during nighttime operations.

- I. Existing Pavement Markings: Where a detour changes the lane use of where normal vehicle paths are altered during construction, remove all existing pavement markings that will conflict with the adjusted vehicle paths. Do not overpaint. Remove existing pavement markings using a method that will not damage the surface texture of the pavement and which will eliminate the previous marking pattern regardless of weather and light conditions. Remove all pavement markings that will be in conflict with “next phase of operation” vehicle paths as described above, before opening to traffic.

- J. Detours
 1. General: Construct and maintain detour facilities wherever it becomes necessary to divert traffic from any existing roadway or bridge, or wherever construction operations block the flow of traffic.
 2. Construction: Plan, construct, and maintain detours for the safe passage of traffic in all conditions of weather. Provide the detour with all facilities necessary to meet this requirement.
 3. Construction Methods: Select and use construction methods and materials that provide a stable and safe detour facility. Construct the detour facility to have sufficient durability to remain in good condition, supplemented by maintenance, for the entire period that the detour is required.
 4. Removal of Detours: Remove detours when they are no longer needed and before the Contract is completed. Restore the area used for detours to a condition equal to or better than existed before beginning of construction. Take ownership of all materials from the detour and remove them.
 5. Detours Over Existing Roads and Streets: When the TCP specifies that traffic be detoured over roads or streets outside the project area, do not maintain such roads or streets; however, maintain all signs and other devices placed for the purpose of the detour.

- K. Traffic Control Officer.
 1. Provide uniformed law enforcement officers, including marked law enforcement vehicles, to assist in controlling and directing traffic in the work zone when traffic control in a signalized intersection is necessary when signals are not in use.

- L. Driveway Maintenance.
 1. General: Ensure that each residence and or business has safe, stable, and reasonable access.
 2. Construction Methods: Place, level, manipulate, compact, and maintain the material, to the extent appropriate for the intended use. As permanent driveway construction is accomplished at a particular location, the Contractor may salvage

and reuse previously placed materials that are suitable for reuse on other driveways.

M. Temporary Traffic Control Devices.

1. Installation and Maintenance: Install and maintain adequate traffic control devices, warning devices and barriers to protect the traveling public and workers, and to safeguard the work area. Erect the required traffic control devices, warning devices and barriers to prevent any hazardous conditions and in conjunction with any necessary traffic re-routing. Immediately remove, turn or cover any devices or barriers that do not apply to existing conditions.
2. Notify the Engineer, City, and City Engineer's representative of any scheduled operation, which will affect traffic patterns or safety, sufficiently in advance of commencing such operation to permit his review of the plan for the proposed installation of traffic control devices, warning devices of barriers.
3. Ensure an employee is assigned the responsibility of maintaining the position and condition of all traffic control devices, warning devices and barriers throughout the duration of the Contract. Keep the Engineer, City, and City Engineer's representative advised at all times of the identification and means of contacting this employee on a 24-hour basis.
4. Keep traffic control devices, warning devices, safety devices and barriers in the correct position, properly directed, clearly visible and clean, at all times. Immediately repair, replace or clean damaged, defaced or dirty devices or barriers.

N. Work Zone Signs: Provide signs in accordance with the approved TCPs and Design Standards.

O. High Intensity Flashing Lights: Furnish Type B lights in accordance with the approved TCPs and Design Standards.

P. Warning/Channelizing Devices: Furnish warning/channelizing devices in accordance with the approved TCPs and Design Standards.

1. Reflective Collars for Traffic Cones: At night use cone collars, designed to properly fit the taper of the cone when installed. Place the upper 6-inch collar a uniform 3 ½ inch distance from the top of the cone and the lower 4 inch collar a uniform 2 inch distance below the bottom of the upper 6 inch collar. Ensure that the collars are capable of being removed for temporary use or attached permanently to the cone in accordance with the manufacturer's recommendations. Provide a white sheeting having a smooth outer surface and that essentially has the property of a retro-reflector over its entire surface.
2. Barrier Wall (Temporary): Furnish, install, maintain, remove and relocate a temporary barrier wall in accordance with the approved TCPs.
3. Glare Screen (Temporary): Furnish, install, maintain, remove and relocate glare screen systems in conjunction with temporary barrier wall at locations identified in the approved TCPs. Ensure the anchorage of the glare screen to the barrier is

capable of safely resisting an equivalent tensile load of 600 lb/ft of glare screen, with a requirement to use a minimum of three (3) fasteners per barrier section. When glare screen is utilized on temporary barrier wall, warning lights will not be required.

4. Barricades shall be furnished where shown on drawings.
 5. Barricades shall also be used where other situations arise that require the installation of a temporary barrier between the public and the Work area.
 6. The Contractor shall make all arrangements and provide all requisite labor for the delivery, loading, unloading, filling with water, deployment and redeployment of barricades as required to meet the intent of the Project.
 7. The Contractor shall verify that all barricades, when deployed, are interlocked and filled with water in accordance with manufacturer's recommendation.
 8. Draining, repositioning / interlocking, filling and refilling barricades shall be the responsibility of the Contractor for the duration of the Project. In this capacity, barricades will be refilled / cleaned, when deemed necessary to maintain aesthetic appearance or intended performance. If necessary, the Contractor shall utilize an anti-fungal inhibitor when filling barricades.
 9. The source of water for filling of barricades shall be subject to City approval. The Contractor shall be responsible for all equipment costs, and labor required for filling / refilling / draining of barricades.
 10. Remove barricades from the project site at a date and time agreed upon with the City.
- Q. Guardrail (Temporary): Furnish guardrail (temporary) in accordance with the approved TCPs.
- R. Advance Warning Arrow Panel: Furnish advance warning panel in accordance with the approved plans, Design Standards and approved TCPs.
- S. Temporary Traffic Control Signals: furnish, install and operate temporary traffic control signals as indicated in the approved TCPs. Temporary traffic control signals will consist of either portable or fixed traffic signals. Provide certification that the portable traffic signals meet the requirements of the Design Standards. The Engineer may approve used signal equipment if it is in acceptable condition.
- T. Work Zone Pavement Marking.
1. Description: Furnish and install Work Zone Pavement Markings for maintenance of traffic construction areas and in close conformity with the lines and details shown on the plans. Measure the reflectivity of white and yellow stripes in accordance with Florida Method FM 5-541. Re-stripe anytime the reflectivity falls below the final values shown in FM 5-541. Use only pavement marking materials that do not contain any lead or chromium compounds.

2. Centerlines, lane lines, edge lines, stop bars and turn arrows in work zones will be required in accordance with the MUTCD with the following additions:
 - a. Install edge lines on paved shoulders.
 - b. Place edge lines on all detours where vehicle paths are altered from normal operations and where a lane is narrowed from its normal width for any reason.
 - c. Apply Work zone Pavement Markings, including arrows and messages as determined by the TCPE to be required for the safe operation of the facility, before the end of the day if the highway is open to traffic. Channelizing devices may be used to direct traffic during the day before placing the Work Zone Pavement Markings.
 - d. Work Zone Pavement Markings shall be designated in the approval TCPs as removable or non-removable.

- END OF SECTION -

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SECTION 01530

PROTECTION OF EXISTING FACILITIES

PART 1 - GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall be responsible for the preservation and protection of property adjacent to the work site against damage or injury as a result of its operations under this Contract. Any damage or injury occurring on account of any act, omission or neglect on the part of the Contractor shall be restored in a proper and satisfactory manner or replaced by and at the expense of the Contractor to an equal or superior condition than previously existed.
- B. The Contractor shall comply promptly with such safety regulations as may be prescribed by the City or the local authorities having jurisdiction and shall, when so directed, properly correct any unsafe conditions created by, or unsafe practices on the part of, its employees. In the event of the Contractor's failure to comply, the City may take the necessary measures to correct the conditions or practices complained of, and all costs thereof will be deducted from any monies due the Contractor. Failure of the Engineer to direct the correction of unsafe conditions or practices shall not relieve the Contractor of its responsibility hereunder.
- C. In the event of any claims for damage or alleged damage to property as a result of work under this Contract, the Contractor shall be responsible for all costs in connection with the settlement of or defense against such claims. Prior to commencement of work in the vicinity of property adjacent to the work site, the Contractor, at its own expense, shall take such surveys as may be necessary to establish the existing condition of the property. Before final payment can be made, the Contractor shall furnish satisfactory evidence that all claims for damage have been legally settled or sufficient funds to cover such claims have been placed in escrow, or that an adequate bond to cover such claims has been obtained.

1.02 PROTECTION OF WORK AND MATERIAL

- A. During the progress of the work and up to the date of final payment, the Contractor shall be solely responsible for the care and protection of all work and materials covered by the Contract.
- B. All work and materials shall be protected against damage, injury or loss from any cause whatsoever, and the Contractor shall make good any such damage or loss at its own expense. Protection measures shall be subject to the approval of the Engineer.

1.03 BARRICADES, WARNING SIGNS AND LIGHTS

- A. The Contractor shall provide, erect and maintain as necessary, strong and suitable barricades, danger signs and warning lights along all roads accessible to the public, as required by the authority having jurisdiction, to insure safety to the public. All barricades and obstructions along public roads shall be illuminated at night and all lights for this purpose shall be kept burning from sunset to sunrise.

- B. Each Contractor shall provide and maintain such other warning signs and barricades in areas of and around their respective work as may be required for the safety of all those employed in the work, City operating personnel, or those visiting the site.

1.04 TEMPORARY BRIDGES

- A. Construct temporary bridges at all points where maintenance of traffic across pipeline construction is necessary.
- B. Make bridges over public streets, roads, and highways acceptable to authority having jurisdiction thereover.
- C. Bridges erected over private roads and driveways shall be adequate for service to which they will be subjected.
- D. Provide substantial guardrails and suitably protected approaches.
- E. Provide foot bridges not less than 4 feet wide with handrails and uprights of dressed lumber.
- F. Maintain bridges in place as long as conditions of the Work require their use for safety of public, except that when necessary for proper prosecution of the Work in immediate vicinity of bridge. Bridge may be relocated or temporarily removed for such period as Engineer may permit.

1.05 EXISTING UTILITIES AND STRUCTURES

- A. The term existing utilities shall be deemed to refer to both publicly-owned and privately-owned utilities such as electric power and lighting, telephone, water, gas, storm drains, process lines, sanitary sewers and all appurtenant structures.
- B. Where existing utilities and structures are indicated on the Drawings, it shall be understood that all of the existing utilities and structures affecting the work may not be shown and that the locations of those shown are approximate only. It shall be the responsibility of the Contractor to ascertain the actual extent and exact location of existing utilities and structures. In every instance, the Contractor shall notify the proper authority having jurisdiction and obtain all necessary directions and approvals before performing any work in the vicinity of existing utilities.
- C. Prior to beginning any excavation work, the Contractor shall, through field investigations, determine any conflicts or interferences between existing utilities and new utilities to be constructed under this project. This determination shall be based on the actual locations, elevations, slopes, etc., of existing utilities as determined in the field investigations, and locations, elevation, slope, etc. of new utilities as shown on the Drawings. If interference exists, the Contractor shall bring it to the attention of the Engineer as soon as possible. If the Engineer agrees that interference exists, it shall modify the design as required.
- D. Additional costs to the Contractor for this change shall be processed through a Change Order as detailed elsewhere in these Contract Documents. In the event the Contractor fails to bring a potential conflict or interference to the attention of the Engineer prior to beginning excavation work, any actual conflict or interference which does arise during

the Project shall be corrected by the Contractor, as directed by the Engineer, at no additional expense to the City.

- E. The work shall be carried out in a manner to prevent disruption of existing services and to avoid damage to the existing utilities. Temporary connections shall be provided, as required, to insure uninterrupted existing services. Any damage resulting from the work of this Contract shall be promptly repaired by the Contractor at its own expense in a manner approved by the Engineer and further subject to the requirements of any authority having jurisdiction. Where it is required by the authority having jurisdiction that they perform their own repairs or have them done by others, the Contractor shall be responsible for all costs thereof.
- F. Where excavations by the Contractor require any utility lines or appurtenant structures to be temporarily supported and otherwise protected during the construction work, such support and protection shall be provided by the Contractor. All such work shall be performed in a manner satisfactory to the Engineer and the respective authority having jurisdiction over such work. In the event the Contractor fails to provide proper support or protection to any existing utility, the Engineer may, at its discretion, have the respective authority to provide such support or protection as may be necessary to insure the safety of such utility, and the costs of such measures shall be paid by the Contractor.
- G. Protection of existing utilities, structures and other facilities: The underground pipes, utilities and structures shown on the Plans are located according to the best information available, but may vary by several feet from both the position and elevation shown. The Contractor shall explore far enough ahead of its work to determine the exact location and condition of such utilities, structures or facilities so that, before the Work is installed, the Engineer may change the line or grade of the pipe or other facility, should that become necessary to avoid a conflict. Should this exploration reveal that adjustments to the work are necessary; the Contractor shall immediately notify the Engineer and coordinate with him to adjust the work in a timely fashion avoiding delays to construction. No request for additional compensation or Contract time (except for a non-compensable time extension at the sole discretion of the Engineer, whose decision shall be final) resulting from encountering utilities or structures not shown, or differing in location or elevation from that shown, will be considered. The Contractor shall explore sufficiently ahead of the Work to allow time for any necessary adjustment without delay occasioned by encountering underground utilities or structures which could have or should have been discovered by timely exploration ahead of the Work shall rest solely with the Contractor.
- H. Relocation of existing utilities: The relocation of existing utilities, as noted on the Plans, or for the convenience of the Contractor shall be the responsibility of the Contractor. This work shall be completed by either the forces of the existing utility or the Contractor's forces at the discretion of the responsible utility. If the work is to be performed by the Contractor, all work shall be done in accordance with the utility company's requirements. Under no circumstances shall the Contractor be authorized extra payment for this work, and all cost for the relocation shall be the responsibility of the Contractor.
- I. Any conflicts between the field investigation and the information shown on the Plans shall be brought to the immediate attention of the Engineer

1.06 TREES WITHIN PROJECT LIMITS

- A. General: The Contractor shall exercise all necessary precautions so as not to damage or destroy any trees on the project site, and shall not trim or remove any trees unless such trees have been approved for trimming or removal by the jurisdictional agency or City. All existing trees which are damaged during construction shall be replaced by the Contractor or a certified tree company to the satisfaction of the City.
- B. Replacement: The Contractor shall immediately notify the City if any tree is damaged by the Contractor's operations. If, in the opinion of the City, the damage is such that replacement is necessary, the Contractor shall replace the tree at its own expense. The tree shall be of a like size and variety as the tree damaged, or, if of a smaller size, the Contractor shall pay to the City compensatory payment acceptable to the City.

1.07 NOTIFICATION BY THE CONTRACTOR

- A. Prior to any excavation in the vicinity of any existing underground facilities, including all water, sewer, storm drain, gas, petroleum products, or other pipelines; all buried electric power, communications, or television cables; all traffic signal and street lighting facilities; and all roadway and state highway rights-of-way the Contractor shall notify the respective authorities representing the owners or agencies responsible for such facilities not less than three days nor more than seven days prior to excavation.

1.08 DETOURS

- A. Where authority having jurisdiction requires that traffic be maintained over construction work in a public street, road, or highway, and traffic cannot be maintained on original roadbed or pavement, construct and maintain detour around the Work. Coordinate traffic routing with that of others working in same or adjacent areas.

1.09 RESTORATION OF PAVEMENT

- A. General: All paved areas including asphaltic concrete berms cut or damaged during construction shall be replaced with similar materials and of equal thickness to match the existing adjacent undisturbed areas, except where specific resurfacing requirements have been called for in the Contract Documents. All pavements which are subject to partial removal shall be neatly saw cut in straight lines.
- B. Temporary Resurfacing: Wherever required by the public authorities having jurisdiction, the Contractor shall place temporary surfacing, signage, striping and/or other traffic controls as required, promptly after backfilling and shall maintain such surfacing for the period of time fixed by said authorities before proceeding with the final restoration of improvements.
- C. Permanent Resurfacing: In order to obtain a satisfactory junction with adjacent surfaces, the Contractor shall saw cut back and trim the edge so as to provide a clean, sound, vertical joint before permanent replacement of an excavated or damaged portion of pavement. Damaged edges of pavement along excavations and elsewhere shall be trimmed back by saw cutting in straight lines. All pavement restoration and other facilities restoration shall be constructed to finish grades compatible with adjacent undisturbed pavement.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -

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SECTION 01540

DEMOLITION AND REMOVAL OF EXISTING STRUCTURES AND EQUIPMENT

PART 1 - GENERAL

1.01 THE REQUIREMENT

- A. This Section covers the demolition, removal, and disposal of existing buildings, structures, pavement, curbs, and sidewalk, removal and disposal of asbestos materials, and any existing equipment including electrical, plumbing, septic tank(s), heating and ventilating equipment and piping not required for the operation of the systems as indicated on the Drawings and as specified hereinafter. The Contractor shall furnish all labor, materials and equipment to demolish buildings and structures and to remove fixtures, anchors, supports, piping and accessories designated to be removed on the Drawings.

1.02 TITLE TO EQUIPMENT AND MATERIALS

- A. Contractor shall have no right or title to any of the equipment, materials or other items to be removed from the existing buildings or structures unless and until said equipment, materials and other items have been removed from the premises. The Contractor shall not sell or assign, or attempt to sell or assign any interest in the said equipment, materials or other items until the said equipment, materials or other items have been removed.
- B. Contractor shall have no claim against the City because of the absence of such fixtures and materials.

1.03 CONDITION OF STRUCTURES AND EQUIPMENT

- A. The City does not assume responsibility for the actual condition of structures and equipment to be demolished and removed.
- B. Conditions existing at the time of inspection for bidding purposes will be maintained by the City so far as practicable.
- C. The information regarding the existing structures and equipment shown on the Drawings is based on visual inspection and a walk-through survey only. Neither the Engineer nor the City will be responsible for interpretations or conclusions drawn therefrom by the Contractor.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

3.01 DEMOLITION AND REMOVALS

- A. The removal of all equipment and piping, and all materials from the demolition of buildings and structure shall, when released by the City and Engineer, shall be done by the Contractor and shall become the Contractor's property, unless otherwise noted, for disposition in any manner not contrary to the Contract requirements and shall be removed from the site to the Contractor's own place of disposal.
- B. The Electrical Subcontractor (in the presences of the City), shall de-energize all panelboards, lighting fixtures, switches, circuit breakers, electrical conduits, motors, limit switches, pressure switches, instrumentation such as flow, level and/or other meters, wiring, and similar power equipments prior to removal. Any electric panels or equipment that are to be retained shall be relocated or isolated by the Electrical Subcontractor specifically, prior to the removal of the equipment specified herein.
- C. The Contractor shall proceed with the removal of the equipment, piping and appurtenances in a sequence designed to maintain the plant in continuous operation as described in Section 01520, Maintenance of Utility Operations During Construction, and shall proceed only after approval of the Engineer.
- D. Any equipment piping and appurtenances removed without proper authorization, which are necessary for the operation of the existing facilities shall be replaced to the satisfaction of the Engineer at no cost to the City.
- E. Excavation caused by demolitions shall be backfilled with fill free from rubbish and debris.

3.02 PROTECTION

- A. Demolition and removal work shall be performed by competent experienced workmen for the various type of demolition and removal work and shall be carried out through to completion with due regard to the safety of City employees, workmen on-site and the public. The work shall be performed with as little nuisance as possible.
- B. The work shall comply with the applicable provisions and recommendation of ANSI A10.2, Safety Code for Building Construction, all governing codes, and as hereinafter specified.
- C. The Contractor shall make such investigations, explorations and probes as are necessary to ascertain any required protective measures before proceeding with demolition and removal. The Contractor shall give particular attention to shoring and bracing requirements so as to prevent any damage to new or existing construction.
- D. The Contractor shall provide, erect, and maintain catch platforms, lights, barriers, weather protection, warning signs and other items as required for proper protection of the public, occupants of the building, workmen engaged in demolition operations, and adjacent construction.

- E. The Contractor shall provide and maintain weather protection at exterior openings so as to fully protect the interior premises against damage from the elements until such openings are closed by new construction.
- F. The Contractor shall provide and maintain temporary protection of the existing structure designated to remain where demolition, removal and new work is being done, connections made, materials handled or equipment moved.
- G. The Contractor shall take necessary precautions to prevent dust from rising by wetting demolished masonry, concrete, plaster and similar debris. Unaltered portions of the existing buildings affected by the operations under this Section shall be protected by dust-proof partitions and other adequate means.
- H. The Contractor shall provide adequate fire protection in accordance with local Fire Department requirements.
- I. The Contractor shall not close or obstruct walkways, passageways, or stairways and shall not store or place materials in passageways, stairs or other means of egress. The Contractor shall conduct operations with minimum traffic interference.
- J. The Contractor shall be responsible for any damage to the existing structure or contents by reason of the insufficiency of protection provided.

3.03 WORKMANSHIP

- A. The demolition and removal work shall be performed as described in the Contract Documents. The work required shall be done with care, and shall include all required shoring, bracing, etc. The Contractor shall be responsible for any damage which may be caused by demolition and removal work to any part or parts of existing structures or items designated for reuse or to remain. The Contractor shall perform patching, restoration and new work in accordance with applicable Technical Sections of the Specifications and in accordance with the details shown on the Drawings. Prior to starting of work, the Contractor shall provide a detailed description of methods and equipment to be used for each operation and the sequence thereof for review by the Engineer.
- B. All supports, pedestals and anchors shall be removed with the equipment and piping unless otherwise specified or required. Concrete bases, anchor bolts and other supports shall be removed to approximately 1-inch below the surrounding finished area and the recesses shall be patched to match the adjacent areas. Superstructure wall and roof openings shall be closed, and damaged surfaces shall be patched to match the adjacent areas, as specified under applicable Sections of these Specifications, as shown on the Drawings, or as directed by the Engineer. Wall sleeves and castings shall be plugged or blanked off, all openings in concrete shall be closed in a manner meeting the requirements of the appropriate Sections of these Specifications, as shown on the Drawings, and as directed and approved by the Engineer.
- C. Materials or items designated to remain the property of the City shall be as hereinafter tabulated. Such items shall be removed with care and stored at a location at the site to be designated by the City.
- D. Where equipment is shown or specified to be removed and relocated, the Contractor shall not proceed with removal of this equipment without specific prior approval of the

Engineer. Upon approval, and prior to commencing removal operations, the equipment shall be operated in the presence of representatives of the Contractor, City and Engineer. Such items shall be removed with care, under the supervision of the trade responsible for reinstallation and protected and stored until required. Material or items damaged during removal shall be replaced with similar new material or item. Any equipment that is removed without proper authorization and is required for plant operation shall be replaced at no cost to the City.

- E. Wherever piping is to be removed for disposition, the piping shall be drained by the Contractor and adjacent pipe and headers that are to remain in service shall be blanked off or plugged and then anchored in an approved manner.
- F. Materials or items demolished and not designated to become the property of the City or to be reinstalled shall become the property of the Contractor and shall be removed from the property and legally disposed of.
- G. The Contractor shall execute the work in a careful and orderly manner, with the least possible disturbance to the public and to the occupants of the building.
- H. In general, masonry shall be demolished in small sections, and where necessary to prevent collapse of any construction, the Contractor shall install temporary shores, struts, and bracing.
- I. Where alterations occur, or new and old work join, the Contractor shall cut, remove, patch, repair or refinish the adjacent surfaces to the extent required by the construction conditions, so as to leave the altered work in as good a condition as existed prior to the start of the work. The materials and workmanship employed in the alterations, unless otherwise shown on the Drawing or specified, shall comply with that of the various respective trades which normally perform the particular items or work.
- J. The Contractor shall finish adjacent existing surfaces to new work to match the specified finish for new work. The Contractor shall clean existing surfaces of dirt, grease, loose paint, etc., before refinishing.
- K. The Contractor shall cut out embedded anchorage and attachment items as required to properly provide for patching and repair of the respective finishes.
- L. The Contractor shall confine cutting of existing roof areas designated to remain to the limits required for the proper installation of the new work. The Contractor shall cut and remove insulation, etc., and provide temporary weather tight protection as required until new roofing and flashings are installed.
- M. The Contractor shall remove temporary work, such as enclosures, signs, guards, and the like when such temporary work is no longer required or when directed at the completion of the work.

3.04 MAINTENANCE

- A. The Contractor shall maintain the buildings, structures and public properties free from accumulations of waste, debris and rubbish, caused by the demolition and removal operations.

- B. The Contractor shall provide on-site dump containers for collection of waste materials, debris and rubbish, and he shall wet down dry materials to lay down and prevent blowing dust.
- C. At reasonable intervals during the progress of the demolition and removal work or as directed by the Engineer, the Contractor shall clean the site and properties, and dispose of waste materials, debris and rubbish.

3.05 STATEMENT OF RESPONSIBILITIES REGARDING ASBESTOS

- A. Submit a written advanced notice form a minimum of 10 days prior to initiation of the demolition, removal or disturbance of 160 square feet or more of material to the following:
 - 1. Broward County Department of Planning and Environmental Protection
Air Quality Division
218 S.W. 1st Avenue
Fort Lauderdale, Florida 33301
 - 2. Engineer

- END OF SECTION

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SECTION 01550

SITE ACCESS AND STORAGE

PART 1 - GENERAL

1.01 HIGHWAY LIMITATIONS

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

1.02 TEMPORARY CROSSINGS

- A. General: Continuous, unobstructed, safe, and adequate pedestrian and vehicular access shall be provided to fire hydrants, commercial and industrial establishments, churches, schools, parking lots, service stations, motels, fire and police stations, and hospitals. Safe and adequate public transportation stops and pedestrian crossings at intervals not exceeding 300 feet shall be provided. The Contractor shall cooperate with parties involved in the delivery of mail and removal of trash and garbage so as to maintain existing schedules for such services. Vehicular access to residential driveways shall be maintained to the property line except when necessary construction precludes such access for reasonable periods of time.
- B. Emergency Access and Security: In order to provide protection to the workers and residents, the Contractor shall maintain emergency access to all adjacent properties at all times during construction. If a road is required to be closed to vehicular traffic and the distance of the closure exceeds 150 feet between stabilized surfaces, or prevents access to properties for a distance that exceeds 150 feet, the Contractor shall provide a 10 foot wide stabilized accessway on one side of the trench capable of supporting a Fire Truck. Contractor shall also provide stabilized accessways across the trench or unstabilized area a minimum of 6 feet in width at a spacing not to exceed 100 feet capable of supporting foot traffic. These accessways shall be protected and delineated with lighted barricades or other such devices as approved by the regulatory agency. Both ends of the emergency accessway shall be blocked in accordance with the MOT permit approved by Owner with signage indicating that this accessway is to be used by emergency vehicles only.
- C. No trenches or holes shall be left open after working hours. In the event a trench must be left open after hours, it shall be done so only with the express written permission from the Engineer, and it shall be the Contractor's responsibility to provide proper protection of the open trench or hole as required by the regulatory agency. In addition, the Contractor shall provide a security guard at the site whenever the Contractor's personnel are not present, 24 hours per day/7 days per week. It shall be the Security Guard's responsibility to protect the open trench or hole from trespassers and to direct emergency personnel on site. The Security Guard shall not have any other responsibilities such as operating pumps or equipment but shall be dedicated to protecting the trench or open hole. The Security Guard shall be equipped with a wireless telephone capable of calling 911 to report an emergency and shall keep that

telephone on their person at all times. In addition to this provision the Contractor shall maintain trench safety and comply with current OSHA regulations and the Trench Safety Act. The Contractor shall maintain and keep all safety barricades, signage, flashers, and detours, in operating condition. A copy of the approved MOT plans, and details, shall be on site at all times.

- D. Measurement and payment for security guard services shall be included in the Mobilization unit price.
- E. Temporary Bridges: Wherever necessary, the Contractor shall provide suitable temporary bridges or steel plates over unfilled excavations, except in such cases as the Contractor shall secure the written consent of the individuals or authorities concerned to omit such temporary bridges or steel plates, which written consent shall be delivered to the Engineer prior to excavation. All such bridges or steel plates shall be maintained in service until access is provided across the backfilled excavation. Temporary bridges or steel plates for street and highway crossing shall conform to the requirements of the authority having jurisdiction in each case, and the Contractor shall adopt designs furnished by said authority for such bridges or steel plates, or shall submit designs to said authority for approval, as may be required.
- F. Street Use: Nothing herein shall be construed to entitle the Contractor to the exclusive use of any public street, alleyway, or parking area during the performance of the Work hereunder, and it shall so conduct its operations as not to interfere unnecessarily with the authorized Work of utility companies or other agencies in such streets, alleyways, or parking areas. No street shall be closed to the public without first obtaining permission of the Engineer and proper governmental authority. Where excavation is being performed in primary streets or highways, one lane in each direction shall be kept open to traffic at all times unless otherwise indicated. Toe boards shall be provided to retain excavated material if required by the Engineer or the agency having jurisdiction over the street or highway. Fire hydrants on or adjacent to the Work shall be kept accessible to fire-fighting equipment at all times. Temporary provisions shall be made by the Contractor to assure the use of sidewalks and the proper functioning of all gutters, storm drain inlets, and other drainage facilities.
- G. Traffic Control: For the protection of traffic in public or private streets and ways, the Contractor shall provide, place, and maintain all necessary barricades, traffic cones, warning signs, lights, and other safety devices in accordance with the requirements of Owner and the "Manual of Uniform Traffic Control Devices, Part VI - Traffic Controls for Street and Highway Construction and Maintenance Operations," published by U.S. Department of Transportation, Federal Highway Administration (ANSI D6.1).
- H. The Contractor shall take all necessary precautions for the protection of the Work and the safety of the public. All barricades and obstructions shall be illuminated at night, and all lights shall be kept burning from sunset until sunrise. The Contractor shall station such guards or flaggers and shall conform to such special safety regulations relating to traffic control as may be required by the public authorities within their respective jurisdictions. All signs, signals, and barricades shall conform to the requirements of the Florida Department of Transportation.
- I. The Contractor shall submit a traffic control plan to the City of Fort Lauderdale and/or the Broward County Traffic Engineering Division as required for approval prior to construction. The Owner reserves the right to observe these traffic control plans in use

and to make any changes as field conditions warrant. Any changes shall supersede these plans and be done solely at the Contractor's expense.

- J. The Contractor shall remove traffic control devices when no longer needed, repair all damage caused by installation of the devices, and shall remove post settings and backfill the resulting holes to match grade.
- K. Temporary Driveway Closure: The Contractor shall notify the Owner of the closure of the driveways to be closed more than one eight-hour work day at least 2 weeks prior to the closure. The Contractor shall minimize the inconvenience and minimize the time period that the driveways will be closed. The Contractor shall fully explain to the Owner/occupant how long the Work will take and when closure is to start.

1.03 CONTRACTOR'S WORK AND STORAGE AREA

- A. The Contractor shall designate and arrange for the use of a portion of property, adjacent to the Work for its exclusive use during the term of the Contract as a storage and shop area for its construction operations relative to this Contract. This shall include but not be limited to interim storage of suitable materials for fill or backfill. Storage areas shall be fenced for the safety of the surrounding neighborhood (minimum 6 foot chain link fence).
- B. The Contractor shall make its own arrangements for any necessary off-site storage or shop areas necessary for the proper execution of the Work. This shall include but not be limited to interim storage of suitable materials for fill or backfill.
- C. The Contractor shall construct and use a separate storage area for hazardous materials used in constructing the Work.
 - 1. For the purpose of this paragraph, hazardous materials to be stored in the separate area are all products labeled with any of the following terms: Warning, Caution, Poisonous, Toxic, Flammable, Corrosive, Reactive, or Explosive. In addition, whether or not so labeled, the following materials shall be stored in the separate area: diesel fuel, gasoline, new and used motor oil, hydraulic fluid, cement, paints and paint thinners, two-part epoxy coatings, sealants, asphaltic products, glues, solvents, wood preservatives, sand blast materials, and spill absorbent.
 - 2. Hazardous materials shall be stored in groupings according to the Material Safety Data Sheets.
 - 3. The Contractor shall develop and submit to the Engineer a plan for storing and disposing of the materials above.
 - 4. The Contractor shall obtain and submit to the Engineer a single EPA number for wastes generated at the site.
 - 5. The separate storage area shall meet all the requirements of all authorities having jurisdiction over the storage of hazardous materials.
 - 6. All hazardous materials which are delivered in containers shall be stored in the original containers until use. Hazardous materials which are delivered in bulk shall be stored in containers which meet the requirements of authorities having jurisdiction.

1.04 PARKING

A. The Contractor shall:

1. Provide temporary parking areas as follows:
 - a. Four spaces for the Owner and Engineer
 - b. One space designated for the handicapped or as required by regulatory agencies
2. The Contractor shall direct its employees to park in designated areas secured by the Contractor.
3. Traffic and parking areas shall be maintained in a sound condition, free of excavated material, construction equipment, mud, and construction materials. The Contractor shall repair breaks, potholes, low areas which collect standing water, and other deficiencies.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

- END OF SECTION -

SECTION 01560

TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 - GENERAL

1.01 EXPLOSIVES AND BLASTING

- A. The use of explosives on the Work will not be permitted.

1.02 DUST ABATEMENT

- A. The Contractor shall furnish all labor, equipment, and means required and shall carry out effective measures wherever and as often as necessary (as determined by the Engineer) to prevent its operation from producing dust in amounts damaging to property, cultivated vegetation, or domestic animals, or causing a nuisance to persons living in or occupying buildings in the vicinity. The Contractor shall be responsible for any damage resulting from any dust originating from its operations. The dust abatement measures shall be continued until the Contractor is relieved of further responsibility by the Engineer. No separate payment will be allowed for dust abatement measures and all costs thereof shall be included in the Contractor's bid price.

1.03 RUBBISH CONTROL

- A. During the progress of the Work, the Contractor shall keep the site of the Work and other areas used by it in a neat and clean condition, and free from any accumulation of rubbish. The Contractor shall dispose of all rubbish and waste materials of any nature occurring at the Work site, and shall establish regular intervals of collection and disposal of such materials and waste. The Contractor shall also keep its haul roads free from dirt, rubbish, and unnecessary obstructions resulting from its operations. Disposal of all rubbish and surplus materials shall be off the site of construction in accordance with local codes and ordinances governing locations and methods of disposal, and in conformance with all applicable safety laws, and to the particular requirements of Part 1926 of the OSHA Safety and Health Standards for Construction.

1.04 SANITATION

- A. Toilet Facilities: Fixed or portable chemical toilets shall be provided wherever needed for the use of employees. Toilets at construction job sites shall conform to the requirements of Part 1926 of the OSHA Standards for Construction.
- B. Such facilities shall be made available when the first employees arrive on the Work, shall be properly secluded from public observation, and shall be constructed and maintained in suitable numbers and at such points and in such manner as may be required.

- C. The Contractor shall maintain the sanitary facilities in a satisfactory and sanitary condition at all time and shall enforce their use. It shall rigorously prohibit the committing of nuisances on the site of the Work, on the lands of the City, or on adjacent property.
- D. The City and the Engineer shall have the right to inspect any building or other facility erected, maintained, or used by the Contractor, to determine whether or not the sanitary regulations have been complied with.
- E. Sanitary and Other Organic Wastes: The Contractor shall establish a regular daily collection of all sanitary and organic wastes. All wastes and refuse from sanitary facilities provided by the Contractor or organic material wastes from any other source related to the Contractor's operations shall be disposed of away from the site in a manner satisfactory to the Engineer and in accordance with all laws and regulations pertaining thereto.

1.05 CHEMICALS

- A. All chemicals used during project construction or furnished for project operation, whether defoliant, soil sterilant, herbicide, pesticide, disinfectant, polymer, paint, fuel, solvent or reactant of other classification, shall show approval of either the U.S. Environmental Protection Agency or the U.S. Department of Agriculture. The handling, storage, use and disposal of all such chemicals and disposal of residues shall be in strict accordance with all applicable rules and regulations of Federal, State and local jurisdictional agencies and the printed instructions of the manufacturer and all regulatory requirements. Copies of antidote literature shall be kept at the storage site and at the Contractor's job site office. A supply of antidotes shall be kept at the Contractor's office.

1.06 NOISE CONTROL

- A. Noise resulting from the Contractor's work shall not exceed the noise levels and other requirements stated in local ordinances. The Contractor shall be responsible for curtailing noise resulting from its operation. It shall, upon written notification from the Engineer or noise control officers, make any repairs, replacements, adjustments, additions and furnish mufflers when necessary to fulfill requirements.

1.07 EROSION ABATEMENT AND WATER POLLUTION

- A. It is imperative that any Contractor dewatering operation not contaminate or disturb the environment of the properties adjacent to the Work. The Contractor shall, therefore, schedule and control its operations to confine all runoff water from disturbed surfaces, water from dewatering operations that becomes contaminated with silt, muck and other deleterious matter, fuels, oils, bitumens, calcium chloride, chemicals and other polluting materials.
- B. The Contractor shall comply with the requirements of the section entitled "Erosion and Sedimentation Control – Stormwater Pollution Prevention".

1.08 MANATEE CONDITIONS FOR IN WATER WORK

- A. The Contractor shall comply with the conditions outlined in the “Standard Manatee Conditions for In-Water Work” as published by the Florida Fish and Wildlife Conservation Commission. See the attached document at the end of this specification section for additional information.

1.09 PRECAUTIONS DURING ADVERSE WEATHER

- A. During adverse weather, and against the possibility thereof, the Contractor shall take all necessary precautions so that the Work may be properly done and satisfactory in all respects. When required, protection shall be provided by use of tarpaulins, wood and building paper shelters, or other acceptable means. The Contractor shall be responsible for all changes caused by adverse weather.
- B. The City may suspend construction operations at any time when, in its judgment, the conditions are unsuitable or the proper precautions are not being taken, whatever the weather conditions may be, in any season.

1.10 HURRICANE PRECAUTIONS

- A. The requirements of Article 8.24 of the Contract Documents apply to the work of this section.
- B. The Contractor shall take all precautions necessary to protect the job site during hurricane and tropical storm watches and warnings.
- C. Within 30 days of the date of Notice to Proceed, the Contractor shall submit to the Engineer and City a Hurricane Preparedness Plan. The plan should outline the necessary measures which the Contractor proposes to perform at no additional cost to the City. The Plan shall be provided for informational purposes only and will not be reviewed by the Engineer or City.

1.11 PERIODIC CLEANUP AND BASIC SITE RESTORATION

- A. During construction, the Contractor shall regularly remove from the site all accumulated debris and surplus materials of any kind which results from its operations. Unused equipment and tools shall be stored at the Contractor's yard or base of operations for the project.

- B. The Contractor shall perform the cleanup work on a regular basis and as frequently as ordered by the Engineer. Basic site restoration in a particular area shall be accomplished immediately following the installation or completion of the required facilities in that area. Furthermore, such work shall also be accomplished, when ordered by the Engineer, if partially completed facilities must remain incomplete for some time period due to unforeseen circumstances.
- C. Upon failure of the Contractor to perform periodic clean-up and basic restoration of the site to the Engineer's satisfaction, the Engineer may, upon five days prior written notice to the Contractor, employ such labor and equipment as it deems necessary for the purpose, and all costs resulting therefrom shall be charged to the Contractor and deducted from amounts of money that it may be due.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -

SECTION 01580

PROJECT IDENTIFICATION AND SIGNS

PART 1 - GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish, install and maintain project identification signs and provide temporary on-site informational signs to identify key elements of construction facilities. Signs shall be removed upon completion of construction.
- B. The Contractor shall notify property owners that may be affected by construction operation at least five (5) working days in advance.

1.02 RELATED REQUIREMENTS

- A. All applicable sections of the Technical Specifications.
- B. Conditions of the Contract.

1.03 PROJECT IDENTIFICATION SIGN

- A. Up to two (2) painted signs, of not less than 32 square feet area each, with painted graphic content. Signs shall be in accordance with the General Conditions. Project signs must be submitted to the City for approval prior to fabrication and installation.
- B. Graphic design, style of lettering, and colors: As designated by Engineer.
- C. Erect on the site at a lighted location of high public visibility at a location outside the public Right-of-Way, as approved by Engineer.

1.04 INFORMATIONAL SIGNS

- A. Painted signs and painted lettering, or standard products:
 - 1. Size of signs and lettering: As required by regulatory agencies, or as appropriate to usage.
 - 2. Colors: As required by regulatory agencies, otherwise of uniform colors throughout project.
- B. Erect at appropriate locations to provide required information.

1.05 PROPERTY OWNER NOTIFICATION

- A. All homes and businesses affected by construction activities shall be notified by use of a "doorhanger" type announcement describing at a minimum, the nature of the Work, the proposed schedule, and the Contractor's contact information. An example door hanger is provided at the end of this section.

- B. Door hangers shall be submitted to the City for approval prior to use.
- C. Door hangers shall be printed and distributed by the Contractor.

1.06 QUALITY ASSURANCE

- A. Sign Painter: Professional experience in type of Work required.
- B. Finishes, Painting: Adequate to resist weathering and fading for scheduled construction period.

PART 2 - PRODUCTS

2.01 SIGN MATERIALS

- A. Structure and Framing: May be new or used, wood or metal, in sound condition structurally adequate to Work and suitable for specified finish.
- B. Sign Surfaces: Exterior softwood plywood with medium density overlay, standard large sizes to minimize joints.
- C. Thickness: As required by standards to span framing members, to provide even, smooth surface without wave or buckles.
- D. Rough Hardware: Galvanized.
- E. Paint: Exterior quality:
 - 1. Use Bulletin colors for graphics.
 - 2. Colors for structure, framing, sign surfaces and graphics: As selected by Engineer.

PART 3 - EXECUTION

3.01 PROJECT IDENTIFICATION SIGN

- A. Paint exposed surfaces of supports, framing and surface material; one coat of primer and one coat of exterior paint.
- B. Paint graphics in styles, sizes and colors selected.

3.02 INFORMATIONAL SIGNS

- A. Paint exposed surfaces: One coat of primer and one coat of exterior paint.
- B. Paint graphics in styles, sizes and colors selected.
- C. Install at a height for optimum visibility, on ground-mounted poles or attached to temporary structural surfaces.

3.03 MAINTENANCE

- A. Maintain signs and supports in a neat, clean condition; repair damages to structure, framing or sign.
- B. Relocate informational signs as required by progress of the Work.

3.04 REMOVAL

- A. Remove signs, framing, supports and foundations at completion of project.

3.05 MEASUREMENT AND PAYMENT

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

- END OF SECTION -

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Stormwater Master Plan Improvements

Creating a resilient and safe coastal community

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What's Happening: The City of Fort Lauderdale is proactively preparing for the future by investing in new stormwater infrastructure to reduce flooding throughout our community.

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Planned Improvements

- Installing a tidal valves
- Installing a new seawall
- Pavement Restoration
- Landscaping Restoration
- Installing new drainage pipe
- Installing new drainage structures

Cost

Expected Completion

Project Number

Contractor

Fort Lauderdale City Commission

Dean J. Trantalis
Mayor

Heather Moraitis
Commissioner, District I

Steven Glassman
Commissioner, District II

Robert L. McKinzie
Vice Mayor, District III

Ben Sorensen
Commissioner, District IV

Chris Lagerbloom, ICMA-CM
City Manager

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[CONTRACTOR'S NAME]
[CONTRACTOR'S STREET ADDRESS]
[CONTRACTOR'S CITY, STATE AND ZIP]
[CONTRACTOR'S TELEPHONE NUMBER]
[CONTRACTOR'S FAX NUMBER]

MEMORANDUM

TO: RESIDENTS OF [LOCATION OF CONSTRUCTION]
DATE: [CURRENT DATE]
RE: CONSTRUCTION IN YOUR AREA
FROM: [CONTRACTOR'S NAME]

Construction in your area will commence on [date of construction commencement].
The construction area is from [boundary #1] to [boundary #2].
Access to the area will be limited at certain times due to the construction activities. We apologize for any inconvenience and we will do our best to accommodate access to residents.

Thank you,

[Contractor Name]



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SECTION 01590

FIELD OFFICE, EQUIPMENT AND SERVICES

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish and install one field office trailer for its own use at the project site, during the entire time of construction beginning at the commencement date stated in the second Notice to Proceed until the date of final acceptance of the Work by the Owner. A field trailer for the Engineer's use shall be fully equipped, furnished, stocked and ready for occupancy at the project site designated location beginning within fifteen (15) days after the Notice to Proceed. The field trailer shall be occupied by the Engineer until the date of final acceptance of the Project Closeout by the Owner.
- B. The Contractor shall locate the field offices in the location approved by the City and Engineer. The field offices shall remain the property of the Contractor and shall be removed (including mountings, connections and hookups) from the site upon completion of the Work, returning the site and all improvements to their pre-Notice-To-Proceed condition.
- C. No invoice for mobilization will be recommended for payment for any work done under the Contract until all field office facilities specified herein have been provided and accepted by the Engineer.

1.02 SUBMITTALS

- A. Submit shop drawings and other information as required demonstrating that the Engineer's field office meets the requirements of this Section.
- B. Prior to installation of the field trailer, Contractor shall submit a certification from the supplier indicating that trailer walls, floor, and ceiling are free from mold.

1.03 GENERAL FIELD OFFICE REQUIREMENTS

- A. The Contractor shall provide steps and platforms with handrails to permit entry to the offices. This work shall conform to the Florida Building Code and OSHA requirements.
- B. The trailers shall be blocked up and hurricane straps installed conforming to the applicable building codes.
- C. The Contractor is responsible for procuring all necessary permits for the installation of the field offices at the location approved by the City and Engineer.

1.04 ENGINEER'S OFFICE

- A. The Contractor shall furnish a field office for the use of the Engineer. The field office shall be new, or like new, and consist of a nominal 56-foot by 12-foot single wide (or equivalent) trailer with two private offices and conference area, each separated by walls

and with an interior door. A unisex restroom shall be provided. Floor plan subject to acceptance by Engineer.

- B. The structure shall be watertight with suitable windows and doors with substantial locks. All windows shall have venetian blinds and aluminum screens. Adequate lighting shall be furnished with wall switches provided for all ceiling lighting fixtures which shall either be installed flush or recessed into the ceiling.
- C. The trailer shall conform to HUD requirements. Minimum ceiling height shall be 7 foot 6 inches. The interior shall have vinyl tile floor covering, wall paneling, 100 amp electrical service, copper wiring, 20-gallon electric water heater, copper water piping, a six cubic foot refrigerator, 600 watt microwave oven and two wall mounted fire extinguishers. Washroom shall be equipped with a flush toilet, cabinet mounted wash basin and medicine cabinet complete with supplies. Plumbing fixtures shall be acceptable house type, trapped and vented.
- D. Air conditioning shall be provided which is capable of lowering the temperature to 72 degrees Fahrenheit in South Florida, worst case, summer heat and humidity conditions. Heating shall be provided which is capable of raising the temperature to 78 degrees Fahrenheit in cold weather. Contractor shall be responsible for providing a new air filter once every month for the duration of the project.
- E. The Contractor shall install the field office trailer and provide services for the specified project duration as follows and as identified on the Drawings:
 - 1. The Contractor shall furnish and install necessary sanitary, water, electric, and telephone connections between the source and its trailer as shown on the drawings. In addition, the Contractor shall coordinate with the local utility to arrange for startup and invoicing of electric and telephone services accordingly. The Contractor shall make arrangements for and pay for all costs for all water used during construction as specified in the Section entitled "Temporary Utilities."
 - 2. The Contractor shall provide and maintain adequate and clean sanitary facilities for the construction work force and visitors. The facilities shall comply with local codes and regulations and be situated in an acceptable location.
 - 3. The Contractor shall furnish the Engineer's field office with voice over internet protocol phone, high speed Wi-Fi internet services and a 4-port DSL router. The trailer shall be provided with seven (7) two-line speaker/intercom telephones. All jack locations shall be subject to review and acceptance by the Engineer.
 - 4. The Contractor shall permit the Engineer, the Owner, or their authorized representatives or employees free and unlimited use of said telephone facilities for all calls that do not involve published toll charges. Calls originated by the Engineer, the Owner, the authorized representative or employees which involve toll or message unit charges shall be billed to the Owner by the Contractor at the rates charged by the telephone company.
 - 5. The Contractor shall furnish and replace electric bulbs and/or fluorescent tubes, toilet paper, towels and soap, water cooler with reusable jugs, cups, and maintain the office copiers, telecopiers and other equipment in first-class condition, including

all paper, ink, and repairs until final acceptance of the work under this Contract. Single-use plastic water bottles are not acceptable.

6. The Contractor shall provide fire insurance, extended coverage and vandalism, malicious mischief and burglary and theft insurance coverage for the Engineer's field office trailer in the amount of \$100,000 and for field office equipment in the amount of \$50,000.
 7. The Contractor shall furnish a free standing electric water cooler to dispense hot and cold water from 5-gallon bottles with regular water bottle delivery service.
 8. The Contractor shall furnish weekly janitorial service to the Engineer's trailer.
 9. The Contractor shall provide 500 feet of Category 6E Ethernet Cable for computer network wiring to the Engineer's field office. Layout of the cable shall be subject to comment and revision by the Engineer prior to acceptance. The Contractor shall install cables to approved locations. Terminations shall be furnished by the Contractor as directed by the Engineer.
 10. The Contractor shall provide monthly pest control services covering both the interior and exterior areas of the trailer.
- F. The field office trailer shall remain the property of the Contractor and shall be removed upon completion of the work. All affected work areas shall be restored to their original condition.
- G. The Contractor shall furnish and install/arrange new or like new office furniture for the Engineer's field office. Model numbers listed below are to establish minimum product quality. Office furniture shall consist of the following:
1. Two double-pedestal desks, Hon Metrostandard Series No. HON-34961-WP with 60 inches x 30 inches top size, or equal.
 2. Two conventional office chairs HON HVL702 mesh chair, United Chari Co. Model No. UP13, or equal.
 3. Two four-drawer letter size (52 inches high) filing cabinets, with lock HON 510 series, Steelmaster, or equal.
 4. One 72 inch high storage cabinet with five adjustable shelves 36W x 24D HON model HSC2472, or equal.
 5. Two 30 inches x 60 inches reference tables HON UTM 3060, or equal.
 6. Two bookcases - 60 inches high x 36 inches wide x 11 inches deep with five shelves, HON Model No. H1895, or equal.
 7. Two desk lamps with two 15-watt tubes, Dazor Model 2324, LUDU F 30L, or equal.

8. Ten conventional office chairs, HON Model HLV702, United Chair Co. Model No. UP12, or equal.
9. One dry erase "white board" 4 feet x 6 feet wall mount type Quartet Aluminum Frame QRT-S537, full length marker rail, two erasers and two boxes of four color dry erase markers, or equal.
10. Three wastepaper baskets.
11. One aluminum framed cork faced bulletin board 36 inch x 60 inch wall mount type.
12. Lease one Xerox WorkCentre 7800i series color copier complete with scanner, fax and email including Wi-Fi, automatic document feeder, stapling, sorter, stand, service contract should include a minimum of 2500 copies per month for duration of Project, consumables and other necessary accessories, or equal. Copier shall be set and provided with trays to print copies on 8-1/2 x 11 inches, 8-1/2 x 14 inches and 11 x 17 inches paper.
13. Two Canon Powershot cameras or equal, built in flash, minimum 20 Megapixel, 1280 x 720 image resolution, 5x optical plus 4x digital zoom with auto focus, 1080p video. Provide a 16 GB memory card, spare battery pack, and battery charger.
14. One first aid cabinet conforming to OSHA requirements for an office up to 5 persons or a construction site of up to 5 persons.

1.05 UTILITIES FOR FIELD OFFICES

- A. The CONTRACTOR shall arrange with Florida Power and Light (FPL) for construction power service and pay all costs for the Work and power necessary for the field offices. The Contractor shall be responsible for all connections and wiring to and from the point of service. In addition, the Contractor shall coordinate with the local utility to arrange startup and invoicing for service.
- B. Telephone service connections shall be obtained from off-site by the Contractor. The Contractor shall be responsible for all connections and wiring between the telephone carrier service point and the field office. In addition, the Contractor shall coordinate with the local phone company to arrange startup and invoicing for service.
- C. Contractor shall supply water service to the field office. Water supply shall be in accordance with the Section entitled "Temporary Utilities." Cleaning, flushing, and related permit requirements for all connections are the Contractor's responsibility.
- D. Contractor shall supply sanitary service to the field office. The Contractor shall be responsible for connection and piping requirements between municipal collection system and its office trailer to meet all applicable code and regulatory requirements.
- E. The Contractor retains responsibility for procuring all necessary permits for the installation of field offices at the approved location.

- F. The Contractor shall familiarize itself with the existing power, telephone, water and sewer connections. All costs associated with "hooking-up" to these existing items shall be included in the Contractor's base bid.

PART 2 -- PRODUCTS

(Not Used)

PART 3 -- EXECUTION

(Not Used)

- END OF SECTION -

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SECTION 01600

MATERIALS AND EQUIPMENT

PART 1 - GENERAL

1.01 THE REQUIREMENT

- A. The word "Products," as used herein is defined to include purchased items for incorporation into the Work, regardless of whether specifically purchased for project or taken from Contractor's stock of previously purchased products.
- B. The word "Materials," is defined as products which must be substantially cut, shaped, worked, mixed, finished, refined, or otherwise fabricated, processed, installed, or applied to form units of Work.
- C. The word "Equipment" is defined as products with operational parts, regardless of whether motorized or manually operated, and particularly including products with service connections (wiring, piping, and other like items).
- D. Definitions in this Section are not intended to negate the meaning of other terms used in Contract Documents, including "specialties," "systems," "structure," "finishes," "accessories," "furnishings," "special construction," and similar terms, which are self-explanatory and have recognized meanings in the construction industry.

1.02 QUALITY ASSURANCE

- A. Source Limitations: To the greatest extent possible for each unit of Work, the Contractor shall provide products, materials, or equipment of a singular generic kind from a single source.
- B. Compatibility of Options: Where more than one choice is available as options for Contractor's selection of a product, material, or equipment, the Contractor shall select an option which is compatible with other products, materials, or equipment already selected. Compatibility is a basic general requirement of product/material selections.

1.03 DESIGN

- A. Equipment and appurtenances shall be designed in conformity with the ASME, AIEE, NEMA and other generally accepted applicable standards and shall be of rugged construction and sufficient strength to withstand all stresses which may occur during fabrication, testing, transportation, installation and all conditions of operation. All bearings and moving parts shall be adequately protected by bushings or other acceptable means against wear, and provision shall be made for adequate lubrication by readily accessible devices. Details shall be designed for appearance as well as utility. Protruding members, joints, corners, gear covers, etc., shall be finished in appearance.

- B. All exposed welds on machinery shall be ground smooth and the corners of structural shapes shall be rounded or chamfered.

1.04 PRODUCT DELIVERY-STORAGE-HANDLING

- A. The Contractor shall deliver, handle, and store products in accordance with supplier's written recommendations and by means and methods that will prevent damage, deterioration, and loss including theft. Delivery schedules shall be controlled to minimize long-term storage of products at site and overcrowding of construction spaces. In particular, the Contractor shall provide delivery/installation coordination to ensure minimum holding or storage times for products recognized to be flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other sources of loss.

1.05 TRANSPORTATION AND HANDLING

- A. Products shall be transported by methods to avoid product damage and shall be delivered in undamaged condition in supplier's unopened containers or packaging, dry.
- B. The Contractor shall provide equipment and personnel to handle products, materials, and equipment including those provided by City, by methods to prevent soiling and damage.
- C. The Contractor shall provide additional protection during handling to prevent marring and otherwise damaging products, packaging, and surrounding surfaces.

1.06 STORAGE AND PROTECTION

- A. Products shall be stored in accordance with supplier's written instructions, with seals and labels intact and legible. Sensitive products shall be stored in weather-tight enclosures and temperature and humidity ranges shall be maintained within tolerances required by supplier's written instructions.
- B. For exterior storage of fabricated products, they shall be placed on sloped supports above ground. Products subject to deterioration shall be covered with impervious sheet covering; ventilation shall be provided to avoid condensation.
- C. Loose granular materials shall be stored on solid surfaces in a well-drained area and shall be prevented from mixing with foreign matter.
- D. Storage shall be arranged to provide access for inspection. The Contractor shall periodically inspect to assure products are undamaged and are maintained under required conditions.
- E. Storage shall be arranged in a manner to provide access for maintenance of stored items and for inspection.

1.07 MAINTENANCE OF STORAGE

- A. Stored products shall be periodically inspected on a scheduled basis.

- B. The Contractor shall maintain a log of inspections and make said log available to the Engineer on request.
- C. The Contractor shall verify that storage facilities comply with supplier's product storage requirements.
- D. The Contractor shall verify that supplier-required environmental conditions are maintained continually.
- E. The Contractor shall verify that surfaces of products exposed to the elements are not adversely affected and that any weathering of finishes is acceptable under requirements of Contract Documents.

1.08 MAINTENANCE OF EQUIPMENT STORAGE

- A. For mechanical and electrical equipment in long-term storage, the Contractor shall provide a copy of the supplier's service instructions to accompany each item, with notice on enclosed instruction shown on exterior of package.
- B. Equipment shall be serviced on a regularly scheduled basis, and a log of services shall be maintained and submitted as a record document to the Engineer.

1.09 LUBRICANTS

- A. During testing and prior to acceptance, the Contractor shall furnish all lubricants necessary for the proper lubrication of all equipment furnished under this Contract.

1.10 SPECIAL TOOLS

- A. For each type of equipment furnished by it, the Contractor shall provide a complete set of all special tools (including calibration and test equipment) which may be necessary for the adjustment, operation, maintenance and disassembly of such equipment.
- B. Special tools shall be delivered at the same time as the equipment to which they pertain. The Contractor shall properly store and safeguard such special tools until completion of the Work, at which time they shall be delivered to the City.

1.11 PROTECTION AGAINST ELECTROLYSIS

- A. Where dissimilar metals are used in conjunction with each other, suitable insulation shall be provided between adjoining surfaces so as to eliminate direct contact and any resultant electrolysis. The insulation shall be bituminous impregnated felt, heavy bituminous coatings, nonmetallic separators or washers, or other acceptable materials.

1.12 FASTENERS

- A. All necessary bolts, anchor bolts, nuts, washers, plates and bolt sleeves shall be furnished by the Contractor in accordance herewith.

- B. Bolts shall have suitable washers and, where so required, their nuts shall be hexagonal.
- C. All bolts, anchor bolts, nuts, washers, plates, and bolt sleeves shall be Type 316 stainless steel unless otherwise specifically indicated or specified.
- D. Unless otherwise specified, stud, tap, and machine bolts shall be of the best quality refined bar iron. Hexagonal nuts of the same quality of metal as the bolts shall be used.

1.13 SALVAGED AND EXCAVATED MATERIALS

- A. In the absence of special provisions in other Sections of the Specifications, salvage materials, equipment or supplies that occur are the property of the City and shall be cleaned and stored as directed by the Engineer.
- B. All excavated materials needed for backfilling operation shall be stored on site. Where additional area is needed for stockpiling, it shall be obtained by the Contractor.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -

SECTION 01660

EQUIPMENT TESTING AND STARTUP

PART 1 - GENERAL

1.01 THE REQUIREMENT

- A. Equipment testing and startup are requisite to satisfactory completion of the contract and, therefore, shall be completed within the contract time. The Contractor shall allow sufficient time in its construction schedule to complete testing, trouble shooting and start-up activities.
- B. As construction of the project enters the final stages of completion, the Contractor shall, in accordance with the requirements set forth in the Contract Documents, attend to the following items:
 - 1. Schedule equipment manufacturer's visits to site.
 - 2. Calibration of instruments and controls.
 - 3. Perform required testing, adjusting and balancing of project components.
 - 4. Schedule start-up and initial operation.
 - 5. Furnish skilled personnel during initiation operation to provide back-up maintenance services to equipment, as necessary.
 - 6. Furnish operation and maintenance training to City's personnel per requirements of the Contract documents.

1.02 EQUIPMENT TESTING

- A. The Contractor shall provide the services of an experienced and authorized representative of the supplier of each item of equipment (excluding minor items of equipment specifically exempted by the Engineer in writing), who shall visit the site of the Work and inspect, check, adjust if necessary, and approve the equipment installation. In each case, the Contractor shall arrange to have the supplier's representative revisit the job site as often as necessary until any and all trouble is corrected and the equipment installation and operation are satisfactory to the Engineer. The Contractor shall provide effective coordination of all parties necessary for complete system testing, including Suppliers, subcontractors, the Engineer, and the City.
- B. The Contractor shall require that each supplier's representative furnish to the Engineer a written report addressed to the City, and copied to the Engineer, certifying that the equipment has been properly installed and lubricated, is in accurate alignment, is free from any undue stress imposed by connecting piping or anchor bolts, has been operated

satisfactorily under full-load conditions is ready for operation and the City's operating personnel have been instructed in the operation, maintenance and lubrication of the equipment.

- C. The Contractor shall be responsible for scheduling all operations testing. The Contractor is advised that the Engineer and the City's operating personnel will witness operations testing.
- D. The supplier's representative shall instruct the City's operating personnel in correct operation and maintenance procedures. The instruction shall demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment. Such instruction shall be scheduled at a time arranged with the City at least 2 weeks in advance and shall be provided while the respective representative's equipment is fully operational. On-site instruction shall be given by qualified persons who have been made familiar in advance with the equipment and systems in the plant. The Contractor shall have submitted, and had accepted, the O&M Manuals (specified in the Section entitled "Submittals") prior to commencement of training.
- E. The Contractor shall notify the Engineer at least 14 days in advance of each equipment test or City training session.
- F. Training shall be provided to two separate shifts of the City's personnel. Training may occur anytime over a 24-hour period.
- G. The Contractor shall furnish all personnel, power, water, chemicals, fuel, oil, grease, and all other necessary equipment, facilities, and services required for conducting the tests except as otherwise accepted by the Engineer.

1.03 STARTUP

- A. The Contractor shall provide the effective coordination of all parties necessary for the successful startup, including suppliers, subcontractors, the Engineer, and the City.
- B. It is not the intent of the Engineer to instruct the Contractor in the startup of the facilities; however, the Engineer will be available prior to and during startup to provide technical support to the Contractor.
- C. The Contractor shall be required to startup the equipment, under direction of the Engineer and City, and operate it for a continuous 7-day (24 hours per day) period at design conditions. The Contractor shall be available at all times during this period to provide necessary maintenance support services as may be deemed necessary by the City and/or Engineer. This 7-day period must be successfully completed prior to the issuance of Substantial Completion.
- D. Not less than 3 months prior to startup, the Contractor shall submit to the Engineer for review, a detailed schedule of operations which will be necessary for a successful initial

operation and sustained period of operation for the duration of the required startup period as specified in the Section entitled "Submittals."

- E. The startup shall not be commenced until all required leakage tests, disinfection, and equipment tests, as applicable, have been completed to the satisfaction of the Engineer.
- F. All defects in materials or quality which appear during this startup period shall be immediately corrected by the Contractor. Time lost for equipment repairs, wiring corrections, control point settings, or other reasons which actually interrupt the startup may, at the discretion of the Engineer, be justifiable cause for extending the startup test duration or beginning the startup test period again.
- G. During the startup, the Contractor shall provide the services of authorized representatives of the suppliers, in addition to those services required under operations testing, as necessary, to correct faulty equipment operation.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -

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SECTION 01700
PROJECT CLOSEOUT

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. Final Cleaning

1. 1. At the completion of the work, the Contractor shall remove all rubbish from and about the site of the work, and all temporary structures, construction signs, tools, scaffolding, materials, supplies and equipment which he or any of his Subcontractors may have used in the performance of the work. Contractor shall broom clean paved surfaces and rake clean other surfaces of grounds.
2. Contractor shall thoroughly clean all materials, equipment and structures; all marred surfaces shall be touched up to match adjacent surfaces; dirty filters and burned out lights replaced as required; all glass surfaces cleaned and floors cleaned and polished so as to leave work in a clean and new appearing condition.
3. Contractor shall maintain cleaning until project, or portion thereof, is occupied by the City.

B. Lubrication Survey

1. A lubrication survey, made by a lubricant supply firm, subject to the approval of the City shall be provided and paid for by the Contractor.
2. The lubrication survey shall list all equipment, the equipment manufacturer's lubrication recommendations, and an interchangeable lubricants tabulation standardizing and consolidating lubricants whenever possible.
3. The Contractor shall supply all lubricants, applicators and labor for lubricating the equipment, in accordance with manufacturer's recommendations, for field testing and prior to final acceptance. A supply of required lubricants sufficient for start-up and one year of operation shall also be supplied by the Contractor.
4. Ten (10) copies of the approved lubrication survey shall be furnished to the Engineer prior to final acceptance.

C. Spare Parts and Special Tools

1. As soon as practicable after approval of the list of equipment, the Contractor shall furnish spare parts data for each different item of equipment listed. The data shall include a complete list of parts and supplies, with current unit prices and source or sources of supply.
2. Contractor shall also furnish a list of parts, and supplies that are either normally furnished at no extra cost with the purchase of the equipment or specified to be furnished as part of the Contract and a list of additional items recommended by the

manufacturer to assure efficient operation for a period of one-hundred and twenty (120) days for the particular installation.

3. All parts shall be securely boxed and tagged, and clearly marked on the box and individually for identification as to the name of manufacturer or supplier, applicable equipment, part number, description and location in the equipment. All parts shall be protected and packaged for a shelf life of at least ten (10) years.
4. Unless otherwise specified in the Contract Documents, the Contractor shall, as a minimum, furnish at no additional cost to the City with each piece of equipment, one (1) complete set, or the number of sets called for in the Technical Specifications (whichever is greater), of suitably marked special tools and appliances which may be needed to adjust, operate, maintain, or repair the equipment.
5. The Contractor shall submit, for approval by the Engineer, a complete list of the special tools and appliances to be furnished. Such tools and appliances shall be furnished in approved painted steel cases properly labeled and equipped with good grade cylinder locks and duplicate keys.

D. Equipment Start-Up Services

1. Equipment start-up period, for the training of plant personnel, shall begin after satisfactory completion and acceptance of the field tests and coincidentally with the certified date of substantial completion for the part of the work for which the equipment is included. If the equipment is not covered by a certificate of substantial completion for a part of the work, the period shall begin upon substantial completion of the project.
2. During the equipment start-up period the Contractor shall furnish, at no additional cost to the City the services of factory trained representatives of the equipment manufacturers for the equipment designated in the Specifications to:
 - a. Assist in the start-up and operations of the equipment.
 - b. Assist in the training of plant personnel, designated by the City in the proper operation and maintenance of the equipment.
3. The City shall:
 - a. Provide the necessary plant personnel to be instructed in the operation and maintenance of the equipment. The City's personnel shall operate all equipment.
 - b. Pay for all fuel, power and chemicals consumed beyond quantities specified in the Contract Documents. The Contractor shall pay for fuel, power, and chemicals consumed up to the date of "certified substantial completion" except as otherwise specified herein.
4. Contractor shall be available to promptly repair all work during the start-up period so as to cause minimum disruption to the total plant operation.
5. Upon completion of a minimum of ten (10) consecutive and continuous days of satisfactory operation, or the number of days called for in the Technical Specifications, the City will assume operation and operating cost of the equipment. If the equipment malfunctions during this start-up period, the start-up period will be repeated until satisfactory operation is achieved.

6. In the event a system, equipment or component proves defective or is unable to meet specified performance criteria, the Contractor shall replace the defective item and the minimum one (1) year guarantee period, or the guarantee period called for in the Technical Specifications shall start after satisfactory replacement, testing and acceptance of the item along with the completion of all other pre-requisites as required in the Contract Documents.

E. Final Cleanup; Site Rehabilitation

1. Before finally leaving the site, the Contractor shall wash and clean all exposed surfaces which have become soiled or marked, and shall remove from the site of work all accumulated debris and surplus materials of any kind which result from his operation, including construction equipment, tools, sheds, sanitary enclosures, etc. The Contractor shall leave all equipment, fixtures, and work, which he has installed, in a clean condition. The completed project shall be turned over to the City in a neat and orderly condition.
2. The site of the work shall be rehabilitated or developed in accordance with other sections of the Specifications and the Drawings. In the absence of any portion of these requirements, the Contractor shall completely rehabilitate the site to a condition and appearance equal or superior to that which existed just prior to construction, except for those items whose permanent removal or relocation was required in the Contract Documents or ordered by the City.

F. Final Inspection

1. Final cleaning and repairing shall be so arranged as to be finished upon completion of the construction work. The Contractor will make his final cleaning and repairing, and any portion of the work finally inspected and accepted by the Engineer shall be kept clean by the Contractor, until the final acceptance of the entire work.
2. When the Contractor has finally cleaned and repaired the whole or any portion of the work, he shall notify the Engineer that he is ready for final inspection of the whole or a portion of the work, and the Engineer will thereupon inspect the work. If the work is not found satisfactory, the Engineer will order further cleaning, repairs, or replacement.
3. When such further cleaning or repairing is completed, the Engineer, upon further notice, will again inspect the work. The "Final Payment" will not be processed until the Contractor has complied with the requirements set forth, and the Engineer has made his final inspection of the entire work and is satisfied that the entire work is properly and satisfactorily constructed in accordance with the requirements of the Contract Documents.

G. Project Close Out

1. As construction of the project enters the final stages of completion, the Contractor shall, in concert with accomplishing the requirements set forth in the Contract Documents, attend to or have already completed the following items as they apply to his contract:
 - a. Scheduling equipment manufacturers' visits to site.

- b. Required testing of project components.
 - c. Scheduling start-up and initial operation.
 - d. Scheduling and furnishing skilled personnel during initial operation.
 - e. Correcting or replacing defective work, including completion of items previously overlooked or work which remains incomplete, all as evidenced by the Engineer's "Punch" Lists.
 - f. Attend to any other items listed herein or brought to the Contractor's attention by the Engineer.
2. Just before the Engineer's Certificate of Substantial Completion is issued, the Contractor shall accomplish the cleaning and final adjustment of the various building components as specified in the Specifications and as follows:
- a. Clean all glass and adjust all windows and doors for proper operation.
 - b. Clean all finish hardware after adjustment for proper operation.
 - c. Touch up marks or defects in painted surfaces and touch up any similar defects in factory finished surfaces.
 - d. Wax all resilient flooring materials.
 - e. Remove bitumen from gravel stops, fascias, and other exposed surfaces.
 - f. Remove all stains, marks, fingerprints, soil, spots, and blemishes from all finished surfaces, tile, stone, brick, and similar surfaces.
3. In addition, and before the Certificate of Substantial Completion is issued, the Contractor shall submit to the Engineer (or to the City if indicated) certain records, certifications, etc., which are specified elsewhere in the Contract Documents. A partial list of such items appears below, but it shall be the Contractor's responsibility to submit any other items which are required in the Contract Documents:
- a. Test results of project components.
 - b. Performance Affidavits for equipment.
 - c. Certification of equipment or materials in compliance with Contract Documents.
 - d. Operation and maintenance instructions or manuals for equipment.
 - e. One set of neatly marked-up record drawings showing as-built changes and additions to the work under his Contract.
 - f. Any special guarantees or bonds (Submit to City).
4. The Contractor's attention is directed to the fact that required certifications and information under Item 3 above, must actually be submitted earlier in accordance with other Sections of the Specifications.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

**SPARE PARTS INVENTORY
SUMMARY SHEET**

DATE _____
 SPEC SECTION _____
 EQUIPMENT _____
 LOCATION _____
 MANUFACTURER NAME _____
 ADDRESS _____
 CONTACT _____ PHONE _____

SPARE PARTS INVENTORY

PART NO.	QUANTITY	DESCRIPTION	MANUFACTURER

Received:

 Resident Inspector Contractor's Representative City Representative

- END OF SECTION

SECTION 01740

WARRANTIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. General requirements for warranties required in the various Specifications.
2. Provisions addressing:
 - a. Suppliers' standard warranties.
 - b. Suppliers' special or extended warranties.
 - c. Implied warranties.
 - d. Commencement and duration of warranties.

1.02 SUBMITTALS

A. General:

1. For each item of equipment furnished under the Contract, submit Supplier's standard warranty, regardless of whether such warranty or Submittal thereof is required by the associated Specifications for that item. Submit such warranties for materials where such Submittal is required in the Specifications for the material.
2. For each item of material or equipment where Supplier's special (or extended) warranty is required by the Contract Documents, submit appropriate special warranty that complies with the Contract Documents.
3. Supplier's warranties shall be specifically endorsed to Owner, Contractor, and the entity purchasing the item (if other than Contractor) by the entity issuing such warranty.
4. Submit Suppliers' standard warranties and special warranties as Submittals in accordance with the Schedule of Submittals accepted by Engineer.

1.03 CONTRACTOR'S GENERAL WARRANTY AND CORRECTION PERIOD OBLIGATIONS

- A. Contractor's General Warranty and Guarantee: Comply with requirements of the General Conditions, as may be modified by the Supplementary Conditions.
- B. Contractor's Warranty of Title: Comply with requirements of the General Conditions, as may be modified by the Supplementary Conditions.
- C. Correction Period: Comply with requirements of the General Conditions, as may be modified by the Supplementary Conditions.

1.04 SUPPLIERS' WARRANTIES FOR MATERIALS AND EQUIPMENT

A. Warranty Types:

1. Required by the General Conditions:
 - a. Warranties specified for materials and equipment shall be in addition to, and run concurrent with, Contractor's general warranty and guarantee and requirements for the Contract's correction period.
 - b. Disclaimers and limitations in specific materials and equipment warranties do not limit Contractor's general warranty and guarantee, nor does such affect or limit Contractor's performance obligations under the correction period.
2. Material or equipment manufacturer's standard warranty is pre-printed, written warranty published by item's manufacturer and specifically endorsed by manufacturer to the entities indicated in this Specifications Section's Article 1.2.
3. Special warranty is written warranty that either extends the duration of material or equipment manufacturer's standard warranty or provides other, increased rights to Owner and other beneficiaries (if any) of such warranty. Where the Contract Documents indicate specific requirements for warranties that differ from the manufacturer's standard warranty for that item, special warranty is implied.

B. Requirements for Special Warranties:

1. Submit written special warranty document that contains appropriate provisions and identification, ready for signature by material or equipment manufacturer, Owner, and other beneficiaries indicated in Article 1.2 of this Specifications Section. Submit draft warranty with Submittals required prior to fabrication and shipment of the item from the Supplier's facility.
2. Manufacturer's Standard Form: Modified to include Project-specific information and properly signed by product manufacturer and other entities as appropriate.
3. Specified Form: When specified forms for special warranties are included in the Contract Documents, prepare written document, properly signed by item manufacturer, Owner, and other beneficiaries indicated in Article 1.2 of this Specifications Section, using the required form.
4. Refer to the Specifications for content and requirements for submitting special warranties.

1.05 IMPLIED WARRANTIES

A. Warranty of Title and Intellectual Property Rights:

1. Except as may be otherwise indicated in the Contract Documents, implied warranty of title required by Laws and Regulations is applicable to the Work and to materials and equipment incorporated therein.
2. Provisions on intellectual property rights, including patent fees and royalties, are in the General Conditions, as may be modified by the Supplementary Conditions.

B. Warranty of Merchantability:

1. Notwithstanding any other provision of the Contract to the contrary, implied warranties of merchantability required by Laws and Regulations apply to the materials and equipment incorporated into the Work.

C. Warranty of Fitness-for-Purpose:

1. Implied warranty of fitness-for-use for materials and equipment to be incorporated into the Work, as indicated in Laws and Regulations, remains in full force and effect.
2. When Supplier is aware of, or has reason to be aware of, specified materials or features of the Work that are contrary to the intended use, purpose, service, application, or environment in which the material or item will be used, submit request for interpretation in accordance with Section 01035 - Modification Procedures. Where appropriate, such request for interpretation shall indicate the apparent discrepancy and propose appropriate, alternative materials or equipment.

1.06 COMMENCEMENT AND DURATION OF WARRANTIES

A. Commencement of Warranties:

1. Contract correction period and Contractor's general warranty commence as indicated in the General Conditions, as may be modified by the Supplementary Conditions.
2. Suppliers' standard warranties and special warranties commence running on the date that the associated item is certified by Engineer as substantially complete in accordance with the Contract Documents. In no event shall special warranties commence running prior to Engineer's review and acceptance of special warranty Submittal for the item.
3. Implied warranties commence in accordance with Laws and Regulations.

B. Duration of Warranties:

1. Duration of correction period is set forth in the General Conditions, as may be modified by the Supplementary Conditions.
2. Duration of Contractor's general warranty and guarantee is in accordance with Laws and Regulations.
3. Duration of Suppliers' standard warranties is in accordance with the applicable standard warranty document accepted for the Project by Engineer.
4. Duration of required Suppliers' special warranties shall be in accordance with the requirements of the Contract Documents for the subject item.
5. Duration of implied warranties shall be in accordance with Laws and Regulations.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 01770
CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 THE REQUIREMENT

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

1.02 RELATED REQUIREMENTS

- A. All applicable sections of the Technical Specifications.
- B. Conditions of the Contract

1.03 SUBSTANTIAL COMPLETION

- A. When Contractor considers the Work is substantially complete, the Contractor shall submit to Engineer:
 - 1. A written notice that the Work, or designated portion thereof, is substantially complete.
 - 2. A list of items to be completed or corrected.
 - 3. Final as-builts per requirements of Section 01320 and City of Fort Lauderdale As-Built Plan Requirements.
- B. Within a reasonable time after receipt of such notice, City and Engineer will make an inspection to determine the status of completion.
- C. Should Engineer determine that the Work is not substantially complete:
 - 1. Engineer will promptly notify the Contractor in writing, giving the reasons therefore.
 - 2. Contractor shall remedy the deficiencies in the Work and send a second written notice of substantial completion to the Engineer.
 - 3. Engineer will reinspect the Work.
- D. When Engineer concurs that the Work is substantially complete, Engineer will:
 - 1. Prepare a Certificate of Substantial Completion accompanied by Contractor's list of items to be completed or corrected, as verified and amended by the Engineer.
 - 2. Submit the Certificate to the Owner and the Contractor for their written acceptance of the responsibilities assigned to them in the Certificate.

1.04 FINAL INSPECTION

- A. On completion of the Work, the Contractor shall submit written certification that:

1. Contract Documents have been reviewed.
 2. Work has been inspected for compliance with Contract Documents.
 3. Work has been completed in accordance with Contract Documents.
 4. Equipment and systems have been tested in the presence of the Engineer and are operational.
 5. Work is completed and ready for final inspection.
- B. Engineer will make an inspection to verify the status of completion with reasonable promptness after receipt of such certification.
- C. Should Engineer consider that the Work is incomplete and defective:
1. Engineer will promptly notify the Contractor, in writing, listing the incomplete or defective Work.
 2. Contractor shall take immediate steps to remedy the stated deficiencies and send a second written certification to Engineer that the Work is complete.
 3. Engineer will reinspect the Work.
- D. When the Engineer finds that the Work is acceptable under the Contract Documents, the Engineer shall request the Contractor to make closeout submittals.

1.05 REINSPECTION FEES

- A. Should Owner or Engineer perform reinspections due to failure of the Work to comply with the claims of status of completion made by the Contractor:
1. Contractor will compensate Owner or Engineer for such additional services, and/or.
 2. Owner will deduct the amount of such compensation from the final payment to the Contractor.

1.06 CONTRACTOR'S CLOSEOUT SUBMITTALS TO OWNER'S REPRESENTATIVE

- A. Evidence of compliance with requirements of governing authorities:
1. Certificate of Occupancy
 2. Permit Closeout Certification
 3. Certificates of Inspection
 - a. Mechanical
 - b. Electrical
 - c. Other, as may be required
- B. Project Record Documents: To requirements of Section 01320

- C. Operating and Maintenance Data, Instructions to City's Personnel: To requirements of Section 01300
- D. Guarantees and Bonds: To requirements of Section 01300
- E. Evidence of Payment and Release of Liens: To requirements of General and Supplementary General Conditions
- F. Certificate of Insurance for Products and Completed Operations

1.07 FINAL ADJUSTMENT OF ACCOUNTS

- A. Submit a final statement of accounting to Engineer.
- B. Statement shall reflect all adjustments to the Contract Sum:
 - 1. The original Contract Sum
 - 2. Additions and deductions resulting from:
 - a. Previous Change Orders
 - b. Allowances
 - c. Unit Prices
 - d. Deductions for uncorrected Work
 - e. Penalties and Bonuses
 - f. Deductions for liquidated damages
 - g. Deductions for reinspection payments
 - h. Other adjustments
 - 3. Total Contract Sum, as required
 - 4. Previous payments
 - 5. Sum remaining due
- C. Engineer will prepare a final Change Order, reflecting approved adjustments to the Contract Sum which were not previously made by Change Orders.

1.08 FINAL APPLICATION FOR PAYMENT

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

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

- END OF SECTION -

SECTION 01800

OPENINGS AND PENETRATIONS IN CONSTRUCTION

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Methods of installing and sealing openings and penetrations in construction.

B. Related Specification Sections include but are not necessarily limited to:

1. Section 05505 - Miscellaneous Metals.
2. Section 06610 - Fiberglass Reinforced Plastic Fabrications.
3. Section 07600 - Flashing and Sheet Metal.
4. Section 07840 - Firestopping.
5. Section 07900 - Joint Sealants.
6. Section 09961 - High Performance Industrial Coatings.

1.02 QUALITY ASSURANCE

A. Referenced Standards:

1. ASTM International (ASTM):
 - a. A36, Standard Specification for Carbon Structural Steel.
 - b. A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - c. A269, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
 - d. A312, Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
 - e. A351, Standard Specification for Castings, Austenitic, for Pressure-Containing Parts.
 - f. A554, Standard Specification for Welded Stainless Steel Mechanical Tubing.
 - g. A653, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - h. A666, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

- i. A995, Castings, Austenitic-Ferritic (Duplex) Stainless Steel, for Pressure-Containing Parts.
2. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC):
 - 1) Article 501, Class 1 Locations.
 - b. 90A, Standard for Installation of Air Conditioning and Ventilating Systems.
 - c. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA).

1.03 DEFINITIONS

- A. Hazardous Areas: Areas shown in the Contract Documents as having Class I or Class II area classifications.
- B. Washdown Areas: Areas having floor drains or hose bibbs.

1.04 SUBMITTALS

- A. Shop Drawings:
 1. For each structure provide dimensioned or scaled (minimum 1/8 IN = 1 FT) plan view drawings containing the following information:
 - a. Vertical and horizontal location of all required openings and penetrations.
 - b. Size of all openings and penetrations.
 - c. Opening type.
 - d. Seal type.
 2. Manufacturer's installation instructions for standard manufactured products.

PART 2 - PROJECT PRODUCTS

2.01 MATERIALS

- A. Pipe Sleeves:
 1. All other Areas:
 - a. Steel, Hot-dipped galvanized after fabrication.
 - b. Section 09961.Penetrations 24 IN DIA or less: ASTM A53, Schedule 40.
 - c. Penetrations larger than 24 IN DIA: ASTM A36, Minimum 1/4 IN thickness.
- B. Backing Rod and Sealant: See Specification Section 07900.
- C. Modular Mechanical Seals:

1. Acceptable manufacturers:
 - a. Link-Seal.
 2. 316 stainless steel bolts, nuts and washers.
- D. Firestopping Material: See Specification Section 07840.
- E. Sheet Metal Sleeves:
1. Areas listed as Corrosive Areas in PART 1: Stainless steel: ASTM A240, Type 316L.
 2. All other areas: Galvanized steel: ASTM A653, G90.
 3. Minimum 12 GA.
- F. Commercial Wall Castings:
1. Ductile iron, ASTM A536.
 2. Grade equal to connecting piping system.

PART 3 - EXECUTION

3.01 FABRICATION

- A. Fabricate pipe sleeves in accordance with Specification Section 05505.
- B. Fabricate sheet metal sleeves in accordance with Specification Section 07600.
- C. Provide waterstop plate/anchor flange for piping, ducts, castings and sleeves cast-in-place in concrete.
 1. For fabricated units, weld plate to sleeve, pipe, or ductwork.
 2. For commercial castings, cast water stop/anchor with wall pipe.
 3. Plate is to be same thickness as sleeve, pipe, casting or ductwork.
 4. For fabricated units, diameter of plate or flange to be 4 IN larger than outside diameter of sleeve, pipe or ductwork.
 5. For commercial castings, waterstop/anchor size to be manufacturer standard.
 6. Provide continuous around entire circumference of sleeve, pipe, or ductwork.
- D. Factory or shop-coat painted components in accordance with Specification Section 09961.

3.02 INSTALLATION AND APPLICATION

- A. Firestopping materials used in fire-resistance rated construction shall be in full compliance with Specification Section 07840.

- B. Seal openings and penetrations in non-fire-resistance-rated construction in accordance with Specification Section 07900.
- C. Obtain prior approval from Engineer when any opening larger than 100 SQIN must be made in existing or newly completed construction.
- D. Perform HVAC penetrations in accordance with NFPA 90A.
- E. Perform electrical penetrations in accordance with NFPA 70, Article 501.
- F. When mechanical or electrical work cannot be installed as structure is being erected, provide and arrange for building-in of boxes, sleeves, insets, fixtures or devices necessary to permit installation later.
 - 1. Lay out chases, holes or other openings which must be provided in masonry, concrete or other work.
- G. Where pipes, conduits or ducts pass through floors in washdown areas, install sleeves with top 3 IN above finish floors.
 - 1. In non-washdown areas, install sleeves with ends flush with finished surfaces.
- H. Size sleeves, blockouts and cutouts which will receive sealant seal such that free area to receive sealant is minimized and seal integrity may be obtained.
- I. For insulated piping and ducts, size sleeves, blockouts and cutouts large enough to accommodate full thickness of insulation.
- J. Where pipes, conduits or ducts pass through grating, provide banding at the entire perimeter of the opening.
 - 1. Metal grating: See Specification Section 05505.
 - 2. FRP grating: See Specification Section 06610.
- K. Where pipes, conduits or ducts are removed where passing through grating:
 - 1. Metal grating:
 - a. Provide banding at perimeter and cover opening with 1/4 IN plate of the same material of the grating.
 - b. See Specification Section 05505.
 - 2. FRP grating:
 - a. Provide full depth cover meeting same loading requirement as existing material or replace grating section.
 - b. See Specification Section 06610.
- L. Do not cut into or core drill any beams, joists, or columns.
- M. Do not install sleeves in beams, joists, or columns.

- N. Do not install recesses in beams, joists, columns, or slabs.
- O. Field Cutting and Coring:
1. Saw or core drill with non-impact type equipment.
 2. Mark opening and drill small 3/4 IN or less holes through structure following opening outline.
 3. Sawcut opening outline on both surfaces.
 - a. Knock out within sawcuts using impact type equipment.
 - b. Do not chip or spall face of surface to remain intact.
 - c. Do not allow any overcut with saw kerf.
- P. Precast-Prestressed Concrete Construction:
1. Do not cut openings or core drill vertically or horizontally through stems of members.
 2. Do not locate or install sleeves or recess sleeves vertically or horizontally through or in stems of members.
 3. Cast openings and sleeves into flanges of units.
 4. Cast openings larger than 6 IN in diameter or 6 IN maximum dimension in units at time of manufacture.
 5. Cast openings smaller than 6 IN in diameter or 6 IN maximum dimensions in flanges of units at time of manufacture or field cut.
- Q. Where alterations are necessary or where new and old work join, restore adjacent surfaces to their condition existing prior to start of work.
- R. Where area is blocked out to receive sheet metal sleeve at later date:
1. If blockout size is sufficient to allow placement, utilize dowels for interface of initially placed concrete and sleeve encasement concrete which is placed later.
 - a. Size blockout based on sleeve size required plus 4 to 6 IN each side of sleeve for concrete encasement.
 - b. Provide #4 dowels at 12 IN spacing along each side of blockout with minimum of two dowels required per side.
 2. If blockout size is not sufficient to allow placement of dowels, provide keyway along all sides of blockout.
 - a. Size blockout based on sleeve size required plus 2 to 4 IN each side of sleeve for concrete encasement.
- S. For interior wall applications where backer rod and sealant are specified, provide backer rod and sealant at each side of wall.

- T. Refer to Drawings for location of fire-rated walls, floors, and ceilings.
 - 1. Utilize firestopping materials and procedures specified in Specification Section 07840 IN conjunction with scheduled opening type to produce the required fire rating.
- U. Use full depth expanding foam sealant for seal applications where single or multiple pipes, conduits, etc., pass through a single sleeve.
- V. Do not make duct or conduit penetrations below high water levels when entering or leaving tankage, wet wells, or other water holding structures.
- W. Modular Mechanical Seals:
 - 1. Utilize one seal for concrete thickness less than 8 IN and two seals for concrete, 8 IN thick or greater.
 - 2. Utilize two seals for piping 16 IN diameter and larger if concrete thickness permits.
 - 3. Install seals such that bolt heads are located on the most accessible side of the penetration.
- X. Backer Rod and Sealant:
 - 1. Install in accordance with Specification Section 07900.
 - 2. Provide backer rod and sealant for modular mechanical seal applications.
 - a. Apply on top side of slab penetrations and on interior, dry side wall penetrations.

3.03 SCHEDULES

- A. General Schedule of Penetrations through Floors, Roofs, Foundation Base Slabs, Foundation Walls, Foundation Footings, Partitions and Walls for Ductwork, Piping, and Conduit:
 - 1. Provide the following opening and penetration types:
 - a. Type A - Block out 2 IN larger than outside dimensions of duct, pipe, or conduits.
 - b. Type B - Saw cut or line-drill opening. Place new concrete with integrally cast sheet metal or pipe sleeve.
 - c. Type C - Fabricated sheet metal sleeve or pipe sleeve cast-in-place. Provide pipe sleeve with water ring for wet and/or washdown areas.
 - d. Type D - Commercial type casting or fabrication.
 - e. Type E - Saw cut or line-drill opening. Place new concrete with integrally cast pipe, duct or conduit spools.
 - f. Type F - Integrally cast pipe, duct or conduit.

- g. Type G - Saw cut or line-drill and remove area 1 IN larger than outside dimensions of duct, pipe or conduit.
 - h. Type H - Core drill.
 - i. Type I - Block out area. At later date, place new concrete with integrally cast sheet metal or pipe sleeve.
 - j. Type J - Grating Banding for any field cut openings.
2. Provide seals of material and method described as follows.
- a. Category 1 - Modular Mechanical Seal.
 - b. Category 2 - Roof curb and flashing according to SMACNA specifications unless otherwise noted on Drawings. Refer to Specification Section 07600 and roofing Specification Sections for additional requirements.
 - c. Category 3 - 12 GA sheet metal drip sleeve set in bed of silicon sealant with backing rod and sealant used in sleeve annulus.
 - d. Category 4 - Backer rod and sealant.
 - e. Category 5 - Full depth compressible sealant with escutcheons on both sides of opening.
 - f. Category 6 - Full depth compressible sealant and flanges on both sides of opening. Flanges constructed of same material as duct, fastened to duct and minimum 1/2 IN larger than opening.
 - g. Category 7 - Full depth compressible sealant and finish sealant or full depth expanding foam sealant depending on application.
 - h. Category 8 - Banding for all grating openings and banding and cover plate of similar materials for abandoned openings.
3. Furnish openings and sealing materials through new floors, roofs, grating, partitions and walls in accordance with Schedule A, Openings and Penetrations for New Construction.
4. Furnish openings and sealing materials through existing floors, grating, roofs, partitions and walls in accordance with Schedule B, Openings and Penetrations for Existing Construction.

SCHEDULE A. OPENINGS AND PENETRATIONS SCHEDULE FOR NEW CONSTRUCTION

APPLICATIONS	DUCTS		PIPING		CONDUIT	
	OPENING TYPE	SEAL CATEGORY	OPENING TYPE	SEAL CATEGORY	OPENING TYPE	SEAL CATEGORY
Through floors with bottom side a hazardous location	C F I	7 Not Req 7	D F I ⁽¹⁾	Not Req Not Req 7	C F	7 Not Req
Through floors on grade above water table	C F I	4 Not Req 4	C F I ⁽¹⁾	7 Not Req 7	C F I ⁽¹⁾	4 Not Req 7
Through slab on grade below water table	F	Not Req	F	Not Req	F	Not Req
Through floors in washdown areas	C I	4 4	C H ⁽²⁾ I ⁽¹⁾	4 3 4	F H ⁽²⁾ I ⁽¹⁾	Not Req 3 7
Through walls where one side is a hazardous area	C F I	7 Not Req 7	D F I ⁽¹⁾	Not Req Not Req 7	C F	7 Not Req
Through exterior wall below grade above water table	C F I	7 Not Req 7	C D F I ⁽¹⁾	1 Not Req Not Req 1	F I ⁽¹⁾	Not Req 7
Through wall from tankage or wet well (above high water level) to dry well or dry area	C F I	7 Not Req 7	C D F H ⁽²⁾	1 Not Req Not Req 1	C F H ⁽²⁾ I ⁽¹⁾	7 Not Req 7 7
Through wall from tankage or wet well (below high water level) to dry well or dry area	F	Not Req	F	Not Req	F	Not Req
Through exterior wall above grade	A B C	6 6 6	A B D H ⁽²⁾	5 5 Not Req 5	C H ⁽²⁾	5 4
Roof penetrations	A	2	A	2	A	2
Through interior walls and slabs not covered by the above applications	A C	4 4	A C	4 4	A C F	4 4 Not Req
Grating openings and penetrations	J	8	J	8	J	8

**SCHEDULE B. OPENINGS AND PENETRATIONS SCHEDULE
FOR EXISTING CONSTRUCTION**

APPLICATIONS	DUCTS		PIPING		CONDUIT	
	OPENING TYPE	SEAL CATEGORY	OPENING TYPE	SEAL CATEGORY	OPENING TYPE	SEAL CATEGORY
Through floors with bottom side a hazardous location	B E	7 Not Req	B ⁽¹⁾ E ⁽³⁾ H ⁽²⁾	7 Not Req 7	B ⁽¹⁾ E ⁽³⁾ H ⁽²⁾	7 Not Req 7
Through floors on grade above water table	B	7	B	7	B	7
Through slab on grade below water table	E	Not Req	E	Not Req	E	Not Req
Through floors in washdown areas	G	3	G H ⁽²⁾	3 3	G H ⁽²⁾	3 3
Through walls where one side is a hazardous area	B E	7 Not Req	B ⁽¹⁾ B ⁽³⁾ E H ⁽²⁾	7 1 Not Req 7	B ⁽¹⁾⁽³⁾ E H ⁽²⁾	7 Not Req 7
Through exterior wall below grade above water table	B	7	B ⁽¹⁾ B ⁽³⁾ H ⁽²⁾	7 1 7	B ⁽¹⁾⁽³⁾ H ⁽²⁾	7 7
Through wall from tankage or wet well (above high water level) to dry well or dry area	B E	7 Not Req	B E H ⁽²⁾	1 Not Req 1	B ⁽¹⁾⁽³⁾ E H ⁽²⁾	7 Not Req 7
Through wall from tankage or wet well (below high water level) to dry well or dry area	E	Not Req	E	Not Req	E	Not Req
Through exterior wall above grade	G	6	G ⁽¹⁾⁽³⁾ H ⁽²⁾	5 5	G ⁽¹⁾⁽³⁾ H ⁽²⁾	5 7
Roof penetrations	G	2	G ⁽¹⁾⁽³⁾ H ⁽²⁾	2	G	2
Through interior walls and slabs not covered by the above applications	G	4	G ⁽¹⁾⁽³⁾ H ⁽²⁾	4 4	G ⁽¹⁾⁽³⁾ H ⁽²⁾	4 4
Grating openings and penetrations	J	8	J	8	J	8

- (1) Multiple piping 3 IN and smaller or multiple conduits.
- (2) Single pipe 3 IN and smaller or single conduit.
- (3) Single pipe or conduit larger than 3 IN.

END OF SECTION

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SECTION 02015

MOBILIZATION, SITE PREPARATION AND DEMOBILIZATION

PART 1 - GENERAL

1.01 THE REQUIREMENT

- A. The Work specified in this section consists of all Work necessary to move in personnel and equipment and prepare the site for construction, complete and to remove the same personnel and equipment from the site when construction is complete.
- B. The limits of the Contractor's staging area and other applicable restrictions are shown on the Drawings.

PART 2 - PRODUCTS

2.01 TEMPORARY UTILITIES

- A. The Contractor shall provide all temporary facilities required for performing the Work as specified in Section entitled "CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS".

PART 3 - EXECUTION

3.01 LAYOUT

- A. The Contractor shall set up construction facilities in a neat and orderly manner within designated areas as noted on the Staging Plan drawing of the Contract documents. It shall accomplish all required Work in accordance with applicable portions of these specifications and shall confine its operations to Work areas as shown on the drawings.

3.02 DEMOBILIZATION

- A. At the completion of Work the Contractor shall remove its personnel, equipment, and temporary facilities from the site in a timely manner. The Contractor shall also be responsible for transporting all unused materials belonging to the City to a place of storage on site designated by the City and for removing from the site and disposing of all other materials and debris resulting from the construction. It shall then return all areas used for its activities to a condition as noted on the Contract documents.

- END OF SECTION -

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SECTION 02080

FIRE HYDRANTS

PART 1 - GENERAL

1.01 REQUIREMENT

- A. Furnish and install fire hydrants where shown on the Drawings.

1.02 SUBMITTALS

- A. Shop Drawings: Catalog cuts of system components.
- B. Quality Control Submittals: Certificate of compliance: Upon completion of the installation, verify all fire department hose connections, and check all fire safety devices to ensure their readiness for emergency connection and operation.

PART 2 - PRODUCTS

2.01 HYDRANTS

A. Hydrant:

1. Two-part break flange or safety top type.
2. Nominal 5-1/4-inch main valve opening with 6-inch bottom connections.
3. Conform to AWWA C502.
4. Two 2-1/2-inch hose nozzles.
5. One 4-1/2-inch pumper nozzle.
6. Operating Nuts: 1-1/2-inch National Standard pentagon nut.
7. Mechanical joint inlet connection.
8. Rustoleum 1201 Red and Rustoleum 2766 White above ground line.
9. Acceptable Manufacturers and Products:
 - a) Mueller Super Centurion 200.
 - b) US Pipe Metropolitan 250.
 - c) American Darling B-84B
 - d) Clow Medallion.

B. Main Valve:

1. See Section 15100, Valves and Operators.
2. Valve opens on counterclockwise rotation.

2.02 GRAVEL

- A. Washed 3/4-inch crushed rock or graded river gravel. Free of organic matter, sand, loam, clay, and other small particles that will restrict waterflow through gravel.

2.03 FOUNDATION STABILIZATION MATERIAL

- A. Furnish when existing trench material or imported pipe base material will not support soft or flooded spots in excavated trench.
- B. Maximum 3-inch hard rock free from excessive clay material, but enough fines to bind larger fragments.

2.04 PIPE, FITTINGS AND JOINT RESTRAINT

- A. All pipe shall be restrained joint ductile iron. See Section 5062, Ductile Iron Pipe and Fittings.
- B. Joints:
 1. Manufacturer's restrained joint - preferred.
 2. Mechanically restrained joint.
 3. Or equal.
- C. Hydrant piping shall include one length of restrained joint ductile iron pipe on each side of the hydrant tee.

PART 3 - EXECUTION

3.01 GENERAL

- A. Install hydrants in accordance with Sections 3.7 and 3.8 of AWWA C600, unless specified otherwise.
- B. See Drawings for hydrant installation detail.

3.02 EXCAVATION

- A. Excavate to subgrade. Fill over excavated areas with foundation stabilization material. Tamp to provide firm foundation.

3.03 INSTALLATION OF HYDRANTS

- A. Locate hydrants to provide accessibility and to minimize potential damage from vehicles.

1. Relocate improperly set hydrants.
2. Depth of Valve Bury: 4 feet.
3. Locate valve as close to hydrant as possible, as shown on the Drawings.
4. Hydrant Located behind Curbs: Set barrel so pumper nozzle or hose nozzle caps are a minimum of 18 inches from gutter face of curb.
5. Hydrant Located Where There is a Sidewalk: Set hydrant in the sidewalk so the back of the barrel is 12 inches inside the property line and the edge of the sidewalk, as shown on the Drawings.
6. Set hydrants so safety flange is a minimum of 2 inches above finished ground or sidewalk level.

B. Joints shall conform to Section 3.4 of AWWA C600 for ductile iron pipe.

C. Maintain hydrant in a plumb position during subsequent Work.

3.04 GRAVEL FOR SUPPORT

A. Place gravel around hydrant bottom in accordance with Section 3.7 of AWWA C600.

3.05 JOINT RESTRAINT

- a. Provide joint restraint as specified and as shown on the Drawings, between main valve and hydrant, water main tee, and main valve.

- END OF SECTION -

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SECTION 02200

SITE PREPARATION

PART 1 - GENERAL

1.01 DEFINITIONS

- A. Interfering or Objectionable Material: Trash, rubbish, and junk; vegetation and other organic matter, whether alive, dead, or decaying; topsoil.
- B. Clearing: Removal of interfering or objectionable material lying on or protruding above ground surface.
- C. Grubbing: Removal of vegetation and other organic matter including stumps, buried logs, and roots greater than 2 inches caliper to a depth of 12 inches below subgrade.
- D. Scalping: Removal of sod without removing more than upper 3 inches of topsoil.
- E. Stripping: Removal of topsoil remaining after applicable scalping is completed.
- F. Project Limits: Areas, as specified, within which Work is to be performed.

1.02 QUALITY ASSURANCE

- A. Obtain Engineer's approval of staked clearing, grubbing, and stripping limits, prior to commencing clearing, grubbing, and stripping.

1.03 SCHEDULING AND SEQUENCING

- A. Prepare site only after adequate erosion and sediment controls are in place. Limit areas exposed uncontrolled to erosion during installation of temporary erosion and sediment controls per 02100 Erosion and Sedimentation Control – Stormwater Pollution Prevention.

PART 2 - MATERIALS

(NOT USED)

PART 3 - EXECUTION

3.01 GENERAL

- A. Clear, grub, and strip areas actually needed for waste disposal, borrow, or site improvements within limits specified.
- B. Property obstructions which are to remain in-place, such as buildings, sewers, drains, water or gas pipes, bridges, etc., are to be carefully protected from damage.

- C. Do not injure or deface vegetation that is not designated for removal. All branches potentially interfering with construction operations shall be pruned prior to starting work and following approval of the City and the City of Fort Lauderdale Urban Forester.

3.02 LIMITS

- A. As Follows, but not to extend beyond project limits.
 - 1. Excavation Including Trenches: 5 feet beyond top of cut slopes or shored wall.
 - 2. Fill:
 - a) Clearing and Grubbing: 5 feet beyond toe of permanent fill.
 - b) Stripping and Scalping: 2 feet beyond toe of permanent fill.
 - 3. Waste Disposal:
 - a) Clearing: 5 feet beyond perimeter.
 - b) Scalping and Stripping: Not required.
 - c) Grubbing: Around perimeter as necessary for neat finished appearance.
 - 4. Overhead Utilities:
 - a) Clearing, Grubbing, Scalping, and Stripping: Wherever grading is required, including borrow pits, ditches, etc.
 - b) Other Areas: As shown.
- B. Remove rubbish, trash, and junk from entire area within Project limits.

3.03 TEMPORARY REMOVAL OF INTERFERING PLANTINGS

- A. Remove and store, as specified in the Contract Documents, trees, plants, and ground covers, shrubs and trees that are not designated for removal but do interfere with construction or could be damaged by construction activities.
- B. Photograph and document location, orientation, and condition of each plant prior to its removal. Record sufficient information to uniquely identify each plant removed and to assure accurate replacement.

3.04 CLEARING

- A. Clear areas within limits specified.
- B. Fell trees so that they fall away from facilities and vegetation not designated for removal.
- C. Cut stumps not designated for grubbing 12 inches below the ground surface.
- D. Cut off shrubs, brush, weeds, and grasses to within 2 inches of ground surface.

3.05 GRUBBING

- A. Grub areas within limits specified.

3.06 SCALPING

- A. Do not remove sod until after clearing and grubbing is completed and resulting debris is removed.
- B. Scalp areas within limits specified.

3.07 STRIPPING

- A. Do not remove topsoil until after scalping is completed.
- B. Strip areas within limits to minimum depths specified. Do not remove subsoil with topsoil.
- C. Stockpile strippings, meeting requirements of Section 02911, Soil Preparation, for topsoil, separately from other excavated material.

3.08 TREE REMOVAL OUTSIDE CLEARING LIMITS

- A. Remove Within Project Limits:
 - 1. Dead, dying, leaning, or otherwise unsound trees that may strike and damage Project facilities in falling.
 - 2. Trees designated by Engineer.
 - 3. Cut stumps off flush with ground, remove debris, grind stump and if disturbed, restore surrounding area to its original condition.

3.09 TREE TOPPING

- A. Top trees designated by the City so remaining portion will not strike facilities in falling. Where topping will remove more than 1/2 of a tree's crown, remove entire tree.
- B. Treat wounds resulting from topping in accordance with standard horticultural practice to preserve the natural character of the tree.

3.10 PRUNING

- A. Remove branches below the following heights:
 - 1. Sixteen feet above roadways and shoulders.
 - 2. Nine feet above sidewalks.
 - 3. Six feet above roofs.
- B. Prune only after planting and in accordance with standard horticultural practice to preserve the natural character of the plant. Perform in presence of the Engineer. Remove all dead wood, suckers, and broken or badly bruised branches. Use only clean, sharp tools. Do not cut lead shoot.

3.11 DISPOSAL

A. Clearing and Grubbing Debris:

1. Woody debris may be chipped. Chips may be sold to Contractor's benefit or used for landscaping onsite as mulch or uniformly mixed with topsoil, provided that resulting mix will be fertile and not support combustion. Maximum dimensions of chipped material used onsite shall be 1/4-inch by 2 inch. Dispose of chips that are unsaleable or unsuitable for landscaping or other uses with unchipped debris.
2. Limit offsite disposal of clearing and grubbing debris to locations that are approved by federal, state, and local authorities, and that will not be visible from Project.

B. Scalpings: As specified for clearing and grubbing debris.

C. Strippings:

1. Dispose of strippings that are unsuitable for topsoil or that exceed quantity required for topsoil offsite or in waste disposal areas approved by Engineer.
2. Stockpile topsoil in sufficient quantity to meet Project needs. Dispose of excess strippings as specified for clearing and grubbing.

- END OF SECTION -

SECTION 02220

DEMOLITION

PART 1 - GENERAL

1.01 THE REQUIREMENT

- A. Removal and disposal of structures, pavement surfaces, sidewalks, underground obstructions, and other facilities necessary to prepare the area for construction of proposed facilities.

PART 2 - MATERIALS

(NOT USED)

PART 3 - EXECUTION

3.01 GENERAL

- A. Utilities:
 - 1. Notify City or appropriate utilities to turn off affected services before starting demolition or alterations. Provide not less than seven (7) days notice to the owner of the utility prior to the shutdown.
 - 2. Remove utility lines exposed by demolition excavation.
 - 3. Remove electric, sanitary, and storm drainage adjacent to buildings to be demolished.
 - 4. Excavate utility lines serving buildings to be demolished and provide a permanent leak-proof closure for water and gas lines.
 - 5. Plug sewerlines at locations shown or at limits of excavation if not shown with concrete length of plug, 5 feet minimum to prevent groundwater infiltrating sewer systems.
- B. Removal and Storage of Equipment for Reuse:
 - 1. Do not remove equipment and materials without approval of Engineer.
 - 2. Properly store and maintain equipment and materials in same condition as when removed.
 - 3. Engineer will determine condition of equipment and materials prior to removal.

3.02 DEMOLITION

- A. Additional quantities of new construction or additional work caused by the demolition, beyond the limits, will be performed at the Contractor's expense.

- B. Drawings define minimum portion of structures to be removed. Unless otherwise shown, rough cuts or breaks may be made exceeding limits of demolition shown. Provide sawcut at limits of all pavement removal. Structures shall be removed in such a way as to leave no obstructions to any proposed new structures or to any waterways.
- C. Core drill floor slabs, catch basins, and other concrete improvements to remain in place below ground, or break holes at structure's lowest point to allow water to freely migrate through.
- D. Remove piping from areas to be backfilled. Pipe, valves, and fittings adjacent to those to be removed may also be removed as salvage.
- E. Remove all materials associated with existing equipment that is to be removed or relocated.
- F. Cut off concealed or embedded conduit, boxes, or other materials a minimum of 2 inches below final finished surface.
- G. Extract existing piling, which conflict with new piles, prior to driving new piles.

3.03 DISPOSAL

- A. Dispose of debris and other nonsalvaged materials offsite in licensed landfills.

3.04 BACKFILLING

- A. Demolished Areas: Backfill to existing ground level or foundation level of new construction.
- B. Backfill Material and Compaction:
 - 1. Conform to Sections 02260 and 02224.
 - 2. Do not use demolition debris as backfill material.

3.05 SALVAGE

- A. Equipment and materials, including piping within the limits of demolition, unless otherwise specified, will become the property of Contractor.
- B. Any material designated to remain by the City shall be stored in neat piles in a location directed by the City.
- C. Fire Hydrants:
 - 1. Salvage for future use by City.
 - 2. Remove and leave for City in location directed by the City.

- END OF SECTION -

SECTION 02222

EXCAVATION AND BACKFILL FOR UTILITIES

PART 1 - GENERAL

1.01 THE REQUIREMENT

- A. Excavate, grade and backfill as required for underground piping systems and appurtenances as shown on the Drawings and specified herein.
- B. All excavation for the project is unclassified.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Division 15
- B. Division 16
- C. Division 2, Specification Section entitled "02200 Site Preparation" and "02300 Earthworks"

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Codes: All codes, as referenced herein, are specified in Section 01090, "Reference Standards".
- B. Commercial Standards:

ASTM D 422	Standard Test Method for Particle-Size Analysis of Soils.
ASTM D 698	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort.
ASTM D 1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
ASTM D 1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort.
ASTM D 2419	Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
ASTM D6938	Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

1.04 SUBMITTALS

- A. General: Submit information and samples to the Engineer for review as specified herein in accordance with the Section entitled "01300 Submittals".

- B. Dewatering: The Contractor shall submit to the Engineer its proposed methods of handling trench water and the locations at which the water will be disposed of. Methods shall be acceptable to the Engineer before starting the excavation.
- C. Bedding and Backfill Materials: The Contractor shall notify the Engineer of the off-site sources of bedding and backfill materials.
 - 1. Submit to the Engineer a representative sample weighing approximately 25 lbs. The sample shall be delivered to a location at the work site determined by the Engineer.
 - 2. The Contractor shall notify the Engineer in writing of the sources of each material at least ten calendar days prior to the anticipated use of the materials.
- D. Sheeting System: Sheeting submittal shall be per 02262 Steel Sheet Piling.
- E. Dewatering Permits: If the quantity or nature of water withdrawn requires approval/permits from regulatory agencies, the Contractor shall procure such permits at its expense and submit copies to the Engineer before commencing the work.

1.05 QUALITY CONTROL

- A. An independent testing laboratory will be retained by the City to do appropriate testing as described in the Section entitled "Quality Control". The Contractor shall schedule its work so as to permit a reasonable time for testing before placing succeeding lifts and shall keep the laboratory informed of his progress. A minimum of 48 hours of notice shall be provided to the testing laboratory to mobilize its activities.
- B. Field Density Testing Frequency for Pipeline Backfill: Refer to specification section entitled "02300 Earthworks".

1.06 SUBSURFACE INFORMATION

- A. A separate geotechnical report found in Appendix A is provided for information purposes with the Contract Documents. The report identifies properties below grade and also offers recommendations for foundation design, primarily for use of the Engineer. The recommendations shall not be construed as requirements of the Contract.
- B. The City and the Engineer will not assume responsibility for variations of sub-soil quality or conditions at locations other than places shown and at the time the geotechnical investigation was made. The Contractor shall examine the site and review the available geotechnical report or undertake its own subsurface investigation prior to submitting its bid, taking into consideration all conditions that may affect its work.

1.07 GROUNDWATER

- A. The Contractor shall be responsible for anticipating groundwater conditions and shall provide positive control measures as required. Such measures shall ensure stability of excavations, groundwater pressure control, prevention of tanks, pipes, and other

structures from being lifted by hydrostatic pressures, and avoiding the disturbance of subgrade bearing materials.

- B. The Contractor shall be responsible for obtaining all permits required for dewatering operations.

1.08 TRENCH SAFETY ACT COMPLIANCE

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

1.09 PROTECTION OF PROPERTY AND STRUCTURES

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

PART 2 - PRODUCTS

2.01 MATERIALS

- A. General: Materials shall be furnished as required from on-site excavations or from acceptable off-site sources as required. The Contractor shall notify the Engineer in writing of the sources of each material at least ten calendar days prior to the anticipated use of the materials.

2.02 BEDDING

- A. Pipe Bedding: In general, clean sandy materials excavated from the utility trench, that is free from organics, clay and construction debris, can be used as pipe bedding when construction is in a dry condition and when the bedding is not sided by muck. Pipe bedding material shall be able to pass through a 3/4-inch sieve. Separation of suitable material for pipe bedding from other material shall be made during the excavation.
- B. Sand shall be used for all copper and other service lines.
- C. In the case of a “dry” installation, sand shall be used for PVC and ductile iron pipe where the bottom of the trench is located in the limestone zone.
- D. In the case of a “wet” installation, pearock shall be used for PVC and ductile iron pipe where the bottom of the trench is located in the limestone zone.
- E. Precast concrete items shall use crushed stone.

2.03 PEAROCK

- A. Pearock shall consist of hard, durable particles of proper size and gradation, and shall be free from organic material, wood, trash, sand, loam, clay, excess fines, and other deleterious materials. Refer to specification section entitled “02300 Earthwork” for size and gradation conformance requirements.

2.04 CRUSHED STONE (3/4-INCH ROCK)

- A. Crushed stone shall consist of hard, durable, subangular particles of proper size and gradation, and shall be free from organic material, wood, trash, sand, loam, clay, excess fines, and other deleterious materials. Refer to specification section entitled “02300 Earthwork” for size and gradation conformance requirements.

2.05 SAND

- A. Sand shall be used for bedding polyvinyl chloride, fiberglass, HDPE and other plastic pipe when installed under dry trench conditions. Refer to specification section entitled “02300 Earthwork” for size and gradation conformance requirements.

2.06 SELECT BACKFILL

- A. Select Backfill: It is the intent of these specifications to obtain clean sandy material passing through a 3/4-inch sieve as select backfill material for utility and structural applications.

- B. At locations where subsurface preparations for structures have been performed under this or other previous construction contracts, clean excavated material (structural fill) may be used as select backfill. Any excess fill shall be disposed of off-site by the Contractor.

2.07 GENERAL BACKFILL

- A. General backfill (for grading applications) shall be placed above the select backfill. General backfill shall be clean granular soil, free of organics or other deleterious material. Refer to specification section entitled "02300 Earthwork" for size and gradation conformance requirements.
- B. General backfill used under roadways shall be compatible with the materials and compaction specified under the Sections entitled "02772 Asphalt Pavement" and "02771 Concrete Curb and Sidewalk".

PART 3 - EXECUTION

3.01 EXCAVATION

- A. The Contractor shall perform all excavation of every description and of whatever substance encountered, to the dimensions, grades and depths shown on the Drawings, or as directed. For projects within the right-of-way, unless shown otherwise on the Drawings, all excavations shall be made by open cut, except for service connections to houses located across the road from the watermain, where directional boring shall be used. All existing utilities such as pipes, poles and structures shall be carefully located, supported and protected from injury; in case of damage, they shall be restored at the Contractor's expense.
- B. TRENCH WIDTH
 - 1. Minimum Width of Trenches:
 - 2. Single Pipes, Conduits, Direct-Buried Cables, and Duct Banks:
 - a. Less than 4-Inch Outside Diameter or Width: 18 inches.
 - b. Greater than 4-Inch Outside Diameter or Width: 18 inches greater than outside diameter or width of pipe, conduit, direct-buried cable, or duct bank.
 - 3. Multiple Pipes, Conduits, Cables, or Duct Banks in Single Trench: 18 inches greater than aggregate width of pipes, conduits, cables, duct banks, plus space between.
 - 4. Increase trench widths by thicknesses of sheeting, if used.
 - a. The maximum trench width shall not exceed the minimum stated width of the trench unless approved by the Engineer. Restoration for excavation beyond the minimum required width shall be at the Contractor's sole expense

5. The Contractor shall be responsible to design, provide, and maintain shoring, sheeting, and bracing per 02262 Steel Sheet Piling as necessary to support the sides of excavations and to prevent detrimental settlement and lateral movement of existing facilities, adjacent property, and completed Work.
 6. Consider all available geotechnical information available when designing the excavation support system.
 7. Remove excavation support in a manner that will maintain support as excavation is backfilled.
 8. Do not begin to remove excavation support until support can be removed without damage to existing facilities, completed Work, or adjacent property.
 9. Remove excavation support in a manner that does not leave voids in the backfill.
 10. For trench excavation exceeding 5 feet in depth, provide adequate safety system meeting requirements of the Occupational Safety and Health Administration's (OSHA), Trench Safety Standards, 29 C.F.R., S.1926.650, Subpart P, and all subsequent revisions or updates adopted by the Department of Labor and Employment Security.
- C. In areas where trench widths are not limited by right-of-way and/or easement widths, property line restrictions, existing adjacent improvements, including pavements, structures and other utilities, and maintenance of traffic, the trench sides may be sloped to a stable angle of repose of the excavated material but only from a point one foot above the crown of the pipe. A substantially and safely constructed movable shield, "box" or "mule" may be used in place of sheeting when the trench is opened immediately ahead of the shield and closed immediately behind the shield as pipe laying proceeds inside the shield.
- D. Ladders or steps shall be provided for and used by Workmen to enter and leave trenches, in accordance with OSHA requirements.
- E. Excavation for appurtenances shall be sufficient to provide a clearance between their outer surfaces and the face of the excavation or sheeting, if used, of not less than 12 inches.
- F. Excavated unsuitable material shall be removed from the site and disposed of by the Contractor. Materials removed from the trenches shall be stored and in such a manner that will not interfere unduly with any on-site operations, traffic on public roadways and sidewalks and shall not be placed on private property. In congested areas, such materials as cannot be stored adjacent to the trench or used immediately as backfill shall be removed to other convenient places of storage acceptable to the City at the Contractor's expense.
- G. Excavated material that is suitable for use as backfill shall be used in areas where sufficient material is not available from the excavation. Suitable material in excess of backfill requirements shall be either used on the site as directed by the Engineer or disposed of the Contractor.
- H. Barriers shall be placed at excavations in accordance with OSHA requirements.

3.02 REMOVAL OF WATER

- A. General: It is a basic requirement of these Specifications unless otherwise authorized per Article 3.10 that excavations shall be free from water before pipe or structures are installed.
- B. The Contractor shall provide pumps, and other appurtenant equipment necessary to remove and maintain water at such a level as to permit construction in a dry condition. The Contractor shall continue dewatering operations until backfilling has progressed to a sufficient depth over the pipe to prevent flotation or movement of the pipe in the trench or so that it is above the water table. If at any point during the dewatering operation it is determined that fine material is being removed from the excavation sidewalls, the dewatering operation shall be stopped. If any of the subgrade or underlying material is disturbed by movement of groundwater, surface water, or any other reason, it shall be replaced at the Contractor's expense with crushed stone or gravel.
- C. The Contractor shall use dewatering systems that include automatic starting devices, and standby pumps that will ensure continuous dewatering in the event of an outage of one or more pumps.
- D. Disposal: Water from the trenches and excavation shall be disposed of in such a manner as will not cause injury to public health, to public or private property, to the Work completed or in progress, to the surface of the streets, cause any interference with the use of the same by the public, or cause pollution of any waterway or stream. The Contractor shall submit his proposed methods of handling trench water and locations at which the water will be disposed of to the Engineer for review and shall receive acceptance before starting the excavation. Disposal to any surface water body will require silt screens to prevent any degradation in the water body. The Contractor shall have responsibility for acquiring all necessary permits for disposal.

3.03 TRENCH STABILIZATION

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

3.04 PIPE BEDDING

- A. Pipe trenches shall be excavated as described in specification section entitled "02300 Earthwork". The resulting excavation shall be backfilled with acceptable pipe bedding material, up to the level of the centerline of the proposed pipe barrel. This backfill shall be tamped and compacted to provide a proper bedding for the pipe and shall then be shaped to receive the pipe. Bedding shall be provided under the branch of all fittings to furnish adequate support and bearing under the fitting.

- B. Any over excavation below the levels required for installation of the pipe shall be backfilled with acceptable bedding material, tamped, compacted and shaped to provide proper support for the proposed pipe, at the Contractor's expense.

3.05 BACKFILL

- A. Pipeline trenches shall be backfilled to a level 12 inches above the top of the pipe with select backfill. When placed in the dry, such material shall be placed in 6-inch layers, each compacted to the densities specified in Article 3.07. Only hand operated mechanical compacting equipment shall be used within six inches of the installed pipe.
- B. After the initial portion of backfill has been placed as specified above, and after all excess water has completely drained from the trench, backfilling of the remainder of the trench may proceed. The remainder of the backfill shall be selected material obtained from the excavation and shall be placed in horizontal layers, the depth of which shall not exceed the ability of the compaction equipment employed, and in no event shall exceed a depth of 6 inches. Each layer shall be moistened, tamped, puddled, rolled or compacted to the densities specified in Article 3.07.

3.06 COMPACTION AND DENSITIES

- A. Compaction of backfill shall be per specification section entitled "02300 Earthwork". More thorough compaction may be required when Work is performed in other regulatory agencies jurisdictions, such as the FDOT. Methods of control and testing of backfill construction are described in specification section entitled "02300 Earthwork".
- B. Testing: Laboratory and field density tests, which in the opinion of the Engineer are necessary to establish compliance with the compaction requirements of these Specifications, shall be ordered by the Engineer. The Contractor shall coordinate and cooperate with the testing laboratory. The testing program will be implemented by the Engineer establishing depths and locations of tests. Modifications to the program will be made as job conditions change.
- C. Trench backfill which does not comply with the specified densities, as indicated by such tests, shall be reworked and recompacted until the required compaction is secured, at no additional cost to the City. The costs for retesting such Work shall be paid for by the Contractor.

3.07 ADDITIONAL EXCAVATION AND BACKFILL

- A. Where organic material, such as roots, muck, or other vegetable matter, or other material which, in the opinion of the Engineer, will result in unsatisfactory foundation conditions, is encountered below the level of the proposed pipe bedding material, it shall be removed to a depth of two feet below the outside bottom of the pipe or to a greater depths as directed by the Engineer and removed from the site. Sheet piling shall be installed if necessary to maintain pipe trenches within the limits identified by the Engineer. The resulting excavation shall be backfilled with suitable backfill material, placed in 12-inch layers, tamped and compacted up to the level of the bottom of the proposed pipe bedding material. Sufficient compaction of this material shall be performed to protect the proposed pipe against settlement. Lean concrete may be used in lieu of backfill when pipe installation is in the wet or at the Contractor's option.

Construction shall then proceed in accordance with the provisions of Article 3.05 "Pipe Bedding".

- B. Additional excavation (more than two feet below the pipe) shall be performed when ordered by the Engineer. Where organic or other material is encountered in the excavation, the Contractor shall bring the condition to the attention of the Engineer and obtain his determination as to whether or not the material will require removal, prior to preparing the pipe bedding. The excavation of material up to a depth of two feet below the outside bottom is an incidental item of construction and the Work shall be done at no additional cost to the City. Where ordered by the Engineer, excavation greater than two feet below the pipe and additional backfill will be compensated by the City.

3.08 FINE GRADING

- A. After piping trenches backfilled, the disturbed areas of the site shall be fine graded. Any lumber, undesirable materials and rocks larger than the 3-inch size shall be removed from the surface. The completed surface shall be to the preconstruction elevation unless otherwise directed by the City. Minor adjustments to line and grade may be required as the work progresses in order to satisfy field conditions.

3.09 ALTERNATE METHOD OF CONSTRUCTION

- A. Use of This Method: A combination of conditions in the substrate, water table, or method of disposal may be encountered during the course of the work which makes dewatering impossible, or only possible through the use of unusual methods, the cost of which is excessive. When such conditions are encountered, but only after all reasonable means (pumps, well points, etc.) to dewater the excavation have been employed without success, the Contractor, may request to employ the following Alternate Method of Construction. The concurrence of the Engineer shall be obtained in writing and shall limit the use of the alternate method of construction to such specific portions of the Work as the Engineer shall determine.
- B. The requirements set forth in other sections of these Specifications shall establish the required standards of construction quality for this work. Use of the alternate method of construction described hereinafter shall in no way be construed as relieving the Contractor of the work. No additional payment will be made to the Contractor for excavation, backfill, sheeting or any cost incurred for Work or materials, or any other costs incurred as a result of the use of this alternate method of construction. The prices established in the Proposal shall be for full payment for the various items of work.
- C. Subject to all the requirements stated herein, including written acceptance of the Engineer, construction will be permitted in accordance with the following specifications. All requirements of these Specifications shall apply to this construction unless otherwise specifically modified herein.
- D. Removal of Water: The installation of pipe and appurtenances under water will be permitted and the requirements of Article 3.03 will be waived.
- E. Excavation shall be performed in accordance with Article 3.01.

- F. Pipe Bedding: Pipe bedding shall be placed from 6 inches below the outside bottom of the proposed pipe barrel up to the centerline of the pipe barrel. The bedding material shall be pearock as specified in Article 2.03 "Pearock". Limerock screenings, sand or other fine organic material shall not be used.
- G. The bedding material shall be placed and then be shaped to receive the pipe at the intended elevation. Bedding shall be provided under the branch of all fittings to furnish adequate support and bearing under the fitting.
- H. Backfill: After the pipe is installed, backfilling shall proceed in accordance with the provisions of Article 3.06 "Backfill" and 3.07 "Compaction and Densities". Select backfill material shall be used to backfill around the pipe and to a level one foot above the crown of the pipe. Under no circumstances will material other than select backfill or specified pipe bedding material be considered satisfactory for this purpose.
- I. If the Alternate Method of Construction is used, all backfill material, including specified pipe bedding material, shall be carefully lifted into the trench and not released to fall freely therein until the bucket or container is at or just above water level. Under no circumstances will backfill material be dumped or pushed into the trenches containing water. Below existing water level, the backfill material shall be carefully rammed into place in uniform layers, of equal depth on each side of the pipe, up to the water level. Above the water level, backfill material shall be placed and compacted for normal backfill as previously specified.

3.10 RESTORATION OF EXISTING SURFACES

- A. Restore all grassed areas disturbed by the trenching operations by resodding in accordance with the Section entitled "02920 Sodding" or the Section entitled "02900 Landscaping".
- B. Restore all asphaltic concrete pavement areas disturbed by the trenching operations in accordance with the Section entitled "02772 Asphaltic Concrete Pavement."
- C. Restore all concrete pavement, curbs, and sidewalks disturbed by the trenching operations in accordance with the Section entitled "02771 Concrete Curbs and Sidewalks".

- END OF SECTION

SECTION 02224

EXCAVATION AND BACKFILL FOR STRUCTURES

PART 1 - GENERAL

1.01 THE REQUIREMENT

- A. This Section includes, except as elsewhere provided, excavation, filling and compacting within the limits defined on the Contract Drawings for complete construction of structures for this project.
- B. All excavation for the project is unclassified.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Division 2, Specification Section entitled "02300 Earthwork".
- B. Division 2, Specification Section entitled "02240 Dewatering".

1.03 QUALITY CONTROL

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

1.04 JOB CONDITIONS

A. General

- 1. A separate geotechnical report is provided for information purposes with the Contract Documents. The report identifies properties below grade and also offers recommendations for foundation design, primarily for use of the Engineer. The recommendations shall not be construed as requirements of the Contract unless specifically referenced by the Contract Documents.
- 2. The City and/or the Engineer will not assume responsibility for variations of sub-soil quality or conditions at locations other than places shown and at the time the geotechnical investigation was made. The Contractor shall examine the site and review the available geotechnical report or undertake its own subsurface investigation prior to submitting its bid, taking into consideration all conditions that may affect its work.

B. Existing Utilities

- 1. Locate existing underground utilities in the areas of work. Accurate "As Built" Information describing existing pipelines and underground utilities is not available.

Test pits and hand excavation in critical areas will be required prior to initiating work.

2. All existing utilities including piping, electrical conduits, electric duct banks and telephone cables that are shown on the Contract Drawings to be relocated, shall be relocated prior to initiating earth work. Excavation and backfill for relocation of existing utilities shall conform to the requirements of Section 02222. The Contractor shall coordinate relocation of utilities with utility companies having jurisdiction in the area. Should unknown or incorrectly identified piping or other utilities be encountered during excavation, the Contractor shall consult the City and the Engineer of such piping or utility immediately for directions.
3. The Contractor shall cooperate with the City and utility companies in keeping respective services and facilities in operation.

1.05 PROHIBITION OF BLASTING

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

1.06 SUBMITTALS

- A. The Contractor shall submit information and samples to the Engineer for review as specified herein in accordance with Section 01300. The information shall include:
 1. Detailed description of dewatering method chosen and sequence of dewatering operations.
 2. Plans showing the methods and location of dewatering and discharge. The drawings shall include a sufficient number of detailed sections to clearly illustrate the scope of work. The drawings showing all of the above information, including calculations, shall be prepared by a qualified Professional Engineer registered in the state of Florida, and shall bear its seal and signature. If required by regulatory agencies, a copy of the dewatering permit shall be submitted.
 3. Lists of materials and equipment to be used. Detailed description of the method(s) of excavation, fill and compaction to be used.
 4. Plans of open cut excavations showing side slopes and limits of the excavation at grade where not shown on the Contract Drawings.
 5. Design computation of sheeting system. Sheeting and shoring plans shall be designed and sealed by a Professional Engineer registered in the State of Florida. Submittals shall indicate depth of penetration.
 6. The Contractor shall furnish the Engineer, for approval, a representative sample of structural fill material from off-site sources at least ten calendar days prior to the date of anticipated use of such material. The sample shall be delivered to the site at a location determined by the Engineer. The submittal shall identify the source of the material.

1.07 PROTECTION OF PROPERTY AND STRUCTURES

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

PART 2 - PRODUCTS

2.01 GENERAL

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

2.02 STRUCTURAL FILL

- A. Fill material shall be noncohesive, nonplastic, granular mixture of local clean sand or local clean sand and limerock free from vegetation, organic material, muck or deleterious matter per specification section entitled "02300 earthwork". Broken Portland cement or asphaltic concrete shall not be considered an acceptable fill material. Fill material containing limerock shall have sufficient sand to fill the voids in the limerock. All structural fill materials shall be obtained from off-site sources.

2.03 CRUSHED LIMESTONE

- A. Crushed limestone placed below foundation slabs shall be hard, durable, subangular particles of proper size and gradation, and shall be free from organic materials, wood, trash, sand, loam, chalk, excess fines and other deleterious materials. Refer to specification section entitled "02300 earthwork" for additional information.

2.04 OTHER MATERIALS

- A. Requirements for any other fill material, if needed, are defined in the Drawings and under specification section entitled "Site Work".

PART 3 - EXECUTION

3.01 CONTRACTOR INSPECTIONS

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

3.02 EXCAVATION FOR STRUCTURES

- A. Unless otherwise indicated on the Drawings, all excavation shall be made in such a manner, and to such widths, as will give ample room for properly constructing and inspecting the structures they are to contain. Excavation shall be made in accordance with the details shown on the Drawings, and as specified herein. Attention shall be given to the proper handling of storm water runoff. The Contractor shall intercept and collect surface run off both at the top and bottom of cut slopes. The excavating equipment shall operate in an organized fashion so as to remove silt from one edge of the excavation to the other so as not to trap silt within the undercut area.
- B. Where required on the Drawings, unsuitable material (silt layer) beneath the groundwater encountered at the site shall be removed using a drag line or hydraulic excavator, as approved by the Engineer. The equipment shall operate in an organized manner so as to remove silt from one edge of the excavation to the other so as not to trap silt within the undercut area. Unsuitable material shall be hauled to and stockpiled temporarily by the Contractor at the "Temporary Muck Storage" location defined on the Drawings. Once drained, and during "dry" weather as determined by the Engineer in the field, the Contractor shall remove and dispose of it off-site. The Contractor shall be responsible for managing and maintaining the temporary muck storage area and shall ensure impact of this area, including providing dust control, runoff control, etc. is minimized. Also, the Contractor shall clean all roadways impacted by his demucking, hauling, temporary stockpiling and removal operations at a frequency as determined by the Engineer in the field.
- C. In excavating for footings, structures, and foundations, the Contractor shall take care not to disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive concrete.
- D. The Contractor shall ensure that its excavation work does not adversely affect the bearing capacity of the structural subsurface. Also, the Contractor shall proceed with foundation work immediately after excavation work and as expeditiously as possible so as to minimize any potential for subsurface disturbance due to environmental factors, adverse weather, etc. The Contractor shall also take all necessary precautions to protect its work from potential adverse impacts. Where excavated areas are disturbed by subsequent operations or adverse weather, scarify surface reshape, fill as required and compact to required density.

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

3.03 UNAUTHORIZED EXCAVATION

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

3.04 SHEETING AND BRACING

- A. The term "sheeting" shall represent any type of shoring used to support sides of the excavation. Walls of the excavation shall be kept vertical where open cut is not practical and, if required to protect the safety of workmen, the general public, this or other work or structure, or excavation walls, the excavation shall be properly sheeted and braced for conditions encountered and OSHA requirements. Excavation for the structures shall be sufficient to provide a clearance between their outer surfaces and the face of the excavation, sheeting, or bracing, of not less than two feet, unless otherwise indicated on the Drawings. Materials encountered in the excavation, which have a tendency to slough or flow into the excavation, undermine the bank, weaken the overlying strata, or are otherwise rendered unstable by the excavation operation shall be retained by sheeting, stabilization, grouting or other acceptable methods.
- B. Minimum length of embedment below the deepest part of the excavation shall be 0.3 times the depth of excavation being supported or greater depending on the sheeting. The design of the sheeting arrangement shall be the responsibility of the Contractor.
- C. Sheetting shall be removed provided its removal will not jeopardize pipes or structures. Any sheeting left in place shall be cut-off two feet below finished grade, or as directed. The Contractor will not receive extra compensation for sheeting left in place or the cut off work required.
- D. Contractor shall follow 02262 Steel Sheet Piling.

3.05 REMOVAL OF WATER

- A. General
 - 1. Contractor shall control water on site per 02240 Dewatering.
 - 2. The Contractor shall provide pumps, well points, and other appurtenant equipment necessary to remove and maintain water at such a level as to permit construction in the dry where defined on the Drawings. The ground water level shall be controlled so as to permit the placing and curing of concrete and the

maintenance of supporting foundations and adjacent work and structures in the dry.

3. The Contractor shall use dewatering systems that include automatic starting devices, and standby pumps that will ensure continuous dewatering in the event of an outage of one or more pumps.
 4. If excavations to be dewatered cannot be maintained dry by the Contractor's dewatering efforts, then the Contractor shall provide tremie seals at no additional cost to the City. The placement of tremie seals shall not preclude dewatering operations specified herein. The limits of tremie seals shall be recommended by the Contractor and reviewed and accepted by the Engineer.
- B. Disposal: The Contractor shall be responsible to dispose of water from the dewatering operation in accordance with the Contract Documents and shall obtain all necessary permits and conform to all local regulations and codes section 02240 Dewatering and 02225 Contaminated Soils And Groundwater. Water from the excavation shall be disposed of in such a manner as will not cause injury to public health, to public or private property, to the work completed or in progress, to the surface of the streets, will not cause any interference with the use of the same by the public, or will not cause pollution of any waterway or stream. Water from dewatering operation may be disposed at locations directed by the City with the proper installation of siltation screens and operation of the dewatering system in accordance with all local regulations and codes. The Contractor shall submit its dewatering method and point(s) of discharge to the Engineer for review at least twenty (20) days prior to any dewatering activities. The Contractor shall provide maintenance of canal(s) and drainage ditches to which it discharges. The cost of maintaining drainage ditches and canal(s) shall be included in the bid price. The Contractor shall remove siltation and haul, and dispose of this material on a regular basis to maintain the original base conditions at all time, so as not to impact drainage in the general area.

3.06 FILL PLACEMENT AND COMPACTION

A. General

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

3. Fill materials placed following this initial lift shall be placed in the dry with loose lift thickness of eight inches or less. Refer to specification section entitled "Site Work" for additional information. Fill materials shall be placed within two percent of optimum moisture content.
- B. Inspection and Testing: The fill placement and compaction shall be observed by the Engineer. Refer to specification section entitled "02300 Earthwork" for in-place density testing requirements. The Contractor shall coordinate and cooperate with the testing laboratory.
- C. Final Grades: Final structure fill grades shall be within 0.1 feet of elevations shown. Where shown on the Drawings, surfaces shall be sloped for drainage or other surfaces.
- D. Refer to the Drawings for additional fill and compaction requirements for specific locations/areas of work.

3.07 BACKFILL AGAINST STRUCTURES

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

- END OF SECTION -

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SECTION 02225

CONTAMINATED SOILS AND GROUNDWATER

PART 1 - GENERAL

1.01 THE REQUIREMENT

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

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02222 – Excavation and Backfill for Utilities
- B. Section 02224 – Excavation and Backfill for Structures
- C. Section 02240 – Dewatering

1.03 QUALITY CONTROL

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

1.04 SUBMITTALS

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

4. Copies of all laboratory analyses required for transportation and disposal of all contaminated soils and groundwater in full compliance with local, state and federal requirements.
5. Names, addresses, and contact numbers of all subcontractors.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

3.01 CONTAMINATED SOILS

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

3.02 CONTAMINATED GROUNDWATER

- A. All water generated, pumped or removed from excavations as a result of excavation dewatering activities shall be collected, containerized, and managed prior to discharge

and/or treatment at an approved discharge point in accordance with local, state and federal regulations and the requirements of the Contract Documents. If groundwater contamination is identified at any time during the performance of the Work, Contractor shall immediately notify the City.

- B. If contaminated groundwater in the dewatering excavation area is encountered, the contaminated groundwater shall be removed, treated and discharged by the Contractor in accordance with all applicable regulatory requirements. Payment for this work shall be in accordance with the allowance bid item for treatment and discharge of contaminated groundwater, included in the Schedule of Prices Bid.
- C. Treatment of contaminated groundwater will include the following options, depending on the magnitude of the contamination in the trench: Granular Activated Carbon (GAC) Treatment vessels, mobile air stripping units, vacuum truck removal and disposal or other method as approved by the City and regulatory agencies with jurisdiction.
- D. If contaminated groundwater is encountered during construction, Contractor shall provide reference information for the qualified groundwater remediation subcontractor to be utilized, including phone number, contact name, and address. The selected groundwater treatment/recycling facility for hauling contaminated groundwater shall also be identified.
- E. Effluent water from the treatment system will be analyzed by the certified laboratory to confirm that concentrations are below regulatory limits. Effluent water will then be directed to a pre-approved location as determined by local regulatory agencies and/or the City.

3.03 TRANSPORT AND DISPOSAL

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

3.04 WASTE CONTAINERS

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

3.05 SHIPPING RECORDS

- A. The Contractor shall prepare accurate shipping records for any wastes leaving the site in accordance with applicable federal and state regulations. The Contractor shall be responsible for providing copies of the records to the City and shall immediately notify the City of any problems in completing shipments and disposal of wastes.
- B. The Contractor shall:
 - 1. Be responsible for appropriate measurement of unit quantity (weight or volume) of waste material removed from the site.
 - 2. Coordinate vehicle inspection and recording of quantities leaving the site with the City. These quantities shall be compared to recorded quantities received at the treatment or disposal facilities. The Contractor shall resolve any discrepancies occurring immediately, determining the probable cause for the discrepancy.
 - 3. Be solely responsible for any and all actions necessary to remedy situations involving waste spiked in transit.
- C. The Contractor shall ensure that a copy of the manifest is returned to the City by the designated treatment or disposal facility within 14 days of receipt of the material to be disposed.

- END OF SECTION -

SECTION 02240

DEWATERING

PART 1 - GENERAL

(NOT USED)

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

3.01 GENERAL

- A. The Contractor shall be responsible for design, installation, and operation of a dewatering system to dewater specified excavations.
 - 1. The dewatering system shall be designed in accordance with the Best Management Practices (BMP's) adopted by FDEP.
 - 2. Inspection and control of dewatering system operations will be in accordance with the FDEP guidelines established in the Florida Erosion and Sediment Control Inspector's Manual (current edition).
- B. Continuously manage and control excavation water recharge in order to facilitate and not impede construction activities at all times, including weekends, holidays, and during periods of work stoppages, and furnish and install, and operate, a contingency backup dewatering system to maintain control of excavation water levels to facilitate construction (i.e.; no construction delays).
- C. The Contractor shall procure dewatering permit at its expense and submit copies to the Engineer before commencing the work.

3.02 SUBMITTALS

- A. Submittals shall be made in accordance with the requirements specified in Contract Documents and the requirements of this Section.
- B. Provide name, address, and phone numbers of all subcontractors.
- C. The Contractor shall submit a Dewatering Best Management Practices (BMP) Plan prior to the start of excavation expected to include dewatering operations. The Plan shall provide detailed descriptions of dewatering procedures to be utilized to meet the requirements of this Section. Methodologies to control dewatering discharge contamination include, but are not limited to:
 - 1. Holding tanks of adequate size and volume.

2. Wellpoint systems.
 3. Sump pumping systems.
 4. Chemical precipitation of particulates.
 5. Filter systems and siltation controls.
 6. Outfall booms.
- D. The Contractor shall provide a Site Health and Safety Plan and Activity Hazard Analysis (AHA) for contaminated soil as specified in the Contract Documents and/or groundwater as specified in this Section, to include the following:
1. A written description of the proposed method for temporary stockpiling, transportation, and disposal of all wastes.
 2. Copy of permits of disposal facilities.
 3. Certification of disposal of all wastes.
 4. Directions to the nearest hospital and phone number.
 5. Emergency contact phone numbers.
 6. Laboratory analyses and sampling plan required for transportation and disposal of all wastes in accordance with applicable federal, state, and local requirements.
- E. Upon Completion of Remediation Activities, the following shall be provided:
1. Copy of manifests for all wastes leaving the site.
 2. Copy of the laboratory analyses results from all sampling activities.
 3. Copy of closure reports that may be required.

3.03 SURFACE WATER CONTROL

- A. Remove surface runoff controls when no longer needed.
- B. Seal off or berm catch basins in the area of construction to prevent discharge of untreated dewatering effluent or runoff from unstabilized construction areas into storm drains.
- C. All drain inlets or catch basins used for dewatering discharge shall be provided with silt and sediment removal barriers as approved by the Engineer.
 1. All barriers shall be cleaned regularly to avoid sediment discharge into the storm drain system.
 2. Construction activities will be stopped at no cost to the City until sediment controls are properly maintained, installed, and in compliance with the dewatering permit.
 3. All barriers shall be removed upon issuance of a hurricane warning.

3.04 DEWATERING SYSTEMS

- A. Design, furnish, and install, operate, and maintain a dewatering system of sufficient size and capacity to permit excavation and subsequent construction activities in water-free conditions, and to lower and maintain the excavation area groundwater level a minimum of 2 feet below the lowest point of excavation. The dewatering system shall be designed and operated such that the system continuously maintains excavations water levels so as to maintain the excavation water level in order to allow for the initiation and completion of excavation backfill compaction and restoration activities.
- B. Dewatering systems shall include, but is not limited to, furnishing and installing wells or well points, and or other equipment and appurtenances as may be necessary, including system components or equipment, installed outside the outermost perimeter of the excavation limits, and sufficiently below lowest point of excavation, to maintain the specified or required groundwater elevation.
- C. Open trench pumping maybe permitted upon the approval of the Engineer.
- D. Design and Operate Dewatering Systems:
 - 1. To prevent loss of ground as water is removed.
 - 2. To avoid inducing settlement or damage to existing facilities, completed Work, or adjacent property.
 - 3. Avoid surface water pollution or discharge of sediment to storm drain systems or waterways.
- E. Provide supplemental ditches and sumps only as necessary to collect water from local seeps. Do not use ditches and sumps as primary means of dewatering. The Contractor shall not direct any flow of water over pavement surfaces. Discharge of water shall be conducted as approved by the local, state, and federal agencies and the Engineer.
- F. Provide controls to prevent surface water from entering excavation pits, trenches, or stockpiled materials.

3.05 PIPELINES CONSTRUCTED UNDER WATER

- A. In the event that it is found that the water in a trench cannot be lowered by ordinary means, i.e., well points and pumps, an alternate construction method may be proposed by the Contractor. Complete details, specifications, manufacturer's descriptive literature, installation lists and any other pertinent data regarding the proposed alternate method shall be submitted as an alternate by the Contractor to the City within 5 calendar days of the time that the Contractor anticipates using such alternate method.
- B. If the City approves the alternate method in writing, it may be used, so long as the Work is performed in a manner which, in the opinion of the Engineer, conforms to the method and procedure as set forth in the information supplied by the Contractor in his original application for use of an alternate method. The City may revoke approval of the alternate method if at any time, in his opinion, the Work is not conforming to any applicable portion of these Specifications.

- C. No pipeline shall be laid under water without approval of the City.
- D. If the dewatering system is eliminated or the effort reduced, and the pipe is laid underwater, additional pipe zone material will be required as backfill to the water table elevation, or to the level it was reduced to.

3.06 DISPOSAL OF WATER

- A. All water generated, pumped, or removed from excavations as a result of excavation dewatering activities shall be collected, containerized, and managed prior to discharge and or treatment at an approved discharge point or facility, in accordance with Broward County Code of Regulation, Sections 27. Contractor shall secure, obtain, and pay for all necessary local, state, and federal permits, licenses, fees, and or approvals to discharge water or perform onsite or offsite treatment and disposal. Treat water collected by dewatering operations as required by regulatory agencies, prior to discharge.
- B. Discharge water as permitted, and in regulatory compliance with Contractor obtained discharge permits/licenses.
 - 1. All discharge activities shall be performed so as to prevent silt and sediment discharge and eliminate any soil erosion or flooding, or otherwise damage existing facilities, completed Work, or adjacent property.
 - 2. Maximum allowable turbidity of discharges to surface waters or storm drains will be 10 NTU's or the maximum permitted by the agency having jurisdiction, whichever is less.
 - 3. Sump discharges cannot be discharged directly to storm drains or surface waters without treatment.
- C. Affected storm sewer outfalls shall be protected with floating silt booms as approved by the Broward County Department of Environmental Protection and Growth Management Division (BCEPGMD) and the Engineer. All accumulated debris resulting from the dewatering discharge collecting in the boom shall be removed on a daily basis.
- D. Visible silt plumes emanating from the area around the outfalls will be considered a failure of the silt and sediment removal measures and may result in a Notice of Violation issued by BCEPGMD. The Contractor will be responsible for all fines associated with the violation of the dewatering permit conditions issued to the Contractor.
- E. Failure to control dewatering discharges as described above and as detailed in the Florida Erosion and Sediment Control Inspector's Manual, may result in an order to cease dewatering operations until the discharge problems are corrected. No claims will be accepted for costs or delays associated with unacceptable dewatering discharge practices.

3.07 WELL POINT REMOVAL

- A. Well point holes shall be filled with sand which shall be washed into the hole.

- B. Well point holes located within asphalt pavement surfaces or concrete pavements, shall be filled with sand to the subgrade. The remaining hole shall be filled with nonshrink grout.

3.08 CONTAMINATED GROUNDWATER AND DISPOSAL REQUIREMENTS

- A. If Contractor suspects, witnesses, or identifies, groundwater contamination at any time during the performance of the Work, Contractor shall notify the City immediately. Results will be obtained by the onsite mobile laboratory.
- B. If analytical testing documents and indicates elevated concentrations above FDEP action levels (Chapter 62-777, Florida Administrative Code) dewatering operations will be suspended until appropriate treatment and or construction measures can be implemented. Contractor shall not resume operations until notified to do so in writing by the City and construction of the remaining pipelines in that area will be installed in the wet or normal construction activities shall be resumed in another areas determined by the Engineer. There shall be no delay or mobilization claim associated with moving to another project area, unless all other Work has been completed. In addition, the local agency will be immediately notified via telephone and in writing by the Contractor. Dewatering activities in the area will not proceed until review of the matter with the local agency is resolved and written authorization is issued.
- C. The Contractor shall submit a dewatering plan to the City for review. The Contractor is advised that the SFWMD, BCEPGMD, etc. May require that a dewatering plan, prepared by a state of Florida licensed Professional Engineer or registered professional geologist, be submitted and approved prior to issuance of a dewatering permit. The Contractor will retain a state of Florida licensed Professional Engineer or registered Professional Geologist to provide an initial report of potential dewatering issues in the site vicinity. The Contractor shall retain a state of Florida licensed Professional Engineer or registered geologist to provide any additional services required by regulatory agencies regarding dewatering and contaminated sites.
- D. The Contractor is advised that the BCEPGMD may have identified contaminated sites within ¼ mile radius of the project site. The Contractor may be required to provide testing and monitoring of the dewatering operations, and to institute dewatering methods and controls, as required by BCEPGMD, SFWMD, etc. The contractor will be responsible for all costs associated with means and methods of dewatering which will be set forth by dewatering permits.
- E. Treatment of the groundwater will include three options depending on the magnitude of the contamination in the trench or as determined by the Engineer: Granular Activated Carbon (GAC) Treatment Vessels, Mobile Air Stripping Units, or Vacuum Truck Removal and Disposal or other method as approved by the Engineer. The Contractor will provide a submittal list of all qualified groundwater remediation subcontractors for GAC vessel treatment/portable air stripping unit and vacuum truck disposal including phone numbers, contact names, and addresses prior to start of construction. The selected groundwater treatment/recycling facility for hauling contaminated groundwater shall also be identified.
- F. If contaminated groundwater in the dewatering trench is encountered, the remediation operations will begin once local agency approval is obtained. Contaminated water will

be disposed first into a high volume holding (FRAC) tank and then treated through a GAC unit/portable air stripper or recovered into vacuum hauling trucks for disposal.

- G. Effluent water from the treatment system will be analyzed by the onsite mobile laboratory to confirm that concentrations are below regulatory limits. Effluent water will then be directed to a pre-approved alternative location as determined by local agency and/or the Engineer.

- END OF SECTION -

SECTION 02262
STEEL SHEET PILING

PART 1 - GENERAL

1.01 SCOPE:

- A. Summary of Work: The Contractor shall furnish all labor, materials, and equipment necessary to install all temporary and permanent sheet piling, including wales, tie rods, and bolts, for the structure as indicated on the Drawings and specified herein. The Contractor shall note the potential presence of limestone at this site, which may impede drivability in certain locations.
- B. Contractor shall consider the possibility of encountering hard rock materials during sheet piling installation. No additional payment will be made for installation of sheet piling through hard rock materials.
- C. Related Work Specified Elsewhere:
 - 1. SECTION 01300 – Submittals
 - 2. SECTION 09900 – Painting
 - 3. SECTION 02222 – Excavations and Backfill For Utilities
 - 4. SECTION 02224 – Excavations and Backfill For Structures
 - 5. SECTION 02240 – Dewatering
 - 6. SECTION 02314 – Vibration and Noise Monitoring

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

- A. Standards or Codes: The edition of the publications of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. See the various paragraphs for the specified standard. In the case of a conflict between the requirements of this Section and those of the listed document, the requirements of this Section shall prevail.
 - 1. American Society for Testing and Materials (ASTM):
 - a. A36 - Standard Specification for Carbon Structural Steel
 - b. A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi (kips per square inch) Minimum Tensile Strength
 - c. A328 - Standard Specification for Steel Sheet Piling
 - d. A563 - Standard Specification for Carbon and Alloy Steel Nuts

- e. A572 - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel
 - f. A668 - Standard Specification for Steel Forgings, Carbon and Alloy, for General Industrial Use
2. American Welding Society (AWS):
- a. AWS D1.1 - Structural Welding Code - Steel

1.03 DEFINITIONS: (NOT APPLICABLE)

1.04 SUBMITTALS:

- A. The Contractor shall make submittals for steel sheet piling in accordance with Section 01300 and the following provisions. The Contractor shall be responsible for coordination of materials, equipment, and installation regardless if the submittals are made together or separately.
- 1. Sheeting type, layout, pipe penetrations, connection details, special corner piles (for turns) and elevations.
 - 2. Overhead obstructions such as powerlines shall be clearly indicated and clearance from such obstructions shall be followed per local regulations.
 - 3. Coating for piles per Specification 09900 – Painting.
 - 4. Driving guide, falsework, sequence of constriction, driving equipment including pile hammer, power plant, leads, and cushion material and helmet.
 - 5. For Temporary Sheet Piles:
 - a. The Contractor shall submit the temporary steel sheet pile design signed and sealed by a Professional Engineer registered in the State of Florida.
 - b. Submit fabrication and erection drawings for temporary piling, wales, tie rods, and accessories prior to installation signed and sealed by a Professional Engineer registered in the State of Florida.
 - 6. For Permanent Sheet Piles:
 - a. Materials submission as identified in Part 2 of this Section.
 - b. Pile driving installation plan, including driving method and plan layout drawing of sheet pile.
 - 1) Steel mill reports, certifying the ASTM designation of the material.
 - 2) Connection details and dimensions of the wales and struts to be installed under this Contract, if applicable.
 - c. Predrilling or pre-punching plan and details, in case hard limestone impedes drivability.

- d. Details of sheet pile connections required for turns in wall.
 - e. Vibration monitoring plan for adjacent structures.
 - f. Submit certification that surface preparation and protective coatings have been applied in conformance with specifications.
7. For Temporary and Permanent Sheet Piles:
- a. Make and model of pile-driving hammer.
 - b. Weight of capblock assembly, cushion dimensions, type of cushion material, and cushion stiffness.
- B. During pile driving, the Contractor shall submit records to the Owner each day including the following for each temporary and permanent sheet pile:
1. Name of structure and pile number
 2. Predrilling or pre-punching if necessary
 3. Driven pile length
 4. Pile length after cut off
 5. Pile cut off and tip elevations
 6. Ground surface elevation during driving
 7. Final driving resistance and pressure gauge readings or hammer stroke
 8. Date and time of day pile is driven
 9. Heaving or re-driving data
 10. Remarks concerning pile-driving operations

1.05 QUALIFICATIONS:

A. Experience Requirement:

1. The Contractor shall have a minimum of five (5) years' experience installing steel sheet piles.
2. Unless otherwise indicated, all workmanship and practices shall be in accordance with ASTM A328. Welding shall conform to AWS D1.1 Structural Welding Code.

1.06 RESPONSIBILITIES:

- A. The Contractor shall be responsible for layout of the piles to the location shown on the Drawings. The Contractor shall establish monitoring devices and benchmarks as required to complete the Work. The Contractor shall mark each pile along its entire length at one (1) foot intervals and along at least the last foot of driving at one (1) inch increments, so as to permit determination of the pile tip elevation and corresponding driving resistances during driving.

1.07 CERTIFICATIONS AND TESTING: NOT USED

1.08 INSPECTION COORDINATION:

- A. The Contractor shall provide access to the Work for the Owner as requested for

inspection. The Contractor shall provide at least 48-hour advance notice of its intention to begin new Work activities.

1.09 WARRANTY:

- A. The Manufacturer shall warrant the equipment, materials and products specified in this Section against defective materials and workmanship with the Manufacturer's standard warranty, but for no less than one (1) year from the date of Substantial Completion.
- B. The Contractor shall warrant the Work against defects for one (1) year from the date of Substantial Completion.

PART 2 - PRODUCTS

2.01 DRIVEN STEEL SHEET PILES:

- A. The Contractor shall provide Steel Sheet Pile in accordance with the following:
 - 1. Sheet piles shall be the size and make as shown on Drawings or approved equal.
 - 2. Permanent steel sheet piles shall be manufactured of hot-rolled or cold-rolled steel conforming to ASTM A572 Grade 50.
 - 3. Sheet piles shall not have a camber or sweep in excess of the permitted mill tolerance.
 - 4. Store on platforms, skids or other supports at the site and support to prevent excessive deflection.
 - 5. Sheet pile points shall be reinforced with protector as manufactured by Associated Pile and Fitting Corporation or Owner approved equal. Points shall be welded to the piles in accordance with the Manufacturer's recommendations and conforming to ASW D1.1.
- B. The Contractor shall drive steel sheet piles to the specified elevation.
- C. The Contractor shall provide equipment for driving steel sheet piles as required to complete the Work and as specified below:
 - 1. The sheet piles shall be driven with an approved single, partial double-acting or double-acting steam, air, diesel or vibratory hammer.
 - 2. The pile driving hammer shall be operated at all times at the speeds and conditions recommended by the hammer Manufacturer.
 - 3. The boiler or compressor capacities for the steam or air-operated hammers shall be sufficient to operate the hammer continuously at the full rated speed and energy.
 - 4. For the steam- or air-operated hammer drivers, the Contractor shall provide a pressure gauge to be located on the hammer steam or airline in a position such that it can be clearly read by the pile driver operator.

5. For the double-acting diesel hammers, the Contractor shall provide a pressure gauge to be located in a position such that it can be clearly read by the pile driver operator.
 6. For a single-acting diesel hammer, the Contractor shall mark the ram as approved by the Owner to permit determination of the stroke.
- D. Capblock and Cushion:
1. The Contractor shall submit to the Owner details concerning the stiffness of the capblock and cushion assembly and the coefficient of restitution and weight of the capblock and cushion assembly two (2) weeks prior to driving.
- E. The Contractor shall provide wales, plate and washers conforming to ASTM A36.
- F. The Contractor shall provide tie rods conforming to ASTM A572 Grade 65 ksi yield stress.
- G. The Contractor shall provide bolts and nuts as follows:
1. Bolts shall conform to A325, otherwise as indicated on the Drawings.
 2. Nuts shall conform to ASTM A563.
- H. The Contractor shall provide turnbuckles conforming to ASTM A563.
- I. The Contractor shall provide shop protective coatings as follows:
1. Apply to all wales, tie rods, and accessories.
 2. Apply to all sheet piling except as otherwise indicated.
 3. Conform to coating system as specified in Section 09900.

PART 3 - EXECUTION

3.01 DRIVEN SHEET PILES: THE CONTRACTOR SHALL PROVIDE PILE DRIVING EQUIPMENT AND DRIVE STEEL SHEET PILES IN ACCORDANCE WITH THE FOLLOWING:

- A. Templates: A template shall be provided for each location and be constructed to locate the relative position of the proposed piling layout.
- B. Equipment for Driving Steel Sheet Piles:
 1. All pile-driving equipment shall be subject to the Owner's approval after inspection at the job Site.
 2. At any time during the progress of the Work, equipment, which in The Owner's opinion, is in poor operating condition will not be approved for pile installation.
- C. Contractor shall meet the requirements of Section 02314 – Vibration And Noise Monitoring during sheet Driving activities. Contractor shall perform Work within the

permissible noise and vibration levels, Work Schedule limitations, and procedures provided herein, and applicable Federal, State, County, and Municipal codes, regulations, and standards.

D. Driving Procedure:

1. Sheet piles shall not be driven until inspected and approved for driving.
2. No piles shall be driven within 100 feet of concrete less than seven (7) days old, unless authorized by the Owner.
3. Drive piles in contact with surrounding soil and leave all permanent piles in place.
4. Do not drive coated piling until coating has cured a minimum of one (1) week (7 days).
5. Prior to driving pilings in water, a horizontal line shall be painted on both sides of each piling at a fixed distance from the bottom so that it is visible above the water line after installation. This line shall indicate the profile of the bottom elevation of installed pilings so potential problem areas can be identified by abrupt changes in elevation.
6. Pilings shall be driven with the proper size hammer and by approved methods to ensure no damage to the piles and proper interlocking over their entire lengths. Driving hammers shall be maintained in proper alignment during driving operations by the use of leads or guides attached to the hammer. Caution shall be taken in the sustained use of vibratory hammers when a hard driving condition is encountered to avoid interlock melt or other damage. The use of vibratory hammers should be discontinued and impact hammers employed whenever the penetration rate due to vibratory loading is one (1) foot or less per minute.
7. A protective cap shall be employed during driving when using impact hammers to prevent damage to the tops of the pilings. Pilings damaged during driving or those driven out of interlock shall be removed and replaced at the Contractor's expense. Provide requirements for Noise and Vibration monitoring as part of this work. Make sure the Measurement and Payment Section includes it in the Pump Station Lump Sum.
8. Pilings shall be driven without the aid of a water jet, unless authorized by the Owner. Authorized jetting shall be performed on both sides of the pilings simultaneously and must be discontinued at least 10 feet before final seating of pilings. Adequate precautions shall be taken to ensure that pilings are driven plumb. If the forward or leading edge of the piling wall is found to be out of plumb, the piling being driven shall be driven to the required depth and tapered pilings shall be driven to interlock with the out-of-plumb leading edge. If approved, other corrective measures may be employed to ensure that succeeding pilings are plumb. The maximum permissible taper for any tapered piling shall be 1/8 inch per foot of length.
9. Pilings in each run or continuous length of piling wall shall be driven alternately, in increments of depth, to the required elevation. No piling shall be driven to a lower elevation than those behind it in the same run, except when the pilings behind it cannot be driven deeper. If the piling next to the one being driven tends to follow

below final elevation, it may be pinned to the next adjacent piling. If obstructions restrict driving a piling to the specified elevation, the obstructions shall be removed or penetrated with a chisel beam. If the Contractor demonstrates that removal or penetration is impractical, the Contractor shall make changes in the design alignment of the piling structure as directed to ensure the adequacy and stability of the structure. Pilings shall be driven to the depths shown and shall extend up to the elevation indicated for the tops of the piles.

E. Bearing Elevation:

1. The sheet piles shall be driven to the bearing elevation indicated on the Drawings.

F. Cutoff:

1. Piles shall be cut off perpendicular to the vertical axis of the pile and to within one half inch of the cutoff elevation indicated.
2. Remove the portion of the pile cut off from the site.
3. If excavation is required to achieve pile cutoff, remove the excess excavated materials as directed by the Owner.
4. Splicing shall not be permitted without approval of the Owner.

G. Installation Tolerance:

1. Tolerances in Driving: All piles shall be driven with a variation of not more than one quarter inch per foot of pile length from the vertical for plumb piles. Top of pile shall be within three (3) inches of the location indicated. Manipulation of piles to force them into position will not be permitted. All piles will be checked for heave. Piles found to have heaved shall be redriven to the required point elevation.

H. Predrilling:

1. Predrilling may be necessary due to the presence of limestone as indicated in the soil borings. The Contractor will not be permitted to predrill or jet until a predrilling plan is submitted by the Contractor and approved by the Owner.

I. Rejected Piles:

1. The Owner will determine the acceptability of all piles driven and may reject those piles that do not conform to the specifications.
2. Perform one of the following, as directed by the Owner, for those piles that have been rejected.
 - a. Leave the piles in place, cut off as directed and drive one or more new piles in locations designated by the Owner.
 - b. Withdraw the pile and drive a new pile.

J. Sheet Pile Bracing: Install permanent wales, tie rods and accessories as indicated.

K. Provide temporary bracing as required prior to installation of permanent bracing.

END OF SECTION

SECTION 02300

EARTHWORKS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 WORK INCLUDED

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

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

1.03 RELATED WORK

A. All applicable sections of Technical Specifications.

1.04 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

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

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

1. ASTM D 422 - Method for Particle-Size Analysis of Soils.
2. ASTM D 698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, using 5.5-lb (2.49-kg) Rammer and 12-in (304.8- mm) Drop.
3. ASTM D 1556 - Test Method for Density of Soil in Place by the Sand Cone Method.
4. ASTM D 1557 - Test Methods for Moisture-Density Relations of Soils and Soil Aggregate Mixtures Using 10-lb (4.54-kg) Rammer and 18-in (457- mm) Drop.
5. ASTM D 1633 - Test Method for Compressive Strength of Molded Soil-Cement Cylinders.
6. ASTM D 2216 - Laboratory Determination of Moisture content of Soil.
7. ASTM D 2419 - Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
8. ASTM D 2487 - Classification of Soils for Engineering Purposes.
9. ASTM D 2901 - Test Method for Cement Content of Freshly-Mixed Soil-Cement.
10. ASTM D 2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
11. ASTM D 3017 - Test for Water Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
12. ASTM D 4253 - Test Methods for Maximum Index Density of Soils Using a Vibratory Table.
13. ASTM D 4254 - Test Methods for Minimum Index Density of Soils and Calculation of Relative Density.
14. ASTM D 4318 - Test for Plastic Limit, Liquid Limit, and Plasticity Index of Soils

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

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

1. T 88 Particle Size Analysis of Soils

1.05 SUBSOIL INFORMATION

A. Refer to the Appendix for the Geotechnical Investigation report.

1.06 SITE INSPECTION

A. The Contractor shall visit the site and acquaint themselves with all existing conditions. Make their own subsurface investigation to satisfy themselves as to site and subsurface conditions, but such subsurface investigations shall be performed only under time schedules and arrangements approved in advance by the City and Engineer.

1.07 TOPOGRAPHIC INFORMATION

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

1.08 DISPOSAL OF SURPLUS OR UNSUITABLE MATERIAL

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

1.09 BENCHMARKS AND MONUMENTS

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

1.10 UTILITIES

- A. Before starting site operations, disconnect or arrange for the disconnection of all utility services designated to be removed.
- B. Locate all existing active utility lines traversing the site and determine the requirements for their protection. Preserve in operating condition all active utilities adjacent to or traversing the site and/or designated to remain.
- C. Observe rules and regulations governing respective utilities in working under requirements of this section. Adequately protect utilities from damage, remove or

replace as indicated, specified or required. Remove, plug or cap inactive or abandoned utilities encountered in excavation. Record location of all utilities.

1.11 QUALITY ASSURANCE

- A. A geotechnical engineer may be retained by the City to observe performance of Work in connection with excavating, filling, grading, and compaction. This inspection will not relieve the Contractor from responsibility to complete the Work in accordance with the Drawings and specifications. The Contractor shall re-adjust all Work performed that does not meet technical or design requirements but make no deviations from the Contract documents without specific and written acceptance of the Engineer.
- B. Visual field confirmation and density testing of subgrade preparation and fill placement procedures shall be performed by the field geotechnical engineer as part of the construction testing requirements. The Contractor shall be informed as soon as possible of the test results.
- C. The Engineer of record shall prepare field reports that indicate compaction test location, elevation data, testing results and acceptability. The City and Contractor shall be provided with written copies of the results within 24 hours of time test was performed.
- D. All costs related to reinspection, due to failures, shall be paid for by the Contractor at no additional expense to City. The City reserves the right to direct any inspection that is deemed necessary. Contractor shall provide free access to site for inspection activities.
- E. Where soil material is required to be compacted to a percentage of maximum density, the maximum density at optimum moisture content will be determined in accordance with ASTM D 1557. Where cohesionless, free draining soil material is required to be compacted to a percentage of relative density, the calculation of relative density will be determined in accordance with ASTM D 4253 and D 4254. Field density in-place tests will be performed in accordance with ASTM D 1556, ASTM D 2922, or by such other means acceptable to the Engineer.
- F. In case the tests of the fill or backfill show non-compliance with the required density, the Contractor shall accomplish such remedy as may be required to insure compliance. Subsequent testing to show compliance shall be by a testing laboratory selected by the City and shall be at the Contractor's expense.
- G. Particle size analysis of soils and aggregates will be performed using ASTM D 422.
- H. Determination of sand equivalent value will be performed using ASTM D 2419.
- I. Unified Soil Classification System: References in these specifications are to soil classification types and standards set forth in ASTM D 2487. The Contractor shall be bound by all applicable provisions of said ASTM D 2487 in the interpretation of soil classifications.
- J. Comply with requirements of all applicable building codes and other public agencies having jurisdiction upon the Work.

1.12 SUBMITTALS

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

PART 2 - PRODUCTS

2.01 SUITABLE FILL AND BACKFILL MATERIAL REQUIREMENTS

- A. General: Fill, backfill, and embankment materials shall be suitable selected or processed clean, fine earth, rock, or sand, free from grass, roots, brush, or other vegetation.
- B. Fill and backfill materials to be placed within 6 inches of any structure or pipe shall be free of rocks or unbroken masses of earth materials having a maximum dimension larger than 2 inches.
- C. Suitable Materials: Soils not classified as unsuitable as defined in Paragraph entitled, "Unsuitable Material" herein, are defined as suitable materials and may be used in fills, backfilling, and embankment construction subject to the specified limitations. In addition, when acceptable to the Engineer, some of the material listed as unsuitable may be used when thoroughly mixed with suitable material to form a stable composite.
- D. Suitable materials may be obtained from on-site excavations, may be processed on-site materials, or may be imported. If imported materials are required to meet the requirements of this Section or to meet the quantity requirements of the project the Contractor shall provide the imported materials at no additional expense to the City, unless a unit price item is included for imported materials in the bidding schedule.

E. On-site fill

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

F. Off-site imported fill

1. If necessary, off-site fill shall be obtained and provided by the Contractor;
2. Fill shall be clean, well graded granular soil which is non-expansive and non-collapsible and shall have less than 20% by weight passing the #200 sieve. The portion passing the #200 shall be non-plastic.
3. Fill with less fines (less than #200) may be required on project specific basis and as required by Engineer. Likewise, fill with more than 20% fines may be acceptable on a project specific basis or as identified in a geotechnical engineering study;
4. Imported fill shall be free of all hazardous substances. Certification of compliance and, if requested, test results substantiating compliance shall be furnished to the City and Engineer by the Contractor not less than one week prior to its intended use;

5. The City reserves the right to test off-site fill material for conformance with these specifications; and,
6. The Contractor shall be responsible for all permits and regulatory requirements associated with offsite borrow sources.

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

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

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

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

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

8. The drainrock shall have a sand equivalent value not less than 75. The finish graded surface of the drainrock immediately beneath hydraulic structures shall be stabilized to provide a firm, smooth surface upon which to construct reinforced concrete floor slabs.
9. Type 8 (Ballast Rock / ¾ inch Rock): Crushed rock or gravel, durable and free from slaking or decomposition under the action of alternate wetting or drying. The material shall be uniformly graded and shall meet the following gradation requirements.

Sieve Size	Percentage Passing
1-inch	100
¾-inch	40 - 60
No. 4	0 - 3
No. 8	0 - 3

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

Sieve Size	Percentage Passing
1-inch	100
¾-inch	98 - 100
½-inch	55 - 70
¾-inch	30 - 40
No. 4	0 - 6

11. Type 10 (Class I crushed stone - ASTM #57): Manufactured angular, granular crushed stone, rock, or slag, with 100 percent passing a 1-inch sieve and less than 5 percent passing a Number 4 sieve.
12. Type 11 (aggregate base): Crushed rock aggregate base material of such nature that it can be compacted readily by watering and rolling to form a firm, stable base for pavements. At the option of the Contractor, the grading for either the 1-½-inch maximum size or ¾-inch maximum size shall be used. The sand equivalent value shall be not less than 22, and the material shall meet the following gradation requirements.

Sieve Size	1-½-inch Max. ¾-inch Max.	Percentage Passing
2-inch	100	--
1-½-inch	90 - 100	-
1-inch	--	100
¾-inch	50 - 85	90 - 100
No. 4	25 - 45	35 - 55
No. 30	10 - 25	10 - 30

Sieve Size	1-1/2-inch Max. 3/4-inch Max.	Percentage Passing
No. 200	2 - 9	2 - 9

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

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

14. Type 13 (cement-treated backfill): Material which consists of Type 7 material, or any mixture of Types B, C, G and H materials which has been cement-treated so that the cement content of the material is not less than 5 percent by weight when tested in accordance with ASTM D 2901. The ultimate compressive strength at 28 days shall be not less than 400 psi when tested in accordance with ASTM D 1633.
15. Type 14 (topsoil): Stockpiled topsoil material which has been obtained at the site by removing soil to a depth not exceeding 2 feet. Removal of the topsoil shall be done after the area has been stripped of vegetation and debris as specified.
16. Type 15 (trench plug): Low permeable fill material, a nondispersible clay material having a minimum plasticity index of 10.
- H. If approved by the Engineer, any bituminous concrete on the site shall be milled/removed prior to placing any fill and shall be reused only onsite immediately below the pavement stone base course.

2.02 UNSUITABLE MATERIAL

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

2.03 USE OF FILL, BACKFILL, AND EMBANKMENT MATERIAL TYPES

- A. The Contractor shall use the types of materials as designated herein for all required fill, backfill, and embankment construction hereunder.
- B. Where these Specifications conflict with the requirements of any local agency having jurisdiction, or with the requirements of a material manufacturer, the Engineer shall be immediately notified. In case of conflict therewith, the Contractor shall use the most stringent requirement, as determined by the Engineer.

- C. Fill and backfill types shall be used in accordance with the following provisions:
1. Embankment fills shall be constructed of any mixture of Type 1 through Type 11 materials.
 2. Pipe zone backfill, as defined under Paragraph 3.15 "Pipe and Utility Trench Backfill" herein, shall consist of the following materials for each pipe material listed below. Where pipelines are installed on grades exceeding 4 percent, and where backfill materials are graded such that there is less than 10 percent passing a Number 4 sieve, trench plugs of Type 13 or 14 materials shall be provided at maximum intervals of 200 feet or as shown on the Drawings.
 - a. Mortar coated pipe, concrete pipe, and uncoated ductile iron pipe shall be provided Type 1, 2, 3, 4, 5, 9 or 10 pipe zone backfill materials.
 - b. Coal tar enamel coated pipe, polyethylene encased pipe, tape wrapped pipe, and other non-mortar coated pipe shall be backfilled with Type 3 pipe zone backfill material.
 - c. Plastic pipe and vitrified clay pipe shall be backfilled with Type 9 or 10 pipe zone backfill material.
 3. Trench zone backfill for pipelines as defined under Paragraph 3.15 "Pipe and Utility Trench Backfill" shall be or any of Types 1 through 11 backfill materials or any mixture thereof, except that Type K material may be used for trench zone backfill in agricultural areas unless otherwise shown or specified.
 4. Final backfill material for pipelines under paved area, as defined under Paragraph 3.15 "Pipe and Utility Trench Backfill" shall be Type 11 backfill material. Final backfill under areas not paved shall be the same material as that used for trench backfill, except that Type K material shall be used for final backfill in agricultural areas unless otherwise shown or specified.
 5. Trench backfill and final backfill for pipelines under structures shall be the same material as used in the pipe zone, except where concrete encasement is required by the Contract Documents.
 6. Aggregate base materials under pavements shall be Type 11 material constructed to the thicknesses shown or specified. Where specified or shown, aggregate subbase shall be Type 12 Material.
 7. Backfill around structures shall be or Types 1 through Type 11 materials, or any mixture thereof.
 8. Backfill materials beneath structures shall be as follows:
 9. Drainrock materials under hydraulic structures or other water retaining structure with underdrain systems shall be Type 7 or Type 8 material.
 10. Under concrete hydraulic structures or other water retaining structures without underdrain systems, Types 7, 8 or 11 materials shall be used.
 11. Under structures where groundwater must be removed to allow placement of concrete, Type 6 material shall be used.

- 12. Under all other structures, Type 4, 5, 6, 7, 8, 9 or 11 material shall be used.
- 13. Backfill used to replace pipeline trench over-excavation shall be a layer of Type 6, 7, 8, 9 or 10 materials. This backfill material shall be wrapped with filter fabric to prevent migration of fines for wet trench conditions. The same material as used for the pipe zone backfill may be used if the trench conditions are not wet. Filter fabric shall be Mirafi 140 N, Mirafi 700 X, or equal.
- 14. The top 6 inches of fill on reservoir roofs, embankment fills around hydraulic structures, and all other embankment fills shall consist of Type 14 material, topsoil.

2.04 EMBANKMENT

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

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

- B. Embankments shall be constructed of material containing no muck, stumps, roots, brush, vegetable matter, rubbish or other material that will not compact into a suitable and enduring roadbed, and material designated as undesirable shall be removed from the site. Where embankments are constructed adjacent to bridge end bents or abutments, rock larger than 3-1/2 inches in diameter shall not be placed within three feet of the location of any abutment.
- C. Fill material containing debris, sod, biodegradable materials shall not be used as fill in construction areas.
- D. Fill material required for the building pads and for pavement subgrade shall be granular fill, free of organic material.
- E. Fill material required for pervious and sodded areas shall have a maximum organic component of 10%. Contractor shall provide, at without any cost to the City, organic content test results for approval by the Engineer.

2.05 EQUIPMENT

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

PART 3 - EXECUTION

3.01 GENERAL

- A. Prior to bidding of all Work within this section, the Contractor shall become thoroughly familiar with the geotechnical engineering study, if available, as well as the site, site conditions, and all portions of the Work falling within this section.
- B. The Contractor shall refer to the erosion control Drawings, if provided, for staging of earthwork operations and for erosion control measures to be implemented prior to commencement of earthwork.
- C. Locate and identify existing utilities that are to remain and protect them from damage.
- D. Notify utility companies to allow removal and/or relocation of any utilities that are in conflict with the proposed improvements.
- E. Protect fences, structures, sidewalks, paving, curbs, etc. to remain from equipment and vehicular traffic.
- F. Protect benchmarks, property corners and all other survey monuments from damage or displacement. If a marker needs to be removed/relocated it shall be referenced by a licensed land surveyor and replaced, as necessary, by the same at no additional cost to the City.
- G. Remove from the site, material encountered in grading operations that, in opinion of City or Engineer, is unsuitable or undesirable for backfilling in pavement or building areas as per Paragraph 2.01.
- H. Identify required lines, levels, contours and datum to bring site grades to the proposed subgrade conditions inferred from the Drawings.
- I. Do not perform any Work associated with this section prior to completion of all required inspections, tests and approvals.
- J. When performing grading operations during periods of prolonged wet or dry weather, provide adequate measures for surface drainage and ground water control, and moisture control of soils (i.e., wetting or drying, scarify and discing) so as to place and compact the soil within the moisture content range a few percentage points of its optimum water content. Any disturbed areas should be proofrolled at the end of each day.
- K. Sloping, shoring, bracing, and fencing shall be installed in accordance with Federal OSHA requirements as well as the requirements of all regulatory authorities having jurisdiction.
- L. Allow no debris to accumulate on-site. Haul debris away from the site and dispose of at no cost to the City.
- M. The Contractor shall remove and dispose of all excess excavated material at a site selected by the Contractor and reviewed by the Engineer.

3.02 JOB CONDITIONS

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

3.03 BACKFILL, FILLING & GRADING

A. Grades:

- 1. Cut, backfill, fill and grade to proper grade levels indicated. The proposed grades shown on the Drawings are for establishing a finished grade over the site.

B. Filling:

- 1. Fill material shall be placed in horizontal layers and spread to obtain a uniform thickness.
- 2. After compaction, layers of fill are not to exceed twelve (12) inches for cohesive soils or eight (8) inches for noncohesive soils.

3.04 STRUCTURE, ROADWAY, AND EMBANKMENT EXCAVATION

- A. General: Except when specifically provided to the contrary, excavation shall include the removal of all materials of whatever nature encountered, including all obstructions of any nature that would interfere with the proper execution and completion of the Work. The removal of said materials shall conform to the lines and grades shown or ordered. Unless otherwise provided, the entire construction site shall be stripped of all vegetation and debris, and such material shall be removed from the site prior to performing any excavation or placing any fill. The Contractor shall furnish, place, and maintain all supports and shoring that may be required for the sides of the excavations, and all pumping, ditching, or other measure for the removal or exclusion of water, including taking care of storm water, groundwater, and wastewater reaching the site of the Work from any source so as to prevent damage to the Work or adjoining property. Excavations shall be sloped or otherwise supported in a safe manner in accordance with applicable State safety requirements and the requirements of OSHA Safety and Health Standards for Construction (29CFR1926).
- B. Excavation Beneath Structures and Embankments: Except where otherwise specified for a particular structure or ordered by the Engineer, excavation shall be carried to the grade of the bottom of the footing or slab. Where shown or ordered, areas beneath structures or fills shall be over-excavated. The subgrade areas beneath embankments shall be excavated to remove not less than the top 6 inches of native material and where such subgrade is sloped, the native material shall be benched. When such over excavation is shown, both over-excavation and subsequent backfill to the required grade shall be performed by the Contractor. When such over-excavation is not shown but is ordered by the Engineer, such over- excavation and any resulting backfill will be paid for under a separate unit price bid item if such bid item has been established; otherwise payment will be made in accordance with a negotiated price. After the required excavation or over-excavation has been completed, the exposed surface shall be scarified to a depth of 6 inches, brought to optimum moisture content, and rolled with heavy compaction equipment to obtain 98 percent of maximum density.

- C. Excavation Beneath Paved Areas: Excavation under areas to be paved shall extend to the bottom of the aggregate base or subbase, if such base is called for; otherwise it shall extend to the paving thickness. After the required excavation has been completed, the top 12 inches of exposed surface shall be scarified, brought to optimum moisture content, and rolled with heavy compaction equipment to obtain 98 percent of maximum density. The finished subgrade shall be even, self-draining, and in conformance with the slope of the finished pavement. Areas that could accumulate standing water shall be regraded to provide a self-draining subgrade.
- D. Notification of Engineer: The Contractor shall notify the Engineer at least 3 days in advance of completion of any structure excavation and shall allow the Engineer a review period of at least one day before the exposed foundation is scarified and compacted or is covered with backfill or with any construction materials.

3.05 PIPELINE AND UTILITY TRENCH EXCAVATION

- A. General: Unless otherwise shown or ordered, excavation for pipelines and utilities shall be open-cut trenches. Trench widths shall be kept as narrow as is practical for the method of pipe zone densification selected by the Contractor, but shall have a minimum width at the bottom of the trench equal to the outside diameter of the pipe plus 24 inches for mechanical compaction methods and 18 inches for water consolidation methods. The maximum width at the top of the trench shall be equal to the outside diameter of the pipe plus 36 inches for pipe diameters 18 inches and larger and to the outside diameter of the pipe plus 24 inches for pipe diameters less than 18 inches, or as shown on the Drawings.
- B. Trench Bottom: Except when pipe bedding is required, the bottom of the trench shall be excavated uniformly to the grade of the bottom of the pipe. The trench bottom shall be given a final trim, using a string line for establishing grade, such that each pipe section when first laid will be continually in contact with the ground along the extreme bottom of the pipe. Rounding out the trench to form a cradle for the pipe will not be required. Excavations for pipe bells and welding shall be made as required.
- C. Open Trench: The maximum amount of open trench permitted in any one location shall be determined by FDOT MOT approvals. All trenches shall be fully backfilled at the end of each day. The above requirements for backfilling will be waived in cases where the trench is located further than 100 feet from any traveled roadway or occupied structure. In such cases, however, barricades meeting OSHA requirements shall be provided and maintained. Requirements of Section 01550, paragraph 1.02B shall also apply.
- D. Trench Over-Excavation: Where the Drawings indicate that trenches shall be over-excavated, they shall be excavated to the depth shown, and then backfilled to the grade of the bottom of the pipe.
- E. Over-Excavation: When ordered by the Engineer, whether indicated on the Drawings or not, trenches shall be over-excavated beyond the depth shown. Such over-excavation shall be to the depth ordered. The trench shall then be backfilled to the grade of the bottom of the pipe. All Work specified in this Section shall be performed by the Contractor when the over-excavation ordered by the Engineer is less than 6 inches below the limits shown.

- F. When the over-excavation ordered by the Engineer is 6 inches or greater below the limits shown, additional payment will be made to the Contractor for that portion of the Work which is located below said 6-inch distance. Said additional payment will be made under separate unit price bid items for over-excavation and bedding if such bid items have been established; otherwise payment will be made in accordance with a negotiated price.
- G. Where pipelines are to be installed in embankment or structure fills, the fill shall be constructed to a level at least one foot above the top of the pipe before the trench is excavated.

3.06 OVER-EXCAVATION NOT ORDERED, SPECIFIED, OR SHOWN

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

3.07 EXCAVATION IN LAWN AREAS

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

3.08 EXCAVATION IN VICINITY OF TREES

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

3.09 ROCK EXCAVATION

- A. Rock is defined as follows:
 1. Rock shall be classified as material having a blow count in excess of 30 blows per foot from a Standard Penetration Test (ASTM D-1586) and exceeding 1000 psi from an Unconfined Compression Strength Test (ASTM D-2938); and,
 2. General Excavation - Any material that cannot be excavated with a single-toothed ripper drawn by a crawler tractor having a minimum draw bar pull rated at not less than 71,000 lbs. (Caterpillar D9N or equivalent), and occupying an original volume of at least 2 cubic yards or more; and,
 3. Trench Excavation - Any material that cannot be excavated with a backhoe having a break out force rated at not less than 44,000 pounds (Caterpillar 235D or equivalent), and occupying an original volume of at least 2 cubic yards.

- B. Rock excavation shall include removal and disposal of the following: (1) all boulders measuring 1/3 of a cubic yard or more in volume; (2) all rock material in ledges, bedding deposits, and unstratified masses which cannot be removed without systematic drilling and blasting; (3) concrete or masonry structures which have been abandoned; and (4) conglomerate deposits which are so firmly cemented that they possess the characteristics of rock as described in Paragraph 3.09(A).
- C. Said rock excavation shall be performed by the Contractor; provided, that should the quantity of rock excavation be affected by any change in the scope of the Work, an appropriate adjustment of the contract price will be made under a separate bid item if such bid item has been established; otherwise payment will be made in accordance with a negotiated price.
- D. Explosives and Blasting: Blasting will not be permitted, except by express permission of the Engineer on a case-by-case basis. The use of explosives will be subject to the approval and regulations of all agencies having jurisdiction. If blasting is utilized at the site of the Work, the Contractor shall take all precautions and provide all protective measures necessary to prevent damage to property and structures or injury to person. Prior to blasting, the Contractor shall secure all permits required by law for blasting operations and shall provide any additional hazard insurance required by the City. The Contractor shall have a fully qualified and experienced blasting supervisor in charge of all blasting operations.
- E. All operations involving the handling, storage, and use of explosives shall be conducted in accordance with the requirements of the OSHA Standards for Construction, and in accordance with all local laws and regulations.

3.10 DISPOSAL OF UNSUITABLE EXCAVATED MATERIAL

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

3.11 BACKFILL - GENERAL

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

3.12 PLACING AND SPREADING OF BACKFILL MATERIALS

- A. Backfill materials shall be placed and spread evenly in layers. When compaction is achieved using mechanical equipment the layers shall be evenly spread so that when compacted each layer shall not exceed 6 inches in thickness.

- B. During spreading each layer shall be thoroughly mixed as necessary to promote uniformity of material in each layer. Pipe zone backfill materials shall be manually spread, tamped, and haunched around the pipe so that when compacted the pipe zone backfill will provide uniform bearing and side support.
- C. Where the backfill material moisture content is below the optimum moisture content water shall be added before or during spreading until the proper moisture content is achieved.
- D. Where the backfill material moisture content is too high to permit the specified degree of compaction the material shall be dried until the moisture content is satisfactory.

3.13 COMPACTION - GENERAL

- A. Compact each layer of fill in designated areas with approved equipment to achieve a maximum density at optimum moisture, AASHTO T 180 - latest edition.
 - 1. Building Pads: compaction shall be to 98% of maximum density, unless otherwise shown on the DRAWINGS or specifications. Building pads shall be within plus or minus one-tenth (0.1) of a foot of the elevations shown on the plans.
 - 2. Refer to Sections 02772 Asphaltic Pavement for compaction requirements in the affected areas.
 - 3. Under landscaped area, compaction shall be to 90% of maximum density, unless otherwise shown on the Drawings.
- B. No backfill shall be placed against any masonry or other exposed building surface until permission has been given by the Engineer and in no case until the masonry has been in place seven days.
- C. Heavy construction equipment will not be permitted within ten (10) feet of any masonry or other exposed building surface.
- D. Compaction in limited areas shall be obtained by the use of mechanical tampers or approved hand tampers. When hand tampers are used, the materials shall be deposited in layers not more than four inches thick. The hand tampers used shall be suitable for this purpose and shall have a face area of not more than 100 square inches. Special precautions shall be taken to prevent any wedging action against masonry, or other exposed building surfaces.

3.14 COMPACTION OF FILL, BACKFILL, AND EMBANKMENT MATERIALS

- A. Each layer of Types 1, 2, 3, 7, 8, and 14 backfill materials as defined herein, where the material is graded such that at least 10% passes a No. 4 sieve, shall be mechanically compacted to the specified percentage of maximum density. Equipment that is consistently capable of achieving the required degree of compaction shall be used and each layer shall be compacted over its entire area while the material is at the required moisture content.
- B. Each layer of Type 4, 5, 6, and 13 backfill materials shall be compacted by means of at least 2 passes from a flat plate vibratory compactor. When such materials are used for

pipe zone backfill, vibratory compaction shall be used at the top of the pipe zone or at vertical intervals of 24 inches, whichever is the least distance from the subgrade.

- C. Type 9 and 10 material requires mechanical spreading and placement to fill voids but does not require mechanical compaction or vibration. Tamping shall be used in pipe zone areas.
- D. Fill on structure roof slabs shall be deposited at least 30 days after the concrete roof slab has been placed. Equipment weighing more than 10,000 pounds when loaded shall not be used on a roof. A roller weighing not more than 8,000 pounds shall be used to compact fill on a roof.
- E. Flooding, ponding, or jetting shall not be used for fill on roofs, backfill around structures, backfill around reservoir walls, for final backfill materials, or aggregate base materials.
- F. Pipe zone backfill materials that are granular may be compacted by a combination of flooding and vibration using concrete vibrators or by jetting, when acceptable to the Engineer. Tamping shall be used to ensure adequate bedding in the pipe zone.
- G. Pipeline trench zone backfill materials, containing 5% or less of material passing a No. 200 sieve, may be compacted using flooding and jetting or vibration if the Contractor uses effective procedures that yield the specified compaction test results. Flooding and jetting shall not be done in such a manner that the pipe or nearby utilities are damaged, in areas of poorly draining or expansive soils, or where the use of the procedure is prohibited by any agency having jurisdiction over the street or right-of-way. Approved jet pipes or immersible vibrators shall be used so that each backfill layer is saturated and consolidated to its full depth before the next layer is placed. Jet pipes shall be kept at least 6 inches away from the pipe where the backfills being consolidated and 2 feet away from other pipes or utilities.
- H. Equipment weighing more than 10,000 pounds shall not be used closer to walls than a horizontal distance equal to the fill at that time. Hand operated power compaction equipment shall be used where use of heavier equipment is impractical or restricted due to weight limitations.
- I. Compaction Requirements: The following compaction test requirements shall be in accordance with AASHTO T-180, T-99-C or ASTM D 2487 as applicable. Where agency or utility company requirements govern, the highest compaction standards shall apply.

Location or Use of Fill	Percentage of Maximum Density AASHTO T-180	Testing Frequency 1 per lift per
Pipe zone backfill portion above bedding for flexible pipe.	98	150 LF
Pipe zone backfill bedding and over-excavated zones under bedding/pipe for flexible pipe, including trench plugs.	98	150 LF
Pipe zone backfill portion above bedding for rigid pipe.	98	150 LF

Location or Use of Fill	Percentage of Maximum Density AASHTO T-180	Testing Frequency 1 per lift per
Pipe zone backfill bedding and over-excavated zones under bedding/pipe for rigid pipe.	98	100 LF
Final backfill, beneath paved areas or structures.	98	2,500 SF
Final backfill, not beneath paved areas or structures.	95	2,500 SF
Trench zone backfill, not beneath paved areas or structures, including trench plugs.	95	150 LF

Location or Use of Fill	Percentage of Maximum Density AASHTO T-180	Testing Frequency 1 per lift per
Embankments.	98	2,500 LF
Embankments, beneath paved areas or structures.	98	2,500 SF
Backfill beneath structures, hydraulic structures.	98	100 SF
Backfill around structures.	98	100 SF
Topsoil (type 14 material)	85	5,000 SF
Aggregate base or subbase (type 11 or 12 material)	98	2,500 SF

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

3.15 PIPE AND UTILITY TRENCH BACKFILL

- A. Pipe Zone Backfill: The pipe zone is defined as that portion of the vertical trench cross-section lying between a plane 6 inches below the bottom surface of the pipe, i.e., the trench subgrade, and a plane at a point 6 inches above the top surface of the pipe. The bedding for flexible pipe is defined as that portion of pipe zone backfill material between the trench subgrade and the bottom of the pipe. The bedding for rigid pipe is defined as that portion of the pipe zone backfill material between the trench subgrade and a level line which varies from the bottom of the pipe to the springline as shown.
- B. Bedding shall be provided for all sewers, drainage pipelines, and other gravity flow pipelines. Unless otherwise specified or shown, for other pipelines the bedding may be omitted if all the following conditions exist.
 - 1. The pipe bears on firm, undisturbed native soil which contains only particles that will pass a one-inch sieve.
 - 2. The excavation is not through rock or stones.
 - 3. The trench subgrade soils are classified as suitable fill and backfill materials per Paragraph 2.01.
 - 4. The trench subgrade soils have, as a maximum, a moisture content that allows compaction.
- C. Where bedding is required, after compacting the bedding the Contractor shall perform a final trim using a stringline for establishing grade, such that each pipe section when first laid will be continually in contact with the bedding along the extreme bottom of the pipe. Excavation for pipe bells and welding shall be made as required.
- D. The pipe zone shall be backfilled with the specified backfill material. The pipe zone shall be well tamped per manufacturer's recommendation to prevent sags or settlement of the pipe. The Contractor shall exercise care to prevent damage to the pipeline coating, cathodic bonds, or the pipe itself during the installation and backfill operations.
- E. Trench Zone Backfill: After the pipe zone backfill has been placed as specified above, and after all excess water has completely drained from the trench, backfilling of the trench zone may proceed. The trench zone is defined as that portion of the vertical trench cross-section lying between a plane 6 inches above the top surface of the pipe and a plane at a point 18 inches below the finished surface grade, or if the trench is under pavement, 18 inches below the roadway subgrade. If flooding, ponding, or jetting is used the pipe shall be filled with water to prevent flotation.
- F. Final Backfill: Final backfill is all backfill in the trench cross-sectional area within 18 inches of finished grade, or if the trench is under pavement, all backfill within 18 inches of the roadway subgrade.

3.16 EMBANKMENT CONSTRUCTION

- A. The area where an embankment is to be constructed shall be cleared of all vegetation, roots and foreign material. Following this, the surface shall be moistened, scarified to a depth of 6 inches, and rolled or otherwise mechanically compacted. Embankment fill material shall be placed and spread evenly in approximately horizontal layers. Each

layer shall be moistened or aerated, as necessary. Unless otherwise approved by the Engineer, each layer shall not exceed 6 inches of compacted thickness. The embankment fill and the scarified layer of underlying ground shall be compacted to 95% of maximum density under structures and paved areas, and 90% of maximum density elsewhere.

- B. When an embankment fill is to be made and compacted against hillsides or fill slopes steeper than 4:1, the slopes of hillsides or fills shall be horizontally benched to key the embankment fill to the underlying ground. A minimum of 12 inches normal to the slope of the hillside or fill shall be removed and recompacted as the embankment fill is brought up in layers. Material thus cut shall be recompacted along with the new fill material at the Contractor's expense. Hillside of fill slopes 4:1 or flatter shall be prepared in accordance with Paragraph A, above.
- C. Where embankment or structure fills are constructed over pipelines, the first 4 feet of fill over the pipe shall be constructed using light placement and compaction equipment that does not damage the pipe. Heavy construction equipment shall maintain a minimum distance from the edge of the trench equal to the depth of the trench until at least 4 feet of fill over the pipe has been completed.

3.17 COMPACTION OF SUBGRADE SURFACES

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

3.18 UNDERCUT EXCAVATION

- A. When approved by City and recommended by the Engineer, the Contractor may be required to remove natural soil materials in areas where fills are to be placed when determined to be undesirable in their location or condition. The Contractor shall be required to remove the undesirable material and backfill with approved material properly compacted.
- B. At locations where unstable soil is shown on the Drawings or identified within the geotechnical engineering study, the removal and replacement of such soil shall be as directed on the Drawings or as directed by the Engineer and the City.

- C. At locations where soil is wet of optimum moisture, the Contractor shall provide a “good faith” effort in drying and discing these areas prior to completing undercut excavation as approved by the Engineer and City.
- D. Where undercutting is required adjacent or beneath the location of the proposed drainage structure, undercut and backfill shall be done over a sufficient distance adjacent to the installation to prevent future operations from disturbing the completed drainage structure.
- E. All material removed in the Work of undercut excavation will be classified by the geotechnical engineer and City as either suitable for other use without excessive manipulation and utilized by the Contractor elsewhere in the Work, or unsuitable for future use and disposed of by the Contractor as directed by the Engineer.
- F. The Contractor shall conduct undercut operations in such a way that the necessary measurements can be taken before any backfill is placed.
- G. Backfill in undercut areas shall be placed as a continuous operation along with the undercutting operation. No backfill material shall be placed in water unless otherwise permitted by the Engineer.

3.19 EXCAVATION, FILL, AND SUBGRADE PREPARATION

A. General

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

B. Excavation

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

3. Unsuitable material, such as wood and any other deleterious materials determined to be unsuitable by the geotechnical engineer for use as on-site fill, shall be disposed of offsite.

C. Subgrade Preparation for Fill

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

D. Fill Placement

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

10. Fill placed on slopes greater than 1 vertical to 3 horizontal shall have each lift benched onto the slope at least 3 feet.

3.20 PROOFROLLING

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

3.21 MAINTENANCE OF SUBGRADE

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

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

3.22 CORRECTION OF GRADE

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

3.23 MAINTENANCE AND PROTECTION OF WORK

- A. While construction is in progress adequate drainage for the roadbed shall be maintained at all times.
- B. The Contractor shall maintain all earthwork construction throughout the life of the contract, unless otherwise provided, and shall take all reasonable precautions to prevent loss of material from the roadway due to the action of wind or water. The Contractor shall repair without any additional expense to the City, except as otherwise provided herein, any slides, washouts, settlement, subsidence, or other mishap which may occur prior to final acceptance of the Work.
- C. All channels excavated as a part of the contract Work shall be maintained against natural shoaling or other encroachments to the lines, grades, and cross sections shown on the plans, until final acceptance of the project.

3.24 AS-BUILT SURVEY

- A. At the completion of the Work and prior to final inspection of the area, the Contractor shall provide the Engineer with an as-built topographic survey made by a Florida Licensed Professional Surveyor & Mapper.
- B. The Florida Licensed Professional Surveyor & Mapper is to certify on the survey whether or not the as-built conditions conform to the elevations shown on the Drawings to within plus or minus one-tenth (0.1) of a foot.

3.25 MEASUREMENT AND PAYMENT

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

- END OF SECTION -

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SECTION 02302
AUGER CAST PILING

PART 1 - GENERAL

1.01 SUMMARY

- A. Furnish labor, materials, tools, equipment, and services for Auger Cast Piling, as indicated, in accordance with provisions of Contract Documents.
- B. Subsoil information:
 - 1. Additional test borings and other exploratory operations may be made, provided such operations are acceptable to Architect.
- C. Definitions:
 - 1. Pile: Cast-in-place pile made by rotating a continuous helical flight hollow shaft auger into subsoil and injecting concrete under sufficient pressure as auger is withdrawn to ensure a continuous column of concrete of minimum diameters and design loads indicated.
 - 2. Geotech: Geotechnical Engineer or Representative of Foundation Consultant employed by Owner to inspect foundation work.
- D. Completely coordinate with work of other trades.

1.02 QUALITY ASSURANCE

- A. Qualified Pile Installers:
 - 1. Berkel and Company.
 - 2. L G Barcus and Sons.
 - 3. Longfellow Foundations, Inc.
- B. Other installers desiring approval comply with Section 01610.
- C. Pile Testing:
 - 1. Conduct 2 load tests.
 - 2. Install test piles in locations and to elevations directed by Geotech.
 - 3. Contractor design test pile arrangement and furnish apparatus necessary to safely test load pile to twice design load.
 - 4. Load test arrangement and apparatus must be acceptable to Geotech.
 - 5. Geotech establishes test load criteria for test piles.

6. After concrete has reached its 28 day strength, test load pile in accordance with ASTM-D1143, "Standard Test Method for Piles Under Static Axial Compressive Load."
 - a. Standard loading procedure
7. Allowable settlement: Not more than 3/4 inches after removal of load
8. Hydraulic jack and pressure gauge must have been recently calibrated.
9. Provide digital gauge readings on uplift pile and rest pile. Contractor to verify readings.
10. In event of failure to attain test load, repeat load test with new test pile as directed by Geotech. Installation of additional test piles will be paid for as set forth in Section 1.4. The additional pile test shall be performed without additional cost to the Owner.
11. Installation, equipment, and procedures for test program identical to those planned for remainder of piles.
12. Test piles may remain in completed structure provided they meet requirements of permanent piles.

D. Concrete Testing:

1. Concrete cylinder tests.
2. Take three 3 inches diameter x 6 inches high test cylinders each morning and afternoon for each drilling rig operating.
3. Record piles represented by each batch of test cylinders.
4. Cylinder molds: Type which will retain mortar expansion yet permit escape of water and air.
5. Test 1 cylinder at 7 days and 2 cylinders at 28 days.

E. Tolerances:

1. Location: 3 inches from location indicated for center of gravity of each single pile or pile group; 1 inch from location indicated perpendicular to a wall and 5 inches from location indicated parallel to wall.
2. Alignment:
 - a. Maintain plumb or verticality to within 1 in 120 from vertical.
3. Cut-off:
 - a. Cut off elevation; 1 inch above and 3 inches below design elevation.

F. Inspections:

1. All piles shall be continuously inspected by the Geotech.

2. The Geotech shall be present during all pile installations.

1.03 SUBMITTALS

A. Project Information:

1. Names of 3 past successful installations under similar conditions.
2. Record of pile installation to Architect and Geotech. Submit prior to pouring cap. Include the following information:
 - a. Location.
 - b. Number.
 - c. Date drilled.
 - d. Length (tip to cut-off) and tip elevation.
 - e. Quantity of concrete pumped into each pile.
 - f. Cylinder strength of concrete.
 - g. Unusual conditions encountered.
 - h. Test reports.
3. Grout Mix Design.

1.04 CONTRACT PRICE ADJUSTMENT

- A. Contractor bid on total lineal footage of production pile indicated for base bid.
- B. Cost of pile load tests including test and uplift pile in base bid.
- C. Base bid will be adjusted in amount (add or deduct) determined by multiplying difference between Base Bid Length indicated and total length of production pile installed by appropriate unit price on proposal form.
- D. Total length of Production Piles:
 1. Accumulated length of production piles from tip to cut-off.
 2. Do not include rejected piles.
 3. Include discontinued piles and additional piles required due to obstructions and additional pile load tests.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Concrete:

1. Adequacy for purpose is Contractor's responsibility.

2. Minimum strength: 4000 psi at 28 days, 3 x 6 inches cylinders.
 3. Consistency (Corp of Engineer's Specification CRD C-79): Not less than 21 seconds.
 4. Cement: Portland cement conforming to ASTM-C150. Cement used shall correspond to that upon which selection of concrete proportions was based.
 5. Sand: ASTM-C33. Obtain from a source approved by the State Highway Department for use in concrete for State Bridges.
 6. Water: Potable: Demonstrate by testing that water does not contain deleterious amounts of chloride.
 7. Admixtures: Comply with applicable ASTM standards.
- B. Reinforcing: ASTM A615, Grade-60.
- C. Reinforcing:
1. Dywidag bars, 1 inches diameter ($f_y=150$ ksi).

PART 3 - EXECUTION

3.01 MIXING AND PUMPING OF GROUT

- A. Use only adequate mixing and pumping equipment in preparation and handling of concrete.
1. Provide accurate (recently calibrated) concrete pressure gauge in clear view of equipment operator.
 2. Use screen between mixer and pump, or between mixer and agitator.
 3. Remove soil, rust, or other foreign material from mixing drums, stirring mechanisms, and other portions of equipment in contact with concrete.
 4. Provide an operating stroke counter to continuously record volume of grout pumped. Calibrate the pump on site by pumping a known volume of grout exceeding 50 gallons.
- B. Accurately measure materials by weight as they are fed to mixer.
- C. Mix not less than one minute.
1. If agitated continuously, concrete may be held in mixer or agitator for period not exceeding 2 hours at temperatures below 70 deg F and for period not exceeding 1-1/2 hour at higher temperatures.
 2. Recirculate concrete through pump or through mixer drum or agitator and pump if there is lapse in operation.
- D. Monitor installation of Auger cast Piles using a Pile Installation Recorder:

1. The recorder shall record appropriate information during both the auguring phase and the grouting phase of the installation to assure a minimum grout volume is pumped per unit depth increment. It shall print the results immediately upon completion of each pile. The PIR-A (available from Pile Dynamics, Inc., 4535 Renaissance Parkway, Cleveland OH 44128; phone: 216-831-6131; fax: 216-831-0916; shall be deemed acceptable installation recording equipment. Equipment shall have the following minimum components.
 - a. The recorder shall include a display unit capable of numerically and/or graphically displaying the information from all sensors, and be able to print results on-site in English units, and store information on a memory card. Unit shall have an easy-to-use touch-screen interface and shall provide immediate feedback to the rig operator, particularly during the critical grouting phase to assure minimum grout volume per depth increment.
 - b. A Depth Sensor shall track the movement of a cable attached to the drill top to measure auger top (and thus auger tip) location at all times during installation. Depth shall be set to zero when the auger tip is touching the ground surface. The maximum pile depth (from ground elevation) shall be recorded.
 - c. A Magnetic Flow Meter (MFM) shall be installed in the grout line to measure grout volume pumped within an accuracy of +/- 2%.
 - d. The Field Printer shall record a hard copy of results for each pile including incremental auguring times, incremental grout volumes, and summary grout volumes. Printed results shall be provided to the Engineer or Inspector immediately following completion of each pile installed.
 - e. The Grout Pressure Sensor monitors and records grout line pressure. Although not used to evaluate incremental volume, this sensor can also count pump strokes. The MFM total volume and total pump strokes allows computation of volume per pump stroke to evaluate consistency of grout pump performance and alert the field crew if pump maintenance is needed.
 - f. The Torque Pressure Sensor monitors crane torque during auguring. Keeping this pressure below but near the maximum pressure allowed by the crane will reduce stalling the crane and improve overall drilling and production efficiency.
2. The auger tip depth and drilling rate (FT/MIN) shall be displayed during drilling. The depth increment of 2 feet for grouting shall be selected so that a minimum of 5 or more strokes are required per increment. The MFM and Depth Sensor information are sufficient to determine volume pumped per unit depth increment (which shall be displayed to the crane operator graphically as a bar chart with the minimum grout ratio clearly displayed as a guide). The printout shall be inspected prior to moving the rig, and if the grout pumped falls below the specified allowable minimum grout ratio for any depth increment, the pile shall be re-augured to 5 feet past the defect and regrouted while the grout is still fluid. The specified minimum grout ratio of 115% may be adjusted by the Engineer based on observed grout return depths and PIR-A grout installation records.
3. The Pile Installation Recorder shall be operational prior to installation of the piles, and shall be maintained during the installation of all production piles unless

otherwise directed by the Engineer. In the unlikely event that the unit is not fully operative, the Contractor shall notify and work with the manufacturer to rectify the situation. In a brief interim duration as directed by the Engineer, the Inspector shall manually record incremental volume until the unit is fully operative.

4. The recorder does not replace the Inspector but rather assists the Inspector during the critical grouting phase by accurately monitoring grout pumped versus depth. The Inspector shall still observe and record arrival times of grout trucks, obtain grout samples, pile location versus planned location, grout return depth, reinforcement bar placement, excavation and other unusual activities or installation information as directed by the Engineer. The Inspector shall collect printouts for each pile installed and transmit them to the Engineer daily.

3.02 PILE INSTALLATION

- A. Install piles such that required penetration into Bearing Stratum defined in Soils Report is achieved.
- B. Select and use installation methods suitable to soil profile which will produce continuous column of concrete of minimum diameter indicated, free of voids and foreign material. A head of at least 15 feet of grout shall be maintained above the injection point.
- C. Extend piles to elevation indicated or established by Geotech.
- D. Accomplish drilling with plug in lower end of auger.
- E. Coordinate rate of concrete injection and rate of auger withdrawal from soil so as to maintain sufficient positive pressure at bottom of auger flight.
 1. Jerky removal of auger flight will be sufficient basis for requesting that pile or piles in question are test loaded.
 2. Use at least 4 part line for withdrawing auger.
- F. Should obstruction, including but not limited to boulders, cobbles, rubble fill, or timbers, be encountered which prevent placing pile to depth required, or causes pile to drift from required location, remove obstruction where possible.
 1. When it is impossible or impracticable to remove obstruction and when so directed by Architect/Geotech, complete short pile.
 2. Install additional adjacent pile as directed by Architect.
 3. Pile refusal shall be defined as no advancement in drilling for 3 minutes.
- G. Place reinforcing with spacers to prevent contact with soil.
- H. Extend "Dywidag" bars full length of uplift piling.
 1. Place through auger or use spacers to locate bar at pile center.
 2. Splice, if required, by mechanical means capable of developing at least 125% of yield strength of bar.

3. Install steel plates and nuts at top of bars.

3.03 CUTOFF

- A. Cut off piles at elevations indicated.
 1. Remove fresh concrete from top of pile no sooner than 3 hour after pile installation.
 2. Or cut off down to final cutoff point at any time after initial set has occurred.
 3. Top of piles after cutoff shall be level and with full diameter cross-section.
- B. Clean and straighten exposed reinforcement.

3.04 REJECTION OF PILES

- A. Replace rejected piles.
- B. Piles may be rejected for:
 1. Being installed outside of specified tolerances.
 2. Being broken, damaged or collapsed.
 3. Failing to develop specified resistance.
 4. Failure to meet specifications.
- C. Subject to approval of Architect, take one of following remedial steps:
 1. Cut off and abandon rejected pile.
 2. Install additional pile or piles at locations designated by Architect.
- D. Redesign of pile caps caused by rejected piles will be at Contractor's expense.

END OF SECTION

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SECTION 02314

VIBRATION AND NOISE MONITORING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This specifies requirements for furnishing all labor, materials, equipment to perform all activities related to vibration and noise monitoring as specified herein:
1. Vibration monitoring associated with the installation of earthwork and/or installation of piles, piping and sheet piling.
 2. Provide vibration monitoring for each building structure within 100 feet of the vibration-inducing construction activity for the new pump station area or as necessary to capture the extent of potential damage. The Contractor shall provide seismographs at locations determined in the vibration monitoring plan as approved by the Engineer and Construction Manager. A preconstruction building condition survey of the existing buildings and structures located within 100 feet of the vibration-inducing construction activities shall be completed by the Contractor prior to the start of construction.
 3. Furnish, install, maintain, monitor, and remove vibration monitoring equipment as specified herein.
 4. Monitor vibrations and noise levels originating from construction operations as indicated herein.
 5. Modify construction operation procedures if existing operation creates vibration or noise exceedances as specified herein.
 6. Provide noise monitoring during all construction activities within the new pump station area.
 7. Furnish, install, maintain, monitor, and remove noise monitoring equipment as specified herein.

1.02 REFERENCES

- A. Unless otherwise noted, the latest edition of the following codes and standards shall govern this work. If any conflicts exist between these codes and standards the more restrictive requirements shall govern.
- B. American Society for Testing and Materials International (ASTM)
1. ASTM E90: Standard Test Method for Laboratory Measurement of Air-borne Sound Transmission Loss of Building Partitions and Elements.
 2. ASTM C423: Standard Test Methods for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
- C. Federal Highway Administration (FHWA)

1. FHWA Highway Construction Noise Handbook, FHWA-HEP-06-02
- D. United States Department of Interior, Bureau of Mines
 1. Report of Investigations 8507, Structure Response and Damage Produced by Ground Vibration from Surface Mine Blasting

1.03 QUALITY ASSURANCE

- A. Provide in accordance with Section 01400.
- B. The Contractor's or Contractor's Vibration consultant and/or Acoustical Engineer, responsible for furnishing and installing all vibration and noise instruments, including all equipment specified here in, maintaining the instruments, as required, and interpreting all data provided or collected shall have the qualifications specified here in. The personnel may be employed by the Contractor or may be employed by a specialized consulting firm.
- C. Vibration and/or Acoustical Engineer Qualifications:
 1. A State of Florida Licensed Professional Engineer responsible for designing and monitoring vibration and noise specified here in and interpretation of the data.
 2. Not less than six (6) years' experience in the installation and monitoring of the vibration and noise instrumentation specified herein.
 3. Completed not less than five (5) successful vibration and noise installation and monitoring projects of similar scope and magnitude within the past ten (10) years.
 4. Shall be onsite to supervise and conduct the pre/post installations of each type of instrumentation. The qualified engineer shall be onsite and supervise the first five (5) installations of each type of instrument, shall oversee and establish the formal initial readings, shall oversee interpretation of all collected and provide vibration and noise data.
- D. Engineering Technician Qualifications:
 1. To be responsible full-time on site during the implementation of the vibration and noise monitoring plan.
 2. Not less than three (3) years of direct field experience in the installation and monitoring of the types of vibration and noise instruments specified herein and have supervised vibration and noise monitoring programs of a similar scope and magnitude with similar work conditions.
 3. Shall be available to supervise all instrument installations, establish initial readings, collect baseline data, and vibration and noise data when the acoustical engineer is not present on-site.

1.04 SUBMITTALS

- A. Submit the following shop drawings in accordance with General Conditions.

1. Submit the following qualifications four (4) weeks prior to the start of any construction activities.
 - a. Qualifications of the Contractor's vibration consulting firm, as specified in Paragraph 1.03.C.
 - b. Qualifications of the Contractor's Acoustical Engineer, as specified in Paragraph 1.03.C.
 - c. Qualifications of the Contractor's Engineering Technician, as specified in Paragraph 1.03.D.
- B. At least two (2) weeks prior to the start of any construction activities provide Vibration and Noise Monitoring Plans, prepared by the Vibration consulting firm and/or the Acoustical Engineer, and installation details specified herein. This shall include but not limited to the following:
 1. Drawings showing the layout and locations of instruments, including wire diagrams for power and/or communications. Power lines carrying 110 volts or more shall be enclosed in conduits of the size and materials required by the NEC.
 2. The scheduled start date and length of construction operations which require vibration and noise monitoring.
 3. Instrument identification numbers.
 4. Details of supports, fixtures, etc. required for installation of instruments and associated systems.
 5. The location of any underground utilities in proximity to the construction operation.
 6. Proposed construction method(s). The duration and type of equipment to be used during construction and an explanation of how the vibrations will be maintained at an acceptable level.
 - a. Identify equipment location and processes.
 7. Identification of the zones of potential construction influence for vibrations and noise.
 8. Identification of vibration and noise sensitive structures including fragile, sensitive, and historic buildings near the project.
 9. Vibration Calculations: Prepare calculations of maximum peak particle velocity vibration level expected at the nearest residential, commercial, and all other structures and railways.
 10. Noise Calculations: prepare calculations of one-hour Leq noise levels expected at the nearest residential and commercial buildings.
 11. Update the Vibration and Noise Monitoring plans at least in three (3) month intervals from the initial acceptance date.

12. Vibration and Noise reduction Methods: To the extent required to meet the ground vibration peak particle velocity, and exterior noise limits specified herein, modify construction operations to reduce vibration and noise.
 13. Manufacturers materials and equipment data sheets.
 14. Design of noise mitigation strategies, methods, procedures, and technology and locations and types of noise reduction measures that may be required. The Contractor is hereby notified that the noise mitigation plan for all work within the new pump station area use zoning area must require review and approval by the Architect/Engineer and Construction Manager.
 15. Location of noise sensitive locations and any specified measures to be undertaken to minimize the impact of work on these locations.
- C. Provide vibration and noise measurement equipment calibration certificates for equipment used on site by the Contractor.
 - D. The procedure for tracking peak particle velocity (PPV) throughout construction operations (e.g., Pile Driving Operations: pile tip vs. vibrations may be correlated through time of day. A record of the time of day at each depth interval, included on the pile driving records, would be required to correlate to a time-based readout of PPV).
 - E. Equipment Sound Level Data Reporting Form for each item of construction equipment to be used.
 - F. Laboratory calibration conformance certificate for all noise measuring equipment used by the Contractor prior to performing any noise level monitoring. Submit updated certificates following subsequent yearly calibrations, or upon completion of repairs to the instrument, for the duration of the Contract.
 - G. Manufactures Certificate of Compliance that equipment is noise attenuated.
 - H. Daily reports, while performing vibration-inducing operations, detailing each source of vibration, location of monitoring, and the vibration records highlighting peak particle velocities. All daily reports shall be stamped and signed by the Vibration Consulting Firm's Professional Engineer and provided within 24 hours of the end of each day's activities indicating a site plan drawing showing the location of the instrument and maximum and average vibration recorded during the workday period.
 - I. The Contractor shall submit a final report summarizing the collected data upon completion of each construction operation.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements specified in Section 01550.

1.06 SITE CONDITIONS

- A. Geotechnical Investigation Results Report: The report is for information only, which is part of the Contract Documents. The boring logs and soil profiles are available and indicate subsurface conditions encountered only at the borehole location. This information shall not be construed as to guarantee that other subsurface materials will

not be present or that proportions of materials will not vary from that shown on the boring logs.

- B. Preconstruction Building Condition Survey: A preconstruction building condition survey shall be completed by the Contractor prior to the start of construction of the Pump Station and 66-Inch Outfall (including but not limited to pipeline, water treatment facility, gate valve, headwall, erosion and sediment controls). The survey will document exterior preconstruction conditions of structures within a 100-foot radius of the new pump station construction site to establish a precondition baseline condition. Contractor shall utilize this document in conjunction with preparation of its monitoring plans as required.

PART 2 - PRODUCTS

2.01 EQUIPMENT

- A. Seismographs shall be "Minimate Pro4" manufactured by InstanTel Inc., or approved equal, and shall have the following minimum features:
 - 1. Seismic Range: 0.01 to 10 inches per second with an accuracy of plus or minus 5-percent of measured peak particle velocity or better at frequencies between 4 and 125 Hertz, and with a resolution of 0.001 inch per second or less.
 - 2. Acoustic Range: 88 to 148 dB (L) with an accuracy and resolution of plus or minus 1 decibel.
 - 3. Frequency Response (plus or minus 3 decibel points) 2 to 250 Hertz.
 - 4. Three Channels for vibration monitoring plus a fourth channel for linear or sound level microphone.
 - 5. Two power sources: Internal rechargeable battery and a charger and 115 volts ac. Battery must be capable of supplying power to monitor vibrations continuously for up to 24 hours.
 - 6. Capable of internal dynamic calibration.
 - 7. Computer software to perform analysis, produce reports of continuous monitoring, and to perform zero-crossing frequency analyses of waveform data on magnetic disks.
 - 8. Self-triggering waveforms capture mode that provides the following information: plot of waveforms, peak particle velocities, and frequency peaks.
 - 9. Continuous monitoring mode capable of recording events up to 10 seconds long, and histogram mode to record events continuously.
 - 10. All geophones shall be external to the seismograph to allow solid bolting or anchoring to surfaces with "Red Head" anchors or approved equals.
- B. Sound Level Meters provided by the Contractor shall comply with the requirements of the current revision of ANSI S1.4, Type 2 (Precision) Sound Level Meters (SLM). SLM

to be capable of measuring the L_{max} and ten minute to one hour L_{eq} on the A-weighted scale required for the noise level limits specified herein.

2.02 NOISE CONTROL MATERIALS

- A. Noise control materials may be new or used. Used materials shall be sound and free of damage and defects and shall be of quality and condition to perform their design function. All equipment and materials specified herein will remain the property of the Contractor or Contractor's subcontractors, vendors, and suppliers, as applicable.
- B. All construction equipment shall incorporate the latest noise attenuation features available to the manufacturer.
- C. Acoustical materials and curtains shall have a Sound Transmission Class (STC) rating of STC 30 or greater, based on sound transmission loss data according to ASTM E90. The noise absorption face of the curtain shall have a Noise Reduction Coefficient (NRC) rating of 0.85 or greater, based on sound absorption coefficient data taken according to ASTM C423.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Provide access to instrument locations and maintain instrument locations from damage.
- B. Perform Work within the permissible noise and vibration levels, Work Schedule limitations, and procedures provided herein, and applicable Federal, State, County, and Municipal codes, regulations, and standards.
- C. The property owners for any and all structures to be monitored for vibration with seismographs shall be notified in writing two (2) weeks in advance of any work and prior to accessing any property to install equipment.
- D. No vibration producing construction activities may be started until the appropriate instrumentation is provided by the Contractor and approved by the Construction Manager.
- E. Other than those provided as part of the Contract, the Contractor is responsible for obtaining permits, variances, equipment certifications, and other documents required.
- F. Modify vibration and noise control measures based on results of the vibration and noise measurements undertaken and any reported nuisance conditions, define operational and/or equipment restrictions.
- G. The Construction Manager may issue a Stop Work notice if the vibration and noise level limits set herein are exceeded and cannot be mitigated.

3.02 VIBRATION AND NOISE MONITORING

- A. Furnish specified instruments to be installed, operated and interpreted by the vibration consulting firm and/or Acoustical Engineer 's personnel, as specified below and indicated.

- B. Noise monitoring stations shall be installed in three (3) locations at the pumping station site (at property boundaries closest to residential structures) and at all work areas downstream of the force main discharge location. For the force main installation, utilize at least one (1) noise monitoring station on each side of the street to adequately capture the noise effects of the construction as it moves from municipal block to municipal block. For the outfall, one (1) noise monitor must be installed near the adjacent private property.
- C. Vibration monitoring stations shall be located at each building structure within 100 feet of the vibration-inducing construction activity for the entire project area and shall be maintained as required as the construction moves from municipal block to municipal block to adequately capture the vibration effects of the construction. A vibration monitor for the outfall construction must be installed in the adjacent private property.
- D. Take initial background readings of all noise stations for a one-week period prior to the start of construction activity in the area.
- E. Take initial background readings at all seismograph locations for three days prior to the start of construction activities in the area.
- F. Perform all vibration-inducing operations so that vibrations reaching adjacent structures and facilities are within specified limits.
- G. All vibration and noise reporting shall comply with this Section as specified herein.

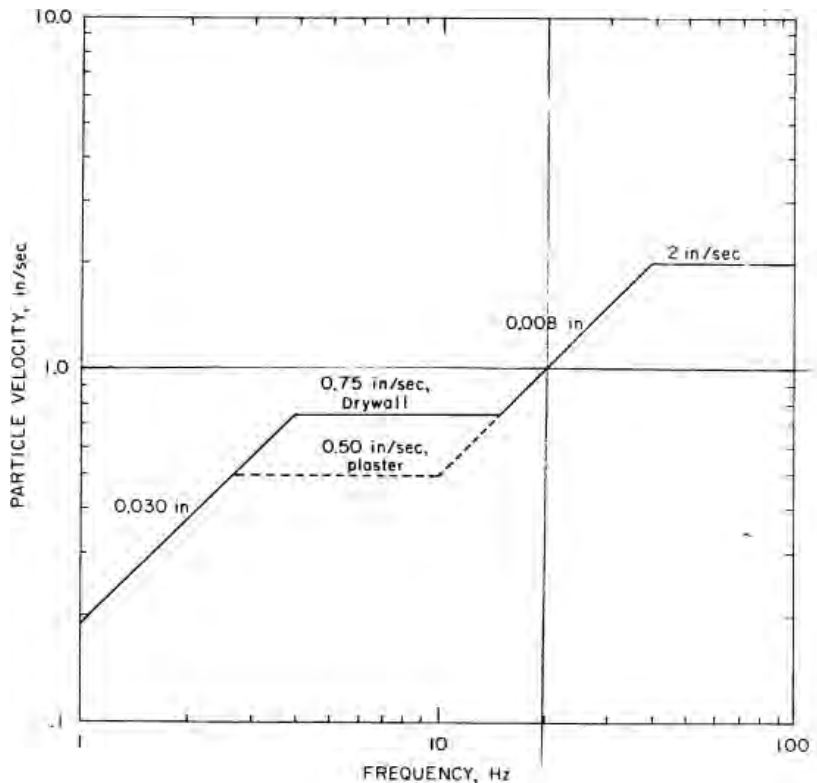
3.03 VIBRATION LEVEL LIMITS

- A. Monitor vibrations by measuring the peak particle velocity in the vicinity of work. Peak particle velocity is defined as the maximum of the ground motion velocities measured in the vertical, longitudinal, and transverse directions measured in inches per second (in/s), for construction activities and operations of temporary systems shall be follows:
 - 1. New Construction:
 - a. The maximum PPV level limits, in any direction, for all new concrete construction shall not exceed the table below measured by a portable seismograph place adjacent to the new construction at the closest point to the vibration source. The maximum permissible PPV shall be reduced if damage is detected. It is assumed that the vibration-inducing construction activity shall have an influence zone of 100 feet radius when considering the protection of new construction.

<u>Type of Concrete</u>	<u>Age of concrete (hours)</u>	<u>Peak Particle Velocity in./sec</u>
Mass Concrete footings, mats, slab-on-grade	0-10	1.0
fill concrete, etc.	11 and over	2.0
Concrete Structures	0-11	0.5
walls, columns, elevated	11-24	1.0
slabs, etc.	24 and over	2.0

2. Existing structures:

- a. The maximum PPV level limits, in any direction, for all construction activities at buildings and structures, as indicated in the Contract documents, shall not exceed the vibration criteria shown in Figure 02 32 14-1 as measured by a portable seismograph placed adjacent to or within the building or structure at the location closest to the vibration source. The maximum permissible PPV shall be reduced if movement or cracking is detected or if the pre-construction survey identifies a building or structure with a lower PPV threshold that should be imposed. It is assumed that the vibration-inducing construction activity shall have an influence zone of approximately 100 feet radius depending on activity when considering the protection of sensitive buildings and structures. Monitoring of vibrations at such buildings shall be undertaken for the duration of construction activities that will influence the structure.



Source: United States Bureau of Mines, RI 8507.

Figure 02314-1: Construction Vibration Criteria

- B. In the event any data indicates that vibration level limits are being exceeded, immediately suspend all vibration-inducing operations and submit a report to the Construction Manager. Revise operations to reduce vibrations and submit a copy of the revised procedure to the Construction Manager at no additional cost to the DEP.
- C. If evidence of displacement or damage to utilities, equipment, or structures is observed or reported, immediately notify the Construction Manager and Stop Work in the area. Revise operation to reduce vibrations and submit a copy of the revised procedure to the Construction Manager.

- D. Restore or replace utilities, equipment, or structures damaged by vibrations at no additional cost to the DEP.

3.04 NOISE LEVEL LIMITS

- A. Noise levels for public exposure shall comply with the following exterior noise level restrictions in all areas:
1. In no case expose the public to construction equipment noise levels exceeding 90 dBA on “slow” response or impulsive noise level exceeding 125 dBA maximum transient level “fast” response as measured on a general-purpose sound level meter.
 2. Conduct construction activities in such a manner that the noise levels at the nearest affected building do not exceed the levels listed in Table 02 32 14-1 below.
 3. In areas outside of the Work area and not designated as a special zone, prevent stationary noise sources, parked mobile sources or any other source or combination of sources from producing repetitively scheduled or long-term noise lasting more than 10 percent of the construction duration from exceeding the limit in Table 02 32 14-1 below.
- B. Test the equipment and demonstrate compliance with noise limits specified herein.
- C. Perform the work in a manner to minimize nuisance conditions such as noise that exhibits a specific audible frequency or tone (e.g. back-up alarms, unmaintained equipment, and brake squeal) or impact noise.

Table 02314-1: Construction Noise Limits		
Land Use	Noise Level – Leq (dBA) (whichever is greater)	Lmax Level (dBA, slow)
Daytime (8 am to 5 PM)		
Residence and building where people normally sleep	75 or Background +5	85 90 (impact equipment)
Commercial Spaces	80 or Background +5	None
Industrial Spaces	80 or Background +5	None
Evening (5 pm to 10 pm)		
Residence and building where people normally sleep	65 or Background +5	85
Commercial Spaces	80 or Background +5	None
Industrial Spaces	80 or Background +5	None
Nighttime (10 pm to 8 am)		
Residence and building where people normally sleep	Background +5 (if <70 dBA) Background +3 (if > 70 dBA)	80 80
Commercial Spaces	None	None
Industrial Spaces	None	None

Notes:

1. Noise from impact equipment is exempt from the Leq requirement, however, is subject to a lot-line Lmax limit of 90 dBA.

2. All measurements will be taken at the affective lot-line in accordance to what is stated herein.
3. Noise level limits are averaged over 20-minute intervals.
4. Lmax noise level limits are the maximum noise level that occurs over a 20-minute period.

3.05 EQUIPMENT NOISE CERTIFICATION

A. Requirements for Construction Equipment:

1. Ensure the Contractor and subcontractor construction equipment used in the Work area is tested for compliance with state noise emission limits during the first day of use on the Project, with compliance data provided to the Construction Manager for review.
2. Retest equipment at six-month intervals while in use in the Work Area and certify new equipment before being placed into service at the Work area.
3. For each piece of equipment used, provide an Application for Certificate of Equipment Noise Compliance. Ensure that the equipment identification number used for the Certificates is consistent with the identification number used in the Noise Monitoring Plan. Do not use equipment onsite without valid Certificates of Noise Compliance. The Certificates at a minimum shall have the following information:
 - a. Contractor Name
 - b. Contract name and number
 - c. Equipment type, manufacturer, and model number
 - d. Identification number
 - e. Rated power & capacity
 - f. Operating condition during test
 - g. Measured noise level at 20 to 50 feet from equipment on both the left and right sides
 - h. Maximum allowable noise level for equipment based on FHWA-HEP-06- 02.
 - i. Authorized signature from the Contractor.

B. Test Procedures for Construction Equipment:

1. Operate engine-powered equipment by Contractor at maximum governed rpm under full load conditions during tests.
2. Test portable and mounted impact hammers, such as hoes rams, jackhammers, to be used for concrete breaking, during first day of actual operation at the Work area under maximum load conditions as rated by the equipment manufacture.
3. Noise Certification Measurement: Use an acoustic calibrator of the type recommended by the sound level meter manufacturer before measurements.
4. As specified herein, take measures at two locations: two from the right and left sides of the equipment, at a distance of 50 feet and a height of five feet above

ground level, with equipment operating at maximum governed rpm under full load conditions for a minimum period of one minute. Reduce noise measurements made at less than 50 feet, due to space limitations at test location by the values in the following Table 02 32 14-2:

Table 02314-2: Adjustments for Close-In Equipment Noise Measurements	
Distance (feet)	Measured Values to be Subtracted from Measured Noise Level to Estimate Sound Level at 50 feet (dBA)
19-21	8
22-23	7
24-26	6
27-29	5
30-33	4
34-37	3
38-42	2
43-47	1
48-50	0

C. Noise Certificate Compliance:

1. Complete and maintain a noise report for each piece of equipment used with certification that the equipment noise emissions does not exceed those prescribed in FHWA-HEP-06-02.
2. If noise levels obtained during tests exceed those specified in FHWA-HEP-06-02, remove such equipment from use until equipment is modified and retested, or substitute other equipment to meet the noise level requirements.
3. Equipment will be subject to spot noise level testing at the Construction Manager's discretion to determine that the equipment in use meets the requirements specified herein.

3.06 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01770.

END OF SECTION

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SECTION 02340

EROSION CONTROL AND SOIL STABILIZATION

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Provide all work and take all measures necessary to control soil erosion resulting from construction operations, prevent flow of sediment from construction site, and contain construction materials (including excavation and backfill) within protected working area as to prevent damage to any stream or wetlands.
- B. The Contractor is responsible for creating a Stormwater Pollution Prevention Plan (SWPPP) for regulatory approval and enforcing its requirements in accordance with applicable Federal, State, and local regulations. The complete SWPPP shall be submitted by the Contractor and approved by the regulatory agencies having jurisdiction before the start of construction. The Contractor shall provide all labor, materials, and equipment required in the prevention of environmental pollution and degradation and thereby for the protection of all environmental resources encountered during construction.
- C. The Contractor is responsible for all permitting and reporting forms as required through the Florida Department of Environmental Protection (FDEP) – National Pollutant Discharge Elimination System (NPDES) program for construction activities.
- D. Temporary erosion controls may include, but are not limited to, mulching, netting, and watering on site surfaces and spoil and borrow area surfaces and providing interceptor ditches at ends of berms and at those locations that will ensure erosion during construction will be either eliminated or maintained within acceptable limits as established by the City.
- E. Temporary sedimentation controls may include, but are not limited to, silt dams, barriers, turbidity curtains, hay bales, drop inlet protection, curb inlet protection, and appurtenances at the foot of sloped surfaces and other areas that will ensure sedimentation pollution will be either eliminated or maintained within acceptable limits as established by the City.

1.02 REFERENCE

- F. "Guidelines for Erosion and Sediment Control, Planning and Implementation" published by the United States Environmental Protection Agency.
- G. "Processes, Procedures and Methods to Control Pollution Resulting from all Construction Activity", published by the United States Environmental Protection Agency.
- H. "The Florida Stormwater, Erosion, and Sedimentation Control Inspector's Manual" published by the Florida Department of Environmental Protection.
- I. NPDES Stormwater Program: www.dept.tate.fl.us/water/stormwater/npdes/

1.03 SUBMITTALS

- A. Contractor shall provide a copy of all permit applications, approvals, and reporting documentation submitted in support to SWPPP.
- B. Contractor shall submit a copy of the SWPPP in accordance with Section 01300.

1.04 DEFINITIONS

- A. Soil Erosion Stabilization:
 - 1. Provide erosion control measures on the Project and in areas where work is accomplished in conjunction with the Project, so as to prevent pollution of water, detrimental effects to public or private property adjacent to the Project.
 - 2. Ground surfaces exposed during the wet season.
 - 3. Areas which will not be subjected to heavy wear by ongoing construction traffic.
 - 4. Temporary and long-term stabilization of new disturbed ditches, swales, storm water ponds, or disturbed ground with intermittent construction traffic.
- B. Buffer Zone: Undisturbed area or, strip of natural vegetation, or an established suitable planting adjacent to disturbed area that reduces erosion and runoff.
- C. Coordinate the installation of temporary erosion control features with the construction of the permanent erosion control features to the extent necessary to ensure economical, effective, and continuous control of erosion and water pollution.
- D. Permanent Stabilization:
 - 1. Permanently stabilize exposed soil surfaces at finished grades
 - 2. Permanent stabilization methods include, but are not limited to, sodding (permanent), mulching, and landscaping.
 - 3. Immediately perform permanent stabilization at each completed excavation and embankment areas except for areas that are scheduled to be redisturbed.
 - 4. Incorporate all permanent erosion control features into the Project at the earliest practical time.

1.02 DELIVERY, STORAGE, AND PROTECTION

- A. General: Prevent or reduce the discharge of pollutants to storm water from all material delivery or storage by minimizing the storage of hazardous materials onsite, storing materials in a designated area, installing secondary containment, conducting regular inspection, and training employees or subcontractors.
- B. Sod: As specified in the Contract Documents.
- C. Mulch: Mark package of mulch to show air-dry weight.

1.03 SEQUENCING AND SCHEDULING

- A. Contractor shall accept responsibility for existing soil and erosion control on the site, including maintenance, installed before starting earth disturbance activities.
- B. Projects permitted by the South Florida Water Management District require written approval of the erosion/sedimentation control plan. Owner's Project Manager's acceptance of Construction Period Erosion/Sedimentation Control Plan required prior to starting earth disturbing activities.
- C. Complete soil preparation, sodding, fertilizing, mulching, and matting on disturbed areas that will require stabilization either because the area has reached final grade (permanent landscaping) or because the area remains unworked for over 14 days (temporary sodding) during the wet season.
- D. Notify Owner's Project Manager at least 3 working days in advance of:
 - 1. Materials delivery.
 - 2. Start of planting activity.
- E. Sodding: Perform under favorable weather conditions during seasons that are normal, for such Work as determined by accepted local practice.

1.04 MAINTENANCE

- A. Operations:
 - 1. Sodded Areas: Perform during maintenance period to include:
 - a. Watering: Keep surface moist.
 - b. Washouts: Repair by filling with topsoil and replace sodded areas.
 - c. Mulch: Replace wherever and whenever washed or blown away.
 - d. Resod unsatisfactory areas or portions thereof immediately if a satisfactory stand has not been produced.
 - 2. Inspect, repair, and replace as necessary all erosion control measures during the time period from start of construction to completion of construction.
 - 3. Inspect a minimum of at least once every 7 days or after each storm event and at least daily during prolonged rainfall. At no time shall more than 1 foot of sediment be allowed to accumulate in any erosion control device. The cleaning operation shall not dispose of sediment offsite.
- B. Sediment Removal:
 - 1. Remove sediment from erosion control devices and work into the grading plan at least once a week as required to maintain proper operation of devices. The cleaning operation shall not dispose of sediment offsite.
 - 2. Sediment shall be removed and the controls upgraded or repaired as needed as soon as practicable, but not later than 2 days after the surrounding exposed ground

has dried sufficiently to prevent further damage from equipment needed for repair operations.

3. In the event of continuous rainfall over a 24 hour period, or other circumstances that preclude equipment operation in the area, hand carry and install additional sediment controls as approved by the Owner's Project Manager.
4. Replace rock filters with new rock at least once a month or when the sediment reduces by one half the filtering capacity of the facility.

PART 2 - MATERIALS

2.01 FERTILIZER

- A. Commercial, uniform in composition, free-flowing, suitable for application with equipment designed for that purpose.
- B. Fertilizer shall have the following minimum percentage of plant food by weight:
 1. Nitrogen: 16 percent.
 2. Phosphoric acid: 4 percent.
 3. Potash: 8 percent.
- B. At least 50 percent of phosphoric acid shall be from normal superphosphate or an equivalent source which will provide a minimum of two units of sulfur.

2.02 SOD

- A. As specified in the Contract Documents.

2.03 MULCH

- A. The mulch material shall be dry straw or hay, consisting of oat, rye, or wheat straw, or of pangola, peanut, coastal bermuda, or bahia grass, hay or compost; and shall be free from noxious weeds and plants.
- B. Any plant officially listed as being noxious or undesirable by any Federal Agency, any agency of the State of Florida or any local jurisdiction in which the project is being constructed shall not be used. Furnish to the Owner's Project Manager, prior to incorporation onto the project, a certification from the Florida Department of Agriculture and Consumer Services, Division of Plant Industry, stating that the Mulch materials are free of noxious weeds. Any such noxious plant or plant part found to be delivered as mulch will be removed by the Contractor at his expense and in accordance with the law.
- C. Only undeteriorated mulch which can readily be cut into the soil shall be used. The "air-dry" weight (as defined by the Technical Association of the Pulp and Paper Industry, for wood cellulose) shall be marked on each package by the producer.

2.04 SOIL TACKIFIER

- A. Derived from natural organic plant sources containing no growth or germination-inhibiting materials.

- B. Capable of hydrating in water, and readily blend with other slurry materials.
- C. Wood cellulose fiber: Add as tracer, at rate of 150 pounds per acre.

2.05 EROSION CONTROL MATTING

- A. Excelsior mat or straw blanket; staples as recommended by matting manufacturer.

2.06 REINFORCED PLASTIC COVERING

- A. Co-extruded, copolymer laminate reinforced with a nonwoven grid of high strength nylon cord submersed in a permanently flexible adhesive media allowing for equal tear resistance in all directions.
- B. Black in color and ultraviolet stabilized.
- C. Physical requirement (minimum average roll values):
 1. Tear strength: 130 pounds.
 2. Elongation: 620 percent.
 3. Minimum thickness: 6 mil.

2.07 SILT FENCE

- A. Support posts: As recommended by manufacturer of geotextile.
- B. Fasteners: Heavy-duty wire staples at least 1-inch long, tie wires, or hog rings, as recommended by manufacturer of geotextile.
- C. Filter fabric: Polyester, polypropylene, or nylon filaments, woven into a uniform pattern, distinct and measurable openings.
 1. Filaments: Resistant to damage from exposure to ultraviolet rays and heat.
 2. Material edges: Finish so that, filaments retain their relative positions under stress.
- D. In accordance with requirements of Table No. 1:

Table No. 1 - Filter Fabric		
Physical Property	Required Value	Test Method
Weight, lbs/sq yd, min.	4	ASTM D3776
Equivalent Opening Size, max.	50-70	U.S. Standard Sieve
Grab Tensile Strength, lb, min. ARV	400	ASTM D4632
Elongation, % max.	25	ASTM D1682
Mullen Burst Strength, psi, min. ARV	200	ASTM D3786
Ultraviolet Radiation Resistance, % Strength Retention	80	ASTM D4355
Flow Rate, gpm/sf, min. ARV	30 to 50	ASTM D4491

2.08 STRAW BALES

- A. Machine baled clean salt hay or straw of oats, wheat, barley, or rye, free from seed of noxious weeds, using standard baling wire or string.

2.09 POSTS FOR STRAW BALES

- A. Two-inch by 2-inch untreated wood, rebar, or commercially manufactured metal posts.

2.10 STABILIZED CONSTRUCTION ENTRANCES

- A. Clean pit run or 2 inches minus gravel.
- B. Subgrade geotextiles as specified in the Contract Documents.

2.11 DUST CONTROLLER

- A. Nontoxic materials that do not have an adverse effect on soil structure or establishment and growth of vegetation.
 - 1. Calcium chloride meeting the requirements of AASHTO M144.
 - 2. Water; reasonably clean, and shall be free from suspended water.

2.12 FILTER FABRIC

- A. All existing and newly constructed storm drainage structures onsite or adjacent to the site shall be protected with two (2) layers of non-woven filter secured beneath the frame and grate.
- B. Filter Fabric shall meet the requirements of Type D-3 meeting the FDOT specifications Section 985.

2.13 FLOATING/STAKED TURBIDITY CURTAINS

- A. Curtains shall be minimum 18 ounce nylon reinforced PVC fabric (300 psi Test).
- B. Curtains are five (5') standard height and shall reach the bottom for depths up to ten (10') feet of water.
- C. Turbidity barriers are required on all outfalls located within the site or adjacent to the site. Location of turbidity barriers will be as approved by Owner's Project Manager.

PART 3 - EXECUTION

3.01 GENERAL

- A. Erosion control measures are required during all construction and site disturbance activities, and shall remain until permanent site ground covers are in-place.
- B. Limitation of exposure of erodible earth: The Owner's Project Manager may limit the surface areas of unprotected erodible earth exposed by the construction operation, and may direct the Contractor to provide erosion or pollution control measures to prevent

contamination of any river, stream, lake, tidal waters, reservoir, canal, or other water impoundments, or to prevent detrimental effects on property outside the project right-of-way or damage to Project. Limit the area in which excavation and filling operations are being performed so that it does not exceed the capacity to keep the finish grading, grassing, sodding, and other such permanent erosion control measures current in accordance with the accepted schedule.

- C. Do not allow the surface area of erodible earth that clearing and grubbing operations or excavation and filling operations expose to exceed 750,000 ft² without specific prior approval by the Owner's Project Manager. This limitation applies separately to clearing and grubbing operations and excavation and filling operation.
- D. The Owner's Project Manager may increase or decrease the amount of surface area the Contractor may expose at any one time.
- E. The implementation of the erosion control plan and the construction maintenance, replacement and upgrading the erosion control devices are the responsibility of the Contractor until all construction is completed and landscaping established and approved. During the construction period, the erosion control devices shall be upgraded for unexpected storm events and to ensure that sediment and sediment laden water do not leave the site.
- F. Maintain existing buffer zones adjacent to Project Limits. Keep all construction equipment, debris, and soils out of the natural buffer zone.

3.02 STABILIZED CONSTRUCTION ENTRANCES

- A. Provide a graveled construction access at each access point between the site and any public or private road or other paved surfaces.
- B. Place subgrade geotextile on the ground prior to aggregate placement.
- C. Place aggregate over the subgrade geotextile to a minimum thickness of 8 inches.
- D. Minimum dimensions for stabilized construction entrances are 50 feet in length by 20 feet in width.

3.03 SOIL PREPARATION

- A. Before start of sodding, and after surface has been shaped and graded, and lightly compacted to uniform grade, scarify soil surface to minimum depth of 1 inch.

3.04 SODDING

- A. As specified in the Contract Documents.

3.05 MULCHING

- B. Apply uniformly on disturbed areas that will remain undisturbed for 7 days or more, as requested by Owner's Project Manager, and on all sodded areas.
- C. Application: Sufficiently loose to permit penetration of sunlight and air circulation, and sufficiently dense to shade ground, reduce evaporation rate, and prevent or materially reduce erosion of underlying soil.

1. As recommended by manufacturer.

3.06 SOIL TACKIFIER

- A. Spray on after mulch is in place.
- B. The soil tackifier shall be applied at the rate per acre specified by manufacturer for applicable grades.

3.07 REINFORCED PLASTIC COVERING

- A. Place on areas where sodding and erosion control matting have not controlled erosion, and over all temporary stockpiles.
- B. Install in single thickness, strips parallel to direction of drainage. Anchor plastic in 6-inch by 6-inch trench backfilled with compacted native material.
- C. Maintain tightly in place by using sand bags on ropes with a maximum 10-foot grid spacing in all directions.
- D. Tape or weight down full length, overlap seams at least 12 inches.
- E. Remove at final acceptance unless notified otherwise by Owner's Project Manager.

3.08 SILT FENCE

- A. Install prior to starting earth disturbing activities upslope of fence.
- B. Install silt fence along contour where shown on the Drawings. Do not deviate from grade more than 4 inches.
- C. One-piece filter fabric or continuously sewn to make one-piece filter fabric for full height of the fence, including portion buried in the toe trench.
- D. When joints are necessary, splice filter fabric together only at a support post, with a minimum 6-inch overlap, and securely fasten both ends to support post.
- E. Filter fabric shall not extend more than 30 inches above the ground surface. Securely fasten to upslope side of each support post using ties. Filter fabric shall not be stapled to existing trees.
- F. Take precaution not to puncture filter fabric during installation. Repair or replace damaged area.
- G. Remove silt fence after upslope area has been permanently stabilized. Immediately dress sediment deposits remaining after the sediment fence has been removed to conform to existing grade. Prepare and sod graded area.

3.09 TEMPORARY SOIL STOCKPILES

- A. Cover with reinforced plastic covering, as directed in Article Reinforced Plastic Covering.
- B. Protect perimeter of stockpile from erosion with ditches.

3.10 DUST CONTROL

- A. Apply appropriate dust control measures on a continuous basis until permanent stabilization measures are in place.
- B. Apply on construction routes and other disturbed areas subject to surface dust movement and where off-site damage may occur if dust is not controlled.
- C. Avoid creating erosion when using water as a dust controller.

3.11 STRAW BALES

- A. Embed minimum of 4 inches in flat-bottomed trench.
- B. Place with ends tightly abutting or overlapped. Corner abutment is not acceptable.
- C. Install so that bale bindings are oriented around the sides and not over the top and bottom of the bale.
- D. Use two posts for each bale. Drive posts through the bale until top of post is flush with top of bale and post is 1-1/2 feet to 2 feet in the ground.
- E. Wedge loose straws in any gaps between bales.

3.12 EROSION CONTROL MATTING

- A. Place on sodded slopes 3H to 1V, and steeper.
- B. Apply sod and fertilizer prior to matting.
- C. At top of slope, entrench material in 6-inch by 6-inch trench. Secure matting at 1 foot intervals down the slope. At the bottom of the slope, extend the mat 2 feet beyond the toe of slope, turn material under 4 inches, and staple at 1 foot intervals.
- D. Mats shall be stapled in-place as they are installed down the slope face. The mats shall have direct contact with the soil surface.
- E. Overlap:
 - 1. Lengthwise: 1 foot minimum.
 - 2. Crosswise: 6 inches minimum.

3.13 CLEANUP

- A. Sediment trapped in erosion control devices shall be removed from the site or regraded into the slopes on the site. Do not flush sediment-laden water into drainage system.
- B. After site restoration is complete and when approved by the Owner's Project Manager, all temporary erosion control measures shall be completely removed and disposed offsite to locations that are approved by federal, state, and local authorities.
- C. Silt fence, straw bales, reinforced plastic covering, and any other erosion control devices shall be disposed offsite to locations that are approved by federal, state, and local authorities.

- END OF SECTION -

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SECTION 02821

DECORATIVE METAL FENCES AND GATES (SLEEKFENCE)

PART 1 - GENERAL

1.01 SUMMARY OF WORK

- A. Decorative aluminium metal fences and manual swing gates.
- B. Related Work:
 - 1. Section 033000: Cast-in-Place Concrete.
 - 2. Section 312316: Excavation.

1.02 REFERENCES

- A. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).
- B. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).
- C. ANSI/BHMA A156.3 – Exit Devices.
- D. ASTM A276/A276M – Standard Specification for Stainless Steel Bars and Shapes.
- E. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- F. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
- G. ISO 9227 – Corrosion Tests in Artificial Atmospheres.
- H. ISO 16474-2 – Methods of Exposure to Laboratory Light Sources.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Site Meetings: Arrange a pre-installation meeting on site one week prior to start of work to be attended by consultant, installer, project manager, manufacturer's representative, and any other parties directly affecting work of this section to:
 - 1. Review methods and procedures related to installation.
 - 2. Review all typical and special details as required to complete the work of this section.

1.04 SUBMITTALS

- A. Submit action submittals in accordance with Section 013300.
- B. Product Data: Submit manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Shop Drawings:
 - 1. Submit Shop Drawings.
 - 2. Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, gates, and schedule of components.
 - 3. Foundation details, concrete design mix.
- D. Samples: Submit samples of fence panels, slat infill, illustrating construction and colored finish.
- E. Manufacturer's Installation Instructions: Indicate installation requirements, post foundation anchor bolt templates, and gate installation.
- F. Project Record Documents: Accurately record actual locations of property perimeter posts relative to property lines.
- G. Closeout and Maintenance Submittals:
 - 1. Submit closeout and maintenance submittals including manufacturers maintenance and cleaning data and product warranty documentation.
 - 2. Submit maintenance materials consisting of one panel.

1.05 QUALITY ASSURANCE

- A. Manufacturers: Manufacturers specializing in manufacturing products specified in this section with a minimum of five (5) years documented experience.
- B. Installers: Perform Work of this Section by a company that has a minimum of five (5) years proven experience in the installation of decorative metal fencing and gates of a similar size and nature.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Store materials in a manner to ensure proper ventilation and drainage.
- B. Protect against damage, weather, vandalism, and theft.

1.07 WARRANTY

- A. Provide extended warranty for decorative metal fences and gates in accordance with the General Conditions, warranty shall be extended from date of Substantial Completion for the period of time listed below:
 - 1. Provide five (5) year extended warranty against defects in installation.
 - 2. Provide ten (10) year extended warranty against defects in powder coated finish including cracking, peeling, chipping, blistering or corroding.
 - 3. Provide twenty (20) year extended warranty against defects in fencing materials.
- B. Provide manufacturers limited lifetime warranty for all structural fence components including rails, pickets, and posts from date of original purchase.

PART 2 - PRODUCTS

2.01 SYSTEM AND MANUFACTURER

- A. Decorative fence and gate components for a [semi] [solid] privacy fence as manufactured by:
 - 1. Sleek Fence Inc.
19272 96 Avenue, Unit 3
Surrey, BC, V4N 4C1
Contact: Samuel Mitchell
Email: sam@sleekfence.com
Tel: 1-855-875-0855
 - 2. Sleek Fence Inc.
2 Vliet Farm Road
Asbury, NJ, 08802
Contact: Samuel Mitchell
Email: sam@sleekfence.com
Tel: 1-855-875-0855

2.02 PERFORMANCE REQUIREMENTS

- A. Provide complete factory-fabricated system of posts and panels, accessories, fittings, and fasteners; finished with electrodeposition coating.
- B. Design gate to suit the type and application.
 - 1. Provide quantity of gate hinges based on weight, height, and number of expected gate cycles.
 - 2. Identify necessary hardware required for application on manufacturer's gate drawings.

- C. Fire resistance: Fencing materials to conform to ASTM E84, Class A rating.
- D. Salt spray rating: Fencing materials to conform to ISO 9227 corrosion test.
- E. Wind force loading: Design fence post installation to suit design wind speed for Place of Work. Refer to Structural calculations and manufacturers recommendations to establish appropriate fence mounting method. Provide steel insert as required.

2.03 MATERIALS

- A. Aluminum:
 - 1. Tubular Pickets, Rails and Posts: ASTM B221, 6063-T6 alloy.
 - 2. Extrusions for Posts and Rails (Outer Channel): ASTM B221, 6063-T6 alloy.
 - 3. Extrusions for Pickets and Rail (Inner Slide Channels): ASTM B221, 6063-T6 alloy.
- B. Fasteners: ASTM A276/A276M, Type 410 stainless steel; self-drilling screws.

2.04 COMPONENTS

A. Fence Panels:

- 1. Fence Panels: 6 feet long extruded aluminum preassembled panels.

Specifiers Note: Select the style of fence noted below and insert fence panel height.

- a. Panel Style 1: Semi-privacy screen fence, fully assembled panel [...]” high by 72” long consisting of 4-inch x 5/8-inch boards installed with 3/4 inch gaps. Aluminum boards to be fabricated with 18-gauge wall thickness and 2 internal ribs.
 - b. Panel Style 2: Solid privacy fence, fully assembled panel [...]” high by 72” long consisting of 5.7-inch x 5/8-inch boards with interlocking tongue and groove. Aluminum boards to be fabricated with 18-gauge wall thickness and 2 internal ribs.
- 2. Posts: 4-inch square aluminum extrusions with 0.138" wall thickness.

B. Manual Swing Gates:

- 1. Gate Panels: Manufacturer's standard decorative aluminum gates.

Specifiers Note: Custom gates (rolling, cantilever, bi-fold, custom sizes) are available if needed, please contact support@sleekfence.com for project specific assistance.

- 2. Posts: 4-inch square aluminum extrusions as standard (custom gates may require larger posts)
- 3. Rails and Frame: Manufacturer's standard interlocking frame design of aluminum extrusions.
- 4. Hardware:

- a. Heavy Duty Hinge: Manufacturer's standard mechanism; factory finished stainless steel.
- b. Latch: Manufacturer's standard mechanism; factory finished stainless steel.

Specifiers Note: Select the style of panic hardware to suit Project requirements.

5. Panic hardware: ANSI/BHMA A156.3, Grade 1 hardware. [Wide stile RIM exit device Dormakaba 9300] [Touch bar exit device for medium or low traffic areas Von Duprin 22] [High performance wide stile for heavy duty use Von Duprin 98/99] [Wide stile push pad exit device Allegion Falcon 25-R].
6. Hydraulic gate closer: Manufacturer's standard mechanism; factory finished stainless steel.
7. Operation: Manual.

2.05 FINISHES

Specifiers Note: AAMA 2603 and Qualicoat Class 1 are standard. The finish can be upgraded to AAMA 2604 and Qualicoat Class 2 if required.

- A. Finish: Powder coating with weathering performance meeting [AAMA 2603] [AAMA 2604] and GSB Standard requirements. Coating to be certified according to Qualicoat Class [1] [2] including the following stages:
 1. Surface preparation: Provide aluminum etching stage.
 2. Pretreatment: Full multi-stage chromate conversion coating, or chrome-free pre-treatment, or pre-anodising pre-treatment. Fully dry aluminum prior to application of powder coating.

Specifiers Note: Black is carried in stock. Wood grain look colors are available with a 10 to 15 week lead time. Custom colors are available, however contact manufacturer for lead times.

3. Powder coating color: [Black RAL 9005] [Wood grain look, Deep Forest/Organic/Warm Cedar/Charcoal/New Light] [Custom color RAL[...]].

Specifiers Note: Select one of the following two Clauses to suit required Qualicoat Class.

- B. Coating performance: Powder coat finish shall meet Qualicoat Class 1 as follows:
 1. Dry film thickness: Minimum 60 µm.
 2. Bend test (minimum 5 mm mandrel): no crack.
 3. Impact Resistance (minimum 2.5 N-m): no crack.
 4. Corrosion resistance to ISO 9227: 1000 hours.
 5. Accelerated weathering to ISO 16474-2 (Method A): 50% Gloss retention and color change to limit per App A12.
- C. Coating performance: Powder coat finish shall meet Qualicoat Class 2 as follows:

1. Dry film thickness: Minimum 60 µm.
2. Bend test (minimum 5 mm mandrel): crack allowed, no film detachment after tape adhesion test.
3. Impact Resistance (minimum 2.5 N-m): crack allowed, no film detachment after tape adhesion test.
4. Corrosion resistance to ISO 9227: 1000 hours.
5. Accelerated weathering to ISO 16474-2 (Method A): 90% Gloss retention and color change to 50% of limit per App A12 Class 2.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Consultant of unsatisfactory preparation before proceeding.

3.02 SURFACE PREPARATION

- A. Clean surfaces thoroughly prior to installation.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's written instructions.
- B. Excavate post holes in accordance with Section **312316**.
- C. Set fence posts to manufacturer recommended spacing.
- D. Space gate posts according to the manufacturers' drawings, dependent on standard out-to-out gate leaf dimensions and gate hardware selected.
- E. Attach panels to posts with manufacturer's standard panel brackets and recommended fasteners. Confirm screw spacing with manufacturer to suit wind speeds for Place of Work.
- F. Provide gate hardware by the manufacturer of the gate and install in compliance with manufacturer's recommendations.

3.04 INSTALLATION TOLERANCES

- A. Maximum Variation from Plumb: 1/8 inch.
- B. Maximum Offset from Indicated Position: 1 inch.
- C. Minimum Distance from Property Line: 6 inches.

3.05 FIELD QUALITY CONTROL

- A. Refer to Section 014000 - Quality Requirements, for additional requirements.
- B. Layout: Verify that fence installation markings are accurate to design, paying attention to gate locations, underground utilities, and property lines.
- C. Post Settings: Randomly inspect three locations against design for:
 - 1. Hole diameter.
 - 2. Hole depth.
 - 3. Hole spacing.
- D. Fence Height: Randomly measure fence height at three locations or at areas that appear out of compliance with design.
- E. Gates: Inspect for level, plumb, and alignment.
- F. Workmanship: Verify neat installation free of defects.

3.06 CLEANING

- A. Leave immediate work area neat at end of each work day.
- B. Clean jobsite of excess materials; scatter excess material from post hole excavations uniformly away from posts. Remove excess material if required.
- C. Clean fence with mild household detergent and clean water rinse well.
- D. Remove mortar from exposed posts and other fencing material using a 10 percent solution of muriatic acid followed immediately by several rinses with clean water.
- E. Touch up scratched surfaces using materials recommended by manufacturer. Match touched-up paint color to factory-applied finish.

3.07 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair, or replace damaged products before Date of Substantial Completion.

3.08 MAINTENANCE

- A. Regular cleaning of fencing in accordance with manufacturers written instructions is required to qualify for extended warranty. Cleaning shall be documented.
 - 1. <https://sleekfence.com/wp-content/uploads/2023/10/SLEEKFENCE%E2%84%A2-Cleaning-Instructions.pdf>
- B. Clean fencing at minimum 6-month intervals unless otherwise required for more aggressive environment.

- C. Clean with the use of mild and non-abrasive household neutral detergent (pH 5 to 8) diluted with water. Do not use dish soap.
- D. Cleaning of powder coated finish shall be conducted out of direct sunlight and ensure surface temperature of substrates does not exceed 86°F/30°C.

END OF SECTION

SECTION 02481

TREE RELOCATION AND PROTECTION

PART 1 - GENERAL

1.01 WORK TO BE PERFORMED AND WORK INCLUDED

- A. Prepare and relocate trees and palms required for relocation within the project boundaries, to include all aspects of preparation, relocation, protection, and maintenance.
- B. Protection and care of existing trees and palms to remain within the project boundaries, to include all aspects of protection, pruning, fertilization, and watering.
- C. Watering by water truck.
- D. Follow up maintenance as required by these Specifications.
- E. Labor, materials, equipment, and services to complete all preparation, relocations and protection work as shown on the Drawings, as specified herein, or both.

1.02 SUBMITTALS

- A. Copy of all permits submitted for tree relocations.
- B. The Contractor shall utilize the services of a Licensed Landscape Architect or Certified Arborist for preparation of tree disposition plans, tree removal permits, tree relocation permits, and all required supporting documentation.
- C. Verification of Qualifications: The Contractor shall provide a list of references and project list of a minimum of five (5) projects that the Contractor has successfully completed that are similar in scope and nature.
- D. List of all equipment to be utilized during tree preparation and transplanting.
- E. Literature on specified wetting agents, fertilizers, and soil conditioners.

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

- A. Comply with the following standards and specifications for all materials, methods, and workmanship unless otherwise noted:
 - 1. Codes and Standards of the American Association of Nurserymen.
 - 2. Codes and Standards of the National Arborists Association.
 - 3. Codes and Standards of the International Society of Arboriculturists.

1.04 PERMITS

- A. The Contractor shall secure any permits required, including tree removal and tree relocation permits, in order to complete the work under this Section. Cost of permit

fees associated with tree removals and/or relocations shall be paid for under the "Permits Allowance" bid item.

1.05 DESCRIPTION

- A. Trees to be relocated within the project area will be specifically designated in the field as project work progresses or as noted in the drawings.
- B. Existing trees to be relocated shall be crown pruned and be treated with soil amendments prior to relocation.
- C. Existing trees to be relocated or to remain shall be protected with barricades during construction. Trees or shrubs to remain which are scarred or destroyed shall be replaced at the direction of the City Forester with the same species, size, and quality at no cost to the City.
- D. Tree pits resulting from relocated material shall be backfilled with clean fill and brought flush with surrounding grade.

1.06 GUARANTEES

- A. The Contractor shall guarantee his work in the following way:
 - 1. Any tree or palm that dies or is deemed in unacceptable condition for one year following final project acceptance shall be removed by the Contractor, including root ball, and backfilling of pit, at no cost to the City.
 - 2. The Contractor shall provide a comparable specimen at no additional cost to the City.
 - 3. The guarantee shall be enforced if it is deemed by the City Forester that tree mortality or decline is a product of negligence by the Contractor.

PART 2 - MATERIALS

2.01 SOIL AMENDMENTS

- A. Root stimulant shall be Roots Biostimulant, concentrate or powder, as manufactured by LISA Products Corp., (305) 797-6801, or City-approved equal. Stimulant shall be applied either as a wash, or by injection, mixed per manufacturer's recommendation.
- B. Soil conditioner shall be Lesco Wet, as manufactured by Lesco, Inc. or NoburN, as manufactured by Roots or City-approved equal.
- C. Minor element liquid fertilizer mix shall be Micro Mix liquid as produced by Lesco, Inc., or equal; to be diluted at a rate of 1 gallon per 100 gallons of water and applied at a rate of 50 gallons per 1,000 square feet of canopy, or Iron Roots, applied per manufacturer's instructions.
- D. Time Release Fertilizer tablets shall be Agriform, 15 grams, designation 8-8-8; or approved equal.

2.02 EQUIPMENT

- A. Soil amendments shall be injected into the soil by means of a spray apparatus utilizing mechanical agitation to keep powdered amendments suspended.
- B. Root pruning equipment shall be designed for this task, and shall produce clean cuts of roots without damage to the resulting root ball.
- C. Relocation equipment shall be capable of lifting and transporting trees without damage.

2.03 SOIL

- A. Soil to be placed once trees or palms are transplanted shall meet the requirements specified in the Contract Documents.

2.04 WATER

- A. Water shall be clean and potable.,

2.05 MULCH

- A. Grade A Eucalyptus mulch, free of viable weed seeds.

2.06 BRACING AND STAKES

- A. All bracing and stakes shall be pressure treated pine. Compression bands shall be stainless steel.

PART 3 - EXECUTION

3.01 EXCAVATING NEAR EXISTING TREES

- A. Maintain a minimum 6-foot clearance from all tree trunks except palm trees.
- B. Use a 24-inch minimum depth saw cut in pavement or dirt/gravel roadway before start of excavation in areas where there are large trees close to the construction area. No coating application is required after saw cutting roots.

3.02 PREPARATION FOR RELOCATION OF TREES AND PALMS WITHIN THE PROJECT BOUNDARIES

- A. Crown Pruning: All trees and palms shall be crown pruned prior to relocation.
 - 1. Broadleaf Trees:
 - a. All trees are to be trimmed by thinning the crown only, and not by reducing crown dimensions. Trim to conform to NAA Standards, including removal of dead wood.
 - b. Repair any existing injuries to trees including cavities and machinery marks.
 - 2. Palms:
 - a. Remove all fruits and seed pods, and all but the seven (7) youngest fronds.

- b. Tie all remaining fronds with untreated cotton twine or burlap straps.
- B. Fertilization and Watering:
- 1. Preparation: Clear the root ball area of all foreign material, trash, etc., to expose undisturbed soil.
 - 2. Application/Schedule:
 - a. Trees shall be deep injection fertilized a minimum of 14 days prior to relocation. Specified liquid fertilizer shall be used and applied at the concentration and application rates stated herein.
 - b. Mix wetting agent, biostimulant, and minor element mix to produce a single fluid with each component included at the specified concentration. Inject into the root zone within the limits of proposed root ball at the rate of 50 gallons fluid per 1,000 square feet of tree canopy, using only approved spray equipment.
 - c. Form an earth berm 6 inches high outside the proposed root ball prior to watering. Water application shall saturate the root ball to its entire depth.
- C. Root Pruning:
- 1. Technique:
 - a. All trees shall be excavated by digging a trench a minimum of 36 inches deep by 6 inches wide, either by hand or with a trenching machine designed for this purpose. Provide continuous trenching around the tree or palm at a minimum distance of 30 inches from the trunk. Hand cut broadleaf tree roots after trenching to produce clean cuts with no splits or tears.
 - b. Barricades: Barricade all root pruned trees and palms at outside of soil berm with minimum 4-foot chain link fence or other barricade approved by the City.
 - c. Timing:
 - 1) All oaks to be relocated shall be maintained for a minimum of 10 weeks after root pruning prior to relocation.
 - 2) Palms shall be maintained a minimum of 4 weeks prior to relocation.

3.03 RELOCATION OF TREES AND PALMS

- A. General: Trees to be relocated shall be as directed by the Engineer.
- B. Preparation:
 - 1. Trees and palms shall be injected with soil amendments a minimum of 14 days prior to relocation. Apply at manufacturer's recommended concentration and application rates.

2. Trees and palms shall be thoroughly soaked to the full depth of the root ball daily for seven (7) consecutive days prior to relocation.
 3. Accurately locate position and elevation where all trees are intended to be planted, for verification by City Forester. Verify that no overhead or underground utilities, existing or proposed, conflict with proposed locations.
 4. Ascertain that all proposed paths for machinery are clear of utilities and other obstructions.
- C. Excavation of Tree Pits: Dig all pits with vertical sides and flat bottom. Existing soil may be utilized as backfill as directed by the City Forester. All Tree Pits to be lined with root barrier adjacent to roadways and sidewalks as directed by City.
- D. Digging and Handling - Broadleaf Trees:
1. Notify City 2 business days in advance of each relocation to allow for observation of procedures.
 2. Determine line of previous root pruning and excavate around root mass to leave area 12 inches out from line of root pruning undisturbed. Digging shall be accomplished so as to produce clean cuts on all roots without tearing or splitting. Trenching shall be a minimum of 36 inches deep.
 3. Trees are to be handled in such a way as to avoid damage to bark and limbs subject to support cables or chains. Attach padded support cables or chains at multiple points where possible. Alternatively, tree trunks may be drilled and doweled for broadleaf trees. The City Forester reserves the right to require doweling in lieu of lifting by straps.
 4. Root balls are to be undercut prior to lifting. Do not force tree from ground prior to undercutting. Ball depth to be determined upon assessing conditions at time of trenching, to keep intact the entire root ball.
 5. Trees shall be properly wrapped during moving so trunks will not be scarred and damaged and to avoid broken limbs. Broken limbs or scarred trunks shall cause tree to be unacceptable and rejected at the City's option. Broken limbs and wounds which do not (in the judgment of the City Forester) cause the tree to be rejected shall be cleanly cut.
 6. Transport plant material on vehicles of adequate size to prevent overcrowding, broken limbs, foliage damage or root ball damage.
 7. Root balls and foliage shall be kept moist during all phases of relocation.
 8. Partially backfill tree pits with 12 inches of approved planting soil prior to setting tree. This layer of soil to be thoroughly drenched prior to relocation to achieve a stable platform at the correct elevation so that the top of rootball is 1 inch above proposed grade.
 9. Rotate tree prior to setting to achieve best positioning relative to adjacent trees and viewing angles.
- E. Backfilling:

1. Flood bottom soil layer to settle tree into best position and to remove air pockets.
2. Continue to flood root ball as planting soil is deposited to ensure removal of all air pockets.
3. Create a saucer to retain water.

F. Bracing:

1. Support tree with machinery until bracing is complete.
2. Buttresses may support separate trunks on multiple trunk trees.
3. Maintain braces until completion of project. Removal of braces shall be by others.

G. Watering: Relocated trees shall be watered using water-truck. Watering schedule shall be once per day for first six weeks; followed by three times per week for following six weeks.

- END OF SECTION -

SECTION 02535

STRUCTURES

PART 1 - GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall construct all precast concrete items as required in the Contract Documents, including all appurtenances necessary to make a complete installation.

1.02 RELATED DOCUMENTS

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

1.03 WORK INCLUDED

- A. The work covered by this section shall include the furnishing of all labor, equipment, services, materials, products and tests to perform all operations in connection with the construction of all structures as shown on the plans, defined in these specifications and subject to the terms and conditions of this contract, including, but not limited to, manhole, catch basins, and inlets.

1.04 SUBMITTALS

- A. The Contractor shall furnish the Engineer shop drawings of the precast manhole for approval. Shop drawings should illustrate all dimensions, reinforcements and specifications for the complete manual.
 - 1. Contractor shall provide calculations signed and sealed by a licensed PE in the State of Florida for buoyancy and loading tolerances.

PART 2 - PRODUCTS

2.01 MORTAR

- A. Mortar for use in constructing and plastering sewer structures shall conform to ASTM C-270, "Specifications for Mortar for Unit Masonry". A Portland cement-hydrated lime mixture or a masonry cement may be used provided that the same materials are used throughout the project.
- B. Mortar materials shall be proportioned by volume and shall consist of one part Type II Portland Cement to two parts aggregate (sand). Portland Cement shall conform to ASTM C-150, "Specifications for Portland Cement". Aggregate shall conform to ASTM C-144, "Specifications for Aggregate for Masonry Units."

2.02 PRECAST CONCRETE MANHOLE

- A. Precast manhole sections shall conform to the plans or ASTM C-478, Specifications for Precast Reinforced Concrete Manhole Sections as modified thereto whichever is more restrictive. Concrete shall attain a minimum compressive strength of 4,000 psi at 28

days. Minimum wall thickness shall be six (6") inches. All manholes shall be designed and manufactured for a minimum H-20 traffic loading.

- B. Unless otherwise specified on the plans, all joints shall be made with neoprene or rubber "O" ring compression joints; mastic joint sealing compound, or approved equal. After assembly, all joints shall be filled with mortar and pointed to provide a smooth surface without joint voids.
- C. The base and walls that compose the bottom section of precast manhole shall be of monolithic construction, minimum 8 inches thick, and the edge of the base slab shall project a minimum 4 inches beyond the outside diameter of the wall.
- D. Contractor is responsible for sizing wall penetrations for pipe. After the pipe is set, the void space between the pipe and the hole perimeter shall be completely filled with non-shrinking, quick-setting, waterproof cement mortar and struck smooth.
- E. The minimum height of precast base section shall be 36 inches from the bottom of the base slab; however, no holes for piping shall be cast less than 8 inches from the top of the base section or less than 2 inches from the top of the base slab.

2.03 ENDWALLS, CATCH BASINS, INLETS AND JUNCTIONS BOXES

- A. Endwalls, catch basins, inlets and junction boxes shall be constructed at the locations shown and to the dimensions indicated on site plans. Unless otherwise specified on the plans, inlets, junction boxes, catch basins, and similar structures may be constructed of brick, concrete block, poured concrete or precast concrete. Precast catch basins shall conform to latest A.C.I. and P.C.A. specifications. Concrete shall have not less than 4,000 psi compressive strength at 28 days. Minimum wall thickness shall be six (6") inches. All structures shall be designed and manufactured for a minimum H-20 traffic loading.
- B. Unless otherwise specified on the plans, all concrete for these structures shall be Class I concrete as specified in the Florida Department of Transportation "Standard Specifications for Road and Bridge Construction", latest revision, Section 345. Mortar for use in constructing and plastering shall be as previously set forth in this section.
- C. Brick shall be solid hard-burned clay conforming to ASTM Serial C-32-93, Grade SM. Concrete brick shall conform to ASTM Serial C-55-75, Grade P-I. Concrete block shall conform to ASTM Serial C-90-78, Grade PI.
- D. All brick or concrete block structures covered in this Section shall be plastered inside and outside with 1/2 inch of cement mortar. Inside surfaces shall be smooth and even.
- E. Base slabs and walls of concrete structures shall be constructed in a continuous pour between expansion joints.
- F. For each grate type inlet, two layers of Mirafi 140 fabric of "Poly Filter X" polypropylene material or approved equal, shall be sandwiched between 2 x 2 x 10/10 welded wire fabric cut to the grate size and attached to the underside of the grate. The sandwiched filter material shall be wired to the cross members of the grate each way on 4-inch centers. After inlet construction and the roadway construction is completed and the project site work (including landscaping) has been established, the filter material and fabric shall be removed with any retained silt or sand.

2.04 CASTINGS (INCLUDING FRAMES, COVERS AND GRATINGS)

- A. Iron castings shall conform to ASTM A-48, "Specifications for Gray Iron Castings", and shall be Class 35. Frames and grates may be Class 35.
- B. All castings shall be made of clean, even grain, tough grey cast iron. The castings shall be smooth, true to pattern and free from projections, sand holes, warp and other defects. The horizontal surface of the frame cover seats and the under surface of the frame cover seat which rests upon the cover seat shall be machined. After machining, it shall not be possible to rock any after it has been seated in any position in its associated frame. Machining shall be required only on those frames and covers intended for vehicular traffic.
- C. Bearing surfaces between cast frames, covers and gratings shall be machined and fitted together to assure a true and even fit. Within areas of vehicular traffic, the frames, covers and gratings shall be machined-ground so that irregularity of contact will be reduced to a minimum and will be rattle-proof.
- D. All manhole covers shall be provided with concealed pick holes. Covers shall be lettered "City of Fort Lauderdale - Sanitary Sewer" or "No Dumping – Drains To Waterway" as applicable and shall be plainly visible. The manhole frames and covers shall be flush with finished grade. Sanitary Sewer manhole covers shall bear the City logo as manufactured by US Foundry or approved equal.
- E. Grates and covers for inlets shall be as shown on the plans, set to the grades indicated and conforming with the requirements of the castings described above. Grates shall be furnished complete with frames specifically constructed to provide full bearing at all points of contact.

PART 3 - EXECUTION

3.01 CHANNELS

- A. Channels shall be accurately and smoothly formed in accordance with the plans. Channels shall be constructed of concrete with trowel finished surfaces. The upper surface of the manhole shall be sloped toward the channels as shown.
- B. Drop pipe at sanitary sewer manhole shall be installed when the difference in elevation between the pipe invert and the invert at the center of the manhole exceeds two feet (2'), or where directed by the City. The drop manhole shall be built according to the plans and specifications.
- C. After channels are formed and section joints are pointed, the interior of the manhole shall be painted with two coats of Koppers Bitumastic 300-M (7 mils per coat) or approved equal. The exterior shall be painted in a similar manner, if required by local regulations.

3.02 CONCRETE GRADE RINGS

- A. All concrete grade rings shall meet ASTM C478 and shall be a minimum 4,000 psi @ 28 days. Concrete grade rings shall be a minimum thickness of 2 inches and a maximum thickness of 6 inches. No more than 8 inches of concrete grade rings shall

be installed on one manhole. Concrete grade rings shall be laid in mortar and all joints shall be finished smooth and not be less than $\frac{1}{4}$ inch or more than $\frac{1}{2}$ inch in thickness. Concrete grade rings shall be painted with two coats of Koppers Bitumastic 300-M (7 mils per coat) or approved equal.

3.03 MANHOLE AND STRUCTURES

- A. All joints shall be finished water tight, all openings for sewers, frames, etc., in precast manhole and catch basins shall be cast at time of manufacture. Spaces around all piping entering or leaving manhole shall be completely filled with Embeco mortar or equal.
- B. All manhole shall be set plumb to line and grade and shall rest on a firm carefully graded subgrade which shall provide uniform bearing under base.
- C. Grout for manhole bottoms shall consist of broken block, brick and 2:1 cement mortar.

3.04 CLEANING AND MAINTENANCE

- A. All structures shall be cleaned and maintained in workable condition until accepted by the City.

- END OF SECTION -

SECTION 02575
SURFACE RESTORATION

PART 1 - GENERAL

1.01 STANDARD SPECIFICATIONS

- A. When referenced in this Section, Standard Specifications shall mean Florida Department of Transportation, Standard Specifications for Road and Bridge Construction, current edition.

1.02 INTENT

- A. Specific surface restoration requirements are detailed in this and other sections.
- B. For pipeline projects, the intent of these Specifications and the criteria of the Measurement and Payment Section is that the roadway, adjacent Right-of-Way, and properties affected by construction activity shall be returned to their pre-existing condition, unless otherwise indicated by these Contract Documents.
1. For pipelines constructed in the Right-of-Way between the sidewalk and edge of pavement, the ground surface will be graded into a swale as shown on the Drawings and provided with sod.
 - a. Argentine Bahia sod will be used for areas without irrigation systems, except where St. Augustine turf existed previously.
 - b. St. Augustine "Floritam" sod will be used for areas with irrigation systems and in locations with similar, existing turf.
 - c. Seashore Paspalum sod will be used in areas prone to salt water flooding, Driveways and sidewalks will be placed in kind, using similar materials of construction.
 2. Trees, shrubs, and personal property (e.g. mail boxes) located in the swale area shall be relocated or replaced in kind, in accordance with the provisions of the Contract Documents.
- C. For work areas disturbed by the Contractor for convenience, the area affected shall be restored in kind.
1. The costs of this restoration shall be incidental to the cost of the Work.
 2. Payment for restoration outside the limits of work shall be repaired at the Contractor's expense.

1.03 WORK INCLUDED

- A. This Section covers the Work necessary to replace all pavement, curbs, sidewalks, rock surfacing, and other street features damaged either directly or indirectly by the operations incidental to the construction described in other sections of the Contract Documents.
- B. Where the materials, construction procedures, degree of compaction of materials, and the method of control and testing, as required in the Contract Documents differ from the Standard Specifications requirements, the more stringent requirements shall apply.
- C. The intent of the Drawings is to provide a full lane, permanent trench repair for all work crossing or running parallel with roadways. Temporary restoration to provide a passable surface is also required.
- D. Overlay of asphalt pavement may be required as shown on the Drawings.
- E. Provide finished gradation and grassing in accordance with the Contract Documents.

1.04 OPTIMUM MOISTURE CONTENT

- A. "Optimum moisture content" shall be determined by the ASTM standard specified to determine the maximum dry density for relative compaction.

1.05 TEMPORARY TRENCH REPAIR OR STABILIZATION

- A. Following pipe installation and prior to permanent trench repair or asphalt replacement, temporary trench repair will be defined as one of the following:
 - 1. Installation of flowable fill as described in this Section and the Contract Documents.
 - 2. Installation of the compacted base course and an asphalt prime coat as described in this Section and the Contract Documents.
- B. Temporary trench repair shall be maintained in accordance with the requirements of this Section and the Contract Documents until the final trench repair or asphalt surface is installed to provide a dust-free, drivable, and safe roadway surface.

PART 2 - MATERIALS

2.01 GENERAL

- A. All materials for replacement of existing base course and asphalt surfacing shall conform to the Standard Specifications except as modified herein.
- B. The Contractor will be responsible for furnishing satisfactory materials that meet the specifications of the Contract Documents and shall provide such tests during the course of the Work as are necessary to assure that the quality of the material used meets the specifications of the Contract Documents.

2.02 LIME ROCK BASE COURSE

- A. Aggregate quality and gradation shall meet the requirements of the Standard Specifications.

2.03 BITUMINOUS PRIME AND TACK COAT

- A. Prime Coat: Material shall be cutback asphalt, Grade RC-70 or RC-250 meeting the requirements of the Standard Specifications, or approved equal.
- B. Tack Coat: Material shall be emulsified asphalt, Grade RS-2, SS-1, or SS-1H meeting the requirements of the Standard Specifications.
- C. Tack coats used for temporary trench stabilization shall be sanded to prevent damage to vehicles.

2.04 ASPHALT CONCRETE

- A. The asphalt concrete for trench leveling, restoration and overlay shall be Type SP-9.5, meeting the requirements of the Standard Specifications and the Contract Documents.
- B. Aggregate: The aggregate shall meet the requirements of the Standard Specifications.
- C. Submit test results from commercial testing laboratories to the Owner's Project Manager to show that the materials meet the quality and gradation requirements.

2.05 CONCRETE PAVERS

- A. Pavers shall be placed on approved restored base and subgrade with a 1" layer of bedding sand meeting the requirements of the Standard Specifications.

2.06 FLOWABLE FILL

- A. Provide flowable fill with a mix design meeting the requirements of the (FDOT) Standard Specifications for excavatable, flowable fill. Flowable fill may be allowed as a substitute for compacted base upon approval of the Consultant, at no additional cost.

2.07 CONCRETE

- A. Concrete shall be 3,000 psi minimum concrete meeting the requirements of the Standard Specifications.
- B. Concrete Forms: All forms for curbs and sidewalks shall be either 2-inch dimensioned lumber, plywood, or metal forms. Forms on the face of the curb shall have no horizontal form joints within 7 inches of the top of the curb.
- C. Curing Compound: Meeting the requirements of the Standard Specifications.
- D. Reinforcing Steel: Conform to ASTM A615, Grade 60.

2.08 TRAFFIC MARKINGS

- A. All traffic striping markings (i.e., lane, edge of pavement, directional, informational, etc.) damaged by the Contractor during construction shall be replaced with new markings meeting the requirements of the Broward County Traffic Engineering Division and the Standard Specifications.
- B. Raised reflective pavement markers (rpm's) damaged by the Contractor during construction shall be replaced with new rpm's meeting the requirements of the Broward County Traffic Engineering Division and the Standard Specifications.

- C. The Contractor shall place and maintain temporary striping markings throughout the course of the work until the permanent striping marking is placed on the final roadway surface.
- D. The Contractor shall provide traffic striping at all intersections including stop bars and crosswalks as required whether they are currently stripped or not. It shall be the Contractor's responsibility to take a complete inventory and provide the appropriate permanent striping after the completion of the Work.

2.09 SWALE STABILIZATION

- A. Materials used for stabilization of swale areas as indicated on the Drawings shall consist of suitable excess existing base material removed from trenching operations, if approved by the Consultant, crushed limerock, rock screenings, or other suitable material as approved by the Consultant.
 - 1. Materials having a plasticity index of more than 10, or a liquid limit greater than 40 shall not be used.
 - 2. Maximum dimension shall not exceed 1.5 inches.

PART 3 - EXECUTION

3.01 CONSTRUCTION PROCEDURE

- A. The Owner's Project Manager reserves the right to vary the type of resurfacing as best serves the interest of the Owner. Trench backfill shall be as specified in the Contract Documents.
- B. Replace all bituminous and concrete roadway pavement damaged or removed under this Contract with asphalt concrete regardless of original type. Pavement thickness shall be in accordance with the Drawings.
- C. In addition to the requirements set forth herein, the work shall conform to the applicable workmanship requirements of the state and county highway or municipal specifications.
- D. Water to control dust shall be used as directed by the Owner's Project Manager until the trench repair has been stabilized. If control of dust is inadequate by these means, the Owner's Project Manager may direct the immediate application of a prime or tack coat in accordance with the provisions of this Section, at no additional cost to the Owner. The Owner's Project Manager reserves the right to delay additional excavation activities until dust control measures are adequate.
- E. Base course and prime coat shall be installed to provide temporary trench stabilization within 5 working days of trench backfill or as soon thereafter as the as-built conditions and pipe slopes have been verified.
- F. Final, permanent trench repair, and paving shall be installed within 3 weeks of pipe verification and temporary trench stabilization, unless flowable fill is used for temporary trench repair, in accordance with the provisions of this Section.

3.02 REMOVAL OF PAVEMENT, SIDEWALK, CURBS, AND GUTTERS

- A. Removal of all pavement, sidewalks, curbs, and gutters shall conform to the Contract Documents, and payment for removal shall be included in that Section of the Contract Documents. Payment for removal is incidental to the cost of pipe installation except where required for water and sewer service installation.

3.03 CUTTING EXISTING PAVEMENT

- A. Where new pavement abuts existing pavement, the old pavement shall be trimmed by saw cutting to a straight line. Any pavement which has been damaged or which is broken and unsound shall be removed to provide a smooth, sound edge for joining new pavement.

3.04 STREET MAINTENANCE

- A. Maintain all trenches as specified in this section and the Contract Documents.

3.05 CONSTRUCTION OF BASE COURSE

- A. Base course shall be constructed in accordance with the City of Fort Lauderdale Standards and the Standard Specifications.
- B. Compact base materials to a minimum of 98 percent of the maximum density as determined by AASHTO T180. Corrections for oversize material may be applied to either the as-compacted field dry density or the maximum dry density, as determined by the Consultant. Where the base is constructed in more than one course, the density shall be obtained in each lift.
- C. Alternately, and with the approval of the Consultant, the Contractor shall provide a minimum 10 inches of excavatable, flowable fill. The flowable fill shall be placed up to 1 ½ inches from the top of the existing pavement or to the fill line without vibration or compaction. Flowable fill shall not be placed during periods of inclement weather and rainfall. Provide a means to confine the material within the designated space. Flowable fill installed in accordance with this provision shall comply with temporary pavement restoration provisions.

3.06 MILLING OR GRINDING OF EXISTING ASPHALT PAVEMENT

- A. Milling of existing asphalt pavement shall meet the requirements of the Standard Specifications.
- B. Milling shall be used to lower the grade of adjacent existing asphalt prior to trench repair to completely remove existing asphalt.
- C. Milled and ground asphalt can be mixed for use with the limerock base course material.

3.07 BITUMINOUS PRIME AND TACK COAT

- A. The bituminous prime coat shall be applied to the lime rock base immediately following the placement of the compacted base course. The prime coat shall be maintained with additional coats as determined by the Owner's Project Manager as temporary restoration until the final asphalt surface is installed. Additional prime coats will be provided at no cost to the Owner.

- B. The lime rock base shall be hard planed with a blade grader immediately prior to the application of the prime coat.
- C. The rate of application of the bituminous prime coat shall meet the requirements of the Standard Specifications.
- D. The bituminous tack coat shall be applied to existing asphalt surfaces prior to the placement of new asphalt, between layers of asphalt concrete surface courses, surfaces of concrete footings that will come in contact with the asphalt concrete pavement, and vertical faces of all longitudinal and transverse joints that have become compacted or cooled.
- E. The rate of application for the bituminous tack coat shall meet the requirements of the Standard Specifications.

3.08 ASPHALT CONCRETE PAVEMENT REPLACEMENT

- A. Preparation for Paving:
 - 1. A prime coat shall be applied over the full length of the roadway, and asphalt concrete pavement shall not be placed until the prime coat has cured as per the manufacturer's recommendations.
 - 2. Should any holes, breaks, or irregularities develop in the roadway surface after the prime coat has been applied, they shall be patched with asphalt concrete immediately in advance of placing the asphalt concrete.
 - 3. After the maintenance, patching, or repair work has been completed and immediately prior to placing the asphalt concrete pavement, the surface of the prime coat shall be swept clean of all dirt, dust, or other foreign matter.
- B. The proposed pavement reconstruction schedule consists of immediately paving over trenches as soon as possible after it has been determined that subbase and base have achieved required compactions. The base course will be brought up to the elevations indicated on the Drawings and asphalt placed to bring grade up to match existing pavement elevations as shown on the Drawings.
- C. For deep excavations where the pavement repair constitutes a full lane or roadway, workmanship shall conform to the standards and details of new road way construction.
 - 1. Existing pavement more than 2 feet wide beyond the trench area shall be left in place and a full overlay applied to the limits of the existing road width.
 - 2. Existing base beyond the trench area shall be left in place.
 - 3. Full lane or width roadways shall have a consistent cross-section and straight edge of pavement delineation's.

3.09 CONSTRUCTION OF ASPHALT CONCRETE PAVEMENT OVERLAY – IF REQUIRED

- A. The Contractor shall place a layer of tack coat at a rate of 0.05 to 0.12 gallon per square yard over all areas to receive asphalt concrete.

- B. Lay asphalt concrete over all areas designated to be resurfaced. The asphalt concrete pavement overlay shall be placed in minimum 1-inch lift and maximum lift as shown in the Contract Documents. The method of proportioning, mixing, transporting, laying, processing, rolling the material, and the standards of workmanship shall meet the applicable requirements of the Standard Specifications. At no time shall the coarse aggregate segregated from the mix either from hand spreading or raking of joints be scattered across the paved mat. Such material shall be collected and disposed of.
- C. The Owner's Project Manager will examine the prepared roadway before the paving is begun and bring any deficiencies to the Contractor's attention to be corrected before the paving is started. Roll each lift of the asphalt concrete until roller marks are eliminated and compacted to 100 percent of the laboratory compacted mixture. The grade, line, and cross section of the finished surface shall conform to the Drawings. Asphalt or asphalt stains which are noticeable upon surfaces of concrete or materials which will be exposed to view shall be promptly and completely removed.

3.10 ASPHALT CONCRETE PAVEMENT

- A. Workmanship in producing, hauling, placing, compacting, and finishing asphalt concrete shall meet the applicable portions of the Standard Specifications.

3.11 CONNECTIONS WITH EXISTING FACILITIES

- A. Where the bituminous pavement is to be connected with an existing roadway surface or other facility, the Contractor will be required to modify the existing roadway profile in such a manner as to produce a smooth riding connection to the existing facility. The Contractor shall meet existing neat lines where required.
- B. Where it is necessary to remove existing asphalt surfaces or oil mat surfaces to provide proper meet lines and riding surfaces, the Contractor shall sawcut the existing surface so that there will be sufficient depth to provide a minimum of 1-inch of asphalt concrete, and the waste material shall be disposed of to the satisfaction of the Consultant. Prior to placing the asphalt concrete, these areas shall be tacked. Meet lines shall be straight and the edges vertical. The edges of meet line cuts shall be painted with liquid asphalt or emulsified asphalt prior to placing asphalt concrete. After placing the asphalt concrete, the meet line shall be sealed by painting with a liquid asphalt or emulsified asphalt and immediately covered with clean, dry sand.

3.12 CONSTRUCTION OF COURSES

- A. The asphalt concrete pavement shall be constructed in one or more courses as shown on the Drawings.
- B. Rolling shall continue until all roller marks are eliminated and compacted to 100 percent of the laboratory compacted mixture has been obtained.

3.13 SURFACE TOLERANCE

- A. Tests for conformity with the specified grade shall be made by the Contractor immediately after initial compression. Any variation shall be immediately corrected by the removal or addition of materials and by continuous rolling.

- B. The completed surface of the pavement shall be of uniform texture, smooth, uniform as to grade, and free from defects of all kinds. The completed surface shall not vary more than 1/8 inch from the lower edge of a 12-foot straightedge placed on the surface along the centerline or across the trench.
- C. After completion of the final rolling, the smoothness and grade of the surface shall again be tested by the Contractor.
- D. When deviations in excess of the above tolerances are found, the pavement surface shall be corrected as stated in the Standard Specifications.
- E. All areas in which the surface of the completed pavement deviates more than twice the allowable tolerances described above shall be removed and replaced to the satisfaction of the Consultant.
- F. All costs involved in making the corrections of defects described above shall be borne by the Contractor and no compensation will be made for this Work.

3.14 SAMPLES

- A. If directed by the Consultant, the Contractor shall without additional charge, provide the Owner's Project Manager with test results of samples of asphalt concrete cut from the completed pavement or the individual courses thereof for each occurrence. Provide a minimum of three test cores located as directed by the Consultant. He shall also provide the Owner's Project Manager with test results of samples of the uncompressed asphalt concrete mixtures and all materials incorporated in the Work.

3.15 WEATHER CONDITIONS

- A. Asphalt shall not be applied to wet material. Asphalt shall not be applied during rainfall or any imminent storms that might adversely affect the construction. The Owner's Project Manager will determine when surfaces and materials are dry enough to proceed with construction. Asphalt concrete shall not be placed during heavy rainfall or when the surface upon which it is to be placed is wet.

3.16 PROTECTION OF STRUCTURES AND ADJUSTMENT OF APPURTENANCES

- A. Provide whatever protective coverings may be necessary to protect the exposed portions of bridges, culverts, curbs, gutters, posts, guard fences, road signs, and any other structures from splashing oil and asphalt from the paving operations. Remove any oil, asphalt, dirt, or any other undesirable matter that may come upon these structures by reason of the paving operations.
- B. Where water valve boxes, manholes, catch basins, or other underground utility appurtenances are within the area to be surfaced, the Contractor shall adjust the tops of these facilities to conform with the proposed surface elevations. The Contractor shall notify the proper authority and either raise or lower the appurtenances or make arrangements with that authority for having the facilities altered at the Contractor's expense before proceeding with the resurfacing. The Contractor will be responsible for making certain that appurtenances are brought to proper grade to conform with finished surface elevations and any delays experienced from such obstructions will be considered as incidental to the paving operation. No additional payment will be made.

Protect all covers during asphalt application. All adjustments shall be made in accordance with the requirements of the respective utility.

- C. To extend manhole use grade rings as specified, do not use leveling rings. Remove the frame and cover, rebuild the manhole top to raise it so that the new height meets the overlay elevations and then replace the frame and cover in accordance with the Contract Documents.

3.17 EXCESS MATERIALS

- A. Dispose of all excess materials. Make arrangements for the disposal and bear all costs or retain any profit incidental to such disposal.

3.18 CONTRACTOR'S RESPONSIBILITY

- A. Settlement of replaced pavement over trenches within the warranty period shall be considered the result of improper or inadequate compaction of the subbase or base materials. The Contractor shall promptly repair all pavement deficiencies noted during the warranty period at the Contractor's sole expense.

3.19 SIDEWALKS AND CURBS

- A. Replace concrete sidewalks and curbs to the same section width, depth, line, and grade as that removed or damaged or as shown on the Drawings. The minimum thickness of sidewalks shall be 6 inches. Cut ends of existing curb to a vertical plane. Prior to replacing the sections, properly backfill and compact the trench to prevent subsequent settlement.
- B. Replace concrete sidewalks at scored joints and make replacement in a manner that will avoid a patched appearance. Provide a minimum 2-inch thick compacted leveling course of clean sand or gravel of quality hereinbefore specified. Finish concrete surface similar to the adjacent sidewalks. All curbs and all gutters shall have a minimum of 4" LBR 100 limerock "curb pad".

3.20 DRIVEWAYS AND WALKS

- A. Replace asphalt driveways and walks in accordance with Paragraph Asphalt Concrete Pavement Replacement.
- B. Replace concrete and paver driveways in kind, using similar materials of construction. Concrete driveways shall consist of a reinforced, 6-inch section installed in accordance with the Contract Documents.

3.21 TRAFFIC STRIPES

- A. All areas having traffic stripes prior to paving shall be restriped. Temporary traffic striping shall be applied immediately after asphalt pavement has been placed. Permanent traffic striping may be applied only after the proper curing time for the asphalt. Traffic stripes (temporary and permanent) shall meet the requirements of Broward County Traffic Engineering Division Standards and the Standard Specifications.

3.22 INSTALLATION OF RAISED REFLECTIVE PAVEMENT MARKERS

- A. All areas having raised reflective pavement markers prior to paving shall have those markers replaced. Temporary pavement markers shall be applied immediately after asphalt pavement has been placed. Permanent pavement markers may be applied only after the proper curing time for the asphalt. Pavement markers and adhesive (temporary and permanent) shall meet the requirements of Broward County Traffic Engineering Division and the Standard Specifications.
- B. Spacing: As shown in the Roadway and Traffic Design Standards for Design, Construction, Maintenance and Utility operations on the State Highway System by the State of Florida, Department of Transportation, current edition and the Broward County Traffic Engineering Division Standards.

3.23 PAVEMENT REPAIR

- A. All damage to pavement as a result of work under this Contract shall be repaired in a manner satisfactory to the Owner's Project Manager and at no additional cost to the Owner. The repair shall include preparation of the subgrade, placing and compaction of the lime rock base and placement of the final asphalt surface as described in this Section.
- B. The width of all repairs shall extend at least 12 inches beyond the limit of the damage with the edge of pavement left saw cut to a true edge with no irregularities. For county roads and CITY streets recently constructed or overlaid, the repair may be required to be full-lane width as shown on the Drawings.

3.24 SWALE RESTORATION

- A. New or existing swale areas (areas between pavement edge and sidewalks, or right-of-way line if there is no existing or proposed sidewalk) shall be graded and reshaped to the cross section shown on the Drawings. Where storm inlets are present, the swale shall have a consistent longitudinal slope towards the inlet.
- B. Swale areas with previously existing improved surfaces, including but not limited to asphalt, concrete, pavers, crushed or decorative rock, shall be restored in kind. Asphalt paved areas shall be constructed with a minimum 6-inch stabilized subbase and minimum 6-inch compacted limerock base, primed and topped with minimum 1-inch asphalt.
- C. Swale areas with previously unimproved or turfed surfaces will be restored with soil stabilization where existing natural soil will not support vehicle loads normally imposed by movement and parking of heavy vehicles without rutting and shifting of soil. Subject to the approval of the Consultant, this work may be performed in connection with preparation of subgrade or construction of the limerock base course.
- D. Swale areas with previously unimproved or turfed surfaces will be topped with sod. St. Augustine "Floritam" and two inches of topsoil shall be used in irrigated areas and where St. Augustine sod was previously established. Bahia sod shall be placed in all other areas not previously improved or sodded.

3.25 SWALE STABILIZATION

- A. Where swale stabilization is required as indicated above, stabilization shall be achieved by the addition and mixing in of suitable stabilizing materials. It shall be incorporated into the existing swale soils by plowing, disking, harrowing, blading or mixing with rotary tillers or other appropriate equipment approved by the Consultant, until the mixed materials are of uniform bearing value throughout the width and at least 6-inch depth from the top of the swale after the swale is graded and shaped to the section indicated on the plans.
- B. The swale areas shall be mixed and compacted to achieve a minimum average dry density of 90 percent throughout the 6-inch thickness, as determined by AASHTO T180. In the determination of such average, the minimum acceptable density shall be 85 percent and the maximum density which shall be used in calculations shall be 100 percent (if the tested density is reported above 100 percent).
- C. Density tests for swale stabilization shall be made at intervals not less than one set of three per CITY block on each side of the roadway, or at increased intervals as directed by the Owner's Project Manager when required to measure small or isolated sections (except where such testing may be considered unnecessary by the Consultant). Each set of three shall be averaged as indicated above for determination of meeting the minimum requirements.

3.26 SPECIAL SWALE REPAIR

- A. Certain swale areas (designated on Drawings) have longitudinal trench filled with ballast rock for drainage. If appropriate, a separate pay item applies for removal and reconstruction of ballast rock drainage damaged during installation of pipelines. All other aspects of restoration work in the swale will be paid for separately under the restoration item. Swale stabilization will not be required in those areas with ballast rock drainage.

3.27 BRICK OR PAVER RESTORATION

- A. Remove and salvage bricks or paver materials to be disturbed by the work. Payment will be made in accordance with the unit price for these items.
- B. Restore pavers and apron area shall be constructed as shown in the Drawings. Payment will be made in accordance with the unit price for these items.
- C. Paver and apron areas shall be constructed as shown in the Drawings.
- D. If brick and paver materials are damaged, new materials shall match or all materials within the crossing must be replaced at no additional cost. New materials shall be approved by the Owner.

- END OF SECTION -

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SECTION 02630

STORM DRAIN FACILITIES

PART 1 - GENERAL

1.01 SUMMARY

- A. Work under this section shall consist of providing all labor, plant facilities, materials, tools, equipment, shop drawings and supervision necessary and required to install all of the storm drainage facilities, including piping, fittings, and structures, as specified in accordance with the contract documents.

1.02 WORK INCLUDED

- A. Provide all labor, materials, necessary equipment and services to complete the Storm Drainage Facilities work, as indicated on the drawings, as specified herein or both, except as for items specifically indicated as "NIC ITEMS".

1.03 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM)
 - 1. A185 – Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
 - 2. A615 – Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
 - 3. A760 – Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains
 - 4. A798 – Installation of Corrugated-Steel Pipe for Sewers and Other Applications
 - 5. A929 – Metallic-Coated by the Hot-Dip Process for Corrugated Steel Pipe
 - 6. C76 – Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
 - 7. C478 – Precast Reinforced Concrete Manhole Sections
 - 8. C1479 – Installation of Reinforced Concrete Pipe
 - 9. C990-01A – Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
 - 10. D2321 – Installation of Thermoplastic Pipe for Sewer/Gravity-Flow Applications
 - 11. D3034 – Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
 - 12. D3212 – Joints for Drain and Sewer Plastic Pipes Using Elastomeric Seals
 - 13. F477 – Elastomeric Seals (Gaskets) for Joining Plastic Pipe
 - 14. F794 – Poly(Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter

15. F949 – Poly(Vinyl Chloride) (PVC) Corrugated Sewer Pipe With a Smooth Interior and Fittings

B. American Association of State Highway and Transportation Officials (AASHTO)

1. M198 – Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets
2. M252 – Corrugated Polyethylene Drainage Tubing
3. M274 – Aluminum-Coated (Type 2), for Corrugated Steel Pipe
4. M294 – Corrugated Polyethylene Pipe. 12 to 14 inch Diameter
5. M36 – Metallic Coated Corrugated Steel Culverts and Underdrains
6. M190 – Bituminous Coated Corrugated Metal Culvert Pipe and Pipe Arches
7. M199 – Standard Specification for Precast Reinforced Concrete Manhole Sections

C. American Water Works Association (AWWA)

1. C110 – Ductile-Iron and Gray-Iron Fittings, 3 in through 48 in (75 mm through 1200 mm), for Water and Other Liquids (revision of ANSI/AWWA C110/A21.10-93)
2. C111 – Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
3. C151 – Ductile-Iron Pipe, Centrifugally Cast, for Water

D. American Concrete Institute (ACI)

1. 301 – Structural Concrete for Buildings, Specifications for
2. 318 – Building Code Requirements for Structural Plain Concrete

1.04 EXISTING UTILITIES

- A. Furnish temporary support, adequate protection and maintenance of all underground and surface utility structures, drains, sewers, cables, etc., and other obstructions encountered in the progress of the work.
- B. When the grade of alignment of the pipe is obstructed by existing utility structures, such as conduits, ducts, pipes, branch connections to water or sewer mains, and other obstructions, the obstructions shall be permanently supported, relocated, removed or reconstructed by the Contractor in cooperation with the owners of such structures. No deviation shall be made from the required line or grade except as directed in writing by the Engineer.
- C. It shall be the responsibility of the Contractor to notify the owners of existing utilities in the area of construction a minimum of 48 hours prior to any excavation adjacent of such utilities, so that field locations of said utilities may be established.
- D. Temporary relocation of existing utilities (to be removed) to accommodate installation of storm drain pipe shall be the responsibility of the Contractor and approved by the

Engineer. No additional payment shall be made for temporary relocation of existing utilities and shall be considered part of the bid item for the pipe.

1.05 QUALITY ASSURANCE

- A. All costs related to re-inspection due to failures shall be paid for by the Contractor at no additional expense to the City. City reserves the right to direct any inspection that is deemed necessary. Contractor shall provide free access to site for inspection activities.

PART 2 - PRODUCTS

2.01 REINFORCED CONCRETE PIPE (RCP)

A. Reinforced Concrete Pipe – ASTM C 76

1. Unless noted otherwise, all RCP pipe shall be in accordance with the requirements of “Reinforced Concrete Pipe – ASTM C 76”.
2. RCP shall be manufactured in accordance with ASTM C 76, Wall Type B or C, unless otherwise specified herein; and shall be minimum Type III, subject to recommendation from the pipe manufacturer based on project specific requirements unless noted otherwise in the Contract Documents. Minimum pipe laying lengths shall be four (4) feet. Portland cement shall conform to ASTM C 150, Type II.
3. Pipe shall have bell and spigot ends with O-ring rubber gaskets. The gaskets shall be smooth solid rubber of circular and uniform cross section conforming to ASTM C 43. The spigot end of the pipe shall contain a special groove or slot to receive and hold the gasket in position during the joint assembly. The complete joint shall be subjected to hydrostatic tests conforming to ASTM C 443.
4. All pipe and specials shall be aged at the manufacturing plant for at least fourteen (14) days before delivery to the job site.

B. Reinforced Concrete Pipe – ASTM C361

1. Reinforced concrete low-head pressure pipe shall be manufactured in accordance with ASTM C361, and shall be minimum Type III, subject to recommendation from the pipe manufacturer based on project specific requirements unless noted otherwise in the Contract Documents. Minimum pipe laying lengths shall be twelve (12) feet.
2. Pipe shall have steel joint rings with O-ring rubber gaskets. The gaskets shall be smooth solid rubber of circular and uniform cross section and shall be confined in an annular space formed by shoulders on the bell and spigot or in a special groove in the spigot to receive and hold the gasket in position during the joint assembly. The complete joint shall be subjected to hydrostatic tests conforming to ASTM C361.
3. All pipe and specials shall be aged at the manufacturing plant for at least fourteen (14) days before delivery to the job site.

C. Concrete Culvert And Drain Pipe

1. All reinforced concrete culvert and drain pipe shall be manufactured in accordance with ASTM C76, Wall Type B or C, and shall be of the class that equals or exceeds the pipe class as specified herein or as shown on the Contract Drawings. Minimum pipe laying lengths shall be four (4) feet. Testing shall be in accordance with FDOT Road and Bridge Manual (latest edition). Portland cement shall conform to ASTM C150, Type II.
2. Joints for the reinforced concrete culvert and drain pipe shall have bell and spigot ends with flexible plastic gaskets meeting the requirements of AASHTO M198, Type B.
3. All pipe shall be aged at the manufacturing plant for at least fourteen (14) days before delivery to the job site.

2.02 HIGH PERFORMANCE POLYPROPYLENE PIPE

- A. High Performance polypropylene storm pipe shall be produced by a reputable manufacturer engaged in the full time business of manufacturing of piping.
- B. All High Performance polypropylene storm pipe shall have a smooth wall interior and annular exterior corrugations conforming to the requirements of ASTM F2736 and AASHTO M330.
- C. Joints: Pipe shall be joined with a gasket integral bell and spigot joint meeting the requirements of ASTM F2736. Joint must be completely water tight according to the requirements of ASTM 3212. Spigots shall have gaskets meeting requirements of ASTM F477. The gasket joint on the inside of the bell shall be installed on the pipe at the plant by the pipe manufacturer and covered with a removable, protective wrap to ensure the gasket is free from debris. A joint lubricant provided from the manufacturer shall be used on the gasket and bell during assembly. All materials and accessories for the gasket joint and the methods of jointing shall be in strict conformance with the pipe manufacturer's direction and recommendation.

2.03 PVC CORRUGATED PIPE

- A. PVC Corrugated storm pipe shall be produced by a reputable manufacturer engaged in the full time business of manufacturing of piping and conform to the requirements of ASTM F949.
- B. PVC Corrugated storm pipe shall have smooth wall interior and annular exterior corrugations. Pipe shall be made of PVC having a minimum cell classification of 12454 per ASTM D1784.
- C. Joints: Pipe shall be joined with a gasket integral bell and spigot joint meeting the requirements of ASTM F2736. Joint must be completely water tight according to the requirements of ASTM 3212. Spigots shall have gaskets meeting requirements of ASTM F477. The gasket joint on the inside of the bell shall be installed on the pipe at the plant by the pipe manufacturer and covered with a removable, protective wrap to ensure the gasket is free from debris. A joint lubricant provided from the manufacturer shall be used on the gasket and bell during assembly. All materials and accessories

for the gasket joint and the methods of jointing shall be in strict conformance with the pipe manufacturer's direction and recommendation.

PART 3 - EXECUTION

3.01 GENERAL

- A. Contractor shall only use the pipe material as specified on the plans. Alternate materials will not be allowed unless approved by the Engineer in writing.
- B. The Contractor shall install all drainage structures and pipe in the locations shown on the drawings and/or as approved by the City. Pipe shall be of the type and sizes specified on the drawings and shall be laid accurately to line and grade. Structures shall be accurately located and properly oriented.
- C. Excavation and Backfilling for Utilities – The provisions of the Contract Documents for Excavation and Backfilling shall govern all work under this Section.
- D. Storage and Handling of Pipe – All pipe shall be protected against impact, shock and free fall, and only equipment of sufficient capacity and proper design shall be used in the handling of the pipe. Storage of pipe on the job shall be in accordance with the pipe manufacturer's recommendations.
- E. Damage to Pipe
 - 1. Pipe which is defective from any cause, including damage caused by handling, and determined by the City as unrepairable, shall be unacceptable for installation and shall be replaced at no cost to the City and as directed by the City; and,
 - 2. Pipe that is damaged or disturbed through any cause prior to acceptance of the work, shall be repaired realigned or replaced as directed by the City, at the Contractor's expense.
- F. Manholes, catch basins and drain inlets shall be constructed as soon as the pipe laying reaches the location of the structures. Should the Contractor continue his pipe laying without making provisions for completion of the structures, the City shall have the authority to stop the pipe laying operations until the structure is completed.
- G. Any structure, which is mislocated or oriented improperly, shall be removed and re-built in its proper location, alignment and orientation at the Contractor's expense.

3.02 EXCAVATION AND BACKFILL

- A. Excavation and backfill shall be as per the Section entitled "Excavation and Backfill for Utilities".

3.03 PIPE INSTALLATION

- A. Laying Pipe
 - 1. Unloading and Handling: All pipes shall be unloaded and handled with reasonable care. Pipes shall not be rolled or dragged over gravel or rock during handling. The Contractor shall take necessary precautions to ensure the method used in lifting or

placing the pipe does not induce stress fatigue in the pipe and the lifting device used uniformly distributes the weight of the pipe along its axis or circumference.

2. Each length of pipe shall be inspected for defects and cracks before carefully lowered into the trench. Any damaged or any pipe that has had its grade disturbed after laying shall be removed and replaced. Bituminous coated pipe shall be handled with special care and repair of damaged coating shall conform with AASHTO M190.
3. Lay pipe on prepared foundation starting at the downgrade end according to line and grade with the necessary drainage structures, fittings, bends and appurtenances as shown on the drawings. Rigid pipes shall be laid with the bell or groove ends upgrade with the spigot or tongue fully inserted. Reinforced concrete pipe shall be installed in accordance with ASTM C1479.
4. Pipe sections shall be firmly joined together with appropriate gaskets or bands.
5. Pipe shall be protected during handling against impact shocks and free falls. Pipe shall be kept clean at all times and no pipe shall be used that does not conform to the Specifications.
6. The laying of the pipe shall be commenced at the lowest point with spigot ends pointing in the direction of flow. All pipe shall be laid with ends abutting and true to line and grade. They shall be laid in accordance with manufacturer's requirements as approved by the Engineer.
7. Pipe shall be laid accurately to the line and grade as designated on the plans. Preparatory to making pipe joints, all surfaces of the portions of the pipe to be jointed, or of the factory made jointing material, shall be clean and dry. Lubricant, primers, adhesive, etc., shall be used as recommended by the pipe or joint manufacturer's specifications. The jointing materials or factory fabricated joints shall then be placed, fitted, joined and adjusted in such a manner as to obtain a water tight line. As soon as possible after the joint is made, sufficient backfill material shall be placed along each side of the pipe to prevent movement of pipe off line and grade.
8. The exposed ends of all pipe shall be suitably plugged to prevent earth, water, or other substances from entering the pipe when construction is not in progress.

3.04 CONCRETE ENCASEMENT OF DRAINAGE PIPE

- A. Trenches in which encasement for pipe are to be placed may be excavated completely with mechanical equipment. Prior to formation of the encasement, temporary supports consisting of timber wedges or masonry shall be used to support the pipe in place. Temporary supports shall have minimum dimensions and shall support the pipe at no more than two places, one at the bottom of the barrel of the pipe adjacent to the shoulder of the socket and the other near the spigot end.

3.05 DRAINAGE STRUCTURES

- A. All structures shall be built to the line and grade shown on drawings. All reinforced concrete work shall be in strict conformance with the concrete specifications contained herein. After erection of the forms and placing of the steel, the Contractor must have

inspection and approval from the Engineer before placing any concrete. After removal of the forms, the Contractor shall backfill around each structure with approved granular fill. The fill shall be placed in layers not exceeding 6 inches in depth measured loose and compacted to 98% of the maximum density as determined by the modified proctor, AASHTO T-180. No defects of any kind in the pipe section will be accepted. All pipe stubs shall be made of the same type of pipe. Pipe stubs shall be sealed with a concrete plug, water tight. The ends of the pipes which enter masonry shall be neatly cut to fit the inner face of the masonry. Cutting shall be done before the pipes are built in.

3.06 INFILTRATION AND EXFILTRATION TESTS

- A. Tests for watertightness shall be made by the Contractor. Leakage of completed storm drainage system shall not exceed 500 U.S. gallons per day per inch diameter per mile of pipe under minimum hydrostatic pressure of 2 feet. Test shall be conducted in a manner satisfactory to the Engineer. Any portion of the project not conforming to the above requirements shall be corrected by the Contractor, at his own expense, prior to acceptance by the Engineer.

3.07 PROTECTION AND CLEANING

- A. The Contractor shall maintain all pipe installations and drainage structures in a condition such that they will function continuously and shall be kept clean of silt, debris and other foreign matter from the pipe and drainage structure is installed until the project is accepted.

3.08 FINAL INSPECTION

- A. All storm sewers shall be lamped by the Engineer prior to acceptance of the work. Repairs or misalignment shown necessary by the tests shall be corrected at the Contractor's expense. All sewers shall be thoroughly cleaned before being placed into use and shall be kept clean until final acceptance by the Engineer.
- B. Upon completion of the work and before final acceptance by the City, the entire drainage system shall be subject to a final inspection in the presence of the City and/or Engineer. The work shall not be considered as complete until all requirements for line, grade, cleanliness, and workmanship have been completed.
- C. For flexible pipes, 48 inches or less in diameter, the Contractor shall submit to the Engineer a video file and Pipe Ovality Report for each pipe run using low barrel distortion video equipment with laser profile technology, non-contact video micrometer and associated software. The report shall include pipe stationing and pipe deformation/deflections measurements with deflection limits clearly delineated. Laser profiling and measurement technology must be certified by the company performing the work to be in compliance with the calibration criteria posted at <https://www.fdot.gov/construction/Engineers/Environment/Laser.shtm>. The Engineer may waive this requirement for side drains and cross drains which are short enough to inspect manually from each pipe end.

- END OF SECTION -

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SECTION 02710

LIMEROCK BASE

PART 1 - GENERAL

1.01 DEFINITIONS

- A. Completed Course: Compacted, unyielding, free from irregularities, with smooth, tight, even surface, true to grade, line, and cross section.
- B. Completed Lift: Compacted with uniform surface reasonably true to cross-section.

PART 2 - MATERIALS

2.01 LIMEROCK BASE ROCK

- A. The material used in limerock base shall be material classified as Miami Oolite Formation.
- B. The minimum of carbonates of calcium and magnesium in the limerock shall be 70 percent. The maximum percentage of water-sensitive clay material shall be 3.
- C. Limerock material shall be uniform in color and not contain cherty or other extremely hard pieces, or lumps, balls, or pockets of sand or clay size material in sufficient quantities as to be detrimental to the proper bonding, finishing, or strength of the limerock base.
- D. The limerock base shall be uniformly graded from coarse to fine with 97 percent passing a 3-1/2-inch sieve, 80 percent passing a 2-inch sieve. The fine material shall consist entirely of dust of fracture. All crushing or breaking up, which might be necessary in order to meet such size requirements, shall be done before the material is placed on the road.
- E. Physical Qualities:
 - 1. Liquid Limit, AASHTO T89: Maximum 35 percent.
 - 2. Nonplastic.
 - 3. Limerock material shall have an average limerock bearing ratio (LBR) value of not less than 100.

2.02 SOURCE QUALITY CONTROL

- A. Contractor: Perform tests necessary to locate acceptable source of materials meeting specified requirements.
- B. Final approval of aggregate material will be based on materials' test results on installed materials.

- C. Should separation of coarse from fine materials occur during processing or stockpiling, immediately change methods of handling materials to correct uniformity in grading.

PART 3 - EXECUTION

3.01 SUBGRADE PREPARATION

- A. As specified in the Contract Documents.
- B. Obtain City's acceptance of subgrade before placement of limerock base rock.
- C. Do not place base materials on soft, muddy subgrade.

3.02 EQUIPMENT

- A. Use mechanical rock spreaders, equipped with a device that strikes off the rock uniformly to laying thickness, capable of producing even distribution. For areas where the use of a mechanical spreader is not practicable, the Contractor may spread the rock using bulldozers or blade graders.

3.03 HAULING AND SPREADING

A. Hauling Materials:

1. The limerock shall be transported to the point where it is to be used and dumped on the end of the preceding spread.
2. Do not haul over surfacing in process of construction.
3. Loads: Of uniform capacity.
4. Maintain consistent gradation of material delivered; loads of widely varying gradations will be cause for rejection.

B. Spreading Materials:

1. Distribute material to provide required density, depth, grade and dimensions with allowance for subsequent lifts.
2. Produce even distribution of material upon roadway without segregation.
3. Should segregation of coarse from fine materials occur during placing, immediately change methods of handling materials to correct uniformity in grading.

3.04 CONSTRUCTION OF COURSES

- A. General: Complete each lift in advance of laying succeeding lift to provide required results and adequate inspection.
- B. Limerock Base:
 1. Maximum Completed Lift Thickness: 6 inches or equal thickness.
 2. Completed Course Total Thickness: As shown on the Drawings.

3. Spread lift on preceding course to required cross-section.
4. Lightly blade and roll surface until thoroughly compacted.
5. Blade or broom surface to maintain true line, grade, and cross-section.

C. Gravel Surfacing:

1. Maximum Completed Lift Thickness: 6 inches or equal thickness.
2. Completed Course Total Thickness: As shown on the Drawings.
3. Spread on preceding course in accordance with cross-section shown.
4. Blade lightly and roll surface until material is thoroughly compacted.

3.05 ROLLING AND COMPACTION

- A. Commence compaction of each layer of base after spreading operations and continue until density of 98 percent of maximum density has been achieved as determined by AASHTO T 180.
- B. Density tests will be conducted every 500 square yards or as directed by the City.
- C. Roll each course of surfacing until material shall not creep under roller before succeeding course of surfacing material is applied.
- D. Commence rolling at outer edges of surfacing and continue toward center; do not roll center of road first.
- E. When the material does not have the proper moisture content to ensure the required density, wet or dry, as required. When adding water, uniformly mix it in by disking to the full depth of the course that is being compacted. During wetting or drying operations, manipulate as a unit, the entire width and depth of the course that is being compacted.
- F. Place and compact each lift to required density before succeeding lift is placed.
- G. Bind up preceding course before placing leveling course. Remove floating or loose stone from surface.
- H. Blade or otherwise work surfacing as necessary to maintain grade and cross-section at all times, and to keep surface smooth and thoroughly compacted.
- I. Surface Defects: Remedy surface defects by loosening and rerolling. Reroll entire area, including surrounding surface, until thoroughly compacted.
- J. Finished Surface: True to grade and crown before proceeding with surfacing.

3.06 SURFACE TOLERANCES

- A. Finished Surface of Base Course and Leveling Course: Within plus or minus 0.04-foot of grade shown at any individual point.

- B. Compacted Surface of Leveling Course: Within 0.04-foot from lower edge of 10-foot straightedge placed on finished surface, parallel to centerline.
- C. Overall Average: Within plus or minus 0.01-foot from crown and grade specified.

3.07 GRAVEL DRIVEWAY RESURFACING

- A. Replace gravel surfacing on driveways which were gravel surfaced prior to construction.
- B. Provide compacted gravel surfacing to depth equal to original, but not less than 4 inches.
- C. Leave each driveway in as good or better condition as it was before start of construction.

3.08 FIELD QUALITY CONTROL

- A. In-Place Density Tests:
 - 1. Construct base course so areas shall be ready for testing.
 - 2. Allow reasonable length of time for City to perform tests and obtain results during normal working hours.

3.09 CLEANING

- A. Remove excess material; clean stockpile areas of aggregate.

- END OF SECTION -

SECTION 02734
CRUSHED STONE BEDS

PART 1 - GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall provide all labor, equipment, and materials to construct a base course by stabilizing the existing soil material with Number 57 stone as specified herein, and in conformity with the lines, grades, notes and typical cross sections shown in the Drawings.

1.02 SUBMITTALS

- A. The Contractor shall submit the following for review in accordance with Section 01300 Submittals.
 - 1. Product Data
 - a. Equipment
 - 2. Test Reports
 - a. Sampling and Testing
 - b. Liquid Limit
 - c. Plasticity Limit
 - d. Gradation Tests

1.03 ENVIRONMENTAL REQUIREMENTS

- A. Aggregate surface courses shall not be constructed when the ambient temperatures is below 35 degrees F and on subgrades that are frozen or contain frost. It is the responsibility of the Contractor to protect, by approved method or methods, all areas of surfacing that have not yet been accepted by the Owner. Surfaces damaged by freeze, rainfall, or other weather conditions shall be brought to a satisfactory condition by the Contractor.

1.04 INSPECTION COORDINATION

- A. The Contractor shall provide access to the Work for the Owner as requested for inspection. The Contractor shall provide 48 hours advance notice of its intention to begin new Work activities.

PART 2 - PRODUCTS

2.01 3/4-INCH CRUSHED STONE BEDS

A. Weed Control Fabric

1. General: All gravel beds and areas of crushed stone shown on the Drawings shall include an underline of weed control fabric as specified herein.
2. Manufacturer and Product, or Equal:

Manufacturer	Product
DeWitt Company (http://www.dewittcompany.com/)	Roc-Kloth™ (black on black)
Easy Gardener Products, Inc. (http://www.easygardener.com/index.htm)	Pro WeedBlock

- B. Crushed Stone:** Crushed stone shall consist of hard, durable, subangular particles of proper size and gradation, and shall be free from organic material, wood, trash, sand, loam, clay, excess fines, and other deleterious materials. Crushed stone shall conform to the requirements of ASTM C 33, Size Number 57, graded within the following limits:

<u>Sieve Size</u>	<u>Percent Finer by Weight</u>
1 inch	100
No. 4	0 to 5

1. Crushed stone shall be carefully placed and spread to a minimum depth of 3 inches. Final grades and locations shall be as indicated on the Drawings.

PART 3 - EXECUTION

3.01 INSTALLATION

- A.** Install weed control fabric per manufacturer's instructions.

B. GRADE CONTROL

1. During construction, the lines and grades including crown and cross slope indicated for the aggregate surface course shall be maintained by means of line and grade stakes placed by the Contractor in accordance with the Special Contract Requirements.

C. MAINTENANCE

1. Maintain the aggregate surface course in a condition that will meet all specification requirements until accepted.

- END OF SECTION -

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SECTION 02761

PAVEMENT MARKING

PART 1 - GENERAL

1.01 STANDARD SPECIFICATIONS

- A. When referenced in this section, Standard Specifications shall mean Florida Department of Transportation, Standard Specifications for Road and Bridge Construction, current edition. All Pavement Markings and Signage shall conform to the Broward County Traffic Engineering Division (BCTED) Standards, latest revision.

1.02 SUBMITTALS

- A. The Contractor shall submit all products used for pavement markings in accordance with the Section entitled "Submittals".

1.03 DELIVER, STORAGE, AND PROTECTION

- A. Packaging and Labeling: All coatings and traffic marking materials shall be shipped in strong containers plainly marked with the weight in pounds per gallon, the volume of coatings and traffic marking materials content in gallons, the color, user information, date of manufacture, LOT, batch and DOT code number. Each batch manufactured shall have a unique number. A true statement of the percentage composition of the pigment, the proportion of pigment to vehicle, and the name and address of the manufacturer, also shall be shown. The label shall warn the user of any special handling or precautions of the material, as recommended by the manufacturer. Any package not so marked will not be accepted for use under these Specifications.
- B. Storage: Any coatings and traffic marking materials which, although inspected and approved at the point of manufacture, hardens or livers in the containers so that it cannot be readily broken up with a paddle to a smooth, uniform painting consistency, will be rejected. All materials shall have a container storage life of one year from date of manufacture. Any coatings and traffic marking materials not acceptable for proper application will be rejected, even though it conforms to these Specifications in all other respects.
- C. Mixing: All paints except aluminum shall be delivered to the project completely mixed, and ready to be used without additional oil or thinner. Gasoline shall not be used for thinner under any circumstances.

PART 2 - MATERIALS

2.01 PAINT

- A. Color: White, yellow, or blue traffic striping meeting the requirements of BCTED and the Standard Specifications.
- B. Homogeneous, easily stirred to smooth consistency, with no hard settlement or other objectionable characteristics during a storage period of 6 months.

2.02 THERMOPLASTIC STRIPING

- A. White or yellow thermoplastic striping material meeting the requirements of BCTED and the Standard Specifications.

2.03 RAISED REFLECTIVE MARKERS

- A. Metallic or nonmetallic, or prismatic reflector type, of permanent colors retaining color and brightness under action of traffic.
- B. Rounded surfaces presenting a smooth contour to traffic. The minimum area of each reflective face shall be 2-1/2 inches squared.
- C. Marker and adhesive epoxy in accordance with ASTM D4280
- D. Markers shall meet the requirements of BCTED and the Standard Specifications.

2.04 GLASS SPHERES

- A. Glass spheres shall be of a composition designed to be highly resistant to traffic wear and to the effects of weathering.
- B. In accordance with AASHTO M247, Type I with moisture resistant coating or a formulation specified by the traffic striping material manufacturer and the BCTED and the Standard Specifications.

PART 3 - EXECUTION

3.01 SURFACE PREPARATION

- A. Cleaning:
 - 1. Thoroughly clean surfaces to be marked before application of pavement marking material.
 - 2. Remove dust, dirt, and other granular surface deposits by sweeping, blowing with compressed air, rinsing with water or a combination of these methods.
 - 3. Completely remove rubber deposits, surface laitance, existing paint markings, and other coatings adhering to pavement with scrapers, wire brushes, sandblasting, approved chemicals, or mechanical abrasion.
 - 4. Scrub areas of old pavement affected with oil or grease with several applications of trisodium phosphate solution or other approved detergent or degreaser, and rinse thoroughly after each application.
 - 5. Surfaces shall be completely free of dry dirt and ice, and dry of water at the time of application of any of the materials specified herein.
 - 6. Oil-Soaked Areas: After cleaning, seal with cut shellac to prevent bleeding through the new paint.
 - 7. Reclean surfaces when Work has been stopped due to rain.

8. Existing Pavement Markings:

- a. Remove existing pavement markings that may interfere or conflict with newly applied marking patterns, or that may result in a misleading or confusing traffic pattern.
- b. Do not apply thermoplastic markings over existing preformed or thermoplastic markings.
- c. Perform grinding, scraping, sandblasting or other operations so finished pavement surface is not damaged.

B. Pretreatment for Early Striping: Where early striping is required on rigid pavements, pretreat with an aqueous solution containing 3 percent phosphoric acid and 2 percent zinc chloride.

C. New Concrete Pavement:

1. Allow a minimum cure time of 30 days before cleaning and marking.
2. Clean by either sandblasting or water blasting to the following results:
 - a. No visible evidence of curing compound on peaks of textured concrete surface.
 - b. No heavy puddled deposits of curing compound in valleys of textured concrete surface.
 - c. Remaining curing compound is intact, with loose and flaking material completely removed.
 - d. Peaks of textured pavement surface are rounded in profile and free of sharp edges and irregularities.
3. Allow a minimum drying time of 24 hours after water blasting before applying thermoplastic markings.

3.02 ALIGNMENT FOR MARKINGS

A. The Contractor shall be responsible for all measurements, reference points and marks, string lining, and any other steps required in establishing pavement marking locations and alignment. On tangents and on curves up to 1 degree, the alignment of the marking shall not deviate from the string line by more than 1 inch. On curves exceeding 1 degree, the maximum permissible deviation shall be 2 inches. All alignment width and location shall conform to the details shown on the Drawings.

3.03 PAINT APPLICATION

A. General:

1. Thoroughly mix pigment and vehicle together prior to application, and keep thoroughly agitated during application.
2. Do not add thinner.

3. Apply only when air and pavement temperatures are above 40 degrees F and less than 95 degrees F. Maintain paint temperature within these same limits.
 4. Apply only when surface is dry.
 5. Do not apply when conditions are windy to the point of causing overspray or fuzzy line edges.
 6. New Asphalt Pavement: Allow a minimum pavement cure time as recommended by the manufacturer before applying paint.
 7. Provide guide lines and templates to control paint application.
 8. Take special precautions in marking numbers, letters, and symbols.
 9. Sharply outline edges of markings and apply without running or spattering.
- B. Rate of Application:
1. Reflective Markings:
 - a. Paint: Apply evenly, 105 plus or minus 5 square feet per gallon.
 - b. Glass Beads: Apply uniformly, 6 plus or minus 0.5 pounds of glass spheres per gallon of paint.
 2. Nonreflective Markings: Apply paint evenly to pavement surface at a rate of 105 plus or minus 5 square feet per gallon.
 3. On new pavement or new asphalt surface treatments, apply two coats of paint at a uniform rate of 210 square feet per gallon.
- C. Drying:
1. Provide maximum drying time to prevent undue softening of bitumen and pickup, displacement, or discoloration by traffic.
 2. If drying is abnormally slow, discontinue painting operations until cause is determined and corrected.

3.04 THERMOPLASTIC MARKING APPLICATION

- A. Following specified surface preparation, prime and apply marking and glass beads to provide a reflectorized strip as shown on Drawings.
- B. The material shall be applied to the pavement by the extrusion method only, wherein one side of extrusion shaping die is the pavement and the other sides are formed by suitable equipment for heating and controlling the flow of the material.
- C. Application Temperatures:
 1. Pavement Surface: Minimum 40 degrees F and rising.
 2. Thermoplastic: Minimum 375 degrees F, maximum 425 degrees F.

D. Primer:

1. On portland cement concrete and existing asphalt pavements, apply epoxy resin primer/sealer according to the thermoplastic manufacturer's recommendations.
2. All primer/sealer to dry prior to applying thermoplastic.

E. Thermoplastic Marking:

1. Extrude in a molten state, free of dirt or tint. at a thickness of 0.10 to 0.15 inch for lane lines and 0.07 to 0.10 inch for edge or other lines in accordance with FDOT Design Standards.
2. Apply centerline, skipline, edgeline, and other longitudinal type markings with a mobile applicator.
3. Apply special markings, crosswalks, stop bars, legends, arrows, and similar patterns with a portable, extrusion-type applicator.

F. Glass Bead Application:

1. Immediately after marker application, mechanically apply such that the beads are held by and imbedded in the surface of the molten material.
2. Application Rate: One pound per 20 square feet of compound.

G. Cool completed marking to ambient temperature prior to allowing vehicular traffic.

3.05 INSTALLATION OF RAISED REFLECTIVE MARKERS

- A. Apply markers to the bonding surface using bituminous adhesives only.
- B. Apply the adhesive to the binding surface (not the marker) so that 100 percent of the bonding area of the marker will be covered.
- C. Align markers carefully, projecting no more than 3/4-inch above level of pavement. Reflective face of the marker shall be perpendicular to a line parallel to the roadway centerline. Do not install markers over longitudinal or transverse joints of the bonding surface.
- D. Spacing: As shown on the Drawings or as required by BCTED.
- E. Immediately remove excess adhesive from the bonding surface and exposed surface of the marker.
- F. Use only a mineral spirits meeting Federal Specifications TT-T-291 to remove adhesive from exposed faces of markers.

3.06 GLASS BEAD APPLICATION

- A. Apply immediately following application of paint.
- B. Use evenly distributed, drop-on application method.
- C. Rate: 10 pounds per gallon of paint.

3.07 PROTECTION

- A. The Contractor shall erect adequate warning signs and/or provide sufficient number of flagmen, and take all necessary precautions for the protection of the materials and safety of the public.
- B. Protect surfaces from disfiguration by paint spatters, splashes, spills, or drips.

3.08 CLEANUP

- A. Remove paint spatters, splashes, spills, or drips from Work and staging areas and areas outside of the immediate Work area where spills occur.

- END OF SECTION -

SECTION 02771

CONCRETE CURB AND SIDEWALK

PART 1 - GENERAL

(NOT USED)

PART 2 - MATERIALS

2.01 EXPANSION JOINT FILLER

- A. 1/2-inch thick, preformed asphalt-impregnated, expansion joint material meeting AASHTO M153 Type I, II, or III, or AASHTO M213, or cellulose fiber types meeting the requirements of AASHTO M213, except the asphalt content is acceptable provided they contain minimum of 0.2 percent copper pentachlorophenate as a preservative and 1 percent water proofing wax.

2.02 CONCRETE

- A. Ready-mixed meeting ASTM C94, Option A, with compressive strength of 3,000 psi at 28 days.
- B. Maximum Aggregate Size: 1-1/2 inch.
- C. Slump: 2 to 4 inches.

2.03 CURING COMPOUND

- A. Liquid membrane-forming, clear or translucent, suitable for spray application and meeting ASTM C309, Type 1.

PART 3 - EXECUTION

3.01 FORMWORK

- A. Lumber Materials:
 - 1. 2 inch dressed dimension lumber, or metal of equal strength, straight, free from defects that would impair appearance or structural quality of completed curb and sidewalk.
 - 2. 1 inch dressed lumber or plywood may be used where short-radius forms are required.
- B. Metals: Steel in new undamaged condition.
- C. Setting Forms:
 - 1. Construct forms to shape, lines, grades, and dimensions.

2. Stake securely in place.

D. Bracing:

1. Brace forms to prevent change of shape or movement resulting from placement.
2. Construct short-radius curved forms to exact radius.

E. Tolerances:

1. Do not vary tops of forms from gradeline more than 1/8 inch when checked with 10-foot straightedge.
2. Do not vary alignment of straight sections more than 1/8 inch in 10 feet.

3.02 PLACING CONCRETE

- A. Excavate to the required depth, place and compact limerock base rock as specified in the Contract Documents. Compact directly under the area and 1 foot beyond each side of the sidewalk and curb.
- B. Prior to placing concrete, remove water from excavation and debris and foreign material from forms.
- C. Place concrete as soon as possible, and within 1-1/2 hours after adding cement to mix without segregation or loss of ingredients, and without splashing.
- D. Place, process, finish, and cure concrete in accordance with applicable requirements of ACI 304, and this section. Wherever requirements differ, the more stringent shall govern.
- E. To compact, vibrate until concrete becomes uniformly plastic.
- F. All edges shall be smooth and rounded.

3.03 CURB CONSTRUCTION

- A. Construct ramps at pedestrian crossings in compliance with FDOT and PROWAG minimum standards. Standards apply to work in the City's Rights of Way.
- B. Expansion Joints: Place at maximum 20-foot intervals and at the beginning and end of curved portions of curb, and at connections to existing curbs. Install expansion joint filler at each joint.
- C. Gutter minimum slope shall be 0.33% unless otherwise approved by the City.
- D. Curb Facing: Do not allow horizontal joints within 7 inches from top of curb.
- E. All gutters and curb and gutters shall have a minimum 4" thick limerock "curb pad" LBR 100.
- F. Contraction Joints:
 1. Maximum 10-foot intervals in curb.

2. Provide open joint type by inserting thin, oiled steel sheet vertically in fresh concrete to force coarse aggregate away from joint.
3. Insert steel sheet to full depth of curb.
4. Remove steel sheet with sawing motion after initial set has occurred in concrete and prior to removing front curb form.
5. Finish top of curb with steel trowel and finish edges with steel edging tool.

G. Front Face:

1. Remove front form and finish exposed surfaces when concrete has set sufficiently to support its own weight.
2. Finish formed face by rubbing with burlap sack or similar device to produce uniformly textured surface, free of form marks, honeycomb, and other defects.
3. Remove and replace *defective* concrete.
4. Apply curing compound to exposed surfaces of curb upon completion of finishing.
5. Continue curing for minimum of 5 days.

H. Backfill curb with earth upon completion of curing period, but not before 7 days has elapsed since placing concrete.

1. Backfill shall be free from rocks 2 inches and larger and other foreign material.
2. Compact backfill firmly.

3.04 SIDEWALK CONSTRUCTION

A. Thickness:

1. 4 inches thick minimum, 6 inches thick at driveways, extended two feet beyond drive on both sides

B. Connection to Existing Sidewalk:

1. Remove old concrete back to an existing contraction joint.
2. Clean the surface.
3. Apply a neat cement paste immediately prior to placing new sidewalk.

C. Expansion Joints: Place at maximum 20-foot intervals, at adjacent curb expansion joint, where sidewalk ends at curb, and around posts, poles, or other objects penetrating sidewalk. Install expansion joint filler at each joint.

D. Contraction Joints:

1. Provide transversely to walks at locations opposite contraction joints in curb.
2. Dimensions: 3/16-inch by 1-inch weakened plane joints.

3. Construct straight and at right angles to surface of walk.

E. Finish:

1. Broom surface with fine-hair broom at right angles to length of walk and tool at edges, joints, and markings.
2. Ensure that the surface variations are not more than ¼ inch under a 10-foot straightedge, or more than 1/8 inch on a 5-foot transverse section.
3. Mark walks transversely at 5 foot intervals, or in pattern shown on Drawings, with jointing tool; finish edges with rounded steel edging tool.
4. Apply curing compound to exposed surfaces upon completion of finishing.
5. Protect sidewalk from damage and allow to cure for at least 7 days.

F. Curb Ramps:

1. All curb ramps and detectable warnings shall comply with the current FDOT Index 304 and the Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way by the United States Access Board.

- END OF SECTION -

SECTION 02772

ASPHALT PAVEMENT

PART 1 - GENERAL

1.01 STANDARD SPECIFICATIONS

- A. When referenced in this Section, Standard Specifications shall mean Florida Department of Transportation, Standard Specifications for Road and Bridge Construction, current edition.

1.02 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Independent Testing Laboratory: In accordance with ASTM E329.
 - 2. Asphalt concrete mix formula shall be prepared by an approved certified independent laboratory under the supervision of a certified asphalt technician.

1.03 SUBMITTALS

- A. The Contractor shall submit its proposed formula for the asphaltic concrete paving for review in accordance with the Section entitled "Submittals".

1.04 ENVIRONMENTAL REQUIREMENTS

- A. Temperature: Do not apply asphalt materials or place asphalt mixes when ground temperature is lower than 10 degrees C (50 degrees F), or air temperature is lower than 4 degrees C (40 degrees F). Measure ground and air temperature in shaded areas away from heat sources or wet surfaces.
- B. Moisture: Do not apply asphalt materials or place asphalt mixes when application surface is wet.

PART 2 - MATERIALS

2.01 MATERIALS

- A. Prime Coat: Cut-back asphalt, Grades RC-70 or RC-250 meeting the requirements of the Standard Specifications.
- B. Tack Coat: Emulsified asphalt, Grade RS-2, SS-1, or SS-1H meeting the requirements of the Standard Specifications. The bituminous material shall be heated to a suitable consistency as directed by the City.
- C. Sand (Blotter Material): Clean, dry, with 100 percent passing a 4.75 mm (No. 4) sieve, and a maximum of 10 percent passing a 75 mm (No. 200) sieve.

2.02 ASPHALT CONCRETE MIX

- A. General:

1. Mix formula shall not be modified except with the written approval of City.
2. Source Changes:
 - a. Should material source(s) change, establish a new asphalt concrete mix formula before the new material(s) is used.
 - b. Perform check tests of properties of the plant-mix bituminous materials on the first day of production and as requested by City to confirm that properties are in compliance with design criteria.
 - c. Make adjustments in gradation or asphalt content as necessary to meet design criteria.
- B. Asphalt Concrete: Type SP meeting the requirements of the Standard Specifications.
- C. Composition: Hot-plant mix of aggregate, mineral filler, and paving grade asphalt cement. The several aggregate fractions shall be sized, uniformly graded, and combined in such proportions that the resulting mixture meets the grading requirements of the mix formula.
- D. Aggregate:
 1. The aggregate shall meet the requirements of the Standard Specifications.
 2. Mineral Filler shall meet the requirements of the Standard Specifications
- E. Asphalt Cement: Paving Grade AC-30 meeting the requirements of the Standard Specifications.

PART 3 - EXECUTION

3.01 GENERAL

- A. Traffic Control: Minimize inconvenience to traffic, but keep vehicles off freshly treated or paved surfaces to avoid pickup and tracking of asphalt.
- B. Driveways: Repave driveways from which pavement was removed. Leave driveways in as good or better condition than before start of construction.

3.02 LINE AND GRADE

- A. Provide and maintain intermediate control of line and grade, independent of the underlying base to meet finish surface grades and minimum thickness.
- B. Shoulders: Construct to line, grade, and cross-section shown.

3.03 PREPARATION

- A. Prepare subgrade as specified in the Contract Documents.
- B. Existing Roadway:

1. Modify profile by grinding, milling, or overlay methods as approved, to provide meet lines and surfaces and to produce a smooth riding connection to existing facility.
 2. Resurface entire roadway following adjustment of base and asphalt grades.
 3. Paint edges of meet line with tack coat prior to placing new pavement.
- C. Thoroughly coat edges of contact surfaces (curbs, manhole frames) with emulsified asphalt or asphalt cement prior to laying new pavement. Prevent staining of adjacent surfaces.

3.04 PAVEMENT APPLICATION

- A. General: Place asphalt concrete mixture on an approved, prepared base in conformance with this Section.
- B. Cold Milling
1. Milling of existing asphalt pavement shall be at the depth and location as indicated on the Construction Drawings or as directed by the City.
 2. The milled surface shall be reasonably smooth and free of excessive scarification marks, gouges, ridges, continuous grooves, or other damage. The milled pavement surface shall be thoroughly cleaned of all loose aggregate particles, dust, and other objectionable material by the use of power brooms, power blowers, power vacuums or other means.
 3. The Contractor shall coordinate the adjustment of maintenance access structures, meter boxes, drainage inlets, and valve boxes with the milling operation.
 4. All milled material shall become the property of the Contractor and shall be disposed of off-site or used in conformance with the Contract Documents, or for utilization as Reclaimed Asphalt Pavement, in conformance with the specification provided above, as approved by the City.
- C. Prime Coat:
1. Heat cut-back asphalt between 100 degrees F and 150 degrees F prior to application.
 2. Apply uniformly to clean, dry surfaces. Avoiding overlapping of applications.
 3. Do not apply when moisture content of upper 3 inches of base exceeds optimum moisture content of base, or if free moisture is present.
 4. Application Rate: Minimum 0.1 gallons per square yard of surface area.
 5. Remove or redistribute excess material.
 6. Allow a minimum of 5 full days for curing of primed surface before placing asphalt concrete.
- D. Tack Coat:

1. Apply uniformly to clean, dry surfaces. Avoiding overlapping of applications.
2. Do not apply more tack coat than necessary for the day's paving operation.
3. Touch up missed or lightly coated surfaces and remove excess material.
4. Application Rate:
 - a. Minimum 0.05 gallons to maximum 0.12 gallons of asphalt (residual if diluted emulsified asphalt) per square yard of surface area.
 - b. Apply at rate, within range specified, sufficient to assure good bonding, but not so heavy that surplus asphalt flushes into asphalt concrete being placed.

E. Pavement Mix:

1. Prior to Paving:
 - a. Sweep primed surface free of dirt, dust, or other foreign matter.
 - b. Patch holes in primed surface with asphalt concrete pavement mix.
 - c. Blot excess prime material with sand.
2. Place asphalt concrete pavement mix in lifts as shown.
3. Compacted Lift Thickness:
 - a. Minimum: Twice the maximum aggregate size, but in no case less than 1 inch. Minimum thickness for Type SP-9.5 is 1.0 inches.
 - b. Maximum: 6 inches.
4. Total Compacted Thickness: Per Contract Documents.
5. Apply such that meet lines are straight and edges are vertical.
6. Collect and dispose of segregated aggregate from raking process. Do not scatter material over finished surface.
7. Joints:
 - a. Offset edge of each layer a minimum of 6 inches so joints are not directly over those in underlying layer.
 - b. Offset longitudinal joints in roadway pavements, so longitudinal joints in wearing layer coincide with pavement centerlines and lane divider lines.
 - c. Form transverse joints by cutting back on previous day's run to expose full vertical depth of layer.
8. Succeeding Lifts: Apply tack coat to pavement surface between each lift.
9. After placement of pavement, seal meet line by painting a minimum of 6 inches on each side of the joint with cut-back or emulsified asphalt. Cover immediately with sand.

F. Compaction:

1. Roll until roller marks are eliminated and compacted to 100 percent of the laboratory compacted mixture.
2. Joint Compaction:
 - a. Place top or wearing layer as continuously as possible.
 - b. Pass roller over unprotected end of freshly laid mixture only when placing of mix is discontinued long enough to permit mixture to become chilled.
 - c. Cut back previously compacted mixture when Work is resumed to produce a slightly beveled edge for full thickness of layer.
 - d. Cut away waste material and lay new mix against fresh cut.

G. Tolerances:

1. General: Conduct measurements for conformity with crown and grade immediately after initial compression. Correct variations immediately by removal or addition of materials and by continuous rolling.
2. Completed Surface or Wearing Layer Smoothness:
 - a. Uniform texture, smooth, and uniform to crown and grade.
 - b. Maximum Deviation: 1/8 inch from lower edge of a 12-foot straightedge, measured continuously parallel and at right angle to centerline.
 - c. If surface of completed pavement deviates by more than twice the specified tolerances, remove and replace wearing surface.
3. Transverse Slope Maximum Deviation: 1/4 inch in 12 feet from the rate of slope shown.
4. Finished Grade:
 - a. Perform a field differential level survey on a maximum 50-foot grid and along all grade breaks.
 - b. Maximum Deviation: 0.02 foot from the grade shown.

H. Seal Coat:

1. General: Apply seal coat of paving grade or emulsified asphalt to finished surface at longitudinal and transverse joints, joints at abutting pavements, areas where the asphalt concrete was placed by hand, patched surfaces, and other areas as directed by the City.
2. Preparation:
 - a. Maintain surfaces that are to be sealed free of holes, dry, and clean of dust and loose material.

- b. Seal in dry weather and when the temperature is above 35 degrees F.
- 3. Application:
 - a. Fill cracks over 1/16 inch in width with an asphalt-sand slurry or approved crack sealer prior to sealing.
 - b. When sealing patched surfaces and joints with existing pavements, extend minimum 6 inches beyond edges of patches.

3.05 PAVEMENT OVERLAY

A. Preparation:

- 1. Remove fatty asphalt, grease drippings, dust, and other deleterious matter.
- 2. Surface Depressions: Fill with asphalt concrete mix, and thoroughly compact.
- 3. Damaged Areas: Remove broken or deteriorated asphalt concrete and patch as specified in Article Patching.
- 4. Portland Cement Concrete Joints: Remove joint filler to minimum 1/2 inch below surface.

B. Application:

- 1. Tack Coat: As specified in this Section.
- 2. Place and compact asphalt concrete as specified in Article Pavement Application.
- 3. Place first layer to include widening of pavement and leveling of irregularities in the surface of the existing pavement.
- 4. When leveling irregular surfaces and raising low areas, the actual compacted thickness of any one lift shall not exceed 2 inches.
- 5. The actual compacted thickness of intermittent areas of 120 square yards or less may exceed 2 inches, but not 4 inches.
- 6. Final wearing layer shall be of uniform thickness, and meet grade and cross-section as shown.

3.06 PATCHING HOT MIX ASPHALT

A. Preparation:

- 1. Remove damaged, broken, or unsound asphalt concrete adjacent to patches. Trim to straight lines exposing smooth, sound, vertical edges.
- 2. Prepare patch subgrade as specified in the Contract Documents.

B. Application:

- 1. Patch Thickness: 3 inches or thickness of adjacent asphalt concrete, whichever is greater.

2. Place asphalt concrete mix across full width of patch in layers of equal thickness.
3. Spread and grade asphalt concrete with hand tools or mechanical spreader, depending on size of area to be patched.

C. Compaction:

1. Roll patches with power rollers capable of providing compression of 200 to 300 pounds per linear inch. Use hand tampers where rolling is impractical.
2. Begin rolling top course at edges of patches, lapping adjacent asphalt surface at least 1/2 the roller width. Progress toward center of patch overlapping each preceding track by at least 1/2 the width of roller.
3. Make sufficient passes over entire area to remove roller marks and to produce desired finished surface.

D. Tolerances:

1. Finished surface shall be flush with and match grade, slope, and crown of adjacent surface.
2. Tolerance: Surface smoothness shall not deviate more than plus 1/4 inch or minus 0 when a straightedge is laid across patched area between edges of new pavement and surface of old surfacing.

3.07 FIELD QUALITY CONTROL

A. General: Provide services of an approved certified independent testing laboratory to conduct tests.

B. Field Density Tests:

1. Perform tests from cores or sawed samples.
2. Measure with properly operating and calibrated nuclear density gauge.
3. Maximum Density: In accordance with ASTM D2041, using a sample of mix taken prior to compaction from the same location as the density test sample.

C. Testing Frequency:

1. Quality Control Tests:
 - a. Asphalt Content, Aggregate Gradation: Once per every 500 tons of mix or once every 4 hours, whichever is greater.
 - b. Mix Design Properties, Measured Maximum (Rice's) Specific Gravity: Once every 1,000 tons or once every 8 hours, whichever is greater.
2. Density Tests: Once every 500 tons of mix or once every 4 hours, whichever is greater.

- END OF SECTION -

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SECTION 02820

FENCE SYSTEM

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. The contractor shall provide all labor, materials and appurtenances necessary for installation of the privacy aluminum fence system defined herein at Progresso Stormwater Pump Station in Fort Lauderdale, Florida.

1.02 RELATED WORK

- A. Section 02300 - Earthworks
- B. Division 03 - Concrete

1.03 SYSTEM DESCRIPTION

- A. The manufacturer shall supply a steel framework Trac system design manufactured by FenceTrac™ or approved equal. The system shall include all components (i.e., all necessary components, posts, gates and hardware) required.

1.04 QUALITY ASSURANCE

- A. The contractor shall provide laborers and supervisors who are thoroughly familiar with the type of construction involved and materials and techniques specified.

1.05 REFERENCES

- A. ASTM International
 1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
 2. ASTM B117 - Practice for Operating Salt-Spray (Fog) Apparatus.
 3. ASTM D523 - Test Method for Specular Gloss.
 4. ASTM D714 - Test Method for Evaluating Degree of Blistering in Paint.
 5. ASTM D822 - Practice for Conducting Tests on Paint and Related Coatings and Materials using Filtered Open-Flame Carbon-Arc Light and Water Exposure Apparatus.
 6. ASTM D1654 - Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.
 7. ASTM D2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.

8. ASTM D2794 - Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
9. ASTM D3359 - Test Method for Measuring Adhesion by Tape Test.

1.06 SUBMITTAL

- A. The manufacturer's submittal package shall be provided prior to installation.

1.07 PRODUCT HANDLING AND STORAGE

- A. Upon receipt at the job site, all materials shall be checked to ensure that no damages occurred during shipping or handling. Materials shall be stored in such a manner to ensure proper ventilation and drainage, and to protect against damage, weather, vandalism and theft.

PART 2 - MATERIALS

2.01 MANUFACTURER

- A. The commercial ornamental steel fence system shall conform to FenceTrac standard system with Aluminum style filler materials supplied by FenceTrac or approved equal. FenceTrac is manufactured in Tulsa, OK. Contact: 918-794-8722; info@fencetrac.com

2.02 MATERIAL

- A. Steel material for fence framework, when galvanized prior to forming, shall conform to the requirements of ASTM A924/A924M, with a minimum yield strength of 45,000 psi (310 MPa). The steel shall be hot-dip galvanized to meet the requirements of ASTM A653/A653M with a minimum zinc coating weight of 0.90 oz/ft² (275 g/m²), Coating Designation G-90.
- B. Steel material for posts, when galvanized prior to forming, shall conform to the requirements of ASTM A924/A924M, with a minimum yield strength of 45,000 psi (310 MPa). The steel shall be hot-dip galvanized to meet the requirements of ASTM A653/A653M with a minimum zinc coating weight of 0.60 oz/ft² (183 g/m²), Coating Designation G-60.
- C. Material for the Top and Bottom Tracs shall be 18 Ga. steel. Material for the Post Mount and Vertical-H Tracs shall be 18 Ga. steel. The cross-sectional shape of the rails shall conform to the manufacturer's roll-formed U-channel design. Fence posts and gate posts shall meet the minimum size requirements of Table 1.

2.03 FABRICATION

- A. All fence framework shall be pre-cut to specified lengths. The Post Mount Tracs shall be pre-drilled for attachment to the posts.
- B. The manufactured steel framework and posts shall be subjected to a multi-stage pretreatment cleaning and coating process. Starting with the pre-rinse and wash process for good adhesion, followed by oven drying in preparation for powder coat application, then adding an electrostatic spray application of a thermosetting Polyester-TGIC powder coat finish. The total coating shall be a minimum thickness of 3 mils

(0.0762mm). The color shall be (specify Black, Bronze, White or Beige). The coated framework shall be capable of meeting the performance requirements for each quality characteristic shown in Table 2.

- C. Completed sections shall be capable of supporting appropriate wind speeds according to ASCE 7-22 for Commercial/Industrial designed systems only. Residential applications will vary and wind speed testing can be calculated for an additional cost if necessary. Panels without special ornamentation or custom additions on top shall be biasable up to a 45% change in grade.

PART 3 - EXECUTION

3.01 PREPARATION

- A. All new installation shall be laid out by the contractor in accordance with the construction plans.

3.02 FENCE INSTALLATION

- A. Fence post shall be spaced according to FenceTrac installation instructions or Submittal drawings. For installations that must be raked to follow sloping grades, the post spacing dimension must be measured along the grade. Fence sections shall be attached to posts with self-tapping screws supplied by the manufacturer. Posts shall be set in concrete footers having a minimum depth of 36" (Note: In some cases, local restrictions of freezing weather conditions may require a greater depth). The 02300 Earthworks and 03300 Cast-In-Place Concrete sections of this specification shall govern material requirements for the concrete footer. Posts setting by other methods such as plated posts or grouted core-drilled footers are permissible only if shown by engineering analysis to be sufficient in strength for the intended application. Alternative materials on posts are also possible with the FenceTrac system, additional contact may be necessary to complete special post installations.

3.03 FENCE INSTALLATION MAINTENANCE

- A. When cutting/drilling rails or posts adhere to the following steps to seal the exposed steel surfaces; 1) remove all metal shavings from cut area. 2) Apply zinc-rich primer to thoroughly cover cut edge and/or drilled hole; let dry. 3) Apply 2 coats of custom finish paint matching fence color. Failure to seal exposed surfaces per steps 1-3 above will negate warranty. FenceTrac spray cans or paint pens shall be used to prime and finish exposed surfaces; it is recommended that paint pens be used to prevent overspray. Use of non-FenceTrac parts or components will negate the manufactures' warranty.

3.04 GATE INSTALLATION

- A. Gate posts shall be spaced according to the manufacturers' gate drawings, dependent on standard out-to-out gate leaf dimensions and gate hardware selected. Type and quantity of gate hinges shall be based on the application; weight, height, and number of gate cycles. The manufacturers' gate drawings shall identify the necessary gate hardware required for the application. Gate hardware shall be provided by the manufacture of the gate and shall be installed per manufacturer's recommendations.

3.05 CLEANING

- A. The contractor shall clean the jobsite of excess materials; post-hole excavations shall be scattered uniformly away from posts.

Table 1 – Minimum Sizes for FenceTrac Posts			
Fence Posts (Steel)	Panel Height		
2-1/2" x 16 Ga.	Up to & Including 6' Height for Residential Applications		
2-1/2" x 14 Ga.	Up to & Including 6' Height for Residential Applications		
2-1/2" x 12 Ga.	Up to & Including 8' Height for Residential Applications		
3" x 12 Ga.	Up to & Including 8' Height for Commercial Applications		
4" x 12 Ga.	Up to & Including 8' Height for Commercial Applications		
4" x 11 Ga.	Up to & Including 10' Height for Commercial Applications		
Gate Leaf	Gate Height		
	Up to & Including 6'	Over 6' Up to & Including 8'	Over 8' Up to & Including 10'
Up to 4'	2-1/2" x 14Ga.	3" x 12 Ga.	4" x 11 Ga.
4'1" to 6'	3" x 12Ga.	3" x 12 Ga.	4" x 11 Ga.
6'1" to 8'	4" x 11 Ga.	4" x 11 Ga.	6" x 3/16"

Table 2 – Coating Performance Requirements		
Quality Characteristics	ASTM Test Method	Performance Requirements
Adhesion	D3359 – Method B	Adhesion (Retention of Coating) over 90% of test area (Tape and knife test).
Corrosion Resistance	B117, D714 & D1654	Corrosion Resistance minimum 1,000 hours (Scribed per D1654; failure mode is accumulation of 1/8" coating loss from scribe or medium #8 blisters).
Impact Resistance	D2794	Impact Resistance over 60 inch lb. (Forward impact using 0.625" ball).
Weathering Resistance	D822 D2244, D523 (60° Method)	Weathering Resistance over 1,000 hours (Failure mode is 60% loss of gloss or color variance of more than 3 delta-E color units).

END OF SECTION

SECTION 02832

TEMPORARY CONSTRUCTION FENCE

PART 1 - GENERAL

1.01 THE REQUIREMENT

- A. Furnish and install temporary chain link fencing, posts, gates, etc. at the staging area where shown on the Drawings.

1.02 PERMITS

- A. Obtain permits as required by local jurisdiction.

PART 2 - PRODUCTS

2.01 TEMPORARY CONSTRUCTION FENCE

- A. Type: Chain link, galvanized.
- B. Height: 8'-0".
- C. Posts: Pounded 2'-0" into ground.
- D. Gates: Provide gates of the size and location as determined by the Contractor to be needed.
- E. Lock and Chain: Provide locks and chains as required to secure gate(s).
- F. Windscreen: Provide fence with windscreen for privacy.
- G. Supplier or Equal: National Construction Rentals, Inc.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install per supplier's instructions.

- END OF SECTION -

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SECTION 02900

LANDSCAPE WORK

PART 1 - PART 1 – GENERAL

1.01 DEFINITIONS

A. Measurement:

1. In size grading balled and burlapped (B & B), caliper takes precedence over height.
2. Take trunk caliper 6 inches above the ground level (up to and including 4-inch caliper size) and 12 inches above the ground level for larger trees.
3. Measure size of container-grown stock by height and width of plant.
4. Measure herbaceous perennials pot size, not top growth.

1.02 DELIVERY, STORAGE, AND HANDLING

- A. Inspection and Transporting: Movement of nursery stock shall comply with all Federal, State, and local laws and regulations. Therefore, required inspection certificates shall accompany each shipment, and shall be submitted in accordance with Section 01300.
- B. Cover plants during shipment with a tarpaulin or other suitable covering to minimize drying.
- C. Balled and Burlapped Plants: Wrap each ball firmly with burlap and securely bind with twine, cord, or wire for shipment and handling. Drum-lace balls with a diameter of 30 inches or more. Wire wrap burlap if root ball is not sufficiently compacted. Palms will not require burlap wrapping if the following requirements are met:
 1. Dug from marl or heavy soil that adheres to roots and retains shape without shattering.
 2. Moistened material used to cover ball and roots not exposed to wind and sun.
 3. Transport material on vehicles large enough to allow plants not to be crowded. Plants shall be covered to prevent wind damage during transit and shall be kept moist, fresh and protected at all times. Such protection shall encompass the entire period which the plants are in transit, being handled, or are in temporary storage.
- D. All plant material shall not remain on the work site longer than two (2) days prior to being installed.
- E. As specified herein for transplanting.

1.03 MAINTENANCE

- A. Commence to maintain plant life immediately after planting and maintain for a minimum of one growing season, and until plants are well established and exhibit a vigorous growing condition.
- B. In accordance with accepted submittal on care and maintenance of plants and as follows:
 - 1. Maintain by watering, pruning, cultivating, and weeding as required for healthy growth. Restore planting saucers.
 - 2. Tighten and repair stake and guy supports and reset trees and shrubs to proper grades or vertical position as required.
 - 3. Restore or replace damaged wrappings. Spray as required to keep trees and shrubs free of insects and disease.
 - 4. Remove guys, stakes, and other supports at end of maintenance service.
 - 5. Maintenance includes temporary protection fences, barriers, and signs as required for protection.
 - 6. Coordinate watering to provide deep root watering to newly installed trees.

1.04 SCHEDULING AND SEQUENCING

- A. Plant Deliveries: Notify Engineer at least 3 days in advance of each delivery.
- B. Planting Season: Conduct planting during times of year that are normal for such work as determined by accepted local practice.
- C. Plant trees and shrubs after final grades are established and before planting of lawns or grasses.

PART 2 - PART 2 – MATERIALS

2.01 PLANT MATERIALS

- A. Provide quantity, size, genus, species, and variety of trees and shrubs indicated; comply with applicable requirements of ANSI Z60.1.
- B. Nomenclature (Names of Plants): In accordance with “Hortus Third”.
- C. Quality and Size:
 - 1. Nursery-grown, habit of growth normal for species.
 - 2. Sound, healthy, vigorous, and free from insects, diseases, and injuries - Florida #1 quality or better.
 - 3. Equal to or exceeding measurements specified in plant list. Measure plants before pruning with branches in normal position.

4. Root System of Container-Grown Plants: Well developed and well distributed throughout the container, such that the roots visibly extend to the inside face of the growing container.
 5. Perform necessary pruning at time of planting.
 6. Sizes: Dimensional relationship requirements of ANSI Z60.1 for kind and type of plants required.
 7. Balled and Burlapped Plants: Firm, intact ball of earth encompassing enough of the fibrous and feeding root system to enable full plant recovery.
 - a. Ball Size: ANSI Z60.1.
 8. Container-Grown Plants: Self-established root systems, sufficient to hold earth together after removal from container, without being rootbound.
 - a. Stock: Grown in delivery containers for at least 6 months, but not over 2 years.
 9. Label each tree and shrub of each variety with securely attached waterproof tag, bearing legible designation of botanical and common name.
 10. All trees must have a fully developed fibrous root system, be heavily branched, or in palms, heavily leafed, free from all insects, fungus, and other diseases.
 11. Palms: Wrap the roots of all plants of the palm species before transporting, except if they are container grown plants and ensure that they have an adequate root ball structure, and mass for healthy transplantation as defined in "Florida Grades and Standards for Nursery Plants."
 12. Burlapping is not required if the palm is carefully dug from marl or heavy soil that adheres to the roots and retains its shape without crumbling. During transporting and after arrival, carefully protect root balls of palms from wind and exposure to the sun. Muck grown palms are not allowed. After delivery to the job site, if not planting the palm within 24 hours, cover the root ball with a moist material. Plant all palms within 48 hours of delivery to the site.
 13. Move sabal and coconut palms in accordance with the "Florida Grades and Standards for Nursery Plants."
- D. Replacement Shrubs and Trees: Same species, size, and quality as specified for plant being replaced, except existing trees larger than 4-inch caliper, may be replaced with 4-inch caliper trees to satisfy the caliper inches lost.

2.02 ANTIDESICCANT

- A. Provide transpiration retarding material to be used where any plant material is moved during the growing season.

2.03 GUYING, STAKING, AND WRAPPING MATERIALS

- A. Wood Stake: 2 inches by 2 inches by 8 feet.
- B. Guy Wires: Galvanized, 12-gauge, ductile steel.
- C. Flags:
 - 1. Wood: 1/2-inch by 3 inches by 12 inches, with 3/8-inch hole centered 1-1/2 inches from each end, painted white.
 - 2. Sheet Metal: 1-1/2-inch with clipped corners and both ends punched, painted white.
- D. Hose: Two-ply, reinforced rubber garden hose, not less than 1/2-inch diameter, new or used.
- E. Burlap: Of first quality, minimum 8 ounces in weight, not less than 6 inches nor more than 10 inches in width.

2.04 MULCH

- A. Mulch shall be free from noxious weed seed and foreign material harmful to plant growth and shall be an approved non-native tree bark mulch. It must be uniformly shredded and be free from large pieces of bark, foreign matter, weed seeds and any other organic or inorganic material.
- B. Barkdust: Medium grind, pine; maximum 3/4-inch particle size.

2.05 PLANTING SOIL MIX

- A. Proportion by Weight: 75% approved good quality top soil mixed with 25% approved organic matter as approved by Engineer. The soil must be taken from ground that has never been stripped, with a slight acid reaction (5.5 to 6.5 ph) and without an excess of calcium or carbonate. Soil shall have a loose friable condition.
- B. Special Type: Planting soil for palms shall be a good grade of salt free sand, which is free of all weeds.

2.06 TOPSOIL

- A. General: Uniform mixture of 75 percent good grade of clean, salt free, weed free sand and 25 percent organic material in a loose friable condition, free from objects larger than 1-1/2 inches maximum dimension, and free of subsoil, roots, grass, other foreign matter, hazardous or toxic substances, and deleterious material that may be harmful to plant growth or may hinder grading, planting, or maintenance.
- B. Textural Amendments: Amend as necessary to conform to required composition.
- C. Source: Import topsoil if onsite material fails to meet specified requirements or is insufficient in quantity.
- D. 95% of topsoil shall pass a 1/4 inch sieve.
- E. Organic matter content shall be 4% to 12% of total dry weight.

2.07 SOURCE QUALITY CONTROL

- A. Topsoil Analysis/Testing: Performed by county or state soil testing service or approved certified independent testing laboratory.
- B. Should soil tests prove the topsoil to alkaline or above the accepted minimum for salt content, the topsoil shall be removed and replaced by acceptable material at Contractor's expense.

PART 3 - PART 3 – EXECUTION

3.01 TRANSPLANTING

- A. Remove existing plantings identified for transplant prior to beginning Work in area in accordance with standard nursery practices and as specified herein.
- B. Nondormant Plants: Prior to digging, spray foliage with antidesiccant, as recommended by manufacturer.
- C. Cover balls and containers of plants that cannot be planted immediately, with moist soil or mulch.
- D. Water plants as often as necessary to prevent drying until planted.
- E. Do not remove container-grown stock from containers before time of planting.
- F. Bare-Root Plants:
 - 1. Dig up with least possible injury to fibrous root system.
 - 2. Immediately upon removal from ground, cover roots with thick coating of mud or wrap in wet straw, moss, or other suitable packing material for protection from drying until planted.
 - 3. Plant or heel-in immediately upon relocation to temporary storage. Open and separate bundles of bare-root plants, and eliminate air pockets among roots as they are covered.
- G. Replant each temporarily removed tree, shrub, or other plant only after construction activities are completed and applicable grading and topsoil replacement is completed in its vicinity. Replant trees, shrubs, and other plants in their original positions unless otherwise shown or approved. Plant as specified for new plants.
- H. Maintain transplanted materials in same manner as new trees and shrubs.

3.02 LOCATION OF PLANTS

- A. Locate new planting or stake positions as shown unless obstructions are encountered, in which case notify Engineer.
- B. Locate no planting, except ground cover, closer than 18 inches to pavements, pedestrian pathways, and structures.

- C. Request Engineer observe locations, and adjust as necessary before planting begins.

3.03 PREPARATION

- A. Subsoil Drainage: Furnish for plant pits and beds.
- B. Planting Soil: Delay mixing of amendments and fertilizer if planting will not follow preparation of planting soil within 2 days. For pit and trench type backfill, mix planting soil prior to backfilling and stockpile at site.
- C. Plants: Place on undisturbed existing soil or well-compacted backfill.
- D. Trees and Shrubs:
 - 1. Pits, Beds, and Trenches: Excavate with vertical and scarified sides.
 - 2. B & B Trees and Shrubs: Make excavations at least twice as wide as root ball.
 - 3. Container-Grown Stock: Excavate as specified for B & B stock, adjust for size of container width and depth.
 - 4. Bare-Root Trees: Excavate pits to a width to just accommodate roots fully extended and depth to allow uppermost roots to be below original grade.
 - 5. Fill excavations with water and allow to percolate out prior to planting.
- E. Ground Cover Beds:
 - 1. Mix amendments and fertilizer with top soil prior to placing or apply on surface of top soil and mix thoroughly before planting.
 - 2. Scarify top soil to a depth of 4 to 6 inches.
 - 3. Establish finish grading of soil. Rake areas to smooth and create uniform texture and fill depressions.
 - 4. Moisten.

3.04 PLANTING

- A. Plant trees before planting surrounding smaller shrubs and ground covers. Adjust plants with most desirable side facing toward the prominent view (sidewalk, building, street).
- B. B & B Plants: Place in pit by lifting and carrying by its ball (do not lift by branches or trunk). Lower into pit. Set straight and in pit center with tip of rootball 1 to 2 inches above adjacent finish grade.
- C. Bare-Root Plants: Spread roots and set stock on cushion of planting soil mixture. Set straight in the pit center so that roots, when fully extended, will not touch walls of the planting pit and the uppermost root is just below finish grade. Cover roots of bare-root plants to the crown.

- D. Container-Grown Plants: Remove containers, slash edges of rootballs from top to bottom at least 1-inch deep. Plant as for B & B plants.
- E. Ground Covers: Dig planting holes through mulch with one of the following: hand trowel, shovel, bulb planter, or hoe. Split biodegradable pots or remove nonbiodegradable pots. Root systems of all potted plants shall be split or crumbled. Plant so roots are surrounded by soil below the mulch. Set potted plants so pot top is even with existing grade.

3.05 BACKFILLING

- A. Backfill with planting soil, except where existing soil is suitable according to top soil analysis.
- B. B & B Plants:
 - 1. Partially backfill pit to support plant. Remove burlap and binding from sides and tops of B & B plants, do not pull burlap from under balls.
 - 2. When excavation is approximately 2/3 full, water thoroughly before placing remainder of backfill to eliminate air pockets even if it is raining. Finish backfilling pit sides.
 - 3. Never cover top of rootball with soil. Form a saucer above existing grade, completely around the outer rim of the plant pit.
- C. Bare-Root Plants:
 - 1. Plumb before backfilling and maintain plumb while working backfill around roots and placing layers above roots.
 - 2. Set original soil line of plant 1-inch to 2 inches above adjacent finish landscape grades. Spread out roots without tangling or turning up to surface. Cut injured roots cleanly; do not break.
 - 3. Carefully work backfill around roots by hand; puddle with water until backfill layers are completely saturated.

3.06 GUYING AND STAKING

- A. Support trees immediately after planting to maintain plumb position.
- B. Guying: Support all trees over 4 inches in caliper with 3 guys equally.
- C. Special Requirements for Palm Trees: Brace palms which are to be staked with three 2-inch by 4-inch wood braces, toe-nailed to cleats which are securely banded at two points to the palm, at a point one third the height of the trunk. Pad the trunk with five layers of burlap under the cleats. Place braces approximately 120 degrees apart and secure them underground by 2- by 4- by 12-inch stake pads.

3.07 SUBGRADE PREPARATION

- A. The subgrade shall be 4 inches lower than finished grade with 2 inches of topsoil added to sod areas.

- B. Scarify subgrade to minimum depth of 6 inches where topsoil is to be placed.
- C. Remove stones over 2-1/2 inches in any dimension, sticks, roots, rubbish, and other extraneous material.
- D. Limit preparation to areas which will receive topsoil within 2 days after preparation.

3.08 TOPSOIL PLACEMENT

- A. Topsoil Thickness:
 - 1. Sodded Areas: 2 inches.
 - 2. Planting Beds: 6 inches.
 - 3. Planting Beds in Roadways and Parking Lots: All planting areas shall be excavated to a minimum depth of 24" or greater as needed to remove all road base/rock down to native soil prior to backfilling with approved planting soil.
- B. Do not place topsoil when subsoil or topsoil is excessively wet or otherwise detrimental to the Work.
- C. Mix soil amendments with topsoil before placement or spread on topsoil surface and mix thoroughly into entire depth of topsoil before planting or seeding.
- D. Uniformly distribute to within 1/2-inch of final grades. Fine grade topsoil eliminating rough or low areas and maintaining levels, profiles, and contours of subgrade.
- E. Remove stones exceeding 1-1/2 inches, roots, sticks, debris, and foreign matter during and after topsoil placement.
- F. Remove surplus subsoil and topsoil from site. Grade stockpile area as necessary and place in condition acceptable for planting or seeding.

3.09 MULCHING

- A. Cover planting beds and area of saucer around each plant with 3-inch thick layer of mulch within 2 days after planting. Saturate planting area with water.

3.10 PRUNING AND REPAIR

- A. Prune only after planting and in accordance with standard horticultural practice to preserve natural character of the plant. Perform in presence of Engineer or City's representative. Remove all dead wood, suckers, and broken or badly bruised branches. Use only clean, sharp tools. Do not cut lead shoot.
- B. For Existing Trees Impacted by Construction Activities:
 - 1. Maintain a minimum 6-foot clearance from the trunk of all trees except palm trees. Existing trees to remain shall be protected during all construction phases. Protective barriers shall be provided at the drip line of existing trees adjacent to construction operations. Replacement of any trees that are damaged or destroyed due to the Contractor's operations shall be the Contractor's responsibility and shall be replaced at the Contractor's expense

2. Where roots of trees are encountered in the excavation area, use a 24-inch deep saw cut prior to excavation. Roots shall not be torn by excavating equipment. Hand dig around roots. Cut roots do not require coating.
3. Overhead branches not trimmed prior to construction and interfering with construction activities will be pruned and cut as approved by the City Forester and not torn or broken off with excavating equipment.

3.11 WEED CONTROL

- A. Maintain a weed-free condition within planting areas. Apply pre-emergent selective herbicide to mulched beds at manufacturer's recommended rate of application.

3.12 PROTECTION OF INSTALLED WORK

- A. Protect planting areas and plants against damage for duration of maintenance period.

3.13 ROOT BARRIERS

- A. Root barriers shall be installed parallel to all trees (except palms) when there is a sidewalk, roadway or utility adjacent to the planting area. Root barriers will be installed as directed by Engineer.

- END OF SECTION -

