

CITY OF RIVIERA BEACH

CONTRACT SPECIFICATIONS

For

RIVIERA HEIGHTS W 1ST STREET TO W 3RD STREET NEIGHBORHOOD IMPROVEMENTS



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SPECIAL PROVISIONS

1.01 NOTICES

- A. In conformance with the requirements of the General Conditions all notices or other documents or papers required to be delivered by the Contractor to the Owner.

1.02 COORDINATION OF DRAWINGS, SPECIFICATIONS AND SPECIAL PROVISIONS

- A. In case of discrepancy, computed dimensions shall govern over scaled dimensions; supplemental specifications shall govern over Standard Specifications; and Special Conditions shall govern over Drawings, Supplemental and Standard Specifications.

1.03 LAYING OUT THE WORK

- A. The Contractor shall be responsible for establishing all lines and grades together with all reference points as required by the various trades. All layout work shall be done using competent and experienced personnel under the supervision of a Land Surveyor registered in the State of Florida.
- B. The Contractor shall provide all labor, instruments and stakes, templates, and other materials necessary for marking and maintaining all lines and grades. The lines and grades shall be subject to any field modification the Owner or Engineer may decide necessary.
- C. No separate cost item is provided for laying out the work, the cost of which is considered incidental to the work and shall be included in the unit prices for items in the Proposal.
- D. The Contractor shall safeguard all existing and known Property corners, monuments and marks adjacent to but not related to the work and shall bear the cost of re-establishing them if disturbed or destroyed. He shall also safeguard all points, stakes, grade marks, monuments and bench marks made or established on the work, bear the cost of re-establishing them if disturbed and bear the cost of rectifying work improperly installed due to not maintaining or protecting or to removing without authorization such established points, stakes and marks.

1.04 PERMITS AND LICENSES

- A. Before starting work, the Contractor shall obtain and pay for all required licenses and permits.

1.05 CONTRACTOR'S OFFICE

- A. The Contractor shall provide and maintain an office with telephone facilities where he or a responsible representative of his organization may be reached at any time while work is in progress.

1.06 USE OF EXPLOSIVES

- A. No blasting shall be performed.

1.07 USE OF PUBLIC STREETS

- A. The use of public streets and alleys shall be such as to provide a minimum of inconvenience to the public and to other traffic. Any earth or other excavated material spilled from trucks shall be removed immediately by the Contractor and the streets cleaned to the satisfaction of the Owner.

1.08 CARE OF TREES, SHRUBS AND GRASS

- A. The Contractor shall be fully responsible for maintaining in good condition all cultivated grass plots, trees and shrubs. Where maintained shrubbery, grass strips or area must be removed or destroyed incident to the construction operation, the Contractor shall, after completion of the work, replace or restore to the original condition all destroyed or damaged shrubbery or grass areas. Tree limbs which interfere with equipment operation and are approved for pruning shall be neatly trimmed and the tree cut coated with a tree paint.

1.09 OBSTRUCTIONS

- A. All water pipes, storm drains, force mains, gas or other piping, telephone or power cables or conduits, and all other obstructions, whether or not shown, shall be temporarily removed from or supported across pipeline excavations. Before disconnecting any pipes or cables, the Contractor shall obtain permission from the owner, or shall make suitable arrangements for their disconnection by the owner. The Contractor shall be responsible for any damage to any such pipes, conduits or cables, and shall restore them to service promptly as soon as the work has progressed past the point involved. Approximate locations of known water, sanitary, drainage, power and telephone installations along route of new pipelines or in vicinity of the work are shown, but must be verified in the field by the Contractor. The Contractor shall uncover these pipes, ducts, cables, etc., carefully, by hand, to verify location and depth of cover. Any discrepancies or differences found shall be brought to the attention of the Owner in order that necessary changes may be made. These conditions are supplemental to general requirements elsewhere in these specifications. Where fences, walls or other man-made obstructions exist illegally in the public right-of-way, the Owner will have them removed upon adequate prior notice by the Contractor.

1.10 DAMAGE TO EXISTING STRUCTURES AND UTILITIES

- A. The Contractor shall be responsible for and make good all damage to pavement

beyond the limits of this Contract, to buildings, telephone or other cables, water pipes, sanitary pipes, or other structures which may be encountered, whether or not shown on the Drawings. Pavement restorations shall follow Owner standards.

- B. Information shown on the Drawings as to the location of existing utilities has been prepared from the most reliable data available to the Engineer. This information is not guaranteed, however, and it shall be this Contractor's responsibility to determine the location, character and depth of any existing utilities. He shall assist the utility companies, by every means possible to determine said locations. Extreme caution shall be exercised to eliminate possibility of damage to utilities resulting from his activities.

1.11 NOTIFICATION TO UTILITY COMPANIES

- A. The excavators shall comply with Florida Statute 553.851 regarding notification of existing gas and oil pipeline company owners and shall also notify "SUNSHINE STATE" at 1- (800) 432-4770 at least forty-eight (48) hours prior to excavating. Evidence of such notice shall be furnished to the Owner prior to excavating.

1.12 TESTS

- A. The Contractor will pay for all required tests, including those proving satisfactory operation of equipment, pressure/leakage tests and disinfection. Materials tests will be compaction and soil density tests, limerock quality tests, concrete quality tests (cylinder breaks). Water required for pressure/leakage tests shall be furnished by the Contractor.

1.13 RECORD DRAWINGS

- A. During the entire construction operation, the Contractor shall maintain records of all deviations from the Drawings and Specifications and shall prepare there from "record" drawings showing correctly and accurately the locations of all improvements to reflect the work as it was actually constructed. Final acceptance of the project will be withheld until delivery of the set of "record" drawings is made to the Owner.

1.14 SUBSURFACE INVESTIGATION

- A. The Contractor shall be responsible for having determined to his satisfaction, prior to the submission of his bid, the nature and location of the work, the conformation of the ground, the character and quality of the substrata, the types and quantity of materials to be encountered, the nature of the ground water conditions, the character of equipment and facilities needed preliminary to and during the execution of the work, the general and local conditions and all other matters which can in any way affect the work under this contract. The prices established for the work to be done will reflect all costs pertaining to the work. Any claims for extras based on substrata or ground water table conditions will not be allowed.

1.15 SUSPENSION OF WORK

- A. Should the Owner be prevented or enjoined from proceeding with work either before or after the start of construction because of any litigation or other reason beyond the control of the Owner, the Contractor shall not be entitled to make or assert claim for damage by reason of said delay; but time for completion of the work will be extended to such reasonable time as the Owner may determine to compensate for time lost by such delay, with such determination to be set forth in writing.

1.16 PAYMENT FOR UTILITIES

- A. The Contractor shall obtain the necessary utility service by making application for the service and paying such fees and charges required by the utility companies, including construction water meters, if required.

1.17 MAINTENANCE OF TRAFFIC

- A. General:
 - 1. The Contractor shall be responsible for the proper maintenance control and detour of traffic in the area of construction, during the course of construction. All traffic control and maintenance procedures shall be in accordance with the requirements of either the Florida Department of Transportation or the City of Riviera Beach.
 - 2. Traffic shall be maintained at all times where practical and as more particularly specified hereinafter. No traffic shall be detoured without prior knowledge and approval of the respective traffic control agency having jurisdiction. The Contractor shall notify such agencies 48 hours in advance of such time he proposes to detour traffic.
 - 3. The Contractor shall keep all law enforcement, fire protection and ambulance agencies informed, in advance, of his construction schedules, and shall notify all such agencies, 48 hours in advance, in the event of detour of any roadway.
 - 4. All traffic control signs and devices, barricades, flashers, flambeaus and similar devices shall be furnished and maintained by the Contractor.
 - 5. Excavated or other material stored adjacent to or partially upon a roadway pavement shall be adequately marked for traffic and pedestrian safety at all times. Necessary access to adjacent property shall be provided at all times.
 - 6. The work shall be conducted in a manner to cause the least possible interruption to traffic. Where traffic must cross excavations, the Contractor shall provide suitable bridges at street intersections and driveways.
- B. Traffic Lanes:
 - 1. At least one lane of traffic shall be maintained at all times; coordination is

required with the Owner and all applicable governmental agencies, within their respective area of jurisdiction.

2. In the event the Contractor must detour or close off residential street traffic, he shall submit a plan (or field sketch) for approval depicting a method of providing one way operation or run-around detour route to the respective traffic agency having jurisdiction a minimum of five days prior to any street closing.

1.18 BARRICADES AND PROTECTION OF WORK

- A. The Contractor shall protect his work throughout its length by the erection of suitable barricades and handrails, where required. He shall further indicate this work at night by the maintenance of suitable lights or flares, especially along or across through-fares. Wherever it is necessary to cross a public walk, he shall provide suitable safe walkways with handrailings. He shall also comply with all laws or ordinances covering the protection of such work and the safety measures to be employed therein. The Contractor shall carry out his work so as not to deny access to private property. All utility access manholes, valves, fire hydrants and letter boxes shall be always kept accessible.
- B. No trenches or holes near walkways, in roadways or road shoulders are to be left open during night hours without the permission of the Owner.

1.19 STATE WATER QUALITY STANDARDS

- A. Submit a temporary erosion and pollution control plan. Plan shall detail means and methods proposed to prevent violation of state water quality standards. Plan shall include placement of turbidity barriers and a turbidity monitoring plan in accordance with the guidelines described in Chapter 6 of the Florida Land Development Manual: A Guide to Sound Land & Water Management (Dept. of Environmental Regulation 1988). Refer to Rule 40E 4.091 FAC.
- B. Turbidity barriers and plan shall remain active until all work is completed.
- C. Remove barriers and other equipment upon completion of the project.

1.20 UNIT PRICE ESCALATION

- A. The Contract unit prices will remain firm for the first year of the Contract. A request for a price escalation will:
 1. Only be considered for subsequent years;
 2. Must be submitted at least sixty (60) days prior to the end of a current year; and
 3. Must be approved by the PARTIES prior to the next year effective date; and
 4. Will only be allowed on a pass-through basis (does not result in a higher profit margin than that reflected in the prices awarded in the original

proposal.

- B. The Contractor will be required to provide sufficient documentation to justify the requested price escalation(s) the OWNER will determine the acceptability of sources. Documentation will include a cost proposal in sufficient detail for the OWNER to perform a cost/price analysis upon which the original proposal was made.
- C. An evaluation and/or audit will be performed on the cost proposal as well as other submitted documentation to determine if the requested price increase(s) is fair and reasonable. Approval of a price escalation request will be at the sole discretion of the OWNER.
- D. Retroactive price increase adjustments will not be considered. In summary, adjustments to pricing shall be the result of increases at the manufacturer's level or payroll paid wage rate level, incurred after the Contract commencement date that:
 - 1. Will not yield a higher profit margin than that reflected in the prices awarded in the original proposal;
 - 2. Clearly identifies the items impacted by the increase; and
 - 3. Is accompanied by documentation, acceptable to the OWNER.
- E. If the City does not find the documentation sufficient to support a price escalation request on a pass through basis the City reserves the option to counter offer with a percentage increase up to but not to exceed the percentage based upon the movement of the unadjusted figures of the U.S. Department of Labor Consumer Price Index for all Urban Consumers (CPI-U, U.S. City Average) hereafter called the CPI. The movement period will be of the CPI for the 12-month period ending three months prior to the end of the current term of the contract. The contract price changes, if agreed to by both Parties, shall be binding on the contractor for the subsequent contract year should it be awarded.
- F. This escalation/de-escalation provision and its methodology shall be considered to mean and apply to price decreases as well as increases. Price decreases may be considered and implemented at any time during the term of the contract if agreed to by both Parties. If a contract is operating on pricing resulting from the use of the CPI the City reserves the right to initiate a request for a price decrease, based upon the CPI, at any time.
- G. Approved price changes will be put into effect using the Owner's Contingency Allowance, Item #8 on the Bid Schedule.
- H. Failure to reach agreement on a request for an increase or decrease in price(s) can, at the sole option of the City, terminate the Contract under the provisions for termination without cause.

END OF SECTION

SECTION 01010

SUMMARY OF WORK

PART 1 GENERAL

1.01 LOCATION OF WORK

- A. Work is located on West 3rd Street from Avenue O to Australian Avenue; West 2nd Street from Avenue O to Australian Avenue; and West 1st Street from Avenue O to Australian Avenue.

1.02 WORK TO BE PERFORMED

- A. The Work to be performed under this Contract shall consist of providing equipment, materials, supplies, and manufactured articles; and for furnishing transportation and services, including fuel, power, water, and essential communications; and for the performance of labor, work, or other operations in strict accordance with the Contract Documents.
- B. Wherever the Contract Documents address a third party, i.e., subcontractor, manufacturer, vendor, etc., it is to be considered as the Contractor through the third party.
- C. Wherever a reference to number of days is noted, it shall mean calendar days.

1.03 GENERAL DESCRIPTION OF CONTRACT

- A. Demolition of old drainage utilities.
- B. Concrete curbing.
- C. Construct stormwater and drainage structures and piping.
- D. Provide and coordinate detailed utility relocations.
- E. Construct new water main.
- F. Construct new sanitary sewer main.
- G. Line existing sanitary sewer main.
- H. Rehabilitate existing sanitary sewer manholes.
- I. Reconstruct Roadway pavement and base.
- J. Remove & Replace Sidewalks.
- K. Other work as shown on the Construction Plans.

1.04 SEQUENCE OF CONSTRUCTION

- A. Following receipt of Notice-to-Proceed with the Work, the Contractor shall notify the Engineer and the Owner at least five days before he is ready to start actual

construction to allow the Owner time to make arrangements for inspection of the Work.

- 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 the systems. Work shall be performed in such a manner that will protect the utilities. Compensation for damages to utilities due to phasing of work.
- C. Submit a sequence of construction schedule for the entire project.

1.05 ABANDONMENT AND REMOVAL OF EXISTING FACILITIES

- A. Remove utilities shown on drawings. Provide by-pass pump and/or system re-routing as required.
- B. Salvage equipment if shown on Drawings.

1.06 REHABILITATION

- A. Right of Ways will be affected by work necessary to complete this Contract. The Contractor shall be responsible to restore those areas affected by its construction activities.
- B. Disposal of Debris: All debris, materials, piping, and miscellaneous waste products from the Work described in the section shall be removed from the project as soon as possible. They shall be disposed of in accordance with applicable federal, state, and local regulations. The Contractor is responsible for determining these regulations and shall bear all costs or retain any profit associated with disposal of these items.

1.07 CONTRACTOR USE OF PROJECT SITE

- A. The Contractor's use of the project site shall be limited to its construction operations, including on-site storage of materials, on-site fabrication facilities, and field offices, as noted on the Contract Drawings.

1.08 OWNER USE OF THE PROJECT SITE

- A. The Owner may utilize all or part of the existing facilities during the entire period of construction for the conduct of the Owner's normal operations. The Contractor shall cooperate with the Owner to minimize interference with the Contractor's operations and to facilitate the Owner's operations.

1.09 COORDINATION WITH OTHER CONTRACTS

- A. Coordinate work with that of other Contractors on site.

1.10 PARTIAL UTILIZATION OF THE WORK BY THE OWNER

- A. The Contractor is hereby advised that the Owner may accept the responsibility for the maintenance and protection of a specific portion of the Project if utilized prior to Completion. However, the Contractor shall retain full responsibility for satisfactory completion of the project.

1.12 PERMITS

- A. It shall be the Contractor's responsibility to secure all permits required to complete the work under this contract, except permits obtained by the Owner. The following permits have already been or will be obtained by the Owner:
 - 1. Permit Number 138288-212-DSGP – General Permit for Construction of Water Main Extension for PWSs – issued by Florida Department of Health Palm Beach County.
 - 2. Permit Number 50-11307-P – Environmental Resource Permit – issued by South Florida Water Management District.
 - 3. Water Use Permit Application, Dewatering Use – by South Florida Water Management District – This permit is in progress. The contractor will be required to modify the permit if construction operations vary from the approved permit. The cost of any permit modification shall be borne by the Contractor.
 - 4. Palm Beach County Utility Permit Application – by Palm Beach County Engineering Land Development Division – This permit is in progress and is required for water main improvements along Australian Avenue.
- B. No separate or direct payment will be made to the Contractor for permits and inspection requirements, but all such costs shall be included in the bid proposal. The Owner will furnish signed and sealed sets of Contract Documents for permit use as required.

1.13 FIELD ENGINEERING

- A. The Contractor shall employ a Land Surveyor registered in the State of Florida and acceptable to the Engineer. The Contractor shall locate and protect survey control and reference points.
- B. Provide Field Engineering Services: Establish elevations, lines, and levels, utilizing recognized engineering survey practices.
- C. Submit a copy of registered site drawing and certificate signed by the Land Surveyor that the elevations and locations of the Work are in conformance with the Contract Documents.

1.14 DIMENSIONS AND LOCATIONS OF EXISTING STRUCTURES, PIPING AND UTILITIES

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

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01015
GENERAL REQUIREMENTS

PART 1 – GENERAL

1.01 RELATED REQUIREMENTS

- A. General provisions of Contract, including General Terms and Conditions.
- B. Requirements for determining completed Work - Section 01025.

1.02 PROJECT DESCRIPTION

- A. Construction of 1-3rd Street Improvements from Australian Ave to Avenue O.

1.03 CONTRACTOR USE OF PREMISES

- A. Contractor shall have use of the project site for construction operations. The Contractor's use of the premises is limited only by the Owner's right to perform construction operations with its own forces or to employ separate contractors on portions of the project.
- B. The Contractor shall be responsible for coordinating his daily activities in conjunction with any Contractors presently working within the vicinity of this project.
- C. Confine operations to areas within rights-of-way and easements.
- D. Keep existing driveways and entrances serving the premises clear and available to the Owner and the Owner's employees at all times.
 - 1. Do not use these areas for parking or storage of materials.
 - 2. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.
- E. Do not dispose of organic and hazardous material on site, either by burial or by burning.

1.04 ENVIRONMENTAL PROTECTION

- A. Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result.

1.05 SUBMITTALS

- A. General: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
- B. Progress Schedule: Fully developed, horizontal bar chart type Contractor's construction schedule. Revise the schedule after each meeting or activity, where revisions have been recognized or made. Issue updated schedules monthly.
 - 1. Each station shall be a separate activity
- C. Daily Construction Report: Record of construction activities, on-site work force and equipment including progress and events at the site; submit two (2) copies to the Engineer at weekly intervals.
- D. Shop Drawings: Newly prepared information, drawn to accurate scale. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not acceptable.
 - 1. Shop Drawings shall include fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings.
 - 2. Do not use Shop Drawings without an appropriate final stamp indicating action taken in connection with construction.
- E. Product Data: Collect into a single submittal for each element of construction or system. Includes printed information such as manufacture's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams and performance curves.
- F. Samples: Full size, fully fabricated samples cured and finished as specified and physically identical with the material or product proposed.
- G. Submit shop drawings/product data for each item to be incorporated in the project.

1.06 QUALITY CONTROL

- A. The Contractor shall provide inspections, tests and similar quality control services, specified in individual Specification Sections and required by governing authorities, except where they are specifically indicated to be the Owner's responsibility, or are provided by another identified entity.
 - 1. Costs for these services shall be included in the Contract Sum.
 - 2. The Owner will engage and pay for the services of an independent agency to perform inspections and tests specified as the Owner's responsibility.
- B. The Contractor is responsible for and shall pay costs of retesting when required by Engineer or Owner and of additional testing needed or required by the Contractor.

- C. The Contractor shall pay costs for additional trips to the project by the agency when scheduled times for tests and inspections are canceled and agency is not notified sufficiently in advance of cancellation to avoid the trip.

1.07 MATERIAL AND EQUIPMENT

- A. Substitutions: After Bidding period, up to 30 days after date of Notice to Proceed, the Engineer will consider written requests from Contractor for proposed substitutions of products. Subsequent requests will only be considered when proof is given to the Engineer of product unavailability or other condition beyond control of the Contractor. Submit a separate request for each proposed substitution; two (2) copies each on the Substitution Request (SR) available from the Engineer.
 - 1. Do not order or install substitute products without written acceptance from the Engineer.
 - 2. Do not imply or indicate substitutions on shop drawings or product data submittals without a separate formal request.
 - 3. Engineer will determine acceptability of substitution.
 - 4. Only one request for substitution for each product will be considered. If not accepted, Contractor shall provide specified product.
- B. Product selection is governed by the Contract Documents and governing regulations, not by previous project experience.
 - 1. Where a single or multiple products or manufacturers are named, provide one of the products indicated or submit a request for substitution for any product or manufacturer not named.
 - 2. Where the Specifications only require compliance with performance requirements, an imposed code, standard or regulation, select a product that complies with the requirements, standards, codes or regulations specified.
 - 3. Manufacturers named in a Specification section are those manufacturers considered capable of manufacturing products conforming to the specified requirements. The naming of a particular manufacturer does not imply acceptance or approval of just any standard product of that manufacturer.
 - 4. The Owner reserves the right to remove or have removed any installation material which is not approved by the Engineer. The total cost for such replacement shall be borne by the Contractor.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.00 SCOPE

- 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 appurtenances needed to complete the 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 Drawings; including surveying both horizontal and vertical control for construction of the roadways, structures, pipeline and appurtenances; including protecting and replacing if necessary existing monuments, control points, found iron rods, valves; including all earthwork, trench excavation as shown on the Drawings, removal and disposal of waste, unsuitable and excess material, furnishing and installing pipe bedding material, all backfill and compaction of native material, and dewatering as required; the restoration of interfering portions of existing service and utility lines that are not included in other bid items and shown on the Drawings, 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 Drawings and grouting of pipe joints; including providing the water for pressure testing, cleaning the pipe and disinfection, 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, existing sprinkler systems, and all other work not included in other bid items.
- C. Payment shall also include providing the necessary equipment and labor power to pothole and verify depths and locations of existing utilities sufficiently ahead of construction to avoid conflicts with the design alignment and grade of structures, culverts, storm drains. Conflicts with utilities shown on the Drawings 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 CITY.
- D. Payment for all bid items shall constitute full compensation for the complete installation of each bid item including but not limited to excavation, dewatering, 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. Support of utilities during construction shall be included in the line item cost for work that is adjacent to the utility. This includes pole support, pipe support, overhead wire protection, protection of above and below ground pedestals, boxes, and transformers, and all other appurtenances related to the existing utilities. CONTRACTOR is responsible for coordinating with the utility agencies.
- F. Payment for restoration of fences, regardless of the material, shall be included in the line item cost for the work that is impacting the fences. Fences shall be replaced in kind. CONTRACTOR is responsible for coordinating with the impacted property owners.
- 1.01 BONDS AND INSURANCE (ITEM # 1)
 - A. Payment will be made at the lump sum price named in the Bid Schedule.
 - B. Bonds and Insurance is limited to 5% of the Total Bid Price.
- 1.02 MOBILIZATION (ITEM #2)
 - A. See Section 01500, "Mobilization" for payment limitations.
 - B. Payment for mobilization will be made in equal monthly amounts during the duration of the original contract time. Mobilization is limited to 10% of the Total Bid Price.
- 1.03 MAINTENANCE OF TRAFFIC (ITEM #3)
 - A. See Section 01570 "Traffic Regulation" and all other references to traffic control and maintenance in this document and any regulatory requirements.
 - B. Payment for maintenance of traffic will be made at the lump sum price named in the Bid Schedule. Payment for maintenance of traffic will be made in equal monthly amounts during the duration of the contract time. Maintenance of Traffic is limited to 5% of the Total Bid Price.
- 1.04 PERMIT FEES (ITEM #4)
 - A. Measurement for payment for permit fees will be based upon the actual permit fees required by the CONTRACTOR from the various agencies having jurisdiction for construction of the project, all in accordance with the Contract Documents. The allowance for permit fee amounts shown on the bid schedule is an estimate of permit fees required for the project and is a cost pass through item. The permit fees are based on allowances, and OWNER will reconcile the actual cost with the CONTRACTOR by change order. The CONTRACTOR shall produce documentation upon request verifying actual cost. Only permit fees substantiated and approved by the ENGINEER will be paid as part of this bid item.
 - B. Payment for permit fees will be made as reimbursement for the actual cost of permitting.
- 1.05 PROFESSIONAL AUDIO/VISUAL OF CONSTRUCTION SITE (ITEM #5)
 - A. Payment for a professional audio/visual of the construction site will be made at the lump sum price named in the Bid Schedule.
- 1.06 SURVEY AND RECORD DRAWINGS (LAYOUT AND AS-BUILT) (ITEM #6)

- A. Payment for survey associated with project layout and as-built record drawings will be made at the lump sum price named in the Bid Schedule.
 - B. As-built record drawings are limited to the lump sum price named in the Bid Schedule.
- 1.07 EROSION AND TURBIDITY CONTROL / NPDES COMPLIANCE (ITEM #7)
- A. Payment for erosion and turbidity control / NPDES compliance will include all temporary erosion controls as specified in Section 01560 and all temporary floating turbidity barriers.
 - B. Payment for erosion and turbidity control / NPDES compliance will be made at the lump sum price named in the Bid Schedule and shall include furnishing and installing all items for erosion control, turbidity control, NPDES compliance, removal of such items after construction, and restoration of area to original project condition unless otherwise called out in the plans. Payment will be made in equal monthly amounts during the duration of the contract time. Payment for this item is limited to 1.0% of the Total Bid Price.
- 1.08 OWNER'S CONTINGENCY (ITEM #8)
- A. This allowance is for the exclusive use of the OWNER. It shall be used for unpredictable, unforeseen, and extraordinary costs or for scope changes initiated by the OWNER. No part of this contingency shall be used for costs resulting from contractor error, mismanagement, or negligence.
 - B. Access to these funds requires an approved Change Order requested in writing by the Contractor and approved by the City.
- 1.09 REMOVE & DISPOSE OF CONCRETE SIDEWALK (4-INCH) (ITEM #9 & A2-1)
- A. Measurement for payment to remove and dispose of existing sidewalk will be based upon the actual number of square yards of such sidewalk removed and disposed of in accordance with the Contract Documents.
 - B. Payment for removing and disposing of existing sidewalk will be made at the unit price per square yard of sidewalk named in the Bid Schedule which price shall constitute full compensation for the excavation, saw cut, removal and disposal of driveway. Any damage to property or features outside the limits of the sidewalk will be restored by the CONTRACTOR at no additional cost.
- 1.10 REMOVE & DISPOSE OF CONCRETE DRIVEWAY APRON AND SIDEWALK (6-INCH) (ITEM #10 & A2-2)
- A. Measurement for payment to remove and dispose of existing driveway and associated 6-inch-thick sidewalk within the public right-of-way will be based upon the actual number of square yards of such driveway removed and disposed of in accordance with the Contract Documents and as approved by the OWNER or OWNER's representative.
 - B. Payment for removing and disposing of existing driveways will be made at the unit price per square yard of sidewalk named in the Bid Schedule which price shall constitute full compensation for the excavation, saw cut, removal and disposal of driveway. Any damage to

property or features outside the limits of the driveway will be restored by the CONTRACTOR at no additional cost.

1.11 REMOVE EXISTING DRIVEWAY APRON (ASPHALT) (ITEM #11)

- A. Measurement for payment to remove and dispose of existing asphalt driveway within the public right-of-way will be based upon the actual number of square yards of such driveway removed and disposed of all in accordance with the Contract Documents and as approved by the OWNER or OWNER's representative.
- B. Payment for removing and disposing of existing driveways will be made at the unit price per square yard of sidewalk named in the Bid Schedule which price shall constitute full compensation for the excavation, saw cut, removal and disposal of driveway. Any damage to property or features outside the limits of the driveway will be restored by the CONTRACTOR at no additional cost.

1.12 REMOVE & DISPOSE OF EXISTING CURB AND GUTTER (ITEM #12)

- A. Measurement for payment to remove and dispose of existing curb and gutter within the public right-of-way will be based upon the actual number of linear feet of such curb and gutter removed and disposed of in accordance with the Contract Documents and as approved by the OWNER or OWNER's representative.
- B. Payment for removing and disposing of existing curb and gutter will be made at the unit price per linear foot of curb and gutter named in the Bid Schedule which price shall constitute full compensation for the excavation, saw cut, removal and disposal of curb and gutter. Any damage to property or features outside the limits of the curb and gutter will be restored by the CONTRACTOR at no additional cost.

1.13 REMOVE AND DISPOSE OF EXISTING ASPHALT PAVEMENT (ITEM #13)

- A. Measurement for payment to remove and dispose of existing pavement will be based upon the actual number of square yards of such pavement removed, all in accordance with the Contract Documents.
- B. Payment for removal and disposal of existing pavement will be made at the unit price per square yard of pavement named in the Bid Schedule which price shall constitute full compensation for the removal and disposal of such pavement, regardless of thickness, and include removal of reflective pavement markers, traffic loops, abandoned valves and valve boxes, the removal and salvage of brass valve tabs.
- C. This item does not include the removal of temporary asphalt, temporary resurfacing, or removal of existing asphalt pavement due to milling.

1.14 REMOVE EXISTING LIMEROCK BASE MATERIAL (ITEM #14)

- A. Measurement for payment for removing existing lime rock base material will be based upon the number of square yards of such materials removed, all in accordance with the requirements of the Contract Documents.
- B. Payment for removing existing lime rock base material will be made at the unit price per square yard regardless of depth, which price shall constitute full compensation for removal and disposal

of waste or unsuitable material under the roadway.

1.15 REMOVE AND DISPOSE OF EXISTING DRAINAGE STRUCTURE (ITEM #15)

- A. Measurement for payment to remove and dispose of existing drainage structures, frame and grate or top slabs will be based upon the actual quantity, each, of such structures removed, all in accordance with the requirements of the Contract Documents.
- B. Payment for removing and disposing of existing drainage structures will be made at the unit price per structure named in the Bid Schedule which price shall constitute full compensation for the removal and disposal of such structure, regardless of structure size and type, and shall include all appurtenances. Any damage to property or features outside the limits of the removal will be restored by the CONTRACTOR at no additional cost.

1.16 REMOVE AND DISPOSE OF EXISTING DRAINAGE PIPE (ITEM #16)

- A. Measurement for payment to remove and dispose of existing drainage pipes will be based upon the actual quantity, in linear feet, of such drainage pipe removed, all in accordance with the requirements of the Contract Documents.
- B. Payment for removing and disposing of existing drainage pipes will be made at the unit price per linear foot named in the Bid Schedule which price shall constitute full compensation for the removal and disposal of such pipe, regardless of drainage pipe size and type, and shall include all fittings and appurtenances. Any damage to property or features outside the limits of the removal will be restored by the CONTRACTOR at no additional cost.

1.17 REMOVE AND DISPOSE OF EXISTING SANITARY SEWER PIPE (ITEM #17 & A1-1)

- A. Measurement for payment to remove and dispose of existing sanitary sewer pipes will be based upon the actual quantity of sanitary sewer pipes removed, in linear feet, all in accordance with the requirements of the Contract Documents.
- B. Payment for removing and disposing of existing sanitary sewer pipes will be made at the unit price per linear foot named in the Bid Schedule which price shall constitute full compensation for the removal and disposal of such pipe, regardless of pipe size and type, and shall include all fittings and appurtenances. Any damage to property or features outside the limits of the removal will be restored by the CONTRACTOR at no additional cost.

1.18 REMOVE AND DISPOSE OF EXISTING FIRE HYDRANT (ITEM #18)

- A. Measurement for payment to remove and dispose of existing fire hydrants will be based upon the actual quantity of hydrants removed, all in accordance with the requirements of the Contract Documents.
- A. Payment to remove and dispose of existing fire hydrant assemblies will be made at the unit price, each, named in the Bid Schedule which price shall constitute full compensation for the plugging of the existing main, removal of all apparatus (i.e. bollards), excavation, backfilling, disposing of the fire hydrant assembly and all restoration work. Any damage to property or features outside the limits of the removal will be restored by the CONTRACTOR at no additional cost.

1.19 GROUT AND ABANDON EXISTING WATER MAIN (4-INCH) (ITEM #19)

- A. Measurement for payment to abandon existing pipe 4-inches in diameter will be based upon the actual linear feet of pipe abandoned, all in accordance with the Contract Documents.
- B. Payment for placing existing pipes 4-inches in diameter out of service will be made at the unit price per linear foot of such pipe abandoned as named in the Bid Schedule. Payment shall constitute full compensation for the plugging, capping and abandoning of such pipe, including pumping out and disposing of existing water, removing and disposing of existing valves and valve boxes, backfilling trench and all restoration work.

1.20 GROUT AND ABANDON EXISTING WATER MAIN (6 INCH) (ITEM #20)

- A. Measurement for payment to grout and abandon existing pipes shall be based upon the total linear feet of pipe abandoned, all in accordance with the requirements of the Contract Documents.
- B. Payment for placing existing pipe out of service will be made at the unit price per linear foot of such pipe grouted and abandoned as named in the Bid Schedule. Payment shall constitute full compensation for the grouting (if necessary), plugging, capping and abandoning of such pipe, including pumping out and disposing of existing water, removing and disposing of existing valves and valve boxes, backfilling trench and all restoration work.
- C. All caps required to adequately grout existing water mains shall be included in this bid items and shall not be paid for under any other line item.

1.21 GROUT AND ABANDON EXISTING WATER MAIN (8 INCH) (ITEM #21)

- A. Measurement for payment to grout and abandon existing pipes shall be based upon the total linear feet of pipe abandoned, all in accordance with the requirements of the Contract Documents.
- B. Payment for placing existing pipe out of service will be made at the unit price per linear foot of such pipe grouted and abandoned as named in the Bid Schedule. Payment shall constitute full compensation for the grouting (if necessary), plugging, capping and abandoning of such pipe, including pumping out and disposing of existing water, removing and disposing of existing valves and valve boxes, backfilling trench and all restoration work.
- C. All caps required to adequately grout existing water mains shall be included in this bid items and shall not be paid for under any other line item.

1.22 FURNISH AND INSTALL LIMEROCK BASE MATERIAL (ITEM # 22, 23, A3-2, A3-3)

- A. Measurement for payment for furnishing and placing limerock base material will be based upon the number of square yards of such materials compacted in place, all in accordance with the requirements of the Contract Documents. No reuse will be allowed.
- B. Payment for furnishing and placing of limerock base material will be made at the unit price per square yard named in the Bid Schedule, regardless of thickness, which price shall constitute full compensation for applying prime coat and furnishing all such materials in place, including all transportation, handling, cleaning, positioning and compacting of said bedding and disposal of waste or unsuitable material under the roadway.

1.23 STABILIZATION OF SUBGRADE (ITEM #24)

- A. Measurement for payment for stabilization of subgrade will be based upon the number of square yards of such materials compacted, all in accordance with the requirements of the Contract Documents.
- B. Payment for stabilization of subgrade will be made at the unit price per square yard named in the Bid Schedule, which price shall constitute full compensation for handling, cleaning, positioning and compacting of said bedding to a Limerock Bearing Ratio (LBR) of 40, importing fill material as needed and disposal of excess waste or unsuitable material under the roadway.

1.24 FURNISH AND PLACE ASPHALTIC CONCRETE PAVEMENT (ITEM #25, 26, 27, 28, A3-4, A3-5)

- A. Measurement for payment of asphalt concrete pavement will be based upon the number of square yards of such asphalt concrete pavement constructed for streets with newly compacted subgrades and limerock bases or milling, as detailed in the drawings, all in accordance with the requirements of the Contract Documents.
- B. Payment for placement of asphalt concrete pavement at the thickness indicated 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 all asphalt surface, including all transportation, installing (2) two lifts of asphalt pavement at the cross section and thickness specified in the Contract Documents, including replacing brass valve tabs, adjusting valve box and MH rim elevations, saw cutting of all pavement, temporary striping and all cleanup of the area disturbed by this construction. This item does not include asphalt concrete pavement restoration of driveways. Only final asphalt concrete pavement will be paid under this line item; temporary asphalt concrete is not included in this line item. The cost of temporary asphalt shall be included in the cost of all other adjacent work.
- C. Payment under this item shall also include furnishing and placing pavement markings which include thermoplastic pavement markings for all colors, widths, and types and reflective pavement markers for all colors and types in accordance with the requirements of the Contract Documents and Palm Beach County latest standards. Pavement markings shall be restored to existing configuration unless otherwise shown in the drawings.

1.25 CONSTRUCT CONCRETE PAVEMENT/SIDEWALK/DRIVEWAY/APRON (ITEM #29, 30, A2-3, A2-4, A3-1)

- A. Measurement and payment for furnishing and installing concrete sidewalk/driveway/apron at thickness indicated in plans will be based upon the actual number of square yards of such concrete surfaces constructed as shown in the drawings, all in accordance with the requirements of the Contract Documents.
- B. Payment for furnishing and installing sidewalks/driveways/aprons will be made at the unit price per square yard and thickness and type named in the Bid Schedule and detailed on the drawings which price shall constitute full compensation for completing said work, including earthwork, construction of the concrete sidewalk to thickness specified in the plans, furnishing and setting for expansion joint material, thickened edge where indicated in plans, disposal of excess material, restoration/replacement of sod disturbed on private property to equal condition as existing, restoration of driveways disturbed due to sidewalk forms, and the appurtenant items

for which separate payment is not specifically included in the Bid Schedule. Readjusting water meter boxes that need to be raised or lowered to meet sidewalk elevation will also be included in compensation for the installation of sidewalk (any meter box relocation which does not include plumbing services will be included in the price of sidewalk installation). No additional compensation will be granted for bumping out sidewalks or sloping sidewalks as required by Contract Documents.

- C. No payment will be made for construction of sidewalks outside the limits shown on the drawings or not approved by the ENGINEER. Sidewalks must be approved and accepted by the CITY to be eligible for payment.
- D. Extent of driveway restoration shown in plans is estimated based on measured slopes. Contractor shall only replace material as required to meet driveway slope requirements. If, in the Contractor's opinion, additional restoration is required than what is shown on the plans, Contractor shall get approval from ENGINEER prior to work. No payment will be made for construction of driveways and aprons outside the limits shown on the drawings or not approved by the ENGINEER. Driveway must be approved and accepted by the OWNER to be eligible for payment.

1.26 CONSTRUCT TYPE F CURB AND GUTTER (ITEM #31 & 32)

- A. Measurement for payment for furnishing and installing curb and gutter will be based upon the number of linear feet of such curb actually constructed as determined by measurement along the centerline of the curb in place, including depressed curb and gutter section for driveway, type F curb and valley curb all in accordance with the requirements of the Contract Documents.
- B. Payment for furnishing and installing curb and gutter will be made at the unit price per linear foot curb named in the Bid Schedule, which shall constitute full compensation for complete installation including, grading, 4" rock curb pad, forming, saw cutting of pavement and cleanup of all areas disturbed by this construction.

1.27 FURNISH AND INSTALL SPEED HUMP (ITEM #33)

- A. Measurement for payment for construction of speed hump will be based on the number of each one constructed, as detailed in the drawings, all in accordance with the requirements of the Contract Documents.
- B. Payment for constructing a speed hump shall be made at the unit price per each as named in the Bid Schedule which price shall constitute full compensation for removal of the existing speed hump, disposal of debris, removal of reflective pavement markers, any temporary striping necessary, construction of the new speed hump and restoration.

1.28 FURNISH AND INSTALL ADA RAMP (ITEM #34)

- A. Measurement for payment for furnishing and installing ADA Ramp will be based upon the actual number, each, of such ADA ramps furnished and installed, all in accordance with requirements of the Contract Documents.
- B. Payment for furnishing and installing ADA ramp will be made at the unit price, each, named in the Bid Schedule which price shall constitute full compensation for the complete installation of the ADA ramp including detectable warning mat.

1.29 MILL EXISTING ASPHALT (1-INCH) (ITEM #35)

- A. Measurement for payment for milling existing pavement will be based on the number of square yards of such pavement milled to a depth of 1-inch, all in accordance with the requirements of the Contract Documents.
- B. Payment for milling existing asphalt pavement will be made at the unit price per square yard of such as named in the Bid Schedule which price shall constitute full compensation for milling, removal and disposal of asphalt, removal of reflective pavement markers, and placement of temporary asphalt necessary during construction. No separate payment shall be made for temporary asphalt placed during construction. Any damage by the CONTRACTOR to existing curbs that are to remain are to be repaired by the CONTRACTOR at no cost to the OWNER.

1.30 REPLACE EXISTING SOD (ITEM #36)

- A. Measurement for payment to replace existing sod will be based upon actual quantity, square yards, of such sod furnished and installed, all in accordance with the requirements of the Contract Documents. Sod shall be replaced in-kind with the type of sod existing prior to the work.
- B. Payment for furnishing and installing the sod will be made at the unit price, square yards, named in the Bid Schedule which price shall constitute full compensation for the necessary grading and placement of sod as well as coordination with the homeowner to insure irrigation is in place to sustain the placed sod including irrigation adjustments and restoration.

1.31 INSTALL PROJECT IDENTIFICATION AND TRAFFIC SIGNS AND POSTS (ITEM #37)

- A. Measurement for payment to install project and traffic signs will be based upon actual quantity, each, of such signs installed, all in accordance with the requirements of the Contract Documents.
- B. Payment for installing the traffic signs will be made at the unit price, each, named in the Bid Schedule which price shall constitute full compensation for the removal of existing sign and the installation of the new sign including sign post. The sign post is considered an in-sequential cost from the actual sign installation. Signs damaged by the CONTRACTOR will be replaced by the CONTRACTOR at no cost to the OWNER.

1.32 REMOVE AND RELOCATE EXISTING MAILBOXES (ITEM #38)

- A. Measurement for payment for relocation of existing mailboxes will be made at the lump sum price named in the Bid Schedule. Only removal and relocation of existing mailboxes within the Project boundaries will be compensated under this line item. Mailbox removal and relocation, however, will only be provided for lots in which the mailbox is in conflict with the proposed improvements.
- B. Payment for removing and relocating the existing mailboxes will be made at the lump sum, named in the bid schedule, which shall constitute full compensation for coordination with the local postmaster, the complete temporary relocation during construction (as needed), and the final relocation of the mailbox including post upon completion of construction. This bid item shall include all mailbox types located within the right of way. No additional compensation will be made for specialty mailboxes. Contractor is responsible for any mailboxes damaged during execution of contractor's work. This line item includes one per mailbox; additional relocations on

the same mailbox will not be compensated.

1.33 TREE REMOVAL AND INSTALLATION (CANOPY TREES) (ITEM #39)

- A. Measurement for tree removal and installation will be made at the lump sum price named in the Bid Schedule.
- B. Payment for tree removal and installation will be made at the lump sum price named in Bid Schedule which shall constitute full compensation for coordination, labor, materials, necessary equipment and services to remove and dispose of the tree, stump removal, including equipment and services for the tree installation, cost of trees, plant material, cost of transportation, replacement tree and tree installation, staking, soil amendments, fertilizing, watering, and maintenance of new tree health. Tree planting locations will be within the OWNER's boundaries as determined by the OWNER. All governing regulations pertaining to the tree removal and replacement are included in this line item. Tree removal and replacement procedures and new trees provided shall follow OWNER Ordinances.

1.34 REMOVE AND RELOCATE TREE (PALM) (ITEM #40)

- A. Measurement for payment for relocation of trees will be made for the trees that are relocated (each) at the price named in the Bid Schedule. Only removal and relocation of trees within the Project boundaries will be compensated under this line item. Tree removal and relocation, however, will only be provided for lots in which the tree conflicts with the proposed improvements.
- B. Payment for removing and relocating the trees will be made based on trees removed (each), named in the bid schedule, the complete temporary relocation during construction (as needed), and the final relocation of the tree including tree installation, staking, soil amendments, fertilizing, watering, and maintenance. Contractor is responsible for any trees damaged during execution of contractor's work.

1.35 RELOCATE LANDSCAPE FEATURES (HEDGES) (ITEM #41)

- A. Measurement for payment to relocate landscape features will be based upon the number of lots where such removal is required. This item shall include trees and shrubs with less than 3" diameter trunk.
- B. Payment for removing landscape features will be made at the unit price for each lot that such removal is performed, as named in the Bid Schedule. This price shall constitute full compensation for the removal of landscape features, relocation to private property (if authorized by homeowner), coordination with property owner for location, and disposal if authorized by ENGINEER. Stump removal of all sizes shall be included in this line item.

1.36 PRESSURE CLEAN EXISTING SIDEWALK/CURB (ITEM #42)

- A. Measurement for payment for pressure cleaning existing sidewalk and curb will be based upon the number of square yards of sidewalk and curb pressure cleaned all in accordance with the requirements of the Contract Documents.
- B. Payment for pressure cleaning existing sidewalks and curbs will be made at the unit price per square yard named in the Bid Schedule which price shall constitute full compensation for all materials and services required to completely clean existing sidewalks and curbs.

1.37 CONTINGENCY/ALLOWANCE EXISTING IRRIGATION SYSTEM RESTORATION (ITEM #43)

- A. Measurement for payment for irrigation system restoration will be based upon the restoration required by the CONTRACTOR, in accordance with the Contract Documents. Irrigation restoration, however, will only be provided for lots with existing irrigation systems that are directly affected by the proposed improvements. The allowance for irrigation system restoration shown on the bid schedule is an estimate of the cost of completing the irrigation system restoration, and OWNER will reconcile the cost with the CONTRACTOR by change order. The CONTRACTOR shall produce documentation upon request verifying actual cost. Only irrigation system restoration substantiated and approved by the ENGINEER will be paid as part of this bid item.
- B. Payment for restoration of existing irrigation systems will be made based on the Change Order approved by the OWNER, which shall constitute full compensation for restoration with coverage matching that prior to construction, including restoration of pipe and sprinklers matching the size and type of the existing pipe and sprinkler heads, and necessary adapters, coupling at each end splicing the restored pipe in place and connecting to existing sleeves underneath the sidewalk. Each irrigation system or irrigation system zone located in the work area that is temporarily removed shall be capped and include a minimum of one active sprinkler head so that the system or zone can continue to run automatically throughout the duration of the project. If irrigation system is to be partially abandoned, then that which is being abandoned shall be removed, and the remaining exposed pipes shall be capped and protected. All work shall meet the approval of the ENGINEER.

1.38 FURNISH AND INSTALL TYPE "C" CURB INLET AND GRATE (ITEM #44)

- A. Measurement for payment to furnish and install new curb inlet and grate including Type "C" catch basin will be based upon actual quantity, each, of each catch basin and grate furnished and installed, all in accordance with the requirements of the Contract Documents.
- B. Payment for furnishing and installing the curb inlet and grate will be made at the unit price, each, named in the Bid Schedule which price shall constitute full compensation for the completed installation and restoration of impacted property and facilities.

1.39 FURNISH AND INSTALL 48-INCH & 60-INCH DIAMETER ROUND MANHOLE (ITEM #45 & #46)

- A. Measurement for payment to furnish and install round manhole with frame and cover will be based upon actual quantity of each structure furnished and installed, all in accordance with the requirements of the Contract Documents.
- B. Payment for furnishing and installing the manhole with frame and cover will be made at the unit price, each, named in the Bid Schedule, regardless of size, which price shall constitute full compensation for the completed installation and restoration of impacted property and facilities. This shall include all labor and materials necessary to connect to existing drainage pipes as well as proposed drainage pipes.

1.40 FURNISH AND INSTALL INLET POLLUTION RETARDANT BAFFLE/WEIR (ITEM #47)

- A. Measurement for payment to furnish and install inlet pollution retardant baffles and weirs will be based upon actual quantity of each furnished and installed, all in accordance with the

requirements of the Contract Documents.

- B. Payment for furnishing and installing the inlet pollution retardant baffles and weirs will be made at the unit price, each, named in the Bid Schedule which price shall constitute full compensation for the completed fabrication, hardware, labor and installation.

1.41 FURNISH AND INSTALL RCP STORM DRAIN (ITEM #48 & 50)

- A. Measurement for payment for furnishing and installing Reinforced Concrete Pipe (Class III) will be made at the unit price for each linear foot installed in accordance with requirements of the Contract Document.
- B. Payment for furnishing and installing Reinforced Concrete Pipe (Class III) will be made at the unit price, linear feet, named in the Bid Schedule which price shall constitute full compensation for the preparation of pipe bedding, installation of new pipe, and restoration of the surface.

1.42 FURNISH AND INSTALL SLOTTED RCP (WITH EXFILTRATION TRENCH (ITEM #49 & #51)

- A. Measurement for payment for furnishing and installing slotted Reinforced Concrete Pipe (Class III) with exfiltration trench will be made at the unit price for each linear foot installed in accordance with requirements of the Contract Document.
- B. Payment for furnishing and installing Reinforced Concrete Pipe (Class III) will be made at the unit price, linear feet, named in the Bid Schedule which price shall constitute full compensation for the preparation of pipe bedding, installation of new perforated drain pipe, geotextile fabric, backfilling, compaction, testing, trench safety and restoration of the surface.

1.43 FURNISH AND INSTALL OUTFALL STRUCTURE (ITEM #52)

- A. Measurement for payment to furnish and install outfall structures will be on a lump sum basis, all in accordance with the requirements of the Contract Documents.
- B. Payment for furnishing and installing outfall structure will be made at the lump sum price named in the Bid Schedule which price shall constitute full compensation for the completed installation of the outfall structure including but not limited to including furnishing and installing mitred end section, riprap, canal re-grading, excavation, dewatering, backfill and compaction. Pipe for the outfall structure shall be paid under the line item price for drainage pipe.

1.44 FURNISH AND INSTALL 8-INCH CURED-IN-PLACE SEWER LINING (ITEM #53 & A1-10)

- A. Measurement and payment for cured-in-place (CIP) sewer lining shall be based upon the total linear feet of sewer lining installed in accordance with the requirements of the Contract Documents.
- B. Payment for placing CIP sewer lining will be made at the unit price per linear foot of 6 mm lining installed as named in the Bid Schedule. Payment shall constitute full compensation for the TV inspections, cleaning, sewer lateral connections and sewer lining installed. Costs for design calculations, shop drawings or other submittal information required per the technical specifications shall be included in the unit price.
- C. In part, the intent of the cured-in-place sewer lining is to provide support to existing sewer mains and to mitigate potential breaks or leaks in the existing sewer mains during construction

activities. As such, the CONTRACTOR is responsible for protecting the existing sewer and no compensation will be paid for repairs of un-lined structurally deficient sewer mains damaged during construction.

1.45 CONTINGENCY FOR SEWER PIPE REPAIR (ITEM #54)

- A. Measurement and payment for sewer pipe repair shall be based upon the total linear feet of sewer pipe repaired in accordance with the requirements of the Contract Documents. Locations of sewer pipe repairs are not identified in the plans but, rather, will be identified based on the results of the TV inspections performed during the work associated with installation of the CIP sewer lining. Sewer deficiencies identified during the inspections shall be communicated immediately to the OWNER for coordination and no repairs shall be made without the prior approval of the OWNER.
- B. The OWNER shall be the sole owner of the contingency, and its intent is to be used for repairs required to facilitate the installation of the lining or repair existing deficiencies identified during execution of the work. The contingency is not intended to be used by the CONTRACTOR to repair sewer damaged during construction activities.

1.46 GRAVITY SANITARY SEWER MANHOLE REHABILITATION (ITEM #55 & A1-11)

- A. Measurement for payment to rehabilitate sewer manholes will be based upon the actual quantity, each, of such sewer manholes rehabilitated, all in accordance with the requirements of the Contract Documents.
- B. Payment for rehabilitating sewer manholes will be made at the unit price each, named in the Bid Schedule which price shall constitute full compensation for all materials and labor needed to rehabilitate sewer manholes regardless of depth including but not limited to surface preparation and cleaning, manhole lining, manhole inspections, sealing of leaks, necessary reshape and/or repair of manhole components, installation of rain guards, proper resident notification, and area clean-up.

1.47 FURNISH AND INSTALL GRAVITY SEWER PIPE (ITEM #56 & A1-3)

- A. Measurement for payment for furnishing and installing sewer pipe will be based upon the number of linear feet of such pipe constructed as determined by measurement along the centerline of the pipe in place, not including through structures, all in accordance with the requirements of the Contract Documents.
- C. Payment for furnishing and installing sewer pipe will be made at the unit price per linear foot of pipe named in the Bid Schedule only after pipe system has passed the required testing and has been as-built; this item shall include all pipe, removal of subbase, trench excavation, dewatering, backfilling, compaction to the bottom of subgrade, and testing. Restoration of roadway from subgrade stabilization, lime rock base, to placing of asphalt is not a part of this pay item. No additional payment will be made for gravity sewer pipe material change to DIP from PVC due to water/sewer separation requirements. This includes any couplings and adapters necessary. Existing laterals to be connected to the proposed sewer pipe are to be included in cost of replacement of the sewer pipe.

1.48 FURNISH AND INSTALL SANITARY SEWER LATERALS (ITEM #57 & 58 & A1-4 to A1-7)

- A. Measurement for payment to furnish and install sanitary sewer laterals will be based upon the

actual number, each, of such sanitary sewer laterals installed, whether single or double, all in accordance with requirements of the Contract Documents.

- B. Payment for furnishing and installing sanitary sewer laterals, single or double, will be made at the unit price each, named in the Bid Schedule which price shall constitute full compensation for the complete installation of the sanitary sewer laterals at required size including main line wye (which may include PVC, DIP, or C900 material), clean out, concrete collars, clean out lids, material adaptor bends and fittings to property line. No additional compensation will be made for going around exfiltration trench; including alternate material as needed.

1.49 EXISTING SANITARY SEWER LATERAL ADJUSTMENT/REPAIR (ITEM #59)

- A. Measurement for payment to adjust sanitary sewer laterals will be based upon the actual number, each, of such sanitary sewer laterals adjusted, all in accordance with requirements of the Contract Documents.
- B. Payment for adjusting sanitary sewer laterals will be made at the unit price each, named in the Bid Schedule which price shall constitute full compensation for the complete installation of the sanitary sewer laterals at the limits required to eliminate conflicts with the water and drainage systems, at required size including main line wye (which may include PVC, DIP, or C900 material), material adaptor bends and fittings to property line. Adaptors to VCP shall be Fernco with shear rings or approved equal.

1.50 BYPASS PUMPING (ITEM #60)

- A. Measurement for payment for bypass pumping during gravity sewer rehabilitation will be at the lump sum amount in accordance with the requirements of the Contract Documents.
- B. Payment for bypass pumping during gravity sewer rehabilitation will be made at the lump sum price named in the Bid Schedule which price shall constitute full compensation for all materials, pipe, and connections to existing pumps. This line item shall include noise reduction measures for pumps when required by City.

1.51 FURNISH AND INSTALL DUCTILE IRON WATER MAIN PIPE (ITEM #61 & 62)

- A. Measurement for payment for furnishing, installing and connecting ductile iron water main pipe will be based upon the number of linear feet of such pipe actually constructed as determined by measurement along the centerline of the pipe in place at 36" minimum cover or more, unless otherwise specified in the plans, to avoid other underground utilities, all in accordance with the requirements of the Contract Documents.
- B. Payment for furnishing, installing and connecting ductile iron water main pipe will be made at the unit price per linear foot of such pipe complete and in place including all clearing and grubbing, saw cut and removal of asphalt, remove and stockpile limerock, pipe, coordination to shut down existing water mains as necessary, unloading, sheeting, excavation, utility pole protection, temporary relocation and restoration of existing fences, trench protection and trench safety, dewatering, laying, connecting existing water services to new water main, backfilling, compaction, pressure testing, disinfection, flushing and temporary blow off with full cannon, and bacteriological testing as named in the Bid Schedule. Restoration of roadway from subgrade stabilization, limerock base and placing of asphalt is not part of this line item. This line item shall include all Ductile Iron pipe thickness and pressure classes specified in the Contract Documents. This line item shall also include any temporary water main offsets required for construction

phasing.

1.52 FURNISH AND INSTALL WATER SERVICES (ITEM #63 & 64)

- A. Measurement for payment furnishing and installing water service will be based upon the actual number, each, of water service and meter boxes furnished and installed as well as relocating existing meter (if applicable) all in accordance with requirements of the Contract Documents. This includes the tapping of the new water main and providing saddle, corporation ball valve and service piping to the meter box (including service piping inside casing under pavement where necessary), key angle meter stop, stainless steel inserts, spring washers on saddles, setting the new meter boxes and relocating existing water meters. The CONTRACTOR is responsible for completing all private side service connections and for the restoration of any disturbed surface features including, but not limited to clearing and grubbing, saw cut and removal of asphalt, remove of lime rock and subbase, trench excavation, dewatering, backfilling, fencing, driveways, walkways, mailboxes, decorations, irrigation and landscaping inside and outside of the public right-of-way to their original condition or better.
- B. Payment for furnishing, installing and connecting water services shall be made at the unit price each, named in the Bid Schedule which price shall constitute full compensation for the completed installation of the water service at 36" minimum cover including connection to existing water meter, installation of existing water meter box, encasement (if required), all clearing and grubbing, saw cut and removal of asphalt or concrete, remove and stockpile limerock, trench excavation, trench protection and safety, dewatering, backfilling, compaction of subgrade, utility pole protection, installation of limerock base material, restoration of fencing, driveways, walkways, mailboxes, decorations, irrigation and landscaping inside of the public right-of-way to their original condition or better.
- C. CONTRACTOR shall be responsible for locating existing water service.
- D. Each double water service is counted as one unit.

1.53 FURNISH AND INSTALL PRESSURE MAIN FITTINGS (ITEM #65)

- A. Measurement for payment to furnish and install fittings, unless specifically listed separately in the bid schedule, shall be at the unit bid price per ton for such fittings, including but not limited to crosses, reducing crosses, tees, side outlet tees, reducing tees, laterals, reducing laterals, bends and elbows of all angles and radius, reducing bends and elbows, concentric and eccentric reducers, offsets, wyes, true wyes, sleeves, plugs, caps, restraining glands and gaskets, base bends, base tees, reducing flanges, mega lugs fillers and connecting pieces, couplings including those for dissimilar materials, furnished all in accordance with the Contract Documents.
- B. Payment for furnishing and installing fittings complete and in place shall be at the unit bid price per ton and shall include furnishing, storing, transporting and installing the fittings.

1.54 FURNISH AND INSTALL GATE VALVE (ITEM #66)

- A. Measurement for payment to furnish and install gate valves will be based upon actual quantity, each, of gate valves furnished and installed, all in accordance with the requirements of the Contract Documents. Test valves will not be compensated for under this line item.

- B. Payment for furnishing and installing gate valves will be made at the unit price each, named in the Bid Schedule which price shall constitute full compensation for the completed installation of the gate valve, including valve box, extension to surface, 3" brass ID disk and restraining glands.

1.55 FURNISH AND INSTALL FIRE HYDRANT (ITEM #67)

- A. Measurement for payment to furnish and install fire hydrant assemblies will be based upon actual quantity, each, of fire hydrant assemblies furnished and installed all in accordance with the requirements of the Contract Documents.
- B. Payment for furnishing and installing fire hydrant assemblies will be made at the unit price each, named in the Bid Schedule which price shall constitute full compensation for the completed installation of the fire hydrant assembly including furnishing, storing, and transporting. Fire hydrant assembly shall include the complete fire hydrant, fire hydrant extensions, pipes, bends, in place pole protection (bollards, if required), concrete pad, mechanical restraints, excavation, dewatering, utility pole protection including additional shoring, and required painting, markings and Reflective Pavement Markings (RPM).

1.56 FURNISH AND INSTALL TAPPING SLEEVE & VALVE (ITEM #68)

- A. Measurement for payment to furnish and install tapping sleeves & valves will be based upon actual quantity, each, of tapping sleeves & valves furnished and installed, all in accordance with the requirements of the Contract Documents.
- B. Payment for furnishing and installing tapping sleeves & valves will be made at the unit price, each, named in the Bid Schedule which price shall constitute full compensation for the completed installation of the tapping sleeve and valve, including valve box, extension to surface, 3" brass ID disk and restraining glands.

1.57 FURNISH AND INSTALL SAMPLE POINT (ITEM #69)

- A. Measurement for payment for furnishing and installing sample points will be based upon the actual number, each, of such sample points furnished and installed, all in accordance with requirements of the Contract Documents.
- B. Payment for furnishing and installing sample points will be made at the unit price, each, named in the Bid Schedule which price shall constitute full compensation for the complete installation of sample points and removal and disposal after sampling is complete.

1.58 FURNISH AND INSTALL TRAFFIC SIGNS (PER POST) (ITEM #70)

- A. Measurement for payment to furnish and install the traffic signs will be based upon actual quantity, each, of such signs furnished and installed, all in accordance with the requirements of the Contract Documents.
- B. Payment for furnishing and installing the traffic signs will be made at the unit price, each, named in the Bid Schedule, which price shall constitute full compensation for the removal of existing signs being replaced (when applicable) and the completed installation of the new sign including sign post. Sign post is considered an in-sequential cost from the actual sign installation. Signs damaged by the CONTRACTOR will be replaced by the CONTRACTOR at no cost to the City.

- 1.59 RELOCATE EXISTING TRAFFIC SIGN (PER POST) (ITEM #71)
- A. Measurement for payment to relocate traffic signs will be based upon actual quantity, each, of such signs relocated, all in accordance with the requirements of the Contract Documents.
 - B. Payment for relocating traffic signs will be made at the unit price, each, named in the Bid Schedule which price shall constitute full compensation for the removal of existing sign and the completed installation of the sign in new location. Signs damaged by the CONTRACTOR will be replaced by the CONTRACTOR at no cost to the City.
- 1.60 FURNISH AND INSTALL TRAFFIC SIGNS ON EXISTING POST (ITEM #72)
- A. Measurement for payment to furnish and install traffic signs on existing posts will be based upon actual quantity, each, of such signs furnished and installed, all in accordance with the requirements of the Contract Documents.
 - B. Payment for furnishing and installing the traffic signs on existing posts will be made at the unit price, each, named in the Bid Schedule, the price of which price shall constitute full compensation for the removal of existing signs being replaced (when applicable) and the complete installation of the new sign on the existing sign post. Signs damaged by the CONTRACTOR will be replaced by the CONTRACTOR at no cost to the City.
- 1.61 FURNISH AND PLACE PAVEMENT MARKING (ITEM #73 to #75)
- A. Measurement for payment for furnishing and placing pavement markings will be based upon the number of linear feet of such markings actually constructed as determined by measurement along the centerline of the pavement markings in place, all in accordance with the requirements of the Contract Documents.
 - B. Payment for furnishing and placing pavement markings will be made at the unit price per linear foot of pavement markings named in the Bid Schedule, which price shall constitute payment for all colors, widths and types. Pavement marking skip lines will be paid per the linear foot of pavement marking which will be measured as the distance from the beginning of the first painted stripe to the last stripe, including skipped intervals.
- 1.62 REMOVE AND DISPOSE OF EXISTING SANITARY SEWER MANHOLES (ITEM #A1-2)
- A. Measurement for payment to remove and dispose of existing sanitary sewer manholes will be based upon the actual number of such structures removed and disposed of all in accordance with the Contract Documents.
 - B. Payment for removing and disposing of existing sanitary sewer manholes will be made at the unit price each per structure as named in the Bid Schedule, which price shall constitute full compensation for the excavation, removing and disposing of such manholes, including backfilling and all restoration work.
- 1.63 FURNISH AND INSTALL SANITARY SEWER MANHOLE (ITEM #A1-8)
- A. Measurement for payment to furnish and install sanitary sewer manholes will be based upon the actual quantity, each, of such manholes constructed, at all depths, all in accordance with the requirement of the Contract Documents.

- B. Payment for furnishing and installing sanitary sewer manholes will be made at the unit price, each, named in the Bid Schedule which price shall constitute full compensation for the completed installation of the structure including but not limited to excavation, dewatering, backfill and compaction, testing, construction of the reinforced concrete structure and rain guards. The cost of external drop connections shall be included in the price for the main structure.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01025

SECTION 01039

COORDINATION AND MEETINGS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Coordination and project conditions
- B. Field engineering
- C. Preconstruction meeting
- D. Progress meetings

1.02 COORDINATION AND PROJECT CONDITIONS

- A. Coordinate scheduling, submittals, and Work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements.
- B. Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment. Coordinate work with Owner operations.
- C. Coordinate space requirements, supports, and installation of mechanical and electrical Work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs. Obtain Owner acceptance of conduit runs and alignments prior to installation.
- D. In finished areas, except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- E. Coordinate completion and clean-up of Work of separate sections in preparation for Substantial Completion and for portions of Work designated for Owner's partial occupancy.
- F. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.03 FIELD ENGINEERING

- A. Employ a Land Surveyor registered in the State of Florida and acceptable to Engineer.
- B. Contractor shall protect survey control and reference points.
- C. Control datum for survey is that established by Owner provided survey.

- D. Verify set-backs and easements; confirm drawing dimensions and elevations.
- E. Establish elevations, lines, and levels, utilizing recognized engineering survey practices.
- F. Submit a copy of site drawing and certificate signed and sealed by the Land Surveyor that the elevations and locations of the Work are in conformance with the Contract Documents.

1.04 PRE-CONSTRUCTION MEETING

- A. Engineer will schedule a meeting after Notice of Award.
- B. Attendance Required: Owner, Engineer, Contractor, Contractor Superintendent, and major sub-contractors.
- C. Agenda:
 - 1. Execution of Owner-Contractor Agreement
 - 2. Submission of executed bonds and insurance certificates
 - 3. Distribution of Contract Documents
 - 4. Submission of list of Subcontractors, list of Products, schedule of values, and progress schedule
 - 5. Designation of personnel representing the parties in Contract, Utilities, and the Engineer
 - 6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 - 7. Scheduling, sequence of work
 - 8. Use of premises by Owner and Contractor
 - 9. Owner's requirements and partial occupancy
 - 10. Construction facilities and controls provided by Owner.
 - 11. Temporary utilities provided by Owner.
 - 12. Security and housekeeping procedures
 - 13. Application for payment procedures
 - 14. Procedures for testing
 - 15. Requirements for start-up of equipment
 - 16. Inspection and acceptance of equipment put into service during construction period.
- D. Record minutes and distribute copies within five days after meeting to participants and those affected by decisions made, with two copies to Engineer

1.05 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the Work at maximum bimonthly intervals.
- B. Make arrangements for meetings, prepare agenda with copies for participants, and preside at meetings.
- C. Attendance Required: Job superintendent, major Subcontractors and suppliers, Owner, Engineer, as appropriate to agenda topics for each meeting.
- D. Agenda:
 - 1. Review minutes of previous meetings.
 - 2. Review of Work progress.
 - 3. Field observations, problems, and decisions
 - 4. Identification of problems which impede planned progress.
 - 5. Review of submittals schedule and status of submittals.
 - 6. Review of off-site fabrication and delivery schedules.
 - 7. Maintenance of progress schedule
 - 8. Corrective measures to regain projected schedules
 - 9. Planned progress during succeeding work period
 - 10. Coordination of projected progress
 - 11. Maintenance of quality and work standards
 - 12. Effect of proposed changes on progress schedule and coordination
 - 13. Other business relating to Work
- E. Record minutes and distribute copies within three days after meeting to participants, and those affected by decisions made.

PART 2 – PRODUCTS - (Not Used)

PART 3 – EXECUTION - (Not Used)

END OF SECTION

SECTION 01045

CUTTING AND PATCHING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 1 Specification sections, apply to the work specified in this Section.

1.02 REQUIREMENTS INCLUDED

- A. All necessary cutting, coring, drilling, grouting, and patching to fit together the several parts of the work will be done by the Contractor, except as may be specifically noted otherwise under any particular section of the specifications.
- B. Definition: Cutting and Patching includes cutting into existing construction to provide for the installation or performance of other work and subsequent fitting and patching required to restore surfaces to their original condition. Cutting and Patching is performed to uncover work for access or inspection, to obtain samples for testing, to permit alterations to be performed or for other similar purposes.

1.03 QUALITY ASSURANCE

- A. Requirements for Structural Work: Do not cut and patch structural work in a way that would result in a reduction of load-carrying capacity or of a load-deflection ratio.
- B. Visual Requirements: Do not cut and patch work, in a way that would result in reducing the strength of structures. Do not cut and patch work in a manner that would result in substantial visual evidence. Remove and replace work judged by the Owner to be cut and patched in a visually unsatisfactory manner.

1.04 SUBMITTALS

- A. Procedure for Cutting and Patching: Where prior approval of cutting and patching is required, submit procedures for this work well in advance of the time work will be performed and request approval to proceed. Include the following information, as applicable, in the submittal:
 - 1. Describe nature of the work and how it is to be performed, indicating why cutting and patching cannot be avoided. Describe anticipated results of the work operation and visual changes as well as other significant elements.
 - 2. List products to be used and firms that will perform work.
 - 3. Give dates when work is expected to be performed.
- B. Approval by Owner to proceed with cutting and patching work does not waive the Owner's right to later require complete removal and replacement of work found to be cut and patched in an unsatisfactory manner.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Except as otherwise indicated, or as directed by the Owner, use materials for cutting and patching that are identical to existing materials. If identical materials are not available, or cannot be used, use materials that match existing adjacent surfaces to the fullest extent possible. Use material for cutting and patching that will result in equal-or-better performance characteristics.

PART 3 EXECUTION

3.01 INSPECTION

- A. Before cutting, examine the surfaces to be cut and patched and the conditions under which the work is to be performed. If unsafe or otherwise unsatisfactory conditions are encountered, take corrective action before proceeding with the work.
- B. Before the start of cutting work, meet at the work site with all parties involved in cutting the patching. Review areas of potential interference and conflict between the various trades. Coordinate layout of the work and resolve potential conflicts before proceeding with the work.

3.02 PREPARATION

- A. Temporary Support: To prevent failure, provide temporary support of work to be cut.
- B. Protection: Protect other work during cutting and patching to prevent damage. Provide protection from adverse weather conditions for that part of the project that may be exposed during cutting and patching operations.
 - 1. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

3.03 PERFORMANCE

- A. Employ skilled workman to perform cutting and patching work. Except as otherwise indicated or as approved by the Owner, proceed with cutting and patching at the earliest feasible time and complete work without delay.
- B. Cut the work using methods that are least likely to damage work to be retained or adjoining work.
 - 1. In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots neatly to size required with minimum disturbance of adjacent work. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces. Temporarily cover openings when not in use.

- C. Patching: Patch with seams which are durable and as invisible as possible. Comply with specified tolerances for the work.
 - 1. Where feasible, inspect and test patched areas to demonstrate integrity of work.
 - 2. Restore exposed finishes of patched areas and where adjoining work in a manner which will eliminate evidence of patching and refinishing.
- D. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection. For an assembly, refinish entire unit.
- E. Damaged Surfaces: Patch or replace any portion of an existing finished surface which is found to be damaged, lifted, discolored, or shows other imperfections, with matching material.

3.04 TRANSITION FROM EXISTING TO NEW WORK

- A. When new work abuts or finishes flush with existing work, make a smooth and workmanlike transition. Patched work shall match existing adjacent work in texture and appearance unless otherwise noted so that the patch or transition is invisible at a distance of five feet.
- B. When finished surfaces are cut in such a way that a smooth transition with new work is not possible, terminate existing surface in a neat manner along a straight line at a natural line of division, and provide trim appropriate to finished surface.

3.05 CLEANING

- A. Thoroughly clean area and spaces where work is performed or used as access to work. Remove completely paint, mortar, oils, putting and items of similar nature.

END OF SECTION

SECTION 01050

FIELD ENGINEERING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Provide and pay for field engineering services required for Project as follows:
 - 1. Land Surveying work required to lay out the work and for execution of the structures.
 - 2. Civil, structural or other professional engineering services specified, or required to execute the Contractor's construction methods.
- B. The Contractor shall retain the services of a registered land surveyor licensed in the State of Florida to identify existing control points and property line corner stakes indicated on the Drawings, as required. Verify all existing structure locations and all proposed building corner locations, tank locations and equipment locations.

1.02 RELATED WORK

- A. Section 01010: Summary of Work.
- B. Section 01720: Project Record Documents.

1.03 QUALIFICATIONS OF PROFESSIONAL

- A. Qualified Engineer or Registered Land Surveyor, acceptable to the Owner and the Engineer.
- B. Registered Professional Engineer of the specialty required for the specific service on the Project, currently licensed in the State of Florida.

1.04 SURVEY REFERENCE POINTS

- A. Horizontal and vertical control points for the Project are to be established by the Contractor.
- B. Locate and protect control points prior to starting work, and preserve all permanent reference points during construction.
 - 1. Make no changes or relocations without prior written notice to the Engineer.
 - 2. Report to the Engineer when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
 - 3. Require surveyor to replace project control points which may be lost or destroyed.
 - a. Establish replacements based on original survey contro

1.05 PROJECT SURVEY REQUIREMENTS

- A. Establish a minimum of five temporary bench marks on site, referenced to data by survey control points.
 - 1. Record locations, with horizontal and vertical data, on Project Record Documents.
 - 2. Two bench marks shall be at ends of project.
- B. Establish lines and levels, locate and lay out, by instrumentation and similar appropriate means:
 - 1. Site Improvements
 - a. Stakes for grading, fill and topsoil placement.
 - b. Utility slopes and invert elevations.
 - 2. Batter boards for structures.
 - 3. Building foundation, column locations and floor levels.
 - 4. Controlling lines and levels required for mechanical and electrical trades.
- C. From time to time, verify layouts by same methods.

1.06 RECORDS

- A. Maintain a complete, accurate log for all control and survey work as it progresses.
- B. At the end of the project, submit certified as-built information at the same scale as the Engineer's line drawings indicating elevations and stations of the project at 100 foot increments and at rapid changes in grade. Provide as-built drawings for all portions of the project that have been completed and for which payment is requested.
- C. Contractor prior to commencement of work shall obtain cross sections at maximum 100 foot intervals for length of proposed improvements.

1.07 SUBMITTALS

- A. Submit name and address of registered land surveyor to the Engineer.
- B. On request of the Engineer, submit documentation to verify accuracy of field engineering work.
- C. Submit certificate signed by registered engineer or surveyor certifying that elevations and locations of improvements.
- D. Submit drawings showing locations of all structures constructed. This drawing shall be included with the project record documents.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION

SECTION 01090

REFERENCES

PART 1 - GENERAL

1.01 GENERAL

- A. **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 that the Work is advertised for 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 portion of, or omission from, said standards or requirements.
- B. **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 assignments 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. 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 the following documents to the extent that the provisions of such documents are not in conflict with the requirements of these Specifications nor the applicable codes.
- B. References herein to "Building Code" or FBC shall mean the Florida Building Code, current edition. The latest edition of the code as approved and used at the local agency having jurisdiction, shall apply to the Work herein, including all addenda, modifications, amendments, or other lawful changes thereto.
- C. In case of conflicts between codes, reference standards, drawings and other Contract Documents, the most stringent requirements shall govern. All conflicts shall be brought to the attention of the Engineer for clarifications and directions prior to ordering or providing any materials or labor. The Contractor shall bid 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 portion of those referenced codes, standards, and specifications listed herein; except, that wherever references to "Standard Specifications" are made, the provisions therein for measurement and payment shall not apply.

- 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 hereto.

1.03 TRADE NAMES AND ALTERNATIVES

- A. For convenience in designation in the Contract Documents, materials to be incorporated in the Work may be designated under a trade name or the name of a manufacturer and its catalog information. The use of alternative material which is equal in quality and of the required characteristics for the purpose intended will be permitted, subject to the following requirements:
 - 1. The burden of proof as to the quality and suitability of such alternative equipment, products, or other materials shall be upon the Contractor.
 - 2. The Engineer will be the sole judge as to the comparative quality and suitability of such alternative equipment, products, or other materials and its decisions shall be final.
- B. Whenever in the Contract Documents the name and address of the manufacturer or distributor is given for a product or other material, or if any other source of a product or material is indicated therefore, such information is given for the convenience of the Contractor only, and no limit, restriction, or direction is indicated or intended thereby, nor is the accuracy or reliability of such information guaranteed. It shall be the responsibility of the Contractor to determine the accurate identity and location of any such manufacturer, distributor, or other source of any product or material called for in the Contract Document.
- C. The Contractor may offer any material, process, or equipment which it considers equivalent to that indicated. Unless otherwise authorized in writing by the Engineer, the substantiation of offers of equivalency must be submitted within 60 days after execution of the Agreement. The Contractor, at its sole expense, shall furnish data concerning items it has offered as equivalent to those specified. The Contractor shall have the material as required by the Engineer to determine that the quality, strength, physical, chemical, or other characteristics, including durability, finish, efficiency, dimensions, service, and suitability are such that the items will fulfill its intended function. Installation and use of a substitute item shall not be made until accepted by the Engineer. If a substitute offered by the Contractor is found not equal to the specified material, the Contractor shall furnish and install the specified material.
- D. The Contractor's attention is further directed to the requirement that failure to submit data substantiating a request for the substitution of an "or equal" item within said 60-day period

after the execution of the Agreement, shall be deemed to mean that the Contractor intends to furnish one of the specific brand-named products named in the specification, and the Contractor does hereby waive all rights to offer or use substitute products in each such case. Wherever a proposed substitute product has not been submitted within said 60-day period, or wherever the submission of a proposed substitute product fails to meet the requirements of the specifications and an acceptable resubmittal is not received by the Engineer within said 60-day period, the Contractor shall furnish only one of the products originally-named in the Contract Document.

1.04 ABBREVIATION

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

1.05 ABBREVIATIONS AND ACRONYMS

AAMA	Architectural Aluminum Manufacturer's Association
AAR	Association of American Railroads
AASHTO	American Association of the State Highway and Transportation Officials
AATCC	American Association of Textile Chemists and Colorists
ACI	American Concrete Institute
ACPA	American Concrete Pipe Association
ACPPA	American Concrete Pressure Pipe Association
AFBMA	Anti-Friction Bearing Manufacturer's Association, Inc.
AGA	American Gas Association
AGC	American General Contractors
AGMA	American Gear Manufacturer's Association
AHAM	Association of Home Appliance Manufacturers
AI	The Asphalt Institute
AIA	American Institute of Architects
AISC	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMCA	Air Movement and Control Association
ANS	American Nuclear Society
ANSI	American National Standards Institute, Inc.
APA	American Plywood Association
API	American Petroleum Institute
APWA	American Public Works Association
AREA	American Railway Engineering Association
ASA	Acoustical Society of America
ASAE	American Society of Agricultural 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
ASPE	American Society of Plumbing Engineers
ASQC	American Society for Quality Control
ASSE	American Society of Sanitary Engineers
ASTM	American Society for Testing and Materials
AWPA	American Wood Preserves Association
AWPI	American Wood Preserves Institute
AWS	American Welding Society
AWWA	American Water Works Association
BBC	Basic Building Code, Building Officials and Code Administrators International
BHMA	Builders Hardware Manufacturers Association
CBM	Certified Ballast Manufacturers
CEMA	Conveyors Equipment Manufacturers Association
CGA	Compressed Gas Association
CLPCA	California Lathing and Plastering Contractors Association
CMA	Concrete Masonry Association
CRSI	Concrete Reinforcing Steel Institute
CSI	Construction Specifications Institute
DCDMA	Diamond Core Drill Manufacturers Association
DIPRA	Ductile Iron Pipe Research Association
EIA	Electronic Industries Association
ETL	Electrical Test Laboratories
HI	Hydraulic Institute
ICBO	International Conference of Building Officials
IEEE	Institute of Electrical and Electronic Engineers
IES	Illuminating Engineering Society
IME	Institute of Makers of Explosives
IP	Institute of Petroleum (London)
IPC	Institute of Printed Circuits
IPCEA	Insulated Power Cable Engineers Association
ISA	Instrument Society of America
ISO	International Organization for Standardization
ITE	Institute of Traffic Engineers
MBMA	Metal Building Manufacturers Association
MPTA	Mechanical Power Transmission Association
MTI	Marine Testing Institute
NAAM	National Association of Architectural Metal Manufacturers
NACE	National Association of Corrosion Engineers
NBS	National Bureau of Standards
NCCLS	National Committee for Clinical Laboratory Standards
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NGLI	National Grease Lubricating Institute
NMA	National Microfilm Association

NRCA	National Roofing Contractors Association
NWMA	National Woodwork Manufacturers Association
NWWA	National Water Well Association
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
PDI	Portland and Drainage Institute
RIS	Redwood Inspection Service
RVIA	Recreational Vehicle Industry Association
RWMA	Resistance Welder Manufacturers Association
SAE	Society of Automotive Engineers
SAMA	Scientific Apparatus Makers Association
SBC	Southern Building Code Congress International, Inc. (SBCCI)
SIS	Swedish Standards Association
SJI	Steel Joint Institute
SMA	Screen manufacturers Association
SMACCNA	Sheet Metal and Air Conditioning Contractors National Association
SPR	Simplified Practice Recommendation
SSBC	Southern Standard Building Code, Southern Building Code Congress
SSPC	Steel Structures Painting Council
SSPWC	Standard Specifications of Public Works Construction
TAPPI	Technical Association of the Pulp and Paper Industry
TFI	The Fertilizer Institute
UBC	Uniform Building Code
UL	Underwriters Laboratories, Inc.
WCLIB	West Coast Lumber Inspection Bureau
WCRSI	Western Concrete Reinforcing Steel Institute
WIC	Woodwork Institute of California
WPCF	Water Pollution Control Federation
WRI	Wire Reinforcement Institute, Inc.
WWPA	Western Wood Products Association

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01152

APPLICATIONS FOR PAYMENT

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Submit Applications for Payment to the Engineer in accordance with the schedule established by Conditions of the Contract and Agreement between Owner and Contractor.

1.02 RELATED REQUIREMENTS

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

1.03 FORMAT AND DATA REQUIRED

- A. Submit applications types on forms approved by the Owner, Application for Payment, with itemized data typed on 8 ½ inch x 11 inch white paper and continuation sheets.

1.04 PREPARATION OF APPLICATION FOR EACH PROGRESS PAYMENT

- A. Application Form:
 - 1. Fill in required information, including that for Change Orders executed prior to date of submittal of application.
 - 2. Fill in summary of dollar values to agree with respective totals indicated on continuation sheets.
 - 3. Execute certification with signature of a responsible officer of Contract firm.
- B. Continuation Sheets:
 - 1. Fill in total list of scheduled component items of work, with item number and scheduled dollar value for each item.
 - 2. Fill in dollar value in each column for each scheduled line item when work has been performed or products stored.
 - a. Round off values to nearest dollar, or as specified.
 - 3. List each Change Order Number, and description, as for an original component item or work.
 - a. List by Change Order Number, and description, as for an original component item or work.

1.05 SUBSTANTIATING DATA FOR PROGRESS PAYMENTS

- A. When the Owner or the Engineer substantiating data, Contractor shall submit suitable

information, with cover letter identifying:

1. Project
 2. Application number and date
 3. Detailed list of enclosures
 4. For stored products:
 - a. Item number and identification as shown on application.
 - b. Description of specific material.
- B. Submit one copy of data cover letter for each copy of application.
- C. As a prerequisite for payment, Contractor is to submit a "Surety Acknowledgment of Payment Request" letter showing amount of progress payment which the Contractor is requesting.
- D. The Contractor shall maintain an updated construction schedule in accordance with Section 01310. As a prerequisite for monthly progress payments, the Contractor shall submit the updated construction schedule.
- E. The Contractor shall maintain an updated set of drawings to be used as a record drawings in accordance with Section 01720. As a prerequisite for monthly progress payments, the Contractor shall exhibit the updated record drawings for review by the Engineer.

1.06 PREPARATION OF APPLICATION FOR FINAL PAYMENT

- A. Fill in Application form as specified for progress payments.
- B. Use continuation sheet for presenting the final statement of accounting as specified in Section 01700 – Contract Closeout.

1.07 SUBMITTAL PROCEDURE

- A. Submit Applications for Payment to the Engineer at the times stipulated in the Agreement.
- B. Number: Five copies of each Application.
- B. When the Engineer and Owner find Application properly completed and correct, Owner will process the Application in accordance with the Agreement.

PART 2 – PRODUCTS

(NOT USED).

PART 3 – EXECUTION

(NOT USED).

END OF SECTION

SECTION 01310

CONSTRUCTION SCHEDULES

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Promptly after Award of the Contract and within ten days after the effective date of the Agreement, prepare and submit to the Engineer estimated construction progress schedules for the work, with subschedules of related activities which are essential to its progress.
- B. Submit revised progress schedules on a monthly basis.
- C. No partial payments shall be approved by the Engineer until there is an approved construction progress schedule on hand.
- D. The Contractor shall designate an authorized representative of his firm who shall be responsible for development and maintenance of the schedule and of progress and payment reports. This representative of the Contractor shall have direct project control and complete authority to act on behalf of the Contractor's schedule.

1.02 RELATED REQUIREMENTS

- A. Section 01010: Summary of Work
- B. Section 01039: Coordination and Meetings
- C. Section 01340: Submittals and Substitutions

1.03 FORM OF SCHEDULES

- A. Prepare schedules in the form of a horizontal bar chart.
 - 1. Provide separate horizontal bar for each trade or operation within each structure or item.
 - 2. Horizontal time scale: In weeks from start of construction and identify the first work day of each month.
 - 3. Scale and spacing: To allow space for notations and future revisions.
 - 4. Minimum sheet size: 11-inches x 17-inches.
- B. Format of listings: The chronological order of the start of each item of work for each structure.
- C. Identification of listings: By major specification section numbers as applicable and structure.

1.04 CONTENT OF SCHEDULES

- A. Construction Progress Schedule:
 - 1. Show the complete sequence of construction by activity.

2. Show the dates for the beginning of, and completion of, each major element of construction in no more than a two-week increment scale. Specifically the schedule shall list, but not be limited to:
 - a. Site Clearing
 - b. Site Utilities
 - c. Subcontractor Work
 - d. Equipment Installations
 - e. Finishings
 - f. Paintings
 - g. Testing
 - h. Receipt of Spare Parts
 - i. Site Work
 - j. Record Drawings
 - k. Restoration
 3. Show projected percentage of completion for each item, as of the first of each month.
 4. Show projected dollar cash flow requirements for each month of construction.
- B. Submittals Schedule for Shop Drawings, and Samples in accordance with Section 01340. Show:
1. The dates for Contractor's submittals.
 2. The dates submittals will be required for owner furnished products, if applicable.
 3. The dates approved submittals will be required from the Engineer.
- C. A list of all long lead items (equipment, materials, etc).

1.05 PROGRESS REVISIONS

- A. Indicate progress of each activity to date of submission.
- B. Show changes occurring since previous submission of schedule:
1. Major changes in scope.
 2. Activities modified since previous submission.
 3. Revised projections of progress and completion.
 4. Other identifiable changes.
- C. Provide a narrative report as needed to define:
1. Problem areas, anticipated delays, and the impact on the schedule.
 2. Corrective actions recommended, and its effect.
 3. The effect of changes on schedules of other prime contractors.

1.06 SUBMISSIONS

- A. Submit initial schedules to the Engineer within 10-days after the effective date of the Agreement.

1. The Engineer will review schedules and return review copy within 21-days after receipt.
 2. If required, resubmit within 7-days after return of review copy.
- B. Submit 5-copies of revised monthly progress schedules with that month's application for payment.

1.07 DISTRIBUTION

- A. Distribute copies of reviewed schedules to:
1. Engineer (Two Copies)
 2. Job Site File
 3. Subcontractors
 4. Other Concerned Parties
 5. Owner (Two Copies)
- B. Instruct recipients to report promptly to the Contractor, in writing, any problems anticipated by the projections shown in the schedule.

PART 2 – PRODUCTS

(NOT USED).

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01340

SUBMITTALS AND SUBSTITUTIONS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Make submittals required by the Contract Documents, and revise and resubmit as necessary to establish compliance with the specified requirements.

1.02 RELATED SECTIONS

- A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
- B. Individual requirements for submittals also may be described in pertinent Sections of these Specifications.
- C. Work not included:
 - 1. Submittals which are not required will not be reviewed by the Engineer.
 - 2. The Contractor may require his subcontractors to provide drawings, setting diagrams, and similar information to help coordinate the Work, but such data shall remain between the Contractor and his subcontractors and will not be reviewed by the Engineer.

1.03 SUBMITTALS FOR REVIEW

- A. Make submittals of Shop Drawings, Samples, substitution requests, and other items in accordance with the provisions of this Section.

1.04 QUALITY ASSURANCE

- A. Coordination of submittals:
 - 1. Prior to each submittal, carefully review and coordinate all aspects of each item being submitted.
 - 2. Verify that each item and the submittal for it conform in all respects with the specified requirements.
 - 3. By affixing the Contractor's signature to each submittal, certify that this coordination has been performed.
- B. Substitutions:
 - 1. The Contract is based on the standards of quality established in the Contract Documents. Substitutions will be considered only after the Bidding period, up to 30 days after date of Notice to Proceed, the Engineer will consider written requests from Contractor for proposed substitutions of products. Subsequent requests will only be considered when proof is given to the Engineer of product unavailability or other condition beyond control of the Contractor.

2. The following products do not require further approval except for interface within the Work:
 - a. Products specified by reference to standard specifications such as ASTM and similar standards.
 - b. Products specified by manufacturer's name and catalog model number.
 3. Do not substitute materials, equipment, or methods unless such substitution has been specifically approved in writing for this Work by the Engineer.
- C. "Or Equal":
1. Where the phrase "or equal," or "or equal as approved by the Engineer," appears in the Contract Documents, do not assume that the materials, equipment, or methods will be approved as equal unless the item has been specifically so approved for this Work by the Engineer.
 2. The decision of the Engineer shall be final.

PART 2 - PRODUCTS

2.01 SHOP DRAWINGS

- A. Scale and Measurements: Make Shop Drawings accurately to a scale sufficiently large to show all pertinent aspects of the item and its method of connection to the Work.
- B. Review comments of the Engineer will be shown on the shop drawings when these are returned to the Contractor. The Contractor may make and distribute such copies as are required for his purposes. The Engineer will retain at least one copy of the reviewed shop drawings; therefore, submit the number of copies that are required to be returned, plus one additional copy.

2.02 MANUFACTURER'S LITERATURE

- A. Where contents of submitted literature from manufacturers includes data not pertinent to the submittal, clearly show which portions of the contents is being submitted for review.
- B. Submit the number of copies which are required to be returned, plus one copy which will be retained by the Engineer.

2.03 SAMPLES

- A. Provide Samples identical to the precise materials proposed to be utilized in the Work. Identify as described under "Identification of Submittals" below.
- B. Number of Samples required:
 1. Unless otherwise specified, submit Samples, in the quantity, which is required to be returned, plus one which will be retained by the Engineer.
 2. By prearrangement in specific cases, a single Sample may be submitted for review and, when approved, be installed in the Work at a location agreed upon by the Engineer.

PART 3 - EXECUTION

3.01 IDENTIFICATION OF SUBMITTALS

- A. Consecutively number all submittals.
 - 1. When material is resubmitted for any reason, transmit under a new letter of transmittal and with a new transmittal number.
 - 2. On resubmittals, cite the original submittal number for reference.
- B. Accompany each submittal with a letter of transmittal showing all information required for identification and checking.
- C. On at least the first page of each submittal, and elsewhere as required for positive identification, show the appropriate submittal number.
- D. Maintain an accurate submittal log for the duration of the Work, showing current status of all submittals at all times. Make the submittal log available to the Engineer for his review upon request.

3.02 GROUPING OF SUBMITTALS

- A. Unless otherwise specified, make submittals in groups containing all items associated with the particular portion of the Work to assure that all necessary information is available for checking each item when it is received.
 - 1. Partial submittals may be rejected as not complying with the provisions of the Contract.
 - 2. The Contractor may be held liable for delays so occasioned.

3.03 TIMING OF SUBMITTALS

- A. Make submittals far enough in advance of scheduled dates for installation to provide time required for reviews, for securing necessary approvals, for possible revisions and re-submittals, and for placing orders and securing delivery.
- B. In scheduling, allow at least ten working days for review by the Engineer following his receipt of the submittal.

3.04 ENGINEER'S REVIEW

- A. Review by the Engineer does not relieve the Contractor from responsibility for errors, which may exist in the submitted data.
- B. Revisions:
 - 1. Make revisions required by the Engineer.
 - 2. If the Contractor considers any required revision to be a change, he shall so notify the Engineer within ten calendar days in writing. **IF** after the review of the Engineer it is determined that the required revisions are in fact a legitimate change in work or time the procedures set forth in the General Conditions shall be followed.
 - 3. Make only those revisions directed or approved by the Engineer.

- C. Reimbursement of Engineer's costs:
1. In the event substitutions are proposed to the Engineer after the Contract has been awarded, the Engineer will record all time used by him and by his consultants in evaluation of each such proposed substitution.
 2. Whether or not the Engineer approves a proposed substitution, the Contractor promptly upon receipt of the Engineer's billing shall reimburse the Engineer at the rate of three times the direct cost to Engineer and his consultants for all time spent by them in evaluating the proposed substitution.

END OF SECTION

SECTION 01370
SCHEDULE OF VALUES

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Submit to the Engineer a Schedule of Values allocated to the various portions of the Work, within 10-days after the effective date of the Agreement.
- B. Upon request of the Engineer, support the values with data which will substantiate their correctness.
- C. The Schedule of Values, unless objected to by the Engineer, shall be used only as the basis for the Contractor's Applications for Payment.

1.02 RELATED REQUIREMENTS

- A. General Terms and Conditions of the Contract
- B. Section 01152: Applications for Payment

1.03 FORM AND CONTENT OF SCHEDULE OF VALUES

- A. Type schedule on an 8-1/2- inch x 11-inch or 8-1/2- inch x 14-inch white paper furnished by the Contractor; Contractor's standard forms and automated printout will be considered for approval by the Engineer upon Contractor's request. Identify schedule with:
 - 1. Title of Project and location
 - 2. Engineer and Project number
 - 3. Name and Address of Contractor
 - 4. Contract designation
 - 5. Date of submission
- B. Schedule shall list the installed value of the component part of the Work in sufficient detail to serve as a basis for computing values for progress payment during construction.
- C. Identify each line item with the number and title of the respective major section of the specifications.
- D. For each major line item, list sub-values of major products or operations under the item.

- E. For the various portions of the Work:
1. Each item shall include a directly proportional amount of the Contractor's overhead and profit.
 2. For items on which progress payments will be requested for stored materials, break down the value into:
 - a. The cost of the materials, delivered and unloaded, with taxes paid. Paid invoices are required for materials upon request by the Engineer.
 - b. The total installed value.
- F. The sum of all values listed in the schedule shall equal the total Contract Sum.

PART 2 – PRODUCTS

NOT USED

PART 3 – PRODUCTS

NOT USED

END OF SECTION

SECTION 01410

TESTING AND TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Contractor shall employ and pay for the services of an Independent Testing Laboratory to perform testing as required by the Owner to verify conformity with the Contract Documents.
 - 1. Contractor shall cooperate with the laboratory to facilitate the execution of its required services.
 - 2. Employment of the laboratory shall in no way relieve Contractor's obligations to perform the Work of the Contract.

1.02 RELATED REQUIREMENTS

- A. Conditions of the Contract: Inspections and testing required by laws, ordinances, rules, regulations, orders or approvals of public authorities.
- B. Testing laboratory, sampling and testing is required for, but not limited to foundations, concrete walls, concrete slabs, soil densities, and soil compaction and any materials requiring testing.

1.03 LIMITATIONS OF AUTHORITY OF TESTING LABORATORY

- A. Laboratory is not authorized to:
 - 1. Release, revoke, alter or enlarge on requirements of Contract Documents
 - 2. Approve or accept any portion of the Work
 - 3. Perform any duties of the Contractor
 - 4. Release reports or analysis to other than Owner, Engineer and Contractor.

1.04 CONTRACTOR'S RESPONSIBILITIES

- A. Cooperate with laboratory personnel, and provide access to Work and pay for testing.
- B. Secure and deliver to the laboratory adequate quantities of representational samples of materials proposed to be used and which require testing.
- C. Provide to the laboratory the preliminary design mix proposed to be used for concrete, and other materials mixes which require control by the testing laboratory.
- D. Materials and equipment used in the performance of work under this Contract are subject to inspection and testing at the point of manufacture or fabrication. Standard specifications for quality and workmanship are indicated in the Contract Documents. The Engineer may require the Contractor to provide statements or certificates from the manufacturers and fabricators that the materials and equipment provided by them are manufactured or fabricated in full accordance with the standard specifications for quality and workmanship indicated in the Contractor Documents. All costs of this testing and

providing statements and certificates shall be a subsidiary obligation of the Contractor, and no extra charge to the Owner shall be allowed on account of such testing and certification.

- D. Furnish incidental labor and facilities:
 - 1. To provide access to Work to be tested
 - 2. To obtain and handle samples at the Project site or at the source of the product to be tested
 - 3. To facilitate inspections and tests
 - 4. For storage and curing of test samples
- F. Notify laboratory sufficiently in advance of operations to allow for laboratory assignment of personnel and scheduling of tests.
- G. Employ and pay for the services of the same or a separate, equally qualified independent testing laboratory to perform additional inspections, sampling and testing required for the Contractor's convenience.

1.05 TESTING

- A. The Contractor shall obtain the services of a professional testing laboratory approved by the Engineer to perform the following type of tests and test frequencies. Copies of all reports are to be sent to the Engineer as soon as possible.
- B. Concrete compression-strength tests.
- C. Laboratory Proctor and LBR tests; one per material type.
- D. Density tests for any backfill at the rate of three tests per lift.
- E. Density tests for subgrade compaction.
- F. Density tests for limerock base compaction.
- G. If in the opinion of the Engineer, suitable compaction has not been achieved around structures, density tests may be required.
- H. Should the above test results indicate deficiencies, the Engineer may order additional tests at the Contractor's expense, and all reworked areas shall be re-tested at the Contractor's expense.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.01 PAYMENT

- A. Payment for testing shall be included in the cost for each individual pay item requiring testing as specified in the bid schedule.

END OF SECTION

SECTION 01500

MOBILIZATION

PART 1 GENERAL

1.01 GENERAL

- A. Mobilization shall include the obtaining of all permits; moving onto the site of all equipment; temporary buildings, and other construction facilities; and implementing security requirements; all as required for the proper performance and completion of the WORK. Mobilization shall include the following principal items:
1. Moving on to the site of all CONTRACTOR's equipment required for first month operations.
 2. Installing temporary construction power, wiring, and lighting facilities.
 3. Developing construction water supply.
 4. Providing field office trailers for the CONTRACTOR, complete with all specified furnishings and utility services including telephones, telephone appurtenances, and copying machine.
 5. Providing all on-site communication facilities, including telephones and radio pagers.
 6. Providing on-site sanitary facilities and potable water facilities.
 7. Arranging for and erection of CONTRACTOR's work, site access, and storage.
 8. Obtaining all required permits (including NOI and SWIP permits as needed).
 9. Having all OSHA required notices and establishment of safety programs.
 10. Having the CONTRACTOR's superintendent at the job site full time.
 11. Submitting initial submittals.
 12. Audio-Visual preconstruction record as described in Section 01010.
 13. Project identification and signs.
 14. Furnishing, installing, and maintaining Stormwater Pollution Prevention devices.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

R

Riviera Beach

Riviera Heights W 1st Street to W 3rd Street - Neighborhood Improvements

CMA Project No. 26-0221.00036

01500 - 1

3.01 PAYMENT FOR MOBILIZATION

- A. The CONTRACTOR's attention is directed to the condition that no payment for mobilization, or any part thereof will be approved for payment under the Contract until all mobilization items listed in Paragraph 1.01.A. above have been completed as specified.

END OF SECTION 01500

SECTION 01505

CONTROL OF WORK

PART 1 - GENERAL

1.01 QUALITY OF WORK

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

1.02 PRIVATE LAND

- A. The Contractor shall not enter or occupy private land outside of easements, except by written permission of the private property owner.

1.03 PIPE LOCATIONS

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

1.04 OPEN EXCAVATIONS

- A. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons, and damage to property. The Contractor shall, at his own expense, provide suitable and safe bridges and other crossings for accommodating travel by pedestrians and workmen. Bridges provided for access to private property during construction shall be removed when no longer required. The length of open trench will be controlled by the particular surrounding conditions, but shall always be confined to the limits prescribed by the Engineer. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, the Engineer may require special construction procedures such as limiting the length of open trench, prohibiting stacking excavated material in the street, and requiring that the trench shall not remain open overnight.
- B. The Contractor shall take precautions to prevent injury to the public due to open trenches. All trenches, excavated material, equipment, or other obstacles which could be dangerous to the public shall be well lighted at night.

1.05 TEST PITS

- A. Test pits for the purpose of locating underground pipeline or structures in advance of the construction shall be excavated and backfilled by the Contractor at his cost at the direction of the Engineer. Test pits shall be backfilled immediately after their purpose has been satisfied and the surface restored and maintained in a manner satisfactory to the Engineer.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 COOPERATION WITHIN THIS CONTRACT

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

3.02 PROTECTION OF CONSTRUCTION AND EQUIPMENT

- A. All newly constructed work shall be carefully protected from damage in any way. No wheeling or walking or placing of heavy loads on it shall be allowed and all portions damaged shall be reconstructed by the Contractor at his own expense.
- B. All structures shall be protected in a manner approved by the Engineer. Should any of the floor or other parts of the structures become heaved, cracked or otherwise damaged, all such damaged portions of the work shall be completely repaired and made good by the Contractor at his own expense and to the satisfaction of the Engineer. Special attention is directed to substructure bracing requirements described in Section 02220. If, in the final inspection of work, any defects, faults or omissions are found, the Contractor shall cause the same to be repaired or removed and replaced by proper materials and workmanship without extra compensation for the materials and labor required. Further, the Contractor shall be fully responsible for the satisfactory maintenance and repair of the construction and other work undertaken herein, for at least the guarantee period described in the contract.
- C. Further, the Contractor shall take all necessary precaution to prevent damage to any structure due to water pressure during and after construction and until such structure is accepted and taken over by the Owner.

END OF SECTION

SECTION 01510

TEMPORARY UTILITIES

PART 1 GENERAL

1.01 DESCRIPTION

- A. Temporary Utilities: The Contractor shall provide for electricity, ventilation, water, and sanitary facilities as noted below. The Contractor shall furnish, install and maintain all temporary utilities during the Contract period including removal upon completion of work.

1.02 TEMPORARY ELECTRICITY

- A. Cost: Contractor to make separate arrangements with Florida Power & Light and make provisions for all electrical power needs during construction. Contractor shall make, and pay for, any modifications to the existing power service.
- B. Exercise measures to conserve energy

1.03 TEMPORARY VENTILATION

- A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

1.04 TEMPORARY WATER SERVICE

- A. Provide, maintain and pay for suitable quality water service required for construction operations at time of project mobilization.
- B. Exercise measures to conserve water.
- C. Extend branch piping with outlets located so water is available by hoses with threaded connections.

1.05 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01520
CONSTRUCTION AIDS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Furnish, install and maintain required construction aids, remove on completion of Work

1.02 RELATED REQUIREMENTS

- A. Section 01010: Summary of Work

PART 2 – PRODUCTS

2.01 MATERIALS, GENERAL

- A. Materials may be new or used, suitable for the intended purpose, but must not violate requirements of applicable codes and standards.

2.02 CONSTRUCTION AIDS

- A. Provide construction aids and equipment required by personnel and to facilitate execution of the Work; Scaffolds, staging, ladders, stairs, ramps, runways, platforms, railings, hoists, cranes, chutes and other facilities and equipment. Refer to respective sections for particular requirements for each trade.
- B. Maintain facilities and equipment in first-class condition.

2.03 TEMPORARY ENCLOSURES

- A. Provide temporary weather-tight enclosure of exterior walls for storage of materials as work progresses, as necessary to, provide weather protection for materials, and to prevent entry of unauthorized persons.
 - 1. Provide temporary exterior doors with self-closing hardware and padlocks.
 - 2. Other enclosures shall be removable as necessary for work and for handling of materials.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Consult with the Engineer, review site conditions and factors which affect construction procedures and construction aids, including adjacent properties and public facilities which may be affected by execution of the Work.

3.02 GENERAL

- A. Comply with applicable requirements specified in sections of Division 2 through 16.
- B. Relocate construction aids as required by progress of construction, by storage or work requirements, and to accommodate legitimate requirements of Owner and other contractors employed at the site.

3.03 REMOVAL

- A. Completely remove temporary materials, equipment and services:
 - 1. When construction needs can be met by use of permanent construction.
 - 2. At completion of Work.
- B. Clean and repair damage caused by installations for construction aids.
 - 1. Remove foundations and underground installations for construction aids.
 - 2. Grade areas of site affected by temporary installations to required elevations and slopes, and clean the area.
- C. Restore permanent facilities used for temporary purposes to specified condition or in kind if not specified.

END OF SECTION

SECTION 01540

SECURITY

PART 1 - GENERAL

1.01 SECTIONS INCLUDES

- A. Security Program
- B. Entry Control
- C. Personnel Identification
- D. Guard Service
- E. Miscellaneous Restrictions

1.02 RELATED SECTIONS

- A. Section 01010 – Summary of Work
- B. Section 01510 – Temporary Utilities

1.03 SECURITY PROGRAM

- A. Protect Work, existing premises and Owner's operations from theft, vandalism and unauthorized entry.
- B. Initiate program in coordination with Owner's security system at job mobilization.
- C. Maintain program throughout construction period until Owner occupancy as directed by Engineer.

1.04 ENTRY CONTROL

- A. Restrict entrance of persons and vehicles into project site existing facilities.
- B. Allow entrance only to authorized persons with proper identification.
- C. Maintain log of workmen and visitors, make available to Owner on request.
- D. Coordinate access of Owner's personnel to site in coordination with Owner's security forces.

1.05 PERSONNEL IDENTIFICATION

- A. Become familiar with Owner and Engineer representatives.
- B. Restrict access to job site to these representatives.

1.06 GUARD SERVICE

- A. When required, employ guard service to provide watchmen at site during all non-working hours, seven days a week.

PART 2 – PRODUCTS	Not Used
PART 3 – EXECUTION	Not Used

END OF SECTION

SECTION 01550

MAINTENANCE OF TRAFFIC

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The Contractor shall furnish all equipment, supplies, personnel, labor and services to accomplish maintenance of traffic at all locations required to complete this project and as authorized by the Engineer.
- B. The intent is to maintain safe and expeditious movement of traffic around every work area where the public may be exposed to the potential hazards of the contract operations.
- C. The term "Maintenance of Traffic" as used in the contract drawings or in these Specifications shall mean the maintenance of traffic movement through and/or around any work site within a public right-of-way in a manner such as to provide minimum disruption and maximum safety to both the public and project personnel and equipment.
- D. General:
 - 1. The Contractor shall be responsible for the proper maintenance control and detour of traffic in the area of construction, during the course of construction. All traffic control and maintenance procedures shall be in accordance with the requirements of either the Florida Department of Transportation or the Owner.
 - 2. Traffic shall be maintained at all times where practical and as more particularly specified hereinafter. No traffic shall be detoured without prior knowledge and approval of the respective traffic control agency having jurisdiction. The Contractor shall notify such agencies 48-hours in advance of such time he proposes to detour traffic.
 - 3. The Contractor shall keep all law enforcement, fire protection and ambulance agencies informed, in advance, of his construction schedules, and shall notify all such agencies, 48-hours in advance, in the event of detour of any roadway.
 - 4. All traffic control signs and devices, barricades, flashers, flambeaus and similar devices shall be furnished and maintained by the Contractor.
 - 5. Excavated or other material stored adjacent to or partially upon a roadway pavement shall be adequately marked for traffic and pedestrian safety at all times. Necessary access to adjacent property shall be provided at all times.
 - 6. The work shall be conducted in a manner to cause the least possible interruption to traffic. Where traffic must cross excavations, the Contractor shall provide suitable bridges at street intersections and driveways.
- E. Traffic Lanes:
 - 1. At least one lane of traffic shall be maintained at all times; coordination is required with the Owner and all applicable governmental agencies, within their respective area of jurisdiction.
 - 2. In the event the Contractor must detour or close off residential street traffic, he shall submit a plan (or field sketch) for approval depicting a method of providing one way operation or run-around detour route to the respective traffic agency having jurisdiction a minimum of five days prior to any street closing.

F. BARRICADES AND PROTECTION OF WORK

1. The Contractor shall protect his work throughout its length by the erection of suitable barricades and handrails, where required. He shall further indicate this work at night by the maintenance of suitable lights or flares, especially along or across through-fares. Wherever it is necessary to cross a public walk, he shall provide suitable safe walkways with hand railings. He shall also comply with all laws or ordinances covering the protection of such work and the safety measures to be employed therein. The Contractor shall carry out his work so as not to deny access to private property. All utility access manholes, valves, fire hydrants and letter boxes shall be kept accessible at all times.
2. No trenches or holes near walkways, in roadways or road shoulders are to be left open during night hours without the permission of the Owner.

1.2 QUALITY ASSURANCE

- A. Maintenance of Traffic in the public rights-of-way shall be in strict accordance with the manual of uniform traffic control devices (M.U.T.C.D.).
- B. Maintenance of Traffic on F.D.O.T. roads shall be as indicated on the contract drawings and as specified in F.D.O.T. index 600.
- C. All traffic control and warning devices so specified; which are not on F.D.O.T. roadways, shall unless otherwise specified by the Department of Traffic and Transportation, be furnished, installed according to the Owner Public Works Manual, and maintained by the Contractor involved.
- D. The traffic control and safety plan shall be submitted to the Owner for approval and shall be furnished by the Contractor without cost to the Owner. The Contractor is required to retain the services of the Owner Officers for the supervision, as required. Further, any and all additional traffic measures deemed necessary by such offices shall be carried out by the Contractor without cost to the Owner.

1.3 ADDITIONAL REQUIREMENTS

- A. All open trenches and holes adjacent to roadway or walkways shall be properly marked and barricaded to assure the safety of both vehicular and pedestrian traffic.
- B. No trenches or holes near walkways, in roadways or their shoulders are to be left open during night-time hours without express permission of the Owner, Public Works Department, and the Engineer, in writing. Trenches shall be backfilled or covered with steel plates and spiked.
- C. Flagmen will be used during this project when traffic is reduced to single lanes or special detours are employed. Only certified flaggers will be accepted, in accordance with the
- D. M.U.T.C.D.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01560

TEMPORARY CONTROLS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Temporary Controls to protect the Work during construction and until final acceptance of the Work.

1.02 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas to allow for Owners use of site, and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- B. Provide protection for plant life designated to remain. Replace damaged plant life.
- C. Protect vehicular traffic, stored materials, site, and structures from damage.

1.03 FENCING

- A. Provide commercial grade chain link fence or other similar type fencing as needed to protect work.
- B. If required in the plans, provide 4 foot high fence around construction site; equip with vehicular gates with lock

1.04 DRAINAGE CONTROL

- A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- B. Protect site from puddling or running water.

1.05 PROTECTION OF INSTALLED WORK

- A. Protect installed Work and provide special protection where specified in individual Sections of these Specifications.
- B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to prevent damage.
- C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- E. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is

necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

- F. Prohibit traffic from landscaped areas.

1.06 SECURITY

- A. Provide security and facilities to protect Work, and existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.
- B. Coordinate with Owners security program.

1.07 DUST CONTROL

- A. Execute Work by methods to minimize dust generation from construction operations.
- B. Provide positive means to prevent air-borne dust from dispersing into atmosphere.

1.08 EROSION AND SEDIMENT CONTROL

- A. Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
- B. Minimize amount of bare soil exposed at one time.
- C. Provide temporary measures as needed to prevent water flow into the Work.
- D. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
- E. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

1.09 NOISE CONTROL

- A. Provide methods, means, and facilities to minimize noise from noise produced by construction operations.

1.10 POLLUTION CONTROL

- A. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01570

TRAFFIC REGULATIONS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Provide, operate and maintain equipment, services and personnel, with traffic control and protective devices, as required to expedite vehicular traffic flow on haul routes, at site entrances, on-site access roads, and parking areas.
- B. Remove temporary equipment and facilities when no longer required, restore grounds to original, or specified conditions.

1.02 RELATED REQUIREMENTS

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

1.03 TRAFFIC SIGNALS AND SIGNS

- A. Provide and operate traffic control and directional signals or signs required to direct and maintain an orderly flow of traffic in all areas under CONTRACTOR's control, or affected by CONTRACTOR's operations.

1.04 FLAGPERSON

- A. Provide qualified and suitably equipped flagperson when construction operations encroach on traffic lanes, as required for regulation of traffic.

1.05 FLARES AND LIGHTS

- A. Provide flares and lights during periods of low visibility:
 - 1. To clearly delineate traffic lanes and to guide traffic
 - 2. For use of flagperson in directing traffic
- B. Provide illumination of critical traffic and parking areas.
 - 1. Maintain free vehicular access to and through parking areas.
 - 2. Prohibit parking on or adjacent to access roads, or in non-designated areas.

1.06 HAUL ROUTES

- A. Consult with OWNER and governing authorities, establish public thoroughfares which will be used as haul routes and site access.
- B. Confine construction traffic to designated haul routes.
- C. Provide traffic control at critical areas of haul routes to expedite traffic flow, to minimize interference with normal public traffic.

PART 2 - PRODUCTS (Not Applicable)

PART 3 – EXECUTION

3.01 MEASUREMENT AND PAYMENT

- A. There shall be no special measurement and payment for work under the section, it shall be included in the lump sum price bid for Maintenance of Traffic.

END OF SECTION 01570

SECTION 01580

PROJECT IDENTIFICATION AND SIGNS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Furnish, install and maintain project identification sign(s).
- B. Provide temporary on-site informational signs to identify key elements of construction facilities.
- C. Remove signs on completion of construction.
- D. Allow no other signs to be displayed.

1.02 RELATED REQUIREMENTS

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

1.03 PROJECT IDENTIFICATION SIGN

- A. One painted sign, of not less than 18 square feet area per the Project Identification Sign Detail shown in the Construction Plans, with painted graphic content to include:
 - 1. The phrase "YOUR TAX DOLLARS WORKING FOR YOU"
 - 2. Title of project.
 - 3. Name of Funding Source(s)
 - 4. Names and titles of:
 - a. Mayor.
 - b. Council Members.
 - 2. Name of OWNER.
- B. Graphic design, style of lettering, and colors: As designated by CITY.
- C. Erect on the site at a lighted location of high public visibility, adjacent to main entrance to site, as approved by CITY.

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 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.
1. Thickness: As required by standards to span framing members, to provide even, smooth surface without wave or buckles.
- C. Rough Hardware: Galvanized
- D. Paint: Exterior quality.
1. Use Bulletin colors for graphics.
 2. Colors for structure, framing, sign surfaces and graphics: As selected by CITY.

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.
- C. Location as specified by CITY or CITY's Representative.

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 mobilization.

END OF SECTION 01580

SECTION 01600

MATERIALS AND EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes administrative and procedural requirements governing the Contractor's selection of products for use in the Project.

1.03 DEFINITIONS

- A. Definitions used in this Article are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties," "systems," "structure," "finishes," "accessories," and similar terms. Such terms are self-explanatory and have well-recognized meanings in the construction industry.
 - 1. "Products" are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 2. "Named Products" are items identified by the manufacturer's product name, including make or model number or other designation, shown or listed in the manufacturer's published product literature, that is current as of the date of the Contract Documents.
 - 3. "Foreign Products," as distinguished from "domestic products," are items substantially manufactured (50 percent or more of value) outside the United States and its possessions. Products produced or supplied by entities substantially owned (more than 50 percent) by persons who are not citizens of, nor living within, the United States and its possessions are also considered to be foreign products.
 - 4. "Materials" are products substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.
 - 5. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections, such as wiring or piping.

1.04 SUBMITTALS

- A. Product List: Prepare a list showing products specified in tabular form acceptable to the Engineer. Include generic names of products required. Include the manufacturer's name and proprietary product names for each item listed.
 - 1. Coordinate product list with the Contractor's Construction Schedule and the Schedule of Submittals.

2. Form: Prepare product list with information on each item tabulated under the following column headings:
 - a. Related Specification Section number.
 - b. Generic name used in Contract Documents.
 - c. Proprietary name, model number, and similar designations.
 - d. Manufacturer's name and address.
 - e. Supplier's name and address.
 - f. Installer's name and address.
 - g. Projected delivery date or time span of delivery period.
3. Initial Submittal: Within 30-days after date of commencement of the Work, submit 3-copies of an initial product list. Provide a written explanation for omissions of data and for known variations from Contract requirements.
 - a. At the Contractor's option, the initial submittal may be limited to product selections and designations that must be established early in the Contract period.
4. Completed List: Within 60-days after date of commencement of the Work, submit 3-copies of the completed product list. Provide a written explanation for omissions of data and for known variations from Contract requirements.
5. Engineer's Action: The Engineer will respond in writing to Contractor within two weeks of receipt of the completed product list. No response within this period constitutes no objection to listed manufacturers or products but does not constitute a waiver of the requirement that products comply with Contract Documents. The Engineer's response will include a list of unacceptable product selections, containing a brief explanation of reasons for this action.

1.05 QUALITY ASSURANCE

- A. Source Limitations: To the fullest extent possible, provide products of the same kind from a single source. When specified products are available only from sources that do not, or cannot, produce a quantity adequate to complete project requirements in a timely manner, consult with the Engineer to determine the most important product qualities before proceeding. Qualities may include attributes, such as visual appearance, strength, durability, or compatibility. When a determination has been made, select products from sources producing products that possess these qualities, to the fullest extent possible.
- B. Compatibility of Options: When the Contractor is given the option of selecting between two or more products for use on the Project; the product selected shall be compatible with products previously selected, even if previously selected products were also options.
 1. Each sub-contractor is responsible for providing products and construction methods that are compatible with products and construction methods of other sub-contractors.
 2. If a dispute arises between sub-contractors over concurrently selectable, but incompatible products, the Engineer will determine which products shall be retained and which are incompatible and must be replaced.
- C. Foreign Product Limitations: Except under one or more of the following conditions, provide domestic products, not foreign products, for inclusion in the Work:
 1. No available domestic product complies with the Contract Documents.

2. Domestic products that comply with the Contract Documents are available only at prices or terms substantially higher than foreign products that comply with the Contract Documents.
- D. Locate Labels and Nameplates according to the following:
1. Labels: Locate required product labels and stamps on accessible surfaces that are not conspicuous.
 2. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on an easily accessible surface that is inconspicuous in occupied spaces. The nameplate shall contain the following information and other essential operating data:
 - a. Name of product and manufacturer.
 - b. Model and serial number.
 - c. Capacity.
 - d. Speed.
 - e. Ratings.

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products according to the manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.
1. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.
 2. Coordinate delivery with installation time to assure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 3. Deliver products to the site in an undamaged condition in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 4. Inspect products upon delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
 5. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.
 6. Store heavy materials away from the immediate Project area in a manner that will not endanger the supporting construction.
 7. Store products subject to damage by the elements above ground, under cover in a weather-tight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.
- B. Delivery of asphalt and concrete materials shall require delivery tickets that are legible and indicate the material mix, delivery times and quantities. Delivery tickets are required to be submitted to the City on a daily basis.
1. Payment for asphalt and concrete shall be based on the quantity of material actually installed. Payment will not be made for excess material delivered but not utilized on site.

PART 2 - PRODUCTS

2.01 PRODUCT SELECTION

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, new at the time of installation.
 - 1. Provide products complete with accessories, finish, safety guards, and other devices and details needed for a complete installation and the intended use and effect.
 - 2. Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.
- B. Product Selection Procedures: The Contract Documents and Specifications govern product selection. Procedures governing product selection include the following:
 - 1. Proprietary Specification Requirements: Where Specifications name only a single product or manufacturer, provide the product indicated. No substitutions will be permitted.
 - 2. Semi-proprietary Specification Requirements: Where Specifications name two or more products or manufacturers, provide one of the products indicated. No substitutions will be permitted.
 - a. Where Specifications specify products or manufacturers by name, accompanied by the term "or equal" or "or approved equal," comply with the Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.
 - 3. Nonproprietary Specifications: When Specifications list products or manufacturers that are available and may be incorporated in the Work, but do not restrict the Contractor to use of these products only, the Contractor may propose any available product that complies with Contract requirements. Comply with Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.
 - 4. Descriptive Specification Requirements: Where Specifications describe a product or assembly, listing exact characteristics required, with or without use of a brand or trade name, provide a product or assembly that provides the characteristics and otherwise complies with Contract requirements.
 - 5. Performance Specification Requirements: Where Specifications require compliance with performance requirements, provide products that comply with these requirements and are recommended by the manufacturer for the application indicated.
 - a. Manufacturer's recommendations may be contained in published product literature or by the manufacturer's certification of performance.
 - 6. Compliance with Standards, Codes, and Regulations: Where Specifications only require compliance with an imposed code, standard, or regulation, select a product that complies with the standards, codes, or regulations specified.
 - 7. Visual Matching: Where Specifications require matching an established Sample, the Engineer's decision will be final on whether a proposed product matches satisfactorily.
 - a. Where no product available within the specified category matches satisfactorily and complies with other specified requirements, comply

- with provisions of the Contract Documents concerning "substitutions" for selection of a matching product in another product category.
8. Visual Selection: Where specified product requirements include the phrase "... as selected from manufacturer's standard colors, patterns, textures ..." or a similar phrase, select a product and manufacturer that complies with other specified requirements. The Engineer will select the color, pattern, and texture from the product line selected.

PART 3 - EXECUTION

3.01 INSTALLATION OF PRODUCTS

- A. Comply with manufacturer's instructions and recommendations for installation of products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other Work.
- B. Install all equipment as indicated in the Contract Documents, and according to the manufacturer's recommendation to assure proper alignment and operation.

END OF SECTION

SECTION 01640
PRODUCT HANDLING

PART 1 GENERAL

1.01 DESCRIPTION

- A. General: Protect products scheduled for use in the Work by means including, but not necessarily limited to, those described in this Section.
- B. Related Work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions and Sections in Division 1 of the Specifications.
 - 2. Additional procedures also may be prescribed in other Sections of these Specifications.

1.02 QUALITY ASSURANCE

- A. Include within the Contractor's quality assurance program such procedures as are required to assure full protection of all work and materials.

1.03 MANUFACTURER'S RECOMMENDATIONS

- A. Except as otherwise approved by the Engineer determine and comply with manufacturer's recommendations on product handling, storage, and protection.

1.04 PACKAGING

- A. Deliver products to the job site in their manufacturer's original packaging with labels intact and legible.
 - 1. Maintain packaged materials with seals unbroken and labels intact until time of use.
 - 2. Promptly remove damaged material and unsuitable items from the job site, and promptly replace with material meeting the specified requirements at no additional cost to the Owner.
- B. The Engineer may reject as non-complying such material and products that do not bear identification satisfactory to the Engineer as to manufacturer, grade, quality, and other pertinent information.

1.05 PROTECTION

- A. Protect all finished work, including access lids or hatches, and other structure openings through which equipment and materials are handled.
- B. Maintain finished surfaces clean, unmarred, and suitably protected until accepted by

the Owner.

1.06 REPAIRS AND REPLACEMENTS

- A. In the event of damage, promptly make replacements or repairs to the approval of the Engineer and at no additional cost to the Owner.
- B. Additional time required to secure replacements and to make repairs will not be considered by the Engineer to justify an extension in the Contract Time of Completion.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01700

PROJECT CLOSE OUT

PART 1 GENERAL

1.01 DESCRIPTION

- A. Comply with requirements stated in Conditions of the Contract and in Specifications for administrative procedures in closing out the work.
- B. The items listed in this Section shall not be considered as a complete listing and shall in no way limit requirements that may be stated in other parts of the Contract Documents, but rather should be considered as an aid in preparing for final inspection and project close out.

1.02 RELATED REQUIREMENTS

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

1.03 SUBSTANTIAL COMPLETION

- A. When CONTRACTOR considers the work is substantially complete, CONTRACTOR shall submit to OWNER's Representative.
 - 1. A written notice that the work, or designated portion thereof, is substantially complete.
 - 2. A list of items to be completed or corrected.
- B. Within a reasonable time after receipt of such notice, OWNER's Representative and ENGINEER will make an inspection to determine the status of completion.
- C. Should OWNER's Representative determine that the work is not substantially complete:
 - 1. OWNER's Representative 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 OWNER's Representative.
 - 3. OWNER's Representative and ENGINEER will reinspect the work.
- D. When OWNER's Representative and ENGINEER concur that the work is substantially complete, OWNER's Representative will:

1. Prepare a Certificate of Substantial Completion form accompanied by CONTRACTOR's list of items to be completed or corrected, as verified and amended by the OWNER's Representative.
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. When CONTRACTOR considers the work is complete, 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 OWNER's Representative and are operational.
 - 5. Work is completed and ready for final inspection.
- B. OWNER's Representative and ENGINEER will make an inspection to verify the status of completion with reasonable promptness after receipt of such certification.
- C. Should OWNER's Representative and ENGINEER consider that the work is incomplete and defective:
 - 1. OWNER's Representative 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 OWNER's Representative that the work is complete.
 - 3. OWNER's Representative and ENGINEER will reinspect the work.
- D. When the OWNER's Representative find that the work is acceptable under the Contract Documents, CONTRACTOR shall request the CONTRACTOR to make closeout submittals.

1.05 REINSPECTION FEES

- A. Should OWNER's Representative perform re-inspections due to failure of the work to comply with the claims of status of completion made by the CONTRACTOR:
 - 1. OWNER will compensate OWNER's Representative and ENGINEER for such additional services.
 - 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. Certificates of Inspection.
 - (a) Mechanical
 - (b) Electrical
 - (c) Other, as may be required.

B. Project Record Documents: To requirements of Section 01720.

C. Warranties and Bonds: To requirements of Section 01740.

D. Evidence of Payment and Release of Liens: To requirements of General and Supplementary General Conditions.

E. Certificate of Insurance for Products and Completed Operations.

1.07 FINAL ADJUSTMENT OF ACCOUNTS

A. Submit a final statement of accounting to OWNER's Representative.

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 re-inspection payments.
 - (h) Other adjustments.
3. Total Contract Sum, as required.

4. Previous payments.

5. Sum remaining due.

C. OWNER's Representative 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 Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

SECTION 01710

CLEANING

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

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

1.02 RELATED REQUIREMENTS

- A. Conditions of the Contract.
- B. Each Specification Section: Cleaning for specific Products or work.

1.03 DISPOSAL REQUIREMENTS

- A. Conduct cleaning and disposal operations to comply with codes, ordinances, regulations, and anti-pollution laws.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Use only equipment and cleaning materials which will not create hazards to health or property and which will not damage surfaces.
- B. Use only those cleaning materials and methods recommended by the manufacturer, installer or engineer for all materials and areas to be cleaned.

PART 3- EXECUTION

3.01 DURING CONSTRUCTION

- A. Execute periodic cleaning to keep the Work, the site and adjacent properties, free from accumulations of waste materials, rubbish and windblown debris, resulting from construction operations.
- B. Provide on-site containers for the collection of waste materials, debris and rubbish.
- C. Remove waste materials, debris and rubbish from the site periodically and dispose of at legal disposal areas away from the site.

3.02 DUST CONTROL

- A. Clean interior spaces prior to the start of finish painting and continue cleaning on an as-needed basis until painting is finished.
- B. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly-coated surfaces.
- C. Site work to be kept dust free by watering with use of water truck daily as needed. Engineer shall direct the Contractor as necessary.

3.03 FINAL CLEANING

- A. Employ skilled workmen for final cleaning.
- B. All areas adjacent to project shall be re-established to equal or better conditions than was existing prior to construction. As a minimum, the contractor shall replace all sod, plants, shrubs and irrigation damaged during construction.
- C. The City and Engineer shall have final approval of site cleanup and shall direct contractor during punch list inspections to make all necessary repairs.

END OF SECTION

SECTION 01720
PROJECT RECORD DOCUMENTS

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Maintain at the site for Owner review one record copy of:
 - 1. Drawings
 - 2. Specifications
 - 3. Addenda
 - 4. Change Orders and other Modifications to the Contract
 - 5. Engineer's Field Orders or Written Instructions
 - 6. Approved Shop Drawings, Working Drawings, and Samples
 - 7. Field Test Reports

1.02 RELATED REQUIREMENTS

- A. Section 01340: Submittals and Substitutions
- B. Section 01700: Project Closeout

1.03 MAINTENANCE OF DOCUMENTS AND SAMPLES

- A. Store documents and samples in Contractor's field office apart from documents used for construction.
- B. File documents and samples in accordance with CSI format number system.
- C. Maintain documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.
- D. Make documents and samples available at all times for inspection by the Engineer.
- E. As a prerequisite for monthly progress payments, the Contractor is to exhibit the currently updated "record documents" for review by the Engineer and the Owner.

1.04 RECORDING

- A. Label each document "PROJECT RECORD" in neat large printed letters.
- B. Record information concurrently with construction progress.
- C. Drawings; Legibly mark record actual construction:
 - 1. Field changes of dimensions and details.

2. Changes made by Field Order or by Change Order.
3. 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 product and item of equipment actually installed.
 2. Changes made by field order or by Change Order.
- E. Shop Drawings (after final review and approval):
 1. One set of record shop drawings for each process equipment, piping, (including casings) electrical system and instrumentation system.
- F. Certified site survey and line elevations, and stationing at increments by registered surveyor.

1.05 SUBMITTAL

- A. At close-out, deliver Record Documents to the Engineer for the Owner.
- B. Accompany submittal with transmittal letter in duplicate, containing:
 1. Date
 2. Project Title and Number
 3. Contractor's Name and Address
 4. Title and Number of each Record Document
 5. Signature of Contractor or his Authorized Representative

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION

SECTION 01740
WARRANTIES AND BONDS

PART 1 -GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Compile specified warranties and bonds.
- B. Co-execute submittals when so specified.
- C. Review submittals to verify compliance with Contract Documents.
- D. Submit to the Engineer for review and transmittal to Owner.

1.02 RELATED REQUIREMENTS

- A. Instructions to Bidders: Bid Bonds
- B. Conditions of the Contract: Performance Bond and Payment Bond
- C. Section 01700: Project Closeout

1.03 SUBMITTAL REQUIREMENTS

- A. Assemble warranties, bond, service and maintenance contracts, executed by each of the respective manufacturers, suppliers, and subcontractors.
- B. Number of original signed copies required: Two each.
- C. Table of Contents: neatly typed, in orderly sequence. Provide complete information for each item.
 - 1. Product or work item
 - 2. Firm, with name of principal, address and telephone number
 - 3. Scope
 - 4. Date of beginning of Warranty, bond or service and maintenance contract
 - 5. Duration of warranty, bond or service maintenance contract
 - 6. Provide information for Owner's personnel:
 - a. Proper procedure in case of failure
 - b. Instances which might affect the validity of warranty or bond
 - 7. Contractor, name of responsible principal, address and telephone number

1.03 FORM OF SUBMITTALS

- A. Prepare in duplicate packets

- B. Format:
 - 1. Size 8 ½-inches x 11-inches, punch sheets for standard 3-post binder
 - 2. Cover: Identify each packet with typed or printed title "WARRANTIES AND BONDS". List:
 - a. Title of Project
 - b. Name of Contractor
- C. Binders: Commercial quality, three-post binder, with durable and cleanable plastic covers and maximum post width of 2-inches.

1.04 WARRANTY SUBMITTAL REQUIREMENTS

- A. For all major pieces of equipment, submit a 1-year warranty from the equipment manufacturer. The manufacturer's warranty period shall be concurrent with the Contractor's for 1- year commencing at the time of acceptance by the Owner.
- B. The Contractor shall be responsible for obtaining certificates for equipment warranty for all major equipment specified under Division 15 and which has a 1/4 HP motor or which lists for more than \$500. The Engineer reserves the right to request warranties for equipment not classified as major. The Contractor shall still warrant equipment not considered to be "major" in the Contractor's 1-year warranty period even though certificates of warranty may not be required.
- C. In the event that the equipment manufacturer or supplier is unwilling to provide a 1-year warranty commencing at the time of Owner acceptance, the Contractor shall obtain from the manufacturer a 2-year warranty commencing at the time of equipment delivery to the job site. This 2-year warranty from the manufacturer shall not relieve the Contractor of the one-year warranty starting at the time of Owner acceptance of the equipment.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 02010
SUBSURFACE INVESTIGATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 WORK INCLUDED

- A. Provide all labor, materials, necessary equipment and services to complete the subsurface investigation work, as indicated on the drawings, as specified herein or both.
- B. The subsurface investigation for conditions of the project site is the sole responsibility of the CONTRACTOR. In preparing the Proposal, the CONTRACTOR shall make all subsurface or surface investigations necessary to provide proper background and knowledge to determine the nature and extent of work required.
- C. OWNER or OWNER's Representative has provided subsurface information at the end of this section, and makes no warranties or guarantees concerning the nature of materials to be encountered on the site.

1.03 RELATED WORK

- A. Section 02110 – Clearing and Grubbing.
- B. Section 02200 - Earthwork.
- C. Section 02720 - Storm Drainage Facilities.
- D. All applicable sections under Divisions 1, 2, and 3.

1.04 MEASUREMENT AND PAYMENT

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

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END SECTION 02010

SECTION 02050

DEMOLITION

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 site demolition work, as indicated on the drawings, as specified herein or both, except as for items specifically indicated as "NIC ITEMS."

1.03 RELATED WORK

- A. Section 02200 - Earthwork.
- B. All applicable Sections under Divisions 1, 2, and 3.

1.04 QUALITY ASSURANCE

- A. Demolition contractor qualifications: Minimum of five (5) years experience in demolition of comparable nature.
- B. Requirements of All Applicable Regulatory Agencies:
 - 1. All applicable Building Codes and other Public Agencies having jurisdiction upon the work.

1.05 SUBMITTALS

- A. Certificates of severance of utility services.
- B. Permit for transport and disposal of debris.
- C. Demolition procedures and operational sequence for review and acceptance by ENGINEER.

1.06 JOB CONDITIONS

- A. Existing Conditions
 - 1. The demolition work shall be done as indicated on the construction plans.

2. Remove all demolition debris from the site the same day the work is performed. Leave no deposits of demolished material on site over night.
3. Structural demolition, excavation, backfill and compaction as indicated in drawings.

B. Protection:

1. Erect barriers, fences, guard rails, enclosures, and shoring to protect personnel, structures, and utilities remaining intact.
2. Protect designated trees and plants from damages.
3. Use all means necessary to protect existing objects and vegetation designated to remain, and, in the event of damage, immediately make all repairs, replacements and dressings to damaged plants necessary, to the approval of the ENGINEER at no additional cost to the OWNER.

C. Maintaining Traffic:

1. Ensure minimum interference with roads, streets, driveways, sidewalks, and adjacent facilities.
2. Do not close or obstruct streets and sidewalks without written approval from the ENGINEER.
3. If required by governing authorities, provide alternate routes around closed or obstructed traffic ways.

D. Dust Control:

1. Use all means necessary for preventing dust from demolition operations from being a nuisance to adjacent property owners. Methods used for dust control are subject to approval by the ENGINEER prior to use.

E. Burning:

1. Burning will not be permitted.

F. No explosives will be permitted.

1.07 GENERAL ITEMS

- A. Scope of work shall comprise the following: Provide all labor, materials, necessary equipment and services to complete the demolition and clearing work, as indicated on the contract plans, and as specified herein.

- B. The CONTRACTOR shall provide references to the OWNER to demonstrate a minimum of five years experience in demolition of a comparable nature. Current occupational licenses held by CONTRACTOR shall be submitted to OWNER.
- C. The CONTRACTOR shall be responsible for adherence to all applicable codes of all regulatory agencies having jurisdiction upon the works.

1.08 PRE-DEMOLITION MEETING

- A. A meeting shall be held with the OWNER or his representative at the jobsite to describe intended demolition and cleaning procedures and schedules. This shall include identifying access routes for bringing necessary equipment in, removing debris from site, and designation of any trees, drives or other items to remain.

1.09 EXISTING CONDITIONS

- A. The CONTRACTOR shall become thoroughly familiar with the site, and of existing utilities and their connections, and note all conditions which may influence the work.
- B. By submitting a bid, the CONTRACTOR affirms that CONTRACTOR has carefully examined the site and all conditions affecting work. No claim for additional costs will be allowed because of lack of full knowledge of existing conditions.
- C. The removal of A.C. pipe shall be done in strict compliance with local, state, and federal regulations. The OWNER shall be notified immediately by the CONTRACTOR should any hazardous materials be discovered during demolition.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify that structures to be demolished are discontinued in use and ready for removal.
- B. Do not commence work until all conditions and requirements of all applicable public agencies are complied with.

3.02 PREPARATION

- A. Arrange for, and verify termination of utility services to include removing meters and capping lines.

B. Notification:

1. Notify the OWNER at least three (3) full working days prior to commencing the work of this Section.

3.03 CLARIFICATION

- A. The drawings do not purport to show all objects existing on the site.
- B. Before commencing the work of this Section, verify with the OWNER all objects to be removed and all objects to be preserved.

3.04 SCHEDULING

- A. Schedule all work in a careful manner with all necessary consideration for the public and the OWNER.
- B. Avoid interference with the use of, and passage to and from, adjacent facilities.

3.05 DISCONNECTION OF UTILITIES

- A. Before starting site operations, disconnect or arrange for the disconnection of all effected utility service.
 1. Arrange and pay for disconnecting, removing, capping, and plugging utility services. Disconnect and stub off. Notify affected utility company in advance and obtain approval before starting this work.
 2. Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction.
 3. Place markers to indicate location of disconnected services.
 4. On-site drainage structures and drain fields shall be removed in their entirety by methods approved by the OWNER's representative.

3.06 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

- A. Utility Services: Maintain existing off-site utilities, keep in service, and protect against damage during demolition operations.
- B. Prevent movement or settlement of adjacent structures. Provide and place bracing or shoring and be responsible for safety and support of structures. Assume liability for such movement, settlement, damage, or injury.
- C. Cease operations and notify OWNER immediately if safety of adjacent structures appears to be endangered. Take precautions to properly support structures. Do

not resume operations until safety is restored.

- D. Prevent movement, settlement, damage, or collapse of adjacent services, sidewalks, driveways and trees. Assume liability for such movement, settlement, or collapse. Promptly repair damage at no cost to the OWNER.
- E. Ensure safe passage of persons around areas of demolition.

3.07 MAINTAINING TRAFFIC

- A. Do not interfere with use of adjacent buildings and facilities. Maintain free and safe passage to and from. Conduct demolition operations and removal of debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, walks, or other occupied or used facilities without permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed travel ways if required by governing authorities.

3.08 POLLUTION CONTROLS

- A. Use water sprinkling, temporary enclosures, and other suitable methods to limit dust and dirt rising and scattering in air to lowest practical level. Comply with governing regulations pertaining to environmental protection.
- B. Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations as directed by the OWNER or his representative or governing authorities. Return adjacent areas to condition existing prior to start of work.

3.09 INSPECTION AND PREPARATION

- A. Verify that structures to be demolished are discontinued in use and ready for removal.
- B. Do not commence work until all conditions and requirements of all applicable public agencies are complied with.
- C. Arrange for, and verify termination of utility services to include removing meters and capping lines.
- D. The drawings do not purport to show all objects existing on the site; at the pre-demolition meeting before commencement of the work, verify with the OWNER all objects to be removed and all objects to be preserved.

3.10 DEMOLITION

- A. Pull out any existing utility lines designated for abandonment, irrigation, electrical lines, pull boxes and splice boxes, manholes and catch basins to be removed

and all other objects designated to be removed or interfering with the work. Contact the utility company or agency involved for their requirements for performing this work. No equipment and materials shall be allowed to remain in the work area after the day it was removed.

- B. Remove all debris from the site and leave the site in a neat, orderly condition to the full acceptance of the ENGINEER, or the OWNER. No debris shall be left on the site over night.
- C. Clear and Grub and dispose of all trees, shrubs and other organic matter not otherwise addressed on tree removal and relocation plans and specifications.

3.11 DEMOLITION OF SITE STRUCTURES

- A. Demolish all site structure items designated to be removed or which are required to be removed to perform the work. This item does not include buildings.

3.12 REMOVAL OF DEBRIS AND DISPOSAL OF MATERIAL

- A. Material resulting from demolition and not scheduled for salvaging shall become the property of the CONTRACTOR and shall be removed from site and legally disposed of off-site. Disposal shall be timely, performed as promptly as possible and not left until the final cleanup. Material shall not be left on the job site for more than 60 days.
- B. Remove from site contaminated, vermin infested, or dangerous materials encountered and dispose of by safe means so as not to endanger health of workers and public.
- C. Burning of removed materials from demolished structures will not be permitted.

3.13 COMPLETION OF WORK

- A. Leave the site in a neat, orderly condition to the full acceptance of the OWNER.
- B. Dirt remaining after demolition shall be graded level and compacted, in preparation for filling operations to follow demolition. Trenches shall be filled in layers of 12" maximum thickness and compacted in accordance with the technical specifications applicable to backfilling of trenches.

END OF SECTION

SECTION 02100
SITE PREPARATION

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Section covers cleaning, grubbing, stripping and demucking of the construction site, complete as specified herein.
- B. Clear and demuck the areas within the limits of construction as required, including drainage easements. The width of the area to be cleared and demucked shall be established by the Engineer prior to the beginning of any work.

1.02 RELATED WORK

- A. Section 02220: Structural Excavation, Backfill & Compaction
- B. Section 02221: Trenching, Bedding & Backfill for Pipe

PART 2 – PRODUCTS

(Not Used)

PART 3 – EXECUTION

3.01 CLEARING

- A. The surface of the ground, for the area to be cleared and grubbed shall be completely cleared of all timber, brush, stumps, roots, grass, weeds, rubbish and all other objectionable obstructions resting on or protruding through the surface of the ground. However, those trees which are designated by the Engineer shall be preserved as hereinafter specified. Clearing operations shall be conducted so as to prevent damage to existing structures and installations, and to those under construction, so as to provide for the safety of employees and others. Clearing for structures shall consist of topsoil and vegetation removal. Clearing for pipelines shall consist of vegetation removal.

3.02 GRUBBING

- A. Grubbing shall consist of the complete removal of all stumps, roots larger than 1 ½ inches in diameter, mattered roots, brush, timber, logs and any other organic or metallic debris resting on, under or protruding through the surface of the ground to a depth of 18 inches below the subgrade. All depressions excavated below the original ground surface for or by the removal of such objects, shall be

refilled with suitable materials and compacted to a density conforming to the surrounding ground surface.

3.03 STRIPPING

- A. In areas so designated, top soil, not muck shall be stockpiled. Topsoil so stockpiled shall be protected until it is placed as specified. Any topsoil remaining after all work is in place shall be disposed of by the Contractor.

3.04 DEMUCKING

- A. When encountered, organic material (muck) shall be excavated and removed. This material may be stockpiled temporarily, but must be disposed of as directed by the Engineer or the Owner.

3.05 DISPOSAL OF CLEARED AND GRUBBED MATERIAL

- A. The Contractor shall dispose of all material and debris from the clearing and grubbing operation by shipping such material and debris and disposing such material to a suitable location as required by the Engineer or the governmental agencies. Disposal by deep burial will not be permitted. The cost of disposal of material (including hauling) shall be considered a subsidiary obligation of the Contractor, the cost of which shall be included in the contract prices.

3.06 PRESERVATION OF TREES

- A. Those trees which are designated by the Engineer or as shown on the drawings for preservation shall be carefully protected from damage. The Contractor shall erect such barricades, guards, and enclosures as may be considered necessary by him for the protection of the trees during all construction operations.

3.07 PRESERVATION OF DEVELOPED PRIVATE PROPERTY

- A. The Contractor shall exercise extreme care to avoid necessary disturbance of developed private property as applicable. Trees, shrubbery, gardens, lawn and other landscaping, which in the opinion of the Engineer must be removed, shall be replaced and replanted to restore the construction easement to the condition existing prior to construction.
- B. All soil preparation procedures and replanting operations shall be under the supervision of nurseryman experienced in such operations.
- C. Improvements to the land such as fences, walls, outbuildings, etc., which of necessity must be removed shall be replaced with equal quality materials and workmanship.
- D. The Contractor shall clean up the construction site across developed private property directly after construction is complete upon approval of the Engineer.

3.08 PRESERVATION OF PUBLIC PROPERTY

- A. The appropriate paragraphs of Articles 3.06 and 3.07, of these specifications shall apply to the preservation and restoration of all damaged areas of public lands, rights-of-way, easements, etc.

END OF SECTION

SECTION 02151

SHORING AND BRACING OF EXCAVATIONS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Work included: Provide shoring at excavations and else where as required to protect workmen, materials, other properties, and the public.

1.02 RELATED WORK

- A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
- B. As established in the General Conditions of the Contract, the Contractor is solely responsible for means and methods of construction and for the sequences and procedures to be used.

1.03 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are familiar with the specified requirements and the methods required for proper performance of the work of this Section.
- B. Employ a Professional Engineer registered in the State of Florida, who is qualified to design the shoring system and to inspect and report on the quality of its construction. All drawings must bear the signature and seal of this engineer.
- C. Comply with pertinent requirements of governmental agencies having jurisdiction, specifically the Florida Trench Safety Act.
- D. The shoring design and construction shall take into consideration all the information regarding the following:
 - 1. Soil investigation report prepared for this Work.
 - 2. Existing Utilities.

1.04 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340 "Submittals and Substitutions".
- B. Submit shoring design for approval by Owner.
 - 1. Should changes in the shoring design be required coordinate all such changes with the Engineer and secure the Owner.

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

- A. Provide list of materials as required for the shoring system.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 DESIGN

- A. Design a shoring system which will safely and adequately prevent collapse of adjacent materials and which will permit construction of the Work to the arrangement shown on the Drawings.
- B. Secure approval from Owner.

3.03 INSTALLATION

- A. Construct and install the shoring system in accordance with the design as approved by the Owner.

END OF SECTION

SECTION 02211

ROCK AND BOULDER EXCAVATION

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Section includes the excavation, disposal and replacement of rock and boulders.

1.02 DEFINITIONS

- A. Rock excavation shall mean rock which, in the opinion of the Engineer, requires for its removal, drilling, wedging, sledging, or barring.
- B. Boulder excavation shall mean boulders exceeding 1-cubic yard in volume which can be excavated without resorting to blasting.

PART 2 – PRODUCTS

(Not Used)

PART 3 – EXECUTION

3.01 BLASTING

- A. Blasting will not be permitted on this project due to the nearby proximity structures.

3.02 DISPOSAL AND REPLACEMENT OF ROCK

- A. Trench excavation, consisting of rock and boulders exceeding 50-pounds in weight, and smaller fragments when directed by the Engineer, shall not be used for backfilling. Rock disposed by washing shall be replaced by available surplus excavation. Approved borrow to supply any deficiency of backfill shall be provided by the Contractor without additional payment.
- B. Fragments of ledge and boulders smaller than 50-pounds in weight may be used in backfilling pipe trenches to the extent approved by the Engineer. The small fragments of rock used as backfill shall not be placed in the trench until the pipe has at least 2-feet of earth cover. The Contractor shall place stone in these layers on the sides of the trench, alternating with earth to fill voids and prevent settlement in the trench. Backfilling trench is further specified under Section 02221. Nesting of rock fragments will not be permitted and will be removed as directed by the Engineer.

END OF SECTION

SECTION 02220

STRUCTURAL EXCAVATION, BACKFILL & COMPACTION

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Section includes, except as elsewhere provided, excavation, filling and grading under and around structures to the subgrades and grades indicated on the Drawings.
- B. Supplemental Foundation and Site Preparation Notes may be indicated on the Structural Drawings.

1.02 RELATED WORK

- A. General Conditions
- B. Section 02100: Site Preparation

1.03 QUALITY ASSURANCE

- A. Codes and Standards: Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.
- B. Testing and Inspection Service: The Contractor will engage soil testing and inspection service for quality control testing during earthwork operations.

1.04 JOB CONDITIONS

- A. The Contractor shall examine the site and review the available test borings or undertake his own soil borings prior to submitting his bid, taking into consideration all conditions that may affect his work. The Owner and Engineer will not assume responsibility for variations of subsoil quality or conditions at locations other than places shown and at the time the investigation was made.
- B. Existing Utilities: Locate existing underground utilities in the areas of work. If utilities are to remain in place, provide adequate means of protection during earthwork operations.
 - 1. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult the Engineer and the Owner of such piping or utility immediately for directions.
 - 2. Cooperate with the Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
 - 3. Demolish and completely remove from site existing underground utilities indicated on the Drawings to be removed.

- C. Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights. Operate warning lights as recommended by authorities having jurisdiction. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

1.05 PROTECTION

A. Sheeting and Bracing in Excavations:

1. In connection with the construction of below grade structures, the Contractor shall construct, brace, and maintain cofferdams consisting of sheeting and bracing as required to support the sides of excavations, to prevent any movement which could in any way diminish the width of the excavation below that necessary for proper constriction, and to protect adjacent structures, existing piping and foundation material from disturbance, undermining, or other damage. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed, they shall be immediately filled and rammed.
2. All sheeting and bracing not left in place shall be carefully removed in such a manner as not to endanger the construction of other structures, utilities, existing piping, or property. Unless otherwise approved or indicated on the Drawings or in the Specifications, all sheeting and bracing shall be removed after completion of substructure, care being taken not to disturb or otherwise injure the finished structures. All voids left or caused by withdrawal of sheeting shall be immediately refilled with sand by ramming with tools especially adapted to that purpose, by watering or otherwise as may be directed.
3. The right of the Engineer to order sheeting and bracing left in place shall not be construed as creating any obligation on his part to issue such orders, and his failure to exercise his right to do so shall not relieve the Contractor from liability for damages to persons or property occurring from or upon the work occasioned by negligence or otherwise, growing out of failure on the part of the Contractor to leave in place sufficient sheeting and bracing to prevent any caving or moving of the ground.
4. The Contractor shall construct the cofferdams and sheeting outside the neat lines of the foundations unless indicated otherwise to the extent, he deems it desirable for his method of operation. Sheeting shall be plumb and securely braced and tied in position. Sheeting, bracing and cofferdams shall be adequate to withstand all pressures to which the structure will be subjected. Pumping, bracing, and other work within the cofferdams shall be done in a manner to avoid disturbing any construction of the masonry enclosed. Any movement or bulging which may expense so as to provide the necessary clearances and dimensions.
5. Drawings of the cofferdams and design computations shall be submitted to the Engineer for approval, and construction shall not be started until such drawings are approved. However, approval of these drawings shall not relieve the Contractor of the responsibility for the cofferdam. The

drawings and computations shall be prepared and stamped by a Registered Professional Engineer in the State of Florida and shall be in sufficient detail to disclose the method of operation for each of the various stages of construction, if required, for the completion of the substructures.

B. Dewatering, Drainage and Floatation:

1. The Contractor shall construct and place all concrete work, structural fill, bedding rock, and limerock base course, in-the-dry unless authorized by the Engineer or Owner to place in the wet. When dewatering, the Contractor shall make the final 24-inches of excavation for this work in-the-dry and not until the water level is a minimum of 12-inches below proposed bottom of excavation.
2. The Contractor shall, at all times during construction, provide and maintain proper equipment and facilities to remove promptly and dispose of properly all water entering excavations and keep such excavations dry so as to obtain a satisfactory undisturbed subgrade foundation condition until the fill and structure to be built thereon have been completed to such extent that they will not be floated or otherwise damaged by allowing water levels to return to natural elevations.
3. Dewatering shall at all times be conducted in such a manner as to preserve the natural undisturbed bearing capacity of the subgrade soils at proposed bottom of excavation.
4. Wellpoints may be required for predrainage of the soils prior to final excavation for some of the deeper in-ground structures, and for maintaining the lowered groundwater level until construction has been completed to such an extent that the structure or fill will not be floated or otherwise damaged. Wellpoints shall be surrounded by suitable filter sand and no fines shall be removed by pumping. Pumping from wellpoints shall be continuous and standby pumps shall be provided.
5. The Contractor shall furnish all materials and equipment and perform all work required to install and maintain the drainage systems he proposes for handling groundwater and surface water encountered during construction of structures and compacted fills.
6. If requested by the Engineer, the Contractor's proposed method of dewatering shall include a groundwater observation well at each structure to be used to determine the water level during construction of the structure. Locations of the observation wells shall be at structures as approved by the Engineer prior to their installation. The observation wells shall be extended to 6-inches above finished grade, capped with screw-on caps protected by 24" x 24" wide concrete base, and left in place at the completion of this Project.
7. Prior to excavation, the Contractor shall submit his proposed method of dewatering and maintaining dry conditions to the Engineer for approval. However, such approval shall not relieve the Contractor of the responsibility for the satisfactory performance of the system. The

contractor shall be responsible for correcting any disturbance or natural bearing soils or damage to structures caused by an inadequate dewatering system or by interruption of the continuous operation of the system as specified.

8. As part of his request for approval of a dewatering system, the Contractor may be requested to demonstrate the adequacy of the proposed system and wellpoint filter sand by means of a test installation. Discharge water shall be clear, with no visible soil particles in a one-quart sample.
9. During backfilling and construction, water levels shall be measured in observation wells located as directed by the Engineer.
10. Continuous pumping will be required as long as water levels are required to be below natural levels.

1.06 SUBMITTALS

- A. The Contractor shall furnish the Engineer, for approval, a representative sample of fill material obtained from on-site sources at least 10-calendar days prior to the date of anticipated use of such material.

- B. For each material obtained from other than on-site sources, the Contractor shall notify the Engineer of the source of the material and shall furnish the Engineer, for approval, a representative sample at least 10-calendar days prior to the date of anticipated use of such material.

PART 2 – PRODUCTS

2.01 MATERIALS

A. General:

- 1. Materials for use as base, fill and backfill shall be as described below.
 - a. Satisfactory soil materials are defined as those complying with American Association of State Highway and Transportation Officials (AASHTO) M-145, soil classification Groups A-1, A-2-4, A-2-5 and A-3.
 - b. Unsatisfactory soil materials are those defined in AASHTO M-145 soil classification Groups A-2-6, A-2-7, A-4, A-5, A-6 and A-7 along with peat and other highly organic soils.
- 2. Materials shall be furnished as required from off site sources and hauled to the site.

B. Structural Fill:

- 1. Structural fill material shall be satisfactory soil material consisting of a minimum of 60 percent clean medium to fine grain sized quartz sand, free of organic, deleterious and compressible material. Rock in excess of 2-1/2-inches in diameter shall not be used in the fill material. Structural fill shall not contain hardpan, stones, rocks, cobbles or other similar materials.

C. Crusher-Run Gravel:

- 1. The impervious aggregate base, crusher-on gravel, subbase or shoulder course material shall be uniform quality throughout. The material retained on the No. 10 sieve shall be composed of aggregate meeting the requirements for Class A or B coarse aggregate, except the percent of soft fragments allowed shall be as shown in the requirements below. To be used only if requested by Contractor and approved by Engineer.
- 2. The impervious aggregate may be produced from an approved quarry source, or bank or pit deposit, which will yield a satisfactory mixture conforming to all requirements of these specifications after it has been crushed or processed as a part of the mining operations, or the material may be furnished in two sizes of such gradation that when combined in the central mix plant the resultant mixture shall conform to the required specifications. Impervious aggregate base, subbase or shoulder material shall conform to the following requirements:
 - a. Gradation, Percent by Weight Passing Each Sieve.

12-Inch Sieve	100
3/4-Inch Sieve	60-100
No. 10 Sieve	30-55
No. 60 Sieve	8-35
No. 200 Sieve	5-20

Test on Material Passing No. 10 Sieve Volume Change, Percent 0-18.

Test on Material Retained on 3/8 Sieve Soft Fragments, Percent 0-30.

3. Method of tests shall be in accordance with the following:

Gradation	AASH O: T27
Volume Change	GHD: 6
Soft Fragments	AASHTO: T-189

D. Base Course:

1. Limerock shall not contain cherty or other extremely hard pieces, or lumps, or balls or pockets of sand material in sufficient quantity as to be detrimental to the proper bonding, finish or strength of the limerock base.
2. Gradation and Size Limits:
At least 97-percent (by weight of the material shall pass a 3-1/2-inch sieve and the material shall be graded uniformly down to dust. The fine material shall consist 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 in place.
3. Limerock shall originate from a Florida Dept. of Transportation (FDOT) certified pit.
4. Crushed or recycled concrete free from deleterious materials may be used as base material conforming to the gradation requirements of limerock.

E. Common Fill:

1. Common fill material shall be satisfactory soil material containing no more than 20-percent by weight finer than No. 200-mesh sieve. It shall be free from organic matter, muck, marl, and rock exceeding 2-1/2-inches in diameter. Common fill shall not contain broken concrete, masonry, rubble or other similar material.
2. Material falling within the above specification, encountered during the excavation, may be stored in segregated stockpiles for reuse. All material which, in the opinion of the Engineer, is not suitable for reuse shall be spoiled as specified herein for disposal of unsuitable materials.

F. Bedding Rock:

1. Bedding rock shall be 3/8" to 3/4-inch washed and graded limerock. This Rock shall be graded so that 99-percent will pass a 3/4-inch screen and 80-percent will be retained on a No. 8 screen.

PART 3 – EXECUTION

3.01 INSPECTION

- 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 walks, pavements and steps 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

- A. Excavation consists of removal and disposal of material encountered when establishing required grade elevations.
- B. Excavation Classifications: The following classifications of excavation will be made when unanticipated rock excavation or unclassified excavation is encountered in the work. Do not perform such work until material to be excavated has been cross-sectioned and classified by Engineer or specialized geotechnical consultant.
 1. Authorized earth excavation includes removal and disposal of pavements and other obstructions visible on ground surface, underground structures and utilities indicated to be demolished and removed, material of any classification indicated in soil boring data on subsurface conditions, and other materials encountered that are not classified as rock excavation or unauthorized excavation.
 2. Unauthorized excavation consists of removal of material beyond the limits needed to establish required grade and subgrade elevations without specific direction of Engineer. Unauthorized excavation, as well as remedial work directed by the Engineer shall be at the Contractor's expense.
 - a. Under footings and foundation bases, fill unauthorized excavation by extending the indicated bottom elevation of the footing or base to the excavation bottom, without altering required top elevation. Lean (unreinforced) concrete fill may be used to bring bottom elevations to proper position, when acceptable to Engineer. Reinforcement shall be placed as needed or directed by the Engineer.

- b. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of same classifications, unless otherwise directed by Engineer.
- C. Additional Excavation: When excavation has reached required subgrade elevations, notify the Engineer who will reserve the right to contact a specialized geotechnical consultant and make an inspection of conditions.
 - 1. If unsuitable bearing materials are encountered at the required subgrade elevations, carry excavations deeper and replace the excavated material as directed by the Engineer.
 - 2. Removal of unsuitable material and its replacement as directed beyond the authorized limits will be paid on the basis of contract conditions relative to changes in work.
- D. Stability of Excavations: Slope sides of excavations to comply with local codes and ordinances having jurisdiction or as shown on the Drawings. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.
 - 1. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.
- E. Shoring and Bracing: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers and cross-braces, in good serviceable condition.
 - 1. Establish requirements for trench shoring and bracing to comply with local codes and authorities having jurisdiction.
 - 2. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.
- F. Dewatering: Prevent surface water and subsurface or groundwater from flowing into excavations and from flooding project site and surrounding area. Maintain groundwater table level a minimum of one-foot below excavation level.
 - 1. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, wellpoints, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
 - 2. Convey water removed from excavations and rainwater to collecting or run-off areas. Establish and maintain temporary drainage ditches and other diversions outside excavation limits for each structure. Do not use trench excavations as temporary drainage ditches.
 - 3. While dewatering for new Construction in the vicinity of existing structures, depletion of the groundwater level underneath these existing structures may cause settlement. To avoid this settlement, the groundwater level under these structures shall be maintained by appropriate methods of construction as approved by the Engineer.

- G. Material Storage: Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade, and shape stockpiles for proper drainage.
 - 1. Locate and retain soil materials away from edge of excavations.
 - 2. Dispose of excess soil material and waste materials as herein specified.
- H. Excavation for Structures: Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 feet, and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction, and for inspection, or as shown on the Drawings.
 - 1. In excavating for footings and foundations, take care not to disturb bottom of excavation. Excavated 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.
 - 2. Do not excavate to the bearing levels designated on the drawings until surface compaction is completed.

3.03 BACKFILL AND FILL

- A. General: Place material in layers to required subgrade elevations, for each area classification listed below.
 - 1. Structural fill shall be used below spread footing foundations, slab-on grade floors, and other structures and as backfill within three feet of the below grade portion of structures.
 - 2. Crusher-run gravel shall be used under and around drainage sumps. It can be used at the request of the Contractor and if approved by the Engineer as base material for areas approved by the Engineer.
 - 3. Limerock base course shall be used under roadways, parking areas, and walks and for riprap. Limerock base course may be used by the Contractor at other similar locations if approved by the Engineer or indicated on the Drawings.
 - 4. Common fill shall be used at all other locations.
 - 5. Bedding rock shall be used for pipe bedding, under and around manhole base and at other locations indicated on the Drawings or approved by the Engineer.
- B. Backfill excavations as promptly as work permits, but not until completion of the following:
 - 1. Acceptance by Engineer of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
 - 2. Inspection, testing, approval, and recording locations of underground utilities.
 - 3. Removal of concrete formwork.
 - 4. Removal of shoring and bracing, and backfilling of voids with satisfactory materials.

5. Removal of trash and debris.
 6. Permanent or temporary horizontal bracing is in place on horizontally supported walls. Layout and location of bracing shall consider loads of the structure as well as the effects of the soil and groundwater.
- C. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow strip, or break-up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.
1. When existing ground surface has a density less than that specified under "Compaction" for the particular area classification, break up the ground surface, pulverize, moisture-condition to the optimum moisture content, and compact to required depth and percentage of maximum density.
- D. Fill Placement:
1. Material placed in fill areas under and around structures shall be deposited within the lines and to the grades shown on the Drawings or as directed by the Engineer, making due allowance for settlement of the material. Backfill shall be carried up evenly on all walls of an individual structure simultaneously with no more than a two-foot elevation variation allowed. Fill shall be placed only on properly prepared surfaces which have been inspected and approved by the Engineer.
 2. Fill material can be obtained from cut areas within the construction project site. If sufficient satisfactory soil material is not available from excavation on site, the Contractor shall provide fill material as may be required from off-site sources at no additional cost to the Owner.
 3. Fill shall be brought up in substantially level lifts throughout the site, starting in the deepest portion of the fill. The entire surface of the work shall be maintained free from ruts, and in such condition that construction equipment can readily travel over any section. Fill shall not be placed on surfaces that are muddy or against concrete structures until they have attained sufficient strength.
 4. Fill shall be dumped and spread in layers by a bulldozer or other approved method. During the process of dumping and spreading, all roots, debris, and stones greater in size than specified under Materials, shall be removed from the fill areas, and the Contractor shall assign a sufficient number of men to this work to insure satisfactory compliance with these requirements.
 5. If the compacted surface of any layer of material is determined to be too smooth to bond properly with the succeeding layer, it shall be loosened by harrowing or by another approved method before the succeeding layer is placed.
 6. All fill materials shall be placed and compacted "in-the-dry." The Contractor shall dewater excavated areas as required to perform

the work and in such manner as to preserve the undisturbed state of the natural inorganic soils.

3.04 COMPACTION

- A. General: Control soil compaction during construction providing minimum percentage of density specified on the drawings for each area classification. It shall be the Contractor's responsibility to notify the Engineer in writing that penetration tests can be performed. Written notice from the Contractor shall precede completion of compaction operations by at least 2- working days.
- B. Percentage of Maximum Density Requirements:
 - 1. Compact soil to not less than the following percentages of maximum dry density in accordance with AASHTO T-180.
 - a. Underneath structures and 5-feet 0-inches around perimeter of foundation: Compact top 12-inches of subgrade and each layer of backfill or fill material at 98-percent maximum dry density.
 - b. Building Slabs and Footings: Compact top 12-inches of subgrade and each layer of backfill or fill material at 98-percent maximum dry density.
 - c. Lawn or Unpaved Areas: Compact top 6-inches of subgrade 95-percent maximum dry density.
 - d. Walkways: Compact top 6-inches of subgrade 95-percent maximum dry density.
 - e. Pavements and Steps: Compact top 12-inches of subgrade at 98-percent maximum dry density.
 - 2. Moisture content of soil shall be within 2-percent of the optimum.
- C. Moisture Control: Where subgrade or layer of soil material that is too wet to permit compaction to specified density.
 - 1. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
 - 2. Soil material that has been removed because it is too wet to permit compaction, but is otherwise satisfactory may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to satisfactory value.
- D. Structural fill shall be placed in layers not more than 9-inches loose depth for material compacted by heavy compaction equipment. Each layer shall be compacted by a minimum of six coverages with the equipment described below, to at least 98 percent of maximum dry density as determined by AASHTO-T-180. Incidental compaction due to traffic by construction equipment will not be credited toward the required minimum coverages.

- E. Common fill consisting of other than structural fill shall be placed and compacted in a manner similar to that described above for structural fill, with the following exception: layer thickness prior to compaction may be increased the 12-inches in open area; and common fill except dike fill, required below water level in peat excavation areas may be placed as one lift, in-the-wet, to an elevation one foot above the water level at the time of filling.
- F. Compaction of the fill by such means shall be to the same degree of compaction as obtained by rubber-tired or vibratory roller equipment, and the Engineer may make the necessary tests to determine the amount compactive effort necessary to obtain equal compaction. Large compaction equipment shall not be used within-5 feet of structures. Compaction equipment is subject to approval by the Engineer.
- G. Place fill material in layers not more than 12-inches loose depth for material compacted by hand-operated tampers. Use manually operated sled-type vibratory compactors next to structures and confined areas not accessible to heavy mechanical compaction equipment.
- H. If the Engineer shall determine that added moisture is required, water shall be applied by sprinkler tanks or other sprinkler systems, which will insure uniform distribution of the water over the area to be treated, distribution of the water over the area to be treated, and give complete and accurate control of the amount of water to be used. If too much water is added, the area shall be permitted to dry before compaction is continued.
- I. The Contractor shall supply all hose, piping, valves, sprinklers, pumps, sprinkler tanks, hauling equipment, and all other materials and equipment necessary to place the water in the fill in the manner specified.

3.05 GRADING

- A. General: Uniformly grade-fill areas within limits of project including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such point and existing grades. No soft spots or uncompacted areas will be allowed in the work.
- B. Grading Outside Building Lines: Grade areas adjacent to Buildings as shown on the Drawings, to drain away from structures and to prevent ponding. Finish surfaces free from irregular surface changes, and as follows:
- C. Grading Surface of Fill Under Building Slabs: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide

final grades within a tolerance of 1/2-inch when tested with a 10-foot straightedge.

- D. Stones or rock fragments larger than 2-1/2-inches in their greatest dimension will not be permitted in the top 6-inches of the subgrade line of all dike, fills or embankments.
- E. All cut and fill slopes shall be uniformly dressed to the slope, cross section and alignment shown on the Drawings, or as directed by the Engineer to prevent ponding water on driveways, walkways or against structures.
- F. During grading, protect all buried valved extensions and covers, sprinklers and any other mechanical or structural object protruding from below grade.

3.06 FIELD QUALITY CONTROL

- A. Quality Control Testing During Construction: Allow testing service to inspect and approve subgrades and fill layers before further construction work is performed.
- B. If in the opinion of the Engineer, based on testing service reports and inspection, subgrade or fills, which have been placed, are below specified density, provide additional compaction and testing at no additional expense.

3.07 MAINTENANCE

- A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.
 - 1. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.
- B. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

3.08 DISPOSAL OF SURPLUS AND WASTE MATERIAL

- A. All surplus and unsuitable excavated material shall be disposed of by the Contractor in the following ways.
 - 1. Transport to an appropriate soil storage area and stockpile or spread as needed.
 - 2. Transport and legally dispose of. Any permit required for the hauling and disposing of this material shall be obtained prior to commencing hauling operations.

- B. Suitable excavated material may be used for fill if it meets that specifications for satisfactory material and is approved by the Engineer. Excavated material so approved may be neatly stockpiled at the site where designated by the Engineer provided there is an area available where it will not interfere with the operator of the facility nor inconvenience traffic or adjoining property owners.
- C. Excavated rock may be used in open fill areas only with the approval of the Engineer.

END OF SECTION

SECTION 02221

TRENCHING, BEDDING, AND BACKFILL FOR PIPE

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. The Contractor shall furnish all labor, equipment, and incidentals necessary to perform all excavation, backfill, fill, grading and slope protection required to complete the sewer piping and utility work shown on the Drawings and specified herein. The work shall include, but not necessarily be limited to: sewer structures, duct work, conduit, pipe, paving, backfilling, fill, grading, disposal of surplus and unsuitable materials, and all related work such as sheeting, and bracing.

1.02 RELATED WORK

- A. Section 02151: Shoring and Bracing of Excavations
- B. Section: 02720: Storm Drainage Systems
- C. Section 02722: Sanitary Sewers

1.03 QUALITY ASSURANCE

- A. Codes and Standards: Perform excavation work in compliance with applicable requirements of Owner.

1.04 JOB CONDITIONS

- A. The Contractor shall examine the site and undertake his own soil borings prior to submitting his bid, taking into consideration all conditions that may affect his work. The Owner and Engineer will not assume responsibility for variations of sub-soil quality or conditions.
- B. Existing Utilities: Locate existing underground utilities in the areas of work. If utilities are to remain in place, provide adequate means of protection during earthwork operations.
 - 1. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult the Engineer and the owner of such piping or utility immediately for directions.
 - 2. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
- C. Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights. Operate warning lights as recommended by authorities having jurisdiction. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement,

undermining, washout and other hazards created by earthwork operations.

1.05 SUBMITTALS

- A. For each material obtained from other than on-site sources, the Contractor shall notify the Engineer of the source of the material and shall furnish the Engineer, for approval, a representative sample weighing approximately 50-pounds, at least 10-calendar days prior to the date of anticipated use of such material.

1.06 TRENCH PROTECTION

- A. Contractor shall construct and maintain sheeting and bracing as required to support the sides of excavations, to prevent any movement which could in any way diminish the width of the excavation below that necessary for proper construction; and to protect adjacent structures, existing piping and/or foundation material from disturbance, undermining, or other damage. Care shall be taken to prevent voids outside of the sheeting, and if voids are formed, they shall be immediately filled and rammed.
- B. For pipe trench sheeting, no sheeting is to be withdrawn if driven below mid-diameter of any pipe, and no wood sheeting shall be cut off at a level lower than 1 foot above the top of any pipe unless otherwise directed by the Engineer. If during the progress of the work the Engineer decides that additional wood sheeting should be left in place, he may direct the Contractor in writing. If steel sheeting is used for trench sheeting, removal shall be as specified above unless written approval is given by the Engineer for an alternate method of removal.
- C. All sheeting and bracing not specified to be left in place shall be carefully removed in such a manner as not to endanger the construction or other structures, utilities, existing piping, or property. All voids left or caused by withdrawal of sheeting shall be immediately refilled with sand by ramming with tools especially adapted to that purpose, by watering, or otherwise as may be directed.
- D. The right of the Engineer to order sheeting and bracing to be left in place shall not be construed as creating any obligation on his part to issue such orders, and his failure to exercise his right to do so shall not relieve the Contractor from liability for damages to persons or property, occurring from or upon the work, occasioned by negligence or otherwise, growing out of a failure on the part of the Contractor to leave in place sufficient sheeting and bracing to prevent any caving or moving of the ground.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. General:
 - 1. Materials for use as base, fill and backfill shall be as described below:
 - a. Satisfactory soil materials are defined as those complying with

American Association of State Highway and Transportation Officials (AASHTO) M-145, soil classification Groups A-1, A-2-4, A-2-5, and A-3.

- b. Unsatisfactory soil materials are those defined in ASSHTO M-145 soil classification Groups A-2-6, A-2-7, A-6, and A-7 along with peat and other highly organic soils.
- B. Structural Fill: Structural fill material shall be satisfactory soil material consisting of a minimum of 60-percent clean medium to fine grain sized quartz sand, free of organic, deleterious and/or compressible material. Rock in excess of 2-1/2- inches in diameter shall not be used in the fill material. Structural fill shall not contain hardpan, stones, rocks, cobbles or other similar materials.
- C. Common Fill:
 - 1. Common fill material shall be satisfactory soil material containing no more than 20-percent by weight finer than No. 200-mesh sieve. The material shall be free from organic matter, much, marl, and rock exceeding 2-1/2- inches in diameter. Common fill shall not contain broken concrete, masonry, rubble or other similar materials.
 - 2. Material falling within the above specification, encountered during the excavation, may be stored in segregated stockpile(s) for reuse. All material which, in the opinion of the Engineer, is not suitable for reuse shall be spoiled as specified herein for disposal of unsuitable materials.
- D. Rock bedding shall be 3/8-inch to 3/4-inch washed and graded limerock. This rock shall be graded so that 99 percent will pass a 3/4-inch screen and 80 percent will be retained on a No. 8 screen.

PART 3 - EXECUTION

3.01 GENERAL

- A. All excavation, backfill and grading necessary to complete the Work shall be made by the Contractor and the cost thereof shall be included in the contract price.
- B. Material may be obtained on-site with the approval of the Owner, or shall be furnished as required from off site sources and hauled to the site.
- C. The Contractor shall take all the necessary precautions to maintain the work area in a safe and workable condition.
- D. The Contractor shall protect his work at all times by flagging, marking, lighting and barricading. It shall also be the Contractor's responsibility to preserve and protect all above and underground structures, pipe lines, conduits, cables, drains or utilities which are existing at the time he encounters them. Failure of the Drawings to show the existence of these obstructions shall not relieve the Contractor from this responsibility. The cost of repair of any damage which occurs to these obstructions during or as a result of construction shall be borne by the Contractor without additional cost to the Owner.

3.02 TRENCH EXCAVATION

- A. Excavation for all trenches required for the installation of pipes and electrical ducts shall be made to the depths indicated on the Drawings. Excavate trench to provide a minimum of 36-inch clear cover over the pipe bell unless otherwise noted on the Drawings, and to sufficient depth to provide the bedding depth indicated on the Drawings. Excavate in such manner and to such widths as will give suitable room for laying the pipe. The trench width at the top of the pipe shall not exceed the allowable as determined by the depth of cut and these specifications.
- B. Rock shall be removed to provide a minimum clearance of 8-inches around the bottom and sides of all the pipe or ducts being laid.
- C. Where pipe or ducts are to specified be laid in limerock bedding or encased in concrete, the trench may be excavated by machinery to or just below the designated subgrade, provided that the material remaining in the bottom of the trench is no more than slightly disturbed.
- D. Where the pipes or ducts are specified to be laid directly on the trench bottom, the lower parts of the trenches shall not be excavated to the trench bottom by machinery. The last of the material being excavated shall be done manually in such a manner that will give a flat bottom true to grade so that pipe or duct can be evenly and uniformly supported along its entire length on undisturbed material or bedding rock. Bell holes shall be made as required manually so that there is no bearing surface on the bells and pipes are supported along the barrel only.

3.03 DEWATERING

- A. Prevent surface water and subsurface or groundwater from flowing into excavations, and from flooding project site and surrounding area.
 - 1. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting structure bases, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
 - 2. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey stormwater runoff and water removed from excavations into collection areas or to direct stormwater runoff in the historical flow direction. Do not use trench excavations as temporary drainage ditches. Maintain proper erosion and sedimentation control measures to avoid siltation of existing stormwater management systems.

3.04 PIPE INTERFERENCE AND ENCASEMENT

- A. The Contractor shall abide by the following schedule of criteria concerning interference with other facilities.

1. In no case shall there be less than 18-inches of vertical separation between any two pipe lines, or 4-inches of separation between pipe lines and structures.
 2. Where the above conditions cannot be met, or unless otherwise specified on the Drawings, the Contractor shall consult with the Engineer.
- B. The Engineer shall have full authority to direct the placement of the various pipes and structures in order to facilitate construction, expedite completion and to avoid conflicts.

3.05 BACKFILLING

- A. Backfilling over pipes shall begin as soon as practicable after the pipe has been laid, jointed, and inspected, and the trench filled with suitable compacted material to the mid-diameter of the pipe.
- B. All backfilling shall be performed expeditiously and as detailed on the Drawings.
- C. Any space remaining between the pipe and sides of the trench shall be packed full by hand shovel with selected earth, free from stones having a diameter greater than 2-inches and thoroughly compacted with a tamper as fast as fill is placed, up to a level of one foot above the top of the pipe. Compact to 100-percent of maximum dry density as determined by AASHTO T-99 in layers not to exceed 6-inches in depth up to the centerline of the pipe from the trench bottom and in layers not to exceed 6-inches from the pipe centerline to 12-inches above the pipe.
- D. The backfill shall be carried up evenly on both sides with at least one person tamping for each person shoveling material into the trench.
- E. The remainder of the trench above the compacted backfill, as just described above, shall be filled and thoroughly compacted with common fill by rolling, ramming, or puddling, as the Engineer may direct. Where pavement is to be constructed over the pipe, compact common fill in 6-inch layers to 98-percent of maximum dry density as determined by AASHTO T-180. Where no pavement is to be constructed over the pipe, compact common fill in 6-inch layers to 95-percent of maximum dry density as determined by AASHTO T-180.
- F. The bedding rock shall consist of at least 6-inches of washed and graded limerock placed in the trench to the proposed elevation of the centerline of the pipe prior to laying the piping. The bedding shall not be used under any circumstances as a drain for groundwater. The Contractor shall take all precautions necessary to maintain the bedding in a compacted state and to prevent washing, erosion or loosening of this bed.
- G. In location where pipes pass through building walls, the Contractor shall take the following precautions to consolidate the backfill up to an elevation of at least 1-foot above the bottom of the pipes:
1. Place structural fill in such areas for a distance of not less than 3-feet on either side of the center line of the pipe in level layers not exceeding 6-

- inches in depth.
2. Wet each layer to the extent directed and thoroughly compact each layer with a power tamper to the satisfaction of the Engineer.

3.06 GRADING

- A. Grading shall be performed at such places as are indicated on the Drawings, to the lines, grades, and elevations shown or as directed by the Engineer and shall be made in such a manner that the requirements for formation of embankments can be followed. All unacceptable material encountered, of whatever nature within the limits indicated, shall be removed and disposed of as directed. During the process of excavation, the grade shall be maintained in such condition that it will be well drained at all times. When directed, temporary drains and drainage ditches shall be installed to intercept or divert surface water, which may affect the performance or condition of the work.
- B. If at the time of excavation it is not possible to place all available material in its proper section of the permanent structure, the excess material shall be stockpiled in approved areas for later use. Stockpiling or double handling of excavation material shall not bear any additional cost to the Owner.
- C. The Owner, through his Engineer, reserves the right to make adjustments or revisions in lines or grades, if found necessary as the Work progresses, due to discrepancies on the Drawings, adverse field conditions, or in order to obtain satisfactory construction.
- D. Stones or rock fragments larger than 2-1/2-inches in their greatest dimensions will not be permitted in the top 6-inches below the subgrade line of all dikes, fills or embankments.
- E. All fill slopes shall be uniformly dressed to the slope, cross-section and alignment shown on the Drawings, or as directed by the Engineer.
- F. In cuts, all loose or protruding rocks on the side slopes shall be barred loose or otherwise removed to line or finished grade of slope. All cut slopes shall be uniformly graded to the slope, cross-section and alignment shown on the Drawings or as directed by the Engineers.
- G. No grading is to be done in areas where existing pipe lines that may be uncovered or damaged until such lines which must be maintained are projected or relocated; or, where lines are to be abandoned, all required valves are closed and drains plugged at manholes.
- H. The Contractor shall replace all pavement cut or otherwise damaged during the progress of the Work as specified elsewhere herein.

3.07 DISPOSAL OF UNSUITABLE AND SURPLUS MATERIAL

- A. All surplus and unsuitable excavated material shall be disposed of in one of the following ways as directed by the Engineer.
 - 1. Transport to designated soil storage area on Owner's property and stockpile or spread as directed by the Engineer.
 - 2. Transport from Owner's property and legally dispose of off-site. Any permit required for the hauling and disposing of this material beyond Owner's property shall be obtained prior to commencing hauling operations.
- B. Suitable excavated material may be used for fill if it meets the specifications for common fill and is approved by the Engineer. Excavated material so approved may be neatly stockpiled at the site where designated by the Owner/Engineer provided there is an area available where it will not interfere with the operation of the facility nor inconvenience traffic or adjoining property owners.

END OF SECTION

SECTION 02240

Dewatering

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All applicable provisions of the Bidding and Contract Requirements, and Division 1 - General Requirements shall govern the work under this Section.
- B. Florida Department of Transportation Standard Specifications for Road and Bridge Construction, (Current Edition).
- C. Florida Department of Transportation Design Standards, (Current Edition).

1.02 WORK INCLUDED

- A. Provide all labor, materials, necessary equipment and services to design, permit, install and maintain, a complete and adequate dewatering system, to dewater excavations as indicated on the drawings, as specified herein or both, except as for items specifically indicated as "NIC ITEMS". The CONTRACTOR will be responsible for all means and methods of dewatering in accordance with the dewatering (water use) permits obtained by OWNER from South Florida Water Management District and all other Governmental Agency's having dewatering (water use) jurisdiction and for compliance with all conditions set forth by Governmental Agency permits and licenses. If CONTRACTOR wishes to perform dewatering operations that are not in accordance with the approved permit, CONTRACTOR shall modify said permit at no cost to OWNER.

1.03 RELATED WORK

- A. Section 02221 – Trenching, Bedding and Backfilling for Pipe.
- B. Section 02720 – Storm Drainage Systems.
- C. Section 15062 – Ductile Iron Pipe and Fittings.

PART 2 - PRODUCTS

2.01 EQUIPMENT

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

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

- A. The CONTRACTOR shall provide continuous dewatering until completion of construction and backfill. The CONTRACTOR shall provide all equipment necessary for normal dewatering, including, but not limited to, surface pumps, sump pumps, wellpoints and header pipe and trenching/digging machinery. Normal dewatering methods include, but are not limited to, constructing shallow surface drainage trenches/ditches, using sand blankets, perforated pipe drains, sumps and siphons, wells and wellpoints. Contractor shall have on hand, at all times, sufficient pumping equipment and machinery in good working condition and shall have available, at all times, competent workmen for the operation of the pumping equipment. Adequate standby equipment shall be kept available at all times to insure efficient dewatering and maintenance of dewatering operation during power failure.
- B. The CONTRACTOR shall construct structures, trenches and embankments in the Dry, and maintain the water level 1 foot or more below the bottom of excavation, whenever normal dewatering equipment and methods can accomplish the needed dewatering. Dewatering for structures and pipelines shall commence when groundwater is first encountered, and shall be continuous until such times as water can be allowed to rise in accordance with the provisions of this Section or other requirements.
- C. At all times, site grading shall promote drainage. Surface runoff shall be diverted from excavations. Water entering the excavation from surface runoff shall be collected in shallow ditches around the perimeter of the excavation, drained to sumps, and be pumped or drained by gravity from the excavation to maintain a bottom free from

standing water.

- D. Dewatering shall at all times be conducted in such a manner as to preserve the undisturbed bearing capacity of the subgrade soils at proposed bottom of excavation.
- E. If foundation soils are disturbed or loosened by the upward seepage of water or an uncontrolled flow of water, the affected areas shall be excavated and replaced with pea rock at no additional cost to the CITY.
- F. Where wet conditions are such that dewatering by normal pumping methods would not be effective, the procedure outlined below may be used when specifically authorized by the Engineer in writing. The City will permit the use of granular material below the elevation at which mechanical tampers would be effective, but only material classified as A-3. Place and compact the material using timbers or hand tampers until the backfill reaches an elevation such that the backfill moisture content will permit the use of mechanical tampers. When the backfill has reached such elevation, use normally acceptable backfill material. Compact the material using mechanical tampers in such manner and to such extent as to transfer the compacting force into the material previously tamped by hand. The City will permit the use of coarse aggregate below the elevation at which mechanical tampers would be effective. Use ASTM D 2321 Class II material (well graded) coarse aggregate such as #57 or #67 rock as specified in FDOT Section 901. Place the coarse aggregate such that it will be stable and firm.
- G. Flotation shall be prevented by the CONTRACTOR by maintaining a positive and continuous removal of water. The CONTRACTOR shall be fully responsible and liable for all damages which may result from failure to adequately keep excavations dewatered.
- H. If well points or wells are used, they shall be adequately spaced to provide the necessary dewatering and shall be sand-packed and/or other means used to prevent pumping of fine sands or silts from the subsurface. A continual check by the CONTRACTOR shall be maintained to ensure that the subsurface soil is not being removed by the dewatering operation.

- I. The CONTRACTOR shall dispose of water from the WORK in a suitable manner without damage to adjacent property. CONTRACTOR shall be responsible for obtaining any permits that may be necessary to dispose of water. Contractor may utilize existing City drainage structures and drainage structures constructed under this contract, for disposal of water. Water shall be filtered using a silt box or another approved method to remove sand and fine-sized soil particles before disposal into any drainage system. Dewatering disposal points shall be approved by the ENGINEER prior to being used. All drainage structures, lines and junction boxes, used by the CONTRACTOR for disposal of water shall be cleaned by a jet vac or other method and approved by the ENGINEER after dewatering is complete.
- J. The release of groundwater to its static level shall be performed in such a manner as to maintain the undisturbed state of the natural foundation soils, prevent disturbance of compacted backfill and prevent flotation or movement of structures, pipelines, and sewers.
- K. The CONTRACTOR shall retain a State of Florida Licensed Professional Engineer or Registered Professional Geologist to prepare a dewatering plan and submit dewatering permit application to the South Florida Water Management District. Permitting required by this paragraph "K" shall be considered "normal permitting".
- L. Normal dewatering of trenches and other excavations shall be considered as incidental to the construction of the WORK and all costs thereof shall be included in the various contract prices in the Bid Forms, unless a separate bid item has been established for dewatering.

3.02 QUALITY CONTROL

- A. It shall be the sole responsibility of the CONTRACTOR to control the rate and effect of the dewatering in such a manner as to avoid all objectionable settlement and subsidence.
- B. All dewatering operations shall be adequate to assure the integrity of the finished project and shall be the responsibility of the CONTRACTOR.
- C. Where critical structures or facilities exist immediately adjacent to areas of proposed

dewatering, reference points shall be established and observed at frequent intervals to detect any settlement which may develop. The responsibility for conducting the dewatering operation in a manner which will protect adjacent structures and facilities rests solely with the CONTRACTOR. The cost of repairing any damage to adjacent structures and restoration of facilities shall be the responsibility of the CONTRACTOR.

3.03 CONTRACTOR SUBMITTALS

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

3.04 MEASUREMENT AND PAYMENT

- A. There shall be no separate measurement and payment for the work under this section for "normal dewatering" or "normal permitting". No separate Bid Item has been established for such "normal dewatering". Construction and operation and permitting work for "normal dewatering" and "normal permitting" shall be included in the appropriate unit prices bid, and will be full compensation for all work related to the permitting and for successful construction and operation of "normal dewatering".

END OF SECTION

SECTION 02260
FINISH GRADING

PART 1 - GENERAL

1.01 WORK INCLUDED

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

1.02 RELATED WORK

- A. Section 02100 - Site Preparation.
- B. Section 02220 - Structural Excavation, Backfill and Compaction.
- C. Section 02481 - Tree Relocation and Protection.
- D. Section 02931 - Sodding.

1.03 PROTECTION

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

PART 2 - PRODUCTS

2.01 MATERIALS

Topsoil shall be friable loam free from subsoil, roots, grass, excessive amount of weeds, stones and foreign matter; acidity range (ph) of 5.5 to 7.5; containing a minimum of 4 percent and a maximum of 25 percent organic matter. (Use topsoil stockpiled on site if conforming to these requirements, or as directed by the Engineer.)

PART 3 - EXECUTION

3.01 SUB-SOIL PREPARATION

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

3.02 PLACING TOPSOIL

- A. Place topsoil in area where seeding, sodding and planting is to be performed. Place to the following minimum depths, up to finished grade elevations:
 - 1. 6-inches for seeded areas.
 - 2. 4 1/2-inches for sodded areas.
 - 3. 24-inches for shrub beds.
 - 4. 18-inches for flower beds.
- B. Use topsoil in relatively dry state. Place during dry weather.
- C. Fine grade topsoil eliminating rough and low areas to ensure positive drainage. Maintain levels, profiles and contours of sub-grades.
- D. Remove stones, roots, grass, weeds, debris and other foreign material while spreading.
- E. Manually spread topsoil around trees, plants, buildings and other structures to prevent damage which may be caused by grading equipment.
- F. Lightly compact placed topsoil.

3.03 SURPLUS MATERIAL

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

END OF SECTION

SECTION 02481

TREE RELOCATION AND PROTECTION

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

- A. All applicable provisions of the Bidding and Contract requirements shall govern the work under this Section.

1.02 WORK TO BE PERFORMED AND WORK INCLUDED

- A. The Contractor shall provide the following:
 - 1. Prepare and relocate trees designated for relocation within the project boundaries, to include all aspects of preparation, relocation, protection, and maintenance.
 - 2. Protection and care of existing trees to remain within the project boundaries, to include all aspects of protection, pruning, fertilization, and watering.
 - 3. Install and operate temporary irrigation system and hand water as required by these specifications.
 - 4. Follow-up maintenance as required by these specifications.
 - 5. Labor, materials, equipment and services to complete all preparation, relocations and protection work as indicated on the drawings, as specified herein, or both.

1.03 RELATED WORK

- A. 02260 Finish Grading.
- B. 02931 Sodding.

1.04 SUBMITTALS

- A. The Contractor shall submit the following:
 - 1. Verification of qualifications. The Contractor shall provide a list of references and project list of a minimum of three (3) projects that the Contractor has successfully completed that are similar in scope of nature.
 - 2. List of all equipment to be utilized during tree preparation and

transplanting.

3. Proposed sequence of events from start to finish, in writing. This shall include a schedule by day as to how many units can be dug and relocated to specified areas.
4. Literature and proposed application rates for specified wetting agents, fertilizers and soil conditioners.
5. Verification of all required licenses and memberships.

1.05 APPLICABLE STANDARDS AND SPECIFICATIONS

- A. The Contractor shall 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 International Society of Arboriculturists.

1.06 LICENSING AND INSURANCE

- A. The Contractor shall be certified with the State of Florida Landscape Maintenance Association.

1.07 PERMITS

- A. The Contractor shall secure any permits required in order for completion of this work.

1.08 DESCRIPTION

- A. Trees to relocate on site are designated on the drawings or as directed by the City and or its representative.
- B. Existing trees to be relocated shall be crown pruned, root pruned, and treated with soil amendments prior to relocation.
- C. Existing trees to be relocated shall be protected with barricades during construction. Trees, which are scarred or destroyed, shall be replaced with the same species, size, and quality at no cost to the City.
- D. All trees subject to encroachment into the rootzone, due to proposed construction, shall be root pruned 18-inches from the pavement edge or trench as indicated on the drawings and herein these specifications.

- E. Tree pits resulting from relocated material shall be backfilled with clean, stable fill, and prepared to receive the appropriate surface, as indicated on drawings.
- F. The Contractor shall call for and attend an inspection of existing conditions by the City prior to commencing work, including but not limited to identification of trees, and potential obstructions to the relocation work. The Contractor shall prepare a report of existing conditions as a matter of record, which shall also include photographs. The Contractor shall accept the existing conditions as a reference point for condition of trees, and condition of the site. Existing conditions shall then become the responsibility of the Contractor to be kept intact.

1.09 GUARANTEES

- A. The Contractor shall guarantee his work according to the following requirements:
 - 1. Any tree or palm that dies or is deemed in unacceptable condition for one year following the project completion date 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 Landscape Architect, the City Landscape Inspector, or City Horticulturist that tree mortality or decline is a product of negligence by the Contractor.
 - 4. The Contractor shall maintain automatic temporary irrigation in operating order for all relocated trees and palms and all trees and palms to remain within the project area until permanent irrigation system is operable.

PART 2 - PRODUCTS

2.01 EQUIPMENT

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

2.02 TOPSOIL

- A. Use free draining topsoil, suitable for plant growth and free from hard clods, stiff clay, hardpan, gravel, subsoil, brush, roots, refuse or other deleterious material,

and of uniform quality.

- B. Mechanical analysis for well graded topsoil:

<u>Sieve Size</u>	<u>Percentage Passing By Dry Weight</u>
2 inch	100
1/4 inch	90-92
No. 10	50-55
No. 40	20-25
No. 100	4-6
No. 200	0-1

Dispose of materials larger than one-half inch off the site.

- C. Maximum Soluble Salts: 550 ppm.
- D. Acidity: pH 6.5 to pH 7.5
- E. Relative Density: 25%-50%, loose
- F. Relative Permeability: 20 in/hr minimum
- G. Plastic Index: 3-10

2.03 SOIL CONDITIONERS

- A. Aluminum Sulfate: Manufacturer's standard commercial grade.
- B. Peat: Federal Specifications Q-P-166 Type 1, Class B, Sphagnum moss.
- C. Pesticides: As recommended by applicable Agricultural Public Agencies.
- D. Herbicides and Sterilizers:
1. "Ronstar" pre-emergent herbicide or equal
 2. "Roundup" systemic herbicide or equal
- E. Soil Amendments:
1. Fertilizer
 - a. All fertilizers shall be manufactured from quality materials, be free from impurities, uniform in composition meet recognized standards for effectiveness and be free flowing and suitable for application with approved equipment.
 - b. All fertilizer shall be delivered to the site in bags or other

convenient containers, each fully labeled, conforming to the applicable state fertilizer laws, bearing the grade and the trade name of the producer.

- c. Die Hard Root Reviver – Endo and Ectomycorrhizal inoculant, as manufactured by Die hard, 1.800.628.6373 or City approved equal.
 - d. Die Hard Transplant – One Step – Endo and Ectomycorrhizal inoculant, as manufactured by Die hard, 1.800.628.6373 or City approved equal.
 - e. Time release, Palm Mix fertilizer with minor elements or City approved equal.
 - f. Time release, Tree and Shrub Mix fertilizer, 6-6-6, with minor elements or City approved Equal.
 - g. Granular Triple Super Phosphate as manufactured by IMC. Agrico. 708.970.3000 or City approved equal.
 - h. Agriform Planting Tablets, 8-8-8 plus minors, as manufactured by Grace Sierra, 408.263.8080 or City approved equal.
 - i. Scott's Turf Starter (16-25-12) or City approved equal.
 - j. Wetting agent to be Terra Sorb or City approved equal.
 - k. Soil conditioner to be "Super Lesco Wet", as manufactured by Lesco, Inc. or City Approved Equal.
- 2. Water: From City irrigation wells or municipal source.
 - 3. Sand: Clean, sharp builders sand free draining and free of substances harmful to growth of plants.
 - 1. Peat: Florida and Canadian Peat from City approved sources.
 - 2. Compost: from City approved source.

2.04 PLANTING SOIL MIXES

- A. Planting Soil Mixture A to be placed in St. Augustine 'Palmetto' sod areas, shrub and ground cover beds and in broadleaf tree pits, both new and transplanted.

20% Topsoil, 10% Peat or Compost, 70% Sand
- B. Planting Soil Mixture B to be placed as backfill around the root balls of palms shall be 90% coarse sand and 10% topsoil.

- C. Test pH of topsoil and planting soil mixtures. If pH is not between specified limits add approved soil conditioner/additive to bring pH within that range.

2.05 WATER

- A. It shall be the responsibility of the Contractor to provide the necessary clean and potable water to the site.

2.06 MULCH

- A. Grade "B" Melaleuca mulch, shredded, loose, and substantially free of mineral waste materials, viable weed seeds and nematodes, showing an acid reaction, and free of arsenic.
- B. Minimum organic matter by weight on an oven dry basis: 85%.
- C. Processed specifically for use as top mulch around plant beds.

2.07 BRACING AND STAKES

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

2.08 BARRICADES

- A. Barricades shall be constructed of 4-foot chain link fence or other barricades as approved by the City.

PART 3 - EXECUTION

3.01 PREPARATION FOR RELOCATION OF TREES WITHIN THE PROJECT BOUNDARIES

- A. Crown Pruning
 - 1. All trees and palms shall be crown pruned prior to relocation. The City shall be notified 48 hours in advance of all pruning activities to allow for observation.
 - 2. All trees to be trimmed by thinning the crown only, and not by reducing the crown dimensions. Trimming shall conform to NAA and ISA standards, including the removal of dead wood.
 - 3. The Contractor shall repair any existing injuries to trees including cavities and machinery marks.
- B. FERTILIZATION AND WATERING

1. Preparation

- a. The Contractor shall clear the root ball area of all foreign material, trash, debris etc., to expose undisturbed soil.

2. Application / Schedule

- a. All trees to be relocated shall be treated with the specified root stimulant at the time of root pruning. The specified root stimulant shall be applied at the concentration and application rates recommended by the manufacturer and approved by the City and or its representative.
- b. All trees to be relocated shall be deep injection fertilized at the time of transplant. Specified fertilizer shall be used and applied at the concentration and application rates recommended by the manufacturer and approved by the City and or its representative.
- c. All trees to be relocated shall be treated with the specified wetting agents, fertilizers, and soil conditioners at the time of relocation. Soil amendments shall be mixed to produce a single fluid with each component included at the manufacturer's recommendation and approved by the City and or its representative. Injection shall be into the root zone within the limits of the proposed root ball at the rate of 50 gallons fluid per 1,000 square feet of tree canopy, using only approved injection equipment.
- d. All trees to be relocated shall be treated with the specified endo and ectomycorrhizal transplant inoculant at the time of transplant. The specified transplant inoculant shall be applied at the concentration and application rates recommended by the manufacturer and approved by the City and or its representative.
- e. The Contractor shall form and maintain an earth berm 6-inches high outside the proposed root ball prior to watering and apply 3-inches of approved mulch within saucer. Water application shall saturate the root ball to its entire depth.

C. ROOT PRUNING

1. Watering

- a. All trees to be relocated are to be provided with an automatic irrigation system, which provides 2 bubbler heads fed by PVC pipe to each tree and palm, prior to root pruning.
- b. The Contractor shall verify a source of municipal or well water and provide for a temporary meter to operate the irrigation system.

- c. The Contractor shall provide an irrigation timer, or battery powered valve to water trees and palms, which are to be relocated. Hand watering in lieu of an automatic system shall not be allowed, however hand watering shall be performed to avoid lapses should the automatic system be inoperable for more than 24 hours.

2. Barricades

- a. The Contractor shall barricade all existing trees and palms with four-foot (4') chain link fence or other barricade approved by City and or its representative.
- b. Barricades shall be installed at an offset distance of 2' (two feet) outside the tree drip line/edge of tree canopy, prior to the commencement of any construction activity.

3. Root Pruning Technique

- a. All trees shall be excavated by digging a trench a minimum of 48-inches deep by 6-inches wide, either by hand or with a trenching machine designed for this purpose. The Contractor shall hand cut broadleaf tree roots after trenching to produce clean cuts with no splints or tears.
- b. Trees to be root pruned shall have a minimum root ball size of 10-inches per 1-inch of caliper measured at DBH for broad leaf trees, and 36-inches for coconut palms. Root balls are to be formed square with all trenches being equal distance from the trunk.

4. Timing

- a. All broadleaf trees that are to be relocated shall be maintained for a minimum of twelve (12) weeks after root pruning and prior to relocation.

3.02 RELOCATION OF TREES

A. Preparation

- 1. Trees shall be thoroughly soaked to the full depth of the root ball daily for seven (7) consecutive days prior to relocation.

2. The Contractor shall accurately locate position and elevation where all trees are intended to be planted, for verification by Architect. The Contractor shall verify that no overhead or underground utilities, existing or proposed, conflict with the proposed locations.
3. The Contractor shall ascertain that all proposed paths for machinery are clear of utilities and other obstructions.
4. Trees to be relocated, as identified in the drawings shall be properly protected during transport to the designated locations. If relocation can not be made due to overhead wires, the Contractor may prune up to 30% of the canopy, if necessary, to facilitate transport of Oaks with the approval of the City and the Landscape Architect.

B. Excavation of Tree Pits

1. The Contractor shall notify and coordinate with the City and or its representative prior to the excavation of the tree pits.
2. The Contractor shall dig all tree pits as shown in the drawings with vertical sides and flat bottom. Portions of the existing soil may be utilized as backfill in accordance with Soil Preparation specification.
3. The Contractor shall be responsible for repairing any damage to existing utilities.

C. Digging and Handling – Broadleaf Trees

1. The Contractor shall notify the City and or its representative in writing 48 hours in advance of each relocation to allow for observation of procedures.
2. The Contractor shall determine the line of previous root pruning and excavate around root mass to leave area 12-inches out from the 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 48-inches deep.
3. Trees shall 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 reserves the right to require doweling in lieu of lifting straps.

4. Root balls shall 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 the entire root ball intact.
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 City's judgement, cause the tree to be rejected, shall be cleanly cut.
6. The Contractor shall 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 stable fill prior to setting tree. This layer of soil is 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 final setting to achieve best positioning relative to adjacent trees and viewing angles.

D. 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 backfilled to insure removal of all air pockets.
3. Construct a saucer to retain water as shown in the drawings.

E. 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.
4. Stake installation:
 - a. Drive stakes perpendicularly, 3-feet. into ground at edge of root ball. Do not drive stake through root ball or soil separator or drainage gravel, if present.
 - b. Number of stakes should be as shown in the drawings.
5. Tying and cross-bracing:
 - a. For trees over 4-inches in caliper:
 - (1) Stake and tie firmly with nylon strapping as shown in the drawings.
 - b. For trees less than 4-inches in caliper:
 - (1) Tie nylon strapping to vertical stakes.

F. Irrigation

1. Install bubbler heads on all trees and palms and mist head risers in oaks. Connect each tree's system immediately to water source. Irrigation timer is to be operable prior to the time of transplanting; alternatively, battery powered valves may be utilized. The temporary irrigation system shall be maintained for a minimum of 90 days and shall be maintained in addition to the permanent irrigation, should the permanent system be operable during this time. Alternatively, transplanted trees shall be hand-watered daily for a minimum of 90 days.
2. Lateral lines to be buried 18-inches and marked for identification.
3. Set time to run daily, to provide an equivalent of 6-inches of rain per week for 30 days, then reduce to equivalent of 3-inches per week.

G. Barricading

1. Barricade all existing trees with four-foot (4') chain link fence or other barricade approved by City.
2. Barricades shall be installed at an offset distance of 2-feet outside the tree drip line/edge of tree canopy, prior to any construction activity.

3.03 PROTECTION AND CARE OF EXISTING TREES AND PALMS TO REMAIN

A. Crown Pruning

1. All trees and palms to remain in place within the project limit shall be pruned within 60 days of Notice to Proceed.
2. All trees and palms to be relocated shall be pruned on a schedule that maximizes acclimatization time prior to relocation. Pruning schedule shall be reviewed and approved by the Architect / Engineer.

B. Watering

1. Existing irrigation system shall remain operable throughout the project.
2. All onsite trees to remain shall be supplied with temporary irrigation, which shall remain operable until permanent irrigation is operable. Existing irrigation system to be demolished may be utilized as the temporary irrigation system.

C. Barricading

1. Barricade all existing trees with four-foot (4') chain link fence or other barricade approved by City and or its representative.
2. Barricades shall be installed at an offset distance of 2-feet outside the tree drip line/edge of tree canopy, prior to any construction activity.

END OF SECTION

SECTION 02510
CONCRETE SIDEWALK

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. The work specified in this Section consists of the construction of concrete sidewalk in accordance with these Specifications and in conformity with the lines, grades, dimensions and notes shown on the plans.

1.03 RELATED WORK

- A. Section 02100 – Site Preparation
- B. Section 03300 – Cast-in-Place Concrete

PART 2 - PRODUCTS

2.01 CONCRETE

- A. Concrete shall be Class I Concrete, with a minimum compressive strength of 3,000 psi in accordance with Section 345, Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

2.02 FORMS

- A. Forms for this work shall be made of either wood or metal and shall have a depth equal to the plan dimensions for the depth of concrete being deposited against them. They shall be straight, free from warp or bends, and of sufficient strength when staked, to resist the lateral pressure of the concrete without displacement from lines and grade. Forms shall be cleaned each time they are used and shall be oiled prior to placing the concrete.

2.03 SUBGRADE AND GRADING

- A. Excavation shall be made to the required depth, and the foundation material upon which the sidewalk is to be set shall be compacted to a firm, even surface, true to grade and cross-section, and shall be moist at the time that the concrete is placed.

2.04 JOINTS

- A. Expansion joints between the sidewalk and the curb, point of curvature, point of tangency and at all other locations indicated on the plans, shall be 1/2-inch wide, formed with a preformed joint filler and the joint shall be edged with a tool having a 1/4-inch radius. Preformed joint filler shall meet the requirements of AASHTO M153 or AASHTO M213.
- B. Contraction joints shall be 1/8-inch wide x 3/4-inch deep and may be of the open type or may be sawed. Open type contraction joints shall be formed by staking a metal bulkhead in place and depositing the concrete on both sides. After the concrete has set sufficiently to preserve the width and shape of the joint, the bulkhead shall be removed. After the sidewalk has been finished over the joint, the slot shall be edged with a tool having a 1/8-inch radius.

If the CONTRACTOR elects to saw the contraction joints, shall be cut with a concrete saw after the concrete has set.

Contraction joints shall be constructed at not more than five (5) foot intervals, and shall be in place within twelve (12) hours after finishing.

PART 3 - EXECUTION

3.01 PLACING

- A. The concrete shall be placed in the forms to the required depth and shall be vibrated and spaded until mortar entirely covers its surface.

3.02 FINISHING

- A. Screeding: The concrete shall be struck-off by means of a wood or metal screed, used perpendicular to the forms, and floated in order to obtain the required grade and remove surplus water and laitance.
- B. Surface requirements: The concrete shall be given a broom finish. The surface variations shall not be more than 1/4 inch under a ten-foot straightedge, nor more than 1/8 inch on a five-foot transverse section. The exposed edge of the slab shall be carefully finished with an edging tool having a radius of 1-1/2 inch.

3.03 CURING

- A. The concrete shall be continuously cured for a period of at least 72 hours. Curing shall be commenced after finishing has been completed and as soon as the concrete has hardened sufficiently, to permit application of the curing material without marring the surface.
- B. Wet burlap, white-pigmented curing compound, waterproof paper or polyethylene sheets may be used for the curing.

END OF SECTION

SECTION 02513
ASPHALTIC CONCRETE PAVING

PART - 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required and place asphaltic concrete pavement in accordance with the grades and typical sections shown on the Drawings and as specified herein.

1.02 RELATED WORK

- A. Section 02221: Trenching, Bedding & Backfill for Pipe
- B. Section 02580: Pavement Marking & Signing

1.03 SUBMITTALS

- A. Submit shop drawings as specified in Section 01340.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. The limerock base shall consist of crushed limerock as specified by the Florida Department of Transportation with minimum LBR of 100 or a crushed, or recycled concrete meeting the same requirements as LR base.
- B. The material used for the prime coat shall conform to the Florida Department of Transportation Specifications for primer to be used on Miami Oolite limerock base.
- C. Bituminous material for tack coat shall meet the standard specifications of the Florida Department of Transportation for the grade used and may be any suitable grade of RC.
- D. The materials of the asphaltic concrete surface shall conform with applicable sections of the Florida Department of Transportation Standard Specification. Asphaltic mix designs shall be as specified in the plans. A tack coat shall be used between paving courses.
- E. The paint used for parking and traffic stripes shall be yellow or white traffic paint which shall be of a type approved by the Florida Department of Transportation under their Specifications for Traffic paint (Sec. 971-12.3), Code T-2.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. The sub-grade preparation shall comply with the requirements of Section 160 of the Florida Department of Transportation Specifications. All soft and yielding

material and other portions of the sub-grade which will not compact readily shall be removed and replaced with suitable material and the whole sub-grade brought to line and grade and to a foundation of uniform compaction and supporting power. The cost of removing and replacing unsuitable material shall be included in the bid for the paving.

- B. The top 12-inches of the sub-grade, in both cut and fill sections, shall be compacted to a density of not less than 98-percent of the maximum density as determined by the AASHTO Method T-180. If shown on the Drawings, compact sub-grade to a Limerock Bearing Value of 40 psi. Unless the sub-grade material at the time of compacting contains sufficient moisture to permit proper compaction it shall be moistened as necessary and then compacted. Sub-grade material containing excess moisture shall be permitted to dry to the proper consistency before being compacted. The sub-grade shall be shaped prior to making the density tests. The required density shall be maintained until the base or pavement has been laid or until the aggregate materials for the base or pavement course have been spread in place.
- C. The minimum compacted thickness of the limerock base shall be 12- inches applied in three layers of equal depth unless otherwise shown on the Drawings. The width of the limerock base shall be 3-feet wider than the pavement, 1-1/2-ft. on each side.
- D. Before the prime coat is applied, all loose material, dust, dirt or other foreign material which might prevent bond with existing surface shall be moved to the shoulders to the full width of the base by means of revolving brooms, mechanical sweepers, blowers, supplemented by hand sweeping or other approved methods. The glazed finish shall have been removed from the base. The prime coat shall be applied by a pressure distributor so that approximately 0.1 gallons per square yard is applied uniformly and thoroughly to a clean surface.
- E. Prior to the application of the surface course, all loose material, dust, dirt and all foreign material which might prevent proper bond with the existing surface shall be removed to the full width of the repair by means of approved mechanical sweepers and supplemented by hand sweeping if required.
- F. Submit as-builts of the finished limerock and curbing to the Engineer of Record for review and approval prior to paving.
- G. Apply bituminous tack coat at a rate between 0.02 and 0.10 gallons per square yard. Bituminous material shall be heated as per manufacturer's recommendations.
- H. The asphaltic concrete shall be placed at an average thickness of 2-inches unless otherwise shown on the drawings.
- I. All manhole castings, valve boxes or other utility castings within the area to be surfaced shall be adjusted to the proposed surface elevation by the Contractor.

The work shall be accomplished in such a manner as to leave the casting fixed permanently in its correct position.

3.02 PAVEMENT REPAIR

- A. All damage to pavement as a result of the work (construction or maintenance) under this contract shall be repaired according to the plans and specifications at the Contractors cost. Pavement shall be repaired to match the original surface material and original grade; however, the asphalt concrete thickness shall not be less than 1-inch. The repair shall include the preparation of the sub-grade, the placing and compacting of the limerock base, the preparation and priming of the base, the placing and maintaining of the surface treatment, all as specified herein and as shown on the Drawings.
- B. The width of all repairs shall extend at least 12-inches beyond the limit of the damage or as shown on the Drawings. The edge of the pavement to be left in place shall be saw cut to a true edge and should provide a clean edge to abut the repair. The line of the repair shall be reasonably uniform with no unnecessary irregularities.

3.03 TESTING

- A. Should any test indicate that any portion of the materials or workmanship does not comply with these Specifications; that portion of the work shall be removed and replaced or reworked at no additional cost to the Owner until satisfactory compliance is attained.

3.04 PARKING AND TRAFFIC STRIPES

- A. The Contractor shall paint the stripes indicated on the Drawings. The paint shall be applied in strict accordance with printed specifications of the manufacturers of the paint being applied, and the latest Florida Department of Transportation Standard Specifications. Unless otherwise indicated the width of stripes shall be 6-inches.

END OF SECTION

SECTION 02520

CONCRETE CURBS AND HEADERS

PART 1 - GENERAL

1.01 SCOPE

The work covered by this section of the specifications consists of furnishing all plant, labor, equipment, appliances and materials and performing all operations in connection with the construction of concrete curbs and headers, complete and in place, in strict accordance with these specifications and the applicable drawings and subject to the terms and conditions of this contract.

1.02 REFERENCES

Florida Department of Transportation Standard Specifications for Road and Bridge Construction, (latest edition)

PART 2 - PRODUCTS

2.01 MATERIALS

- A. The concrete mix shall produce standard weight concrete with the following properties to be verified by the use of the appropriate listed test methods.
 - *Compressive strength:* 3,000 psi at 28 days - tested according to ASTM designation C31 (AASHTO T23)
 - *Slump Range:* 2-4 inches - tested according to ASTM designation C143 (AASHTO T119)
- B. Joint materials shall be in accordance with FDOT Specification Section 932

PART 3 - EXECUTION

3.01 CONSTRUCTION METHODS

Concrete curbs and headers shall be constructed of the type and in the locations as shown on the plans.

- A. **FORMS:** Forms for this work shall be made of either wood or metal. They shall be straight, free from warp or bends, and of sufficient strength, when staked, to resist the pressure of the concrete without springing. If made of wood, they shall be of two (2) inch surfaced plank; if made of metal, they shall be of approved section and shall have a flat surface on top.

- B. CONSTRUCTION: Excavation shall be made to the required depth; and the sub-grade or base upon which the curb or header is placed shall be compacted to 98% AASHTO T-180.

The concrete shall be placed in the forms to the depth specified, and tamped and spaded to prevent honeycomb and until the top of the structure can be floated smooth and the edges rounded to the radius shown on the plans.

Contraction joints shall be placed at intervals of ten feet except where a lesser interval is required for closure, but no section shall be less than four feet in length.

Contraction joints shall be created while the concrete is still plastic by using a grooving tool or by inserting a premolded filler strip, or a groove may be saw cut into the concrete soon after it has hardened. Curb with irregular cracks due to late contraction joint construction will not be accepted.

Expansion joints shall be constructed at all radius points and at other locations indicated on the plans. They shall be located at intervals of 500 feet between other expansion joints, or ends of a run. The joint shall be 1/2 inch in width.

The forms shall be removed within twenty-four (24) hours after the concrete has been placed, and minor defects then filled with mortar composed of one (1) part Portland Cement and two (2) parts fine aggregate. Plastering shall not be permitted on the face of the curb; and all rejected curb, or header shall be removed and replaced without additional compensation. The curb top, face and/or header top shall be given a surface finish while the concrete is still green. A brush finish will be required unless noted otherwise; however, additional finishing may be required in areas considered too rough or with minor defects.

After the concrete has been rubbed smooth, it shall be rubbed again until a uniform color is produced, using a thin grout composed of one (1) part Portland Cement and one (1) part fine aggregate.

After concrete has set sufficiently, the spaces in front and back of the curb shall be refilled to the required elevation with suitable material, which shall be placed and thoroughly compacted in layers of not more than six (6) inches in thickness.

END OF SECTION

SECTION 02525

SURFACE RESTORATION

PART 1 - GENERAL

1.01 SCOPE

- A. The work to be performed under this item shall include completing of surface restoration as specified herein. This work does include pavement paver restoration, concrete curb and/or sidewalk restoration and landscaping. Surface restoration shall follow completion of backfilling within 7 calendar days. Where work is on private property the Contractor shall photograph the area of work before construction and not proceed with the work until clearance has been received through the City. Where work is in FDOT or County right-of-way, restoration shall conform to the conditions of the permit and/or FDOT or County standards.

1.02 REFERENCES

- A. Work and materials shall conform to the applicable requirements from the Florida Department of Transportation "Standard Specifications for Road and Bridge Construction", most current edition at time of bid.
- B. American Association of State Highway and Transportation Officials (AASHTO).
 - 1. AASHTO T-180 - Test for Moisture-Density Relations of Soils Using a 10 lb. Rammer and an 18-Inch Drop Modified Protector Test.

PART 2 - PRODUCTS

2.01 SUBGRADE

- A. Subgrade shall be compacted in accordance with the plans and specifications.

2.02 BASE COURSE

- A. The base course shall consist of Grade No. 2 limerock conforming to Section 911-3 of FDOT "Standard Specifications for Road and Bridge Construction".

2.03 PRIMER

- A. Primer shall be hot bituminous material in accordance with Section 300-2 of FDOT Standard Specifications, most current edition at time of bid. Alternate primers shall be acceptable only with prior approval of the Engineer.

2.04 TACK COAT

- A. Tack coat shall be in accordance with Section 300-2.3 of FDOT Standard Specifications, most current edition at time of bid.

2.05 SURFACE COURSE

- A. If required, the temporary surface course shall be SP 9.5 (1") asphaltic concrete in accordance with all applicable requirements of FDOT "Standard Specifications for Road and Bridge Construction," most current edition at time of bid.

2.06 GRASS, SHRUBBERY, TREES, ETC.

- A. All planted vegetation which is removed, damaged or destroyed by project construction shall be replaced by like kind and in the same manner.

2.07 CONCRETE

- A. The concrete used shall be Class I (3,000 psi in 28 days) in accordance with FDOT Standard Specification Section 345. Concrete in right-of-way shall be 3,000 psi in 28 days

2.08 PAVERS

- A. Pavers shall be replaced in kind and shall match style and pattern of existing pavers.

PART 3 - EXECUTION

3.01 NON STATE-OWNED PUBLIC PAVEMENT

- A. Base Course: The base course shall be constructed to the details shown on the Plans and at the Engineer's direction. Any variance from the Plan details shall not be allowed without the prior written consent of the Engineer.
- B. The limerock shall be transported to the point where it is to be used, over rock previously placed, if practicable, and dumped on the end of the preceding spread.
- C. In no case shall rock be dumped directly on the subgrade.
- D. The limerock shall be spread uniformly with equipment approved by the Engineer.
- E. All segregated areas of fine or coarse rock shall be removed and replaced with well graded rock.
- F. The equipment to be used shall include a self-propelled blade grader weighing not less than 3 tons, with wheel base not less than 15 feet and blade length not less than 10 feet; scarifiers shall have teeth spaced not to exceed 4-½ inches apart; at least one three-wheel roller weighing not less than 10 tons; provision for furnishing water at the site of work by tank truck or hose at a rate not less than 50 gallons per minute.
- G. Alternate equipment approved by the Engineer may be used where narrow widths preclude use of larger equipment.

- H. After spreading is completed, the entire surface shall be scarified and shaped so as to produce the exact grade and cross section after compaction.
- I. The full depth of base shall be compacted to an average density of 98% of maximum density as determined by AASHTO T-180 (Modified Proctor). The minimum density acceptable at any location shall be 98%.
- J. The finished surface of rock base shall be true to the required cross section throughout. Any irregularities in the surface greater than ¼-inch, as determined by placing a 10 foot straightedge parallel or perpendicular with the centerline, shall be corrected by scarifying to a depth of 3-inches, removing or adding rock as may be required and again watering, rolling and compacting the scarified area.
- K. Priming: Before any bituminous material is applied, all loose material, dust, dirt and other foreign material which might prevent proper bond shall be removed from the base for the full width of application.
- L. The surface to be primed shall have the glazed finish removed by "hard-planing" prior to the application.
- M. The bituminous material to be used shall be RC-70 or other material approved by the Engineer. The temperature of the material shall be between 100 degrees F and 150 degrees F, the exact temperature being such as will insure uniform distribution.
- N. The surface to be primed shall be clean and dry. No bituminous material shall be applied when the temperature of the air is less than 60 degrees F in the shade, or when, in the opinion of the Engineer, the weather conditions or the condition of the existing surface is unsuitable.
- O. The rate of application shall not be less than 0.10 gal. per square yard, and shall be sufficient to coat the surface thoroughly and uniformly without having any excess to puddle or flow off the base.
- P. Application shall be by self-propelled pressure distributor, operating under a pressure not less than 20 lbs. per square inch.
- Q. The prime shall be allowed to stand, without sanding, for a period of at least 4 hours. A uniform application of clean sand shall be applied prior to opening the primed base to traffic, in which case the sand shall be rolled with a traffic roller in conjunction with traffic to cure the prime coat.
- R. The sand to be used shall be free of silt, rock, particles, sticks, trash, vegetation, or other deleterious material.
- S. Asphaltic Surface Course: Saw cut and square edges of existing asphalt. After the prime coat has had adequate time to cure, and prior to the installation of a temporary surface course, the Contractor shall clean the prepared base of all loose sand and other deleterious materials.

- T. If, in the opinion of the Engineer, the prepared surface is unsuitable to receive the temporary surface course without tacking, a tack coat shall be applied in accordance with FDOT Section 300-7.
- U. Once the surface has been properly prepared, the Contractor shall install SP 9.5 (1") Asphaltic Concrete in accordance with the details shown on the Plans as a temporary surface course. Said Asphaltic Concrete shall conform to all of the applicable requirements of the Florida Department of Transportation "Standard Specifications for Road and Bridge Construction," current edition at time of bid, except that "Job Mix Formula" will not be required.
- V. The temporary surface course may be spread with a spreader box in lieu of a self-propelled mechanical spreader.

3.02 STATE OR COUNTY OWNED PUBLIC PAVEMENT

- A. Restoration within all State or County owned and maintained rights-of-way shall be made in strict compliance with the construction permit.
- B. All work shall be subject to final inspection and approval of the Florida Department of Transportation or the County and shall be completed as expeditiously as possible.

3.03 DRIVEWAYS, PARKING LOTS AND MISCELLANEOUS PAVEMENT

- A. Driveways, parking lots and miscellaneous pavement shall be replaced in kind and restored to a condition equal to or better than that which existed previously.
- B. The Contractor is to repair all improvements at no extra cost whether shown or not shown by the Plans.

3.04 UNIMPROVED STREETS

- A. Unimproved streets shall be restored to a condition equal to that which existed prior to this construction.

3.05 PAVER RESTORATION

- A. The work to be performed under this item shall include delivering and the installation of pavers to replace pavers which have been removed and/or damaged during the course of construction of the work performed under this contract.
- B. All pavers shall be replaced in kind and shall be installed in accordance with manufacturer's specifications.
- C. No separate pay item for pavement restoration. Cost of pavement restoration to be included in price of item such as pipe, sidewalk, pavers, etc.

3.06 CONCRETE SIDEWALK AND/OR CURB RESTORATION

- A. The work to be performed under this item shall include the selling and delivering and the installing of concrete sidewalk which have been removed and/or damaged during the course of construction of the work performed under this Contract. The sidewalk shall be replaced to the same width as the original sidewalk.
- B. Work shall conform to Florida Department of Transportation (FDOT) Standard Specifications for Road and Bridge Construction, Section 520 and 522 "Concrete, Gutter, Curb Elements and Traffic Separator" and "Concrete Sidewalk and Driveways".
- C. All material, labor, forms, tools and equipment for restoration of the sidewalk shall be supplied by the Contractor. All disturbed sidewalk shall be replaced with 4-inch thick (6-inches thick at driveways) to the widths required. The sidewalk finish shall match as near as possible the original finish. Broken or cracked sidewalk shall be removed and disposed of as directed by the Engineer. Subgrade shall be fully compacted, scored joints shall be placed at a maximum of 5 foot intervals, 3/4" expansion joints shall be placed at changes in direction and at maximum 20 foot intervals.

3.07 SWALE RESTORATION

- A. Where the Contractor is to construct a new watermain/storm sewer pipe in the swale area, the swale shall be excavated and replaced in conformance to the City's Swale Restoration Standards, as shown on the plans detail sheet. No separate payment shall be made for landscape or swale construction/restoration, it is part of the unit bid price for new watermain/storm sewer pipe.

3.08 RIGHT-OF-WAYS AND/OR EASEMENTS IN GRASS AND SHRUBBERY PLOTS

- A. Rights-of-way and/or easements in grass and shrubbery plots shall be restored to the condition existing prior to making the excavation. All shrubbery, ornamental trees and others plantings shall be fully protected. If it is found necessary to remove any grass, shrubbery or plants to accomplish the work, they shall be satisfactorily replaced before the work will be accepted or paid for. Grass shall be replaced with sod.

3.09 CLEANUP

- A. Cleanup is an essential part of the project and this portion of the work will not be considered complete and no payment made until the cleanup is complete to the satisfaction of the Engineer.

END OF SECTION

SECTION 02580

PAVEMENT MARKING AND SIGNING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish all labor, materials, equipment and incidentals required and place pavement markings and signing in accordance with the Drawings and Specifications as shown herein.

1.02 RELATED WORK

- A. Section 02513 – Asphaltic Concrete Paving

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Paint: In accordance with requirements as specified in Section 971 of the FDOT Specifications.
 - 1. Paint shall be factory mixed, quick drying and non-bleeding type.
 - 2. Color shall be as per D.O.T. requirements.
 - 3. Striping, arrows, lane markers and stop bars shall be provided with paint containing reflective additive.
- B. Thermoplastic paint: In accordance with the applicable Technical Specifications (Section 711) of the Florida Department of Transportation.
- C. Reflectors: In accordance with Palm Beach County Minimum Standards.
- D. Sign Panels:
 - 1. Aluminum or galvanized steel in accordance with the applicable requirements of Section 700 "Highway Signing" of the FDOT Standard Specifications.
 - 2. Size, shape and color as indicated on the drawings or as directed by the Engineer.
- E. Sign Support Posts:
 - 1. Aluminum or Galvanized Steel in accordance with the applicable requirements of Section 700 "Highway Signing" of the FDOT Specifications.
 - 2. Size, shape and color of posts and mountings as indicated on drawings or as directed by the Engineer.

2.02 EQUIPMENT

- A. All equipment shall be of a type and design which will readily obtain the required uniformity of application of the stripes, both as to thickness of coating and as to alignment.
- B. The traveling unit shall be capable of traveling at a uniform predetermined rate of speed, both uphill and downhill, in order to produce a uniform application of paint.
- C. The paint machine shall be of the spray type and shall be capable of spraying the paint to the required spread without thinning of the paint. The paint tank shall be equipped with a mechanical agitator. The nozzles shall have cut-off valves which will apply broken or skip lines automatically. The nozzles shall be equipped with a mechanical bead dispenser that will operate simultaneously with the spray nozzle and distribute the beads in a uniform pattern at the rate specified. Each nozzle shall also be provided with suitable line guides, either metallic shrouds or air blasts.
- D. Misalignment, defective surfaces, etc., shall be corrected by sand blasting or by any other type of mechanical device which, in the opinion of the Engineer, will effectively remove the paint without damage to the pavement surface.

PART 3 - EXECUTION

3.01 ALIGNMENT FOR STRIPES

- A. Tack points will be established at appropriate intervals for use in aligning stripes, and if found to be necessary to achieve accuracy a stringline will be set from such points.
- B. Tolerances:
 - 1. Dimensions
 - a. Longitudinal Lines: No stripe shall be less than the specified width. No stripe shall exceed the specified width by more than ½ inch.
 - b. Transverse markings, gore markings, arrows, and messages: When the specified width of the markings cannot be made with a single pass and multiple passes are required, the width of the line may be plus or minus one inch.
 - 2. Alignment: On tangents, and on curves up to one degree, the alignment of the painted stripe shall not deviate from the stringline by more than one inch. On curves exceeding one degree the maximum permissible deviation will be two inches. In addition, the outer edges of the edge stripe shall fall uniformly at not less than two nor more than four inches from the edge of the pavement, and shall have no noticeable breaks or deviations in alignment or width.
 - 3. Correction Rates: Any corrections or variations in the width or in the alignment of the stripes shall not be made abruptly but the stripes shall be returned to the design

width at the rate of at least ten feet for each ½ inch of correction, and returned to the stringline at the rate of at least 25 lineal feet per inch of correction.

- C. Application of Paint and Spheres: Painting shall be done only during daylight hours and, as far as practicable, shall be terminated in time to permit sufficient drying by sunset.

Placing of permanent pavement markings on newly constructed Friction Course shall not be accomplished prior to 30 calendar days after placement of the friction course unless authorized by the Owner. Temporary pavement striping will be required during the interim period if the road is open to traffic.

- D. No paint shall be applied when any moisture is present on the surface to be painted or when the air temperature is below 40° F. Painting shall not be done when winds are sufficient to cause spray dust.
- E. The surface which is to be painted shall be cleaned by compressed air or other effective means, immediately before the start of painting, and shall be clean and dry when the paint is applied. Any vegetation or loose solid shall be removed from the pavement before edge striping is done.
- F. The paint shall be thoroughly mixed before it is poured into the painting machine and no thinning of the paint in the machine will be allowed at any time. Before the start of each day's work the paint container, the connections, and the spray nozzles on machine shall be thoroughly cleaned with paint thinner or other suitable cleaner.
- G. The traffic stripe shall be of the specified width, with clean, true edges and without sharp breaks in the alignment. A uniform coating of paint shall be obtained and the finished stripe shall contain no light spots or paint skips. Any stripes which do not have a uniform satisfactory appearance, both day and night, shall be corrected.
- H. The minimum rate of application for paint shall be as follows: Six-inch solid traffic stripes: 16.5 gallons per mile, Six-inch skip traffic stripe: 4.12 gallons per gross mile.
- I. The minimum wet film thickness for all painted areas shall be 15 mils.
- J. Where a stripe deviates from the correct alignment, as indicated by the stringline, by more than one inch in any 50-foot length, it shall be obliterated and the stripe, corrected as specified in 710-3.4.

3.02 PROTECTION

- A. All newly painted stripes, including edge stripes, shall be protected until the paint is sufficiently dry to permit vehicles to cross the stripe without damage from the tires. While the center line stripes are being painted all traffic shall be routed to the right side of the painting operations and the newly painted stripe. When necessary, a pilot car shall be used to protect the painting operations from the traffic interference.

- B. Warning signs shall be set up before the beginning of each operation and extra signs shall be kept well ahead of the painting equipment. The painting equipment shall be so operated that traffic may pass on the right side safely. Warning signs are to be placed only where operations are in progress and are to be relocated as often as is necessary.
- C. The contractor shall erect adequate warning signs, provide sufficient number of flagman, and take all necessary precautions for the protection of the wet paint and the safety of the public. Cones, rubber "Z"guards or similar protective devices shall be placed along or similar protective devices shall be placed along the newly painted stripe to prevent traffic from crossing the wet paint. Any such devices used shall be of a type that will not cause damage to vehicular traffic in the event that these objects are accidentally passed over. All protective devices shall be removed not later than sunset to allow free movement of traffic at night.

If the Contractor elects to use fast dry traffic paint no protective devices will be required provided that the Contractor utilizes a trailing vehicle (behind striping machine) equipped with warning sign and flashing beacon and that he operates such vehicle in a manner consistent with the paint drying time.

- D. Any portion of the stripes damaged by passing traffic or from any other cause shall be repainted at the Contractor's expense.

3.03 CORRECTIVE MEASURE

- A. All painted stripes which fail to meet the specifications including the permissible tolerances and the appearance requirements, or are marred or damaged by traffic or from other causes, shall be corrected at the Contractor's expense. All drip and spattered paint shall be removed to the satisfaction of the Engineer. Whenever it is necessary to remove paint it shall be done by means, as approved by the Engineer, which will not damage the underlying surface of the pavement. When necessary to correct a deviation which exceeds the permissible tolerance in alignment, that portion of the stripe affected shall be removed and repainted in accordance with these specifications.

3.04 ACCEPTANCE OF THE WORK

- A. When the work under this Section has been completed to the satisfaction of the Engineer, including any corrections or repairs ordered by the Engineer, acceptance of the work of painting will be made, independently of the remaining work under the Contract, and the Contractor will be relieved of all maintenance of the painting except for damage due to his operations.

END OF SECTION

SECTION 02720

STORM DRAINAGE SYSTEM

PART 1 GENERAL

1.01 WORK INCLUDED

- A. The work covered and described in this Section includes the furnishing and construction of culverts, storm sewers, inlets and other drainage structures as shown on the Drawings and specified herein.

1.02 RELATED WORK

- A. Section 02221: Trenching Bedding & Backfill for Pipe.
- B. Section 05500: Metal Fabrications
- C. Section 03480: Precast Concrete Specialties
- D. Section 15050: Reinforced Concrete Pipe

1.03 SUBMITTALS

- A. Shop Drawings: Shop drawings for the following items shall be submitted for Engineer's approval.
 - 1. Grates and Castings
 - 2. Precast structures
- B. Pipe certification of quality by producer shall be delivered to Engineer ten days prior to installation.

1.04 JOB CONDITIONS

- A. Existing Drainage System: Maintain operational, prevent siltation with the method as approved and as directed by the Engineer.

PART 2 PRODUCTS

2.01 MATERIALS

- A. A-2000 PVC Pipe: Polyvinyl Chloride (PVC) storm sewer/drain pipe and fittings shall be manufactured by Contech Construction Products, Inc. or approved equal and tested in accordance with ASTM F949. The structural design of thermoplastic pipes shall be in accordance with AASHTO Section 12 titled: "BURIED Structures and Tunnel Liners." To ensure long-term design strength properties, PVC pipe shall be manufactured from 12454 cell class material per ASTM D1784. Pipe and fittings shall have a minimum pipe stiffness of 46 lbs./in./in. when tested in accordance with ASTM D2412.

- B. Concrete Pipe: Concrete pipe shall be reinforced concrete culvert pipe conforming to ASTM Designation C 76, Class III, Wall B, except when otherwise indicated. Pipe joints shall be rubber gasket joints, and the pipe joint shall be manufactured to meet the requirements of the approved type of gasket to be used. Pipe joints and rubber gaskets shall conform to the requirements of Section 941 and 942 of the FDOT Standard Specifications.
- C. Corrugated aluminum pipe (C.A.P.) shall be helical type, conforming to ASTM B209 and AASHTO M196, as manufactured by Kaiser Aluminum, Inc., or approved equal. The corrugation pattern and gauge shall be as follows:

<u>DIA.</u>	<u>CORRUGATION</u>	<u>GAUGE</u>
12" TO 21"	2-2/3" X 1/2"	16
24" TO 27"	2-2/3" X 1/2"	16
30"	2-2/3" X 1-1/2"	14
36" TO 54"	3" X 1"	14
60" TO 78"	3" X 1"	12

Pipe couplings for C.A.P. shall be 12" wide (minimum), 24" for 60" diameter or larger, split bands of the same alloy as the pipe may be one gauge lighter than the pipe. Polyurethane or other manufacturer supplied sealant shall be used with the couplings.

- D. French Drain Pipe: Pipe for the French drains shall be one of the following types, unless otherwise specified on the drawings, that conform to the respective specification, except perforations and joints shall be as shown on the Drawings.
1. Concrete Pipe - ASTM Designation C14
 2. Perforated Concrete Pipe - AASHTO Designation MI 75
 3. Perforated and Nonperforated Clay Pipe - ASTM Designation C700, Standard Strength
 4. Bituminous Coated Corrugated Metal Pipe (Perforated) - AASHTO Designations Type III and MI 90, Type A.
 5. Corrugated Aluminum Perforated Pipe - AASHTO Designation MI 97.
 6. HDPE
 7. A2000 PVC
- E. Brick: Brick for drainage structures shall be dense, hard burned, shale or clay brick conforming to ASTM Designation C32, Grade MM or C 62, Grade MW, except that brick absorption shall be between five and twenty-five grams of water absorbed in one minute by dried brick, set flat face down, in 1/8-inch of water.
- F. Cement Mortar: Cement mortar for manhole construction shall be one part cement and two parts clean sharp sand to which may be added lime in the amount of not over twenty-five percent volume of cement. It shall be mixed dry and then wetted to proper consistency for use. No mortars that have stood for more than one hour shall be used.
- G. Concrete: Concrete shall conform to the requirements of Section 03300 Cast-in-Place Concrete.
- H. Precast Concrete Units: Precast concrete inlets shall conform to applicable requirements of

Section 03480.

- I. Castings: Castings for inlets and other items shall conform to the ASTM Designation A 48, Class 25. Castings shall be true to pattern in form and dimensions and free of pouring faults and other defects in positions which would impair their strength or otherwise make them unfit for the service intended. No plugging or filling will be allowed. Catch basin gratings shall be as specified on the drawings.
- J. The trench liner shall be Mirafi 700X filter fabric or approved equal.
- K. Ballast rock for French drains shall be limerock free from deleterious matter and 3/4-inch to 1 1/2-inches in size with not more than 10% passing the 1/2-inch sieve.
- L. Pea rock shall be graded so that 100% passes the 1-inch sieve and not more than 5% passes the 1/4-inch sieve.
- M. Roofing felt shall be 30 pound felt.
- N. Drainage Well Casing Pipe: Casing pipe shall be plain, standard weight, 3/8-inch minimum thickness, new black steel pipe conforming to ASTM A 53.

PART 3 EXECUTION

3.01 PREPARATION

- A. Pipe Trenches:
 - 1. Pipe trenches shall be of necessary widths for the proper laying of the pipe and the banks shall be as nearly vertical as practicable. In paved areas, the trench shall be vertical and sheeted, if required; the clearance between the pipe and trench wall or back of sheeting shall not exceed 18 inches. The bottom of the trenches shall be excavated to a depth of the outside bottom of the pipe barrel. Any over excavation shall be replaced with suitable compacted material. Excavation for inlets and other appurtenances shall be sufficient to provide a clearance between their outer vertical surfaces and the face of the excavation or sheeting, if used, of not less than 12-inches.
 - 2. Soft, spongy, or otherwise unsuitable material encountered below the established grade of the excavation which will not provide a firm foundation for subsequent work shall be removed and replaced as directed. Unless otherwise directed, all such unstable materials shall be removed for the full width of the excavation and replaced with approved fill material.
 - 3. Where sheeting and bracing are necessary to prevent caving of the trench sidewalls or sidewalls of excavation for other structures, and to safeguard the workmen, the trench or excavation for other structures shall be dug to such width that the proper allowance is made for the space occupied by the sheeting and bracing to provide clearance as specified above.

3.02 INSTALLATION

- A. Laying Concrete Pipe and A2000 PVC Pipe:
 - 1. All pipe shall be placed on a minimum of 4" stable granular material free of rock formation and other foreign formations, all pipe shall be carefully laid true to the line

and grade shown on the Drawings. Any deviation from true alignment or grade which would result in a displacement from the normal position of the gasket of as much as 1/4-inch, or which would produce a gap exceeding 1/2-inch between sections of pipe for more than 1/3 of the circumference of the inside of the pipe, will not be acceptable and where such occurs, the pipe shall be relaid without additional compensation. No mortar, joint compound, or other filler which would tend to restrict the flexibility of the gasket joint shall be applied to the gap. Pipes having defects that have not caused their rejection are to be so laid that these defects will be in the upper half of the sewer.

2. Before installation of the pipe gasket and the surface of the pipe joint, including the gasket recess shall be clean and free from grit, dirt, or other foreign matter at the time the joints are made. In order to facilitate closure of the joint, application of an approved vegetable soap lubricant immediately prior to closing of the joint will be permitted.
3. All pipes shall be laid with bells or grooves uphill. As the pipes are laid throughout the work, they must be thoroughly cleaned and protected from dirt and water. No length of pipe shall be laid until the two preceding lengths have been thoroughly embedded in place so as to prevent any movement or disturbance of the finished joint. No walking on or working over the pipes after they are laid, except as may be necessary in tamping earth and refilling, will be permitted until they are covered to a depth of one-foot. No pipe shall be laid except in the presence of an authorized inspector. Fill placed around the pipe shall be deposited on both sides simultaneously to approximately the same elevation and uniformly compacted. Whenever the pipe laying is discontinued, as at night, the unfinished end is to be securely protected from displacement due to caving of the banks or from other injury and a suitable stopper is to be inserted therein.
4. A2000 Pipe Jointing System: Joints shall be an integral bell-gasketed joint. When the joint is assembled, it shall prevent misalignment of adjacent pipes and form either a soil tight joint (2 psi hydrostatic test per AASHTO Standard Specification for Highway Bridges, Section 26.4.2.4) or a watertight joint (10.8 psi test per ASTM D3212 TITLED: "Standard Specification for Joints for Drain and Sewer Plastic Pipes using Flexible Elastomeric Seals") as required. The PVC Pipe shall provide a Manning's "n" value of .009. Thermoplastic pipe and fittings shall be installed in strict accordance with ASTM D2321 or AASHTO Section 30.

B. Laying Corrugated Pipe:

1. All corrugated pipe shall be carefully laid, true to the line and grade shown on the Drawings. Where a coupling is required, the pipe gasket and coupling band shall be centered over the joint with the coupling band bolts securely tightened without cutting the gasket.
2. Fill placed around the pipe shall be deposited on both side simultaneously to approximately the same elevation and uniformly compacted. Whenever the pipe laying is discontinued, as at night, the unfinished end is to be securely protected from displacement due to caving of the banks or from other injury and a suitable stopper is to be inserted therein.

C. French Drain Trenches:

1. French drain trenches shall be excavated to the lines and grade shown on the Drawings and backfilled with ballast rock to the bottom of the proposed pipe. The pipe shall be laid with open joints as shown on the Drawings. The remaining ballast

rock shall be placed, and the line and grade of the pipe shall be maintained. Pea rock and 30 pound per square felt paper shall be placed over ballast rock as shown on the Drawings. The remaining trench shall be backfilled with suitable material and backfill material 12-inches and above the felt paper shall be compacted to not less than 98 percent of the maximum density as determined by AASHTO Designation T 180.

D. Drainage Structures:

1. Concrete inlets or other structures shall be constructed in conformity with the Plan Details. Forms shall be designed and constructed so that they may be removed without injury to the concrete and shall be left in place for at least 24 hours after concrete is poured. Concrete shall be thoroughly tamped and shall be cured for at least five days after removal of forms. Honeycomb places shall be thoroughly cleaned, saturated with water and pointed up with mortar.
2. Precast inlets or other structures may be used in lieu of cast-in-place structures. Grates are to be set in place in mortar to the proper line and grade.

E. Backfilling for Pipe Culverts and Drainage Structures:

1. After the pipe has been installed, approved selected material from excavation at a moisture content which will facilitate compaction shall be placed along side the pipe in layers not exceeding 6-inches loose measure in depth. Care shall be taken to insure thorough compaction of the fill under the haunches of the pipe. Each layer shall thoroughly compacted by rolling or tamping with mechanical rammers. This method of filling and compacting shall be continued until the fill is 12-inches above the pipe, then the remainder of the backfill shall be placed in lifts not exceeding 12-inches. The operation of heavy equipment shall be conducted so that no damage to the pipe will result. Backfill material 12-inches and above the top of the pipe shall be compacted to not less than 98 percent of maximum density as determined by AASHTO Designation T 180. Selected material for backfill shall not contain any stones or rock larger than 2 1/2-inches. Tests for density of compaction shall be made at the places designated by the Engineer, and deficiencies shall be corrected by the Contractor without additional cost to the Department.

END OF SECTION

SECTION 02722
SANITARY SEWERS

PART 1 - GENERAL

1.01 INCLUDED

- A. The Contractor shall furnish, install, make the joints, and test gravity sewer lines, laterals, and appurtenances as shown on the Drawings and as required by these Specifications.
- B. Polyvinyl chloride (PVC) PIPE and Ductile Iron Pipe (DIP) shall be used for gravity sewer lines as indicated on the Drawings.

1.02 RELATED WORK

- A. Trenching, Bedding and Backfill for pipe is specified in Section 02221.
- B. Paving is specified in Section 02513.
- C. Precast manholes are specified in Section 03480.
- D. Castings are specified in Section 05500.

1.03 SHOP DRAWINGS

- A. The Contractor shall submit to the Engineer for approval, shop drawings showing details of Construction, joints, materials, gaskets and fittings of all sanitary sewer pipe to be incorporated in the work.

PART 2 - PRODUCTS

2.01 DUCTILE IRON SEWER PIPE

- A. Ductile iron sewer pipe and fittings shall conform to the specifications Section 15062.
- B. Ductile iron pipe for sanitary sewer service shall have a minimum thickness of Class 53. All pipe shall be double cement mortar lined in accordance with AWWE C-104 (ANSI A21.4). The inside and outside of the pipe shall have a bituminous coating as applied at the Foundry.
- C. Ductile iron pipe shall be as furnished by American Cast Iron Pipe Company or the United States Pipe and Foundry Company or equal.

2.02 POLYVINYL CHLORIDE PIPE

- A. Gravity sewer lines and laterals shall be extra strength polyvinyl chloride pipe and shall conform to ASTM Designation D 3034-SDR 26.
- B. Fittings and accessories shall be as manufactured and furnished by the pipe supplier and have bell and spigot configurations compatible with that of the pipe.
- C. In addition to the requirements of ASTM specifications, the pipe shall not be out-of-round or crooked in alignment as determined by the Engineer. Any length of pipe in sizes 6-inch through 12-inch diameter whose inside diameters measured at right angles to each other vary more than 1/4-inch may be rejected.
- D. Polyvinyl chloride pipe shall be furnished by J-M Pipe Company or equal.
- E. Material shall meet or exceed the requirements of ASTM Designation 1784, Type 1, Grade 1 (12454-B). All PVC materials shall be stored in accordance with the manufacturer's specifications (not in direct sunlight). PVC pipe and fittings which show signs of ultra-violet degradation will be considered substandard and unfit for use.
- F. All wyes, fittings and laterals shall be manufactured by J-M Pipe Company or equal. No saddles will be allowed. Adaptors shall be suitable for J-M Pipe materials. All joints shall be rubber gasket.
- G. Manhole couplings shall be the molded black neoprene rubber boot type ("Kor-N-Seal") embedded in the concrete walls of the precast manholes. The rubber boot shall act as a sleeve and be clamped down around the sewer pipe by a pair of stainless steel clamps. Asbestos cement manhole couplings will not be allowed.

PART 3 - EXECUTION

3.01 SYSTEM LAYOUT

- A. At least 3 days prior to beginning construction of any gravity sewer section or any portion of the system the Contractor must submit to the Engineer for review "cut sheets" for that portion to be constructed.
- B. Sewers shall be laid accurately to the line and grade shown on the drawings. Tolerances are 1/4-inch on grade and 1/2-inch on line in any section between manholes. Deviations exceeding these tolerances shall be grounds for rejection of the line. The Sewer system shall be "laid out" on the ground surface by placement of a series of reference points. Line and grade of the sewer pipe may be laid out by one of several methods as approved by the Engineer. One method is the "Batter Board or Grade Board System"; another method is with a Laser Generator at the trench bottom or; a Laser Generator on the ground surface. The laser equipment shall be protected against receiving an accidental bump, particularly if placed on the ground surface. The light beam shall be checked by the Contractor a minimum of two times between any two manholes. The light beam is to be checked against surface control points to insure its correct horizontal and vertical alignment.

- C. It is the Contractor's responsibility to protect and preserve all line and grade stakes with flag stakes, guard stakes, or other methods as may be required. Any stakes that are disturbed during construction shall be reset at the Contractor's expense.
- D. The sewer lay-out method must be submitted by the Contractor in writing with full details for approval by the Engineer.

3.02 REMOVAL OF WATER FROM TRENCH

- A. All trenches and excavations are to be kept dry and free from water at all times when work is in progress and at no time is water to run through the sewer or its bedding material.
- B. It is preferred that the water table be lowered by the use of a well point system. Open trench pumping may be permitted upon approval in writing by the Engineer of the method of pumping and draining to be used. The water must be conveyed entirely through approved coarse material placed below the bottom of the pipe. The depth of the material is to be determined by the contractor and the coarse material may be ¼-inch to ¾-inch washed and graded limerock. No extra payment shall be made for this construction.
- C. The Contractor shall provide for the disposal of the water removed from the excavation in such manner as shall not cause injury to public health or private or public property or to any portion of the work completed or in progress, to the surface of the streets, or cause any impediment to the reasonable use of the site by other Contractors.
- D. Trenches and excavations shall be maintained in a dry condition to permit the placing of concrete and masonry and sufficiently long thereafter to protect the concrete masonry against washing or other water damage.
- E. 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; and if it is recognized by the Engineer and Owner that it is not economically feasible to dewater the trench, an alternate construction method may be proposed. Complete details, specifications, manufacturer's descriptive literature, installation lists and any other pertinent data regarding the alternate method shall be submitted as an alternate by the Contractor to the Engineer within ten (10) days of the time that the Contractor anticipates using such alternate method.
- F. If the Engineer 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 Engineer 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.

3.03 LAYING GRAVITY SEWER LINES

- A. Gravity sewer lines shall be laid according to the details shown on the Drawings or specified herein, and according to applicable portions of ASTM Designation D-2312, Underground Installation of Flexible Thermo-plastic Sewer Pipe. The type of bedding

to be used shall be as shown on the Drawings, specified herein, or as directed in writing by the Engineer.

- B. The trench bottom shall be graded to the proposed elevation of the pipe line and the bottom shaped to fit the lower quadrant of the pipe. Holes shall be excavated at each bell so that pipe is uniformly excavated at each bell so that pipe is uniformly supported along the entire length of the barrel only and not the bell. Pipe bedding shall be as described in Section 02221.
- C. The storage of pipe on the job site shall be done in accordance with pipe manufacturer's recommendations and with the approval of the Engineer. Pipe shall be protected during handling against impact shocks and free fall. Pipe laying shall not precede backfilling by more than 100 feet without approval from the Engineer.
- D. The laying of the pipe in finished trenches shall be commenced at the lowest point, with the spigot ends pointing in the direction of flow. The interior of the pipe and the jointing seal shall be free from sand, dirt and trash before installing in the line. Extreme care must be taken to keep the bells of the pipe free from dirt and rocks so that joints may be properly assembled without overstressing the bells. The jointing of the pipe shall be done in strict accordance with the pipe manufacturer's instructions and shall be done entirely in the trench.
- E. Each time the work on the sewer is halted for more than one hour, the ends of the pipe shall be sealed to prevent foreign material from gaining entrance to the pipe.
- F. The trench width at the top of the pipe shall not exceed the allowable as determined by the depth of cut and indicated on the Drawings.
- G. The Contractor must use the Special Bedding unless a Special Foundation is required. In some cases this requirement may be waived by the Engineer but then only if extraordinary care is taken not to disturb the soil below the proposed line of the bottom of the pipe, the last excavation operation is done manually and the trench bottom is shaped to receive the pipe barrel. Also, the bell holes shall be excavated by hand so that there is no bearing surface on the bells and the pipe barrel shall be uniformly supported along its entire length on bedding material.

3.04 JOINING SEWER LINES

- A. Joint seals in polyvinyl chloride pipe and fittings shall comply with ASTM Designation D-3212.
- B. Laying instructions of the manufacturer of the pipe and joint shall be followed explicitly. The Engineer will examine each bell and spigot end to determine whether the preformed joint has been damaged prior to installation. Any pipe defective joint surfaces shall be rejected.
- C. The joint shall remain sealed by its own compression strength and adhesives shall not be necessary to weld or fuse the gaskets together. The compressive stress which is developed in the gasket material shall be high as is permitted by the strength of the

bell in ring tension, with due regard to factor of safety, and this stress shall be at its maximum value when the joint is completely assembled.

3.05 LATERAL INSTALLATION

- A. A lateral connection shall be provided for each platted lot, parcel, tract or as shown on the drawings.
- B. Lateral connections shall be determined by the Engineer in the field.
- C. Service connections shall be extended to the property line as shown on the Drawings and adequately sealed with plugs or caps prior to beginning exfiltration tests. Six inches of crusher-on gravel or bedding rock shall be placed in front of the plugs or caps and over the top of the last 3-feet of pipe laid. Each service connection shall be backed with a piece of wood (2-in x 4-in) that extends to a point 3 feet below the finished ground surface and 6 inches above grade. The wood shall be placed slightly ahead and above the end of the service pipe, to avoid damage when excavating later.
- D. The Contractor shall be careful to permit the Engineer ample time to obtain the exact location of each connection before it is covered up. Connections, which are covered before the Engineer has had time to obtain their location, shall be exposed at the Contractor's expense, so that the location measurements can be taken. This does not waive the Contractor of his obligation to accurately survey/locate the sewer laterals and depict on as-built drawings.

3.06 BACKFILLING

- A. Backfill material will be clean earth fill composed of sand, clay and sand, sand and rock, crushed rock, or an approved combination thereof. Backfilling will be accomplished under two specified requirements: First Lift, from trench grade to a point 12 inches above the top of the pipe; and, Second Lift, from the top of the First Lift to the ground surface. Where concrete encasements, or other below grade concrete work have been installed, backfilling will not proceed until the concrete has obtained sufficient strength to support the backfill load.
- B. First Lift: Fine material must be carefully placed and tamped around the lower half of the pipe. Backfilling will be carefully continued in layers not exceeding 6 inches in thickness for the full trench width, until the fill is 12 inches above the top of the pipe, using the best available material from the excavation, if approved. The material for these first layers of backfill will be lowered to within 2 feet above the top of the pipes before it is allowed to fall, unless the material is placed with approved devices that protect the pipes from impact. The "First Lift" is to be thoroughly compacted and completed before the "Second Lift" is placed. Compaction must equal 98 percent of maximum density, as determined by AASHTO Specification T-180. The "First Lift" backfill will exclude stones, or rock fragments larger than 2 ½ inches.
- C. Second Lift: The remainder of the trench, above the "First Lift" will be backfilled in layers not exceeding 6 inches. The maximum dimensions of a stone, rock, or pavement fragment will be 2 1/2 inches. When trenches are cut in pavements or

areas to be paved, compaction as determined by AASHTO Specification T-180, must be equal to 98 percent of maximum density.

- D. **Compaction Methods:** The above specified compaction will be accomplished using accepted standard methods (power tampers, vibrators, etc.), with the exception that the first two feet of backfilling over the pipe must be compacted by hand-operated tamping devices. Flooding or puddling with water to consolidate backfill is not acceptable, except where sand is encountered and the method has been approved by the Engineers.
- E. **Density Tests:** For determination of the above specified compaction will be made by a testing laboratory approved by Owner and at the expense of the contractor. Test locations will be determined by the Engineer but in any case, are to be spaced not more than 300 feet apart where the trench cut is continuous in pavements or areas to be paved. Tests will also be made where a trench crosses a paved roadway or future paved roadway. If any test results are unsatisfactory, the Contractor is to re-excavate and recompact the backfill at his expense until the desired compaction is obtained. Additional compaction tests must be made to each side of an unsatisfactory test, as directed to determine the extent of re-excavation and re-compaction necessary.

3.07 SPECIAL FOUNDATIONS

- A. The Contractor shall furnish and install a special foundation for the pipe and appurtenances whenever shown on the Drawings or directed by the Engineer.
- B. Assumptions have been made as to the approximate amount of the various foundation types and these assumptions are indicated in the bid quantities for the purpose of determining the low bidder. The Engineer will determine after excavation which foundation type will be required and will direct the Contractor which Contractor shall change foundation types as directed by the Engineer. Payment shall be made only at the unit price for the foundation type which the Engineer has directed and the Contractor to use. It is expressly understood that the Owner is not bound by the results of preliminary soil test borings or by the assumed quantities in the bid form.
- C. Special foundation types are designed as Special Bedding and Foundation Type 2, and the details of each type are shown on the Drawings and further described in these Specifications.
- D. If no other special foundation type is directed to be installed, all gravity sewer lines and laterals shall be installed on the Special Bedding foundation and the prices for laying gravity sewer lines shall include this cost.
- E. Special Bedding shall be used wherever a Type 2 foundation is not required. This bedding shall consist of at least 4-inches of 3/8" x 3/4" washed and graded limerock placed in the trench to the proposed elevation of the centerline of the pipe prior to any pipe laying. This bedding shall not be used under any circumstances as a drain for ground water. The Contractor shall take all precautions necessary to maintain the bedding in a compacted state and to prevent washing, erosion or loosening of this bed.

- F. Type 2 foundation shall be used when unstable soil is encountered at the proposed sewer elevation to a depth greater than 4-inches but not exceeding approximately 3 feet. The trench shall be cut to stable material and then mechanically compacted with stable material to maximum density in layers not exceeding 12-inches. The type of stable material to be used shall be determined by the Contractor and may be either clean sand fill or approved coarse material such as $\frac{3}{4}$ " x $\frac{3}{4}$ " washed and graded limerock. When clean sand fill is used the trench bottom shall be brought up to within 4-inches of grade, and then the Special Bedding placed as described above. The price for Type 2 foundation shall include the Special Bedding.

3.08 MANHOLES

- A. All manholes shall be built at points indicated on the Drawings, or as directed by the Engineer and shall be constructed to the grade as shown and in strict accordance with the details on the Drawings. Manholes shall, in all cases, be fully and completely built and fitted with frames and covers as the work progresses.
- B. Precast reinforced concrete manholes are to be in accordance with ASTM Designation C478, with pre-formed flexible plastic joint sealer conforming to Federal Specifications SS-S-00210 (GSA-FSS) "Ram-Nek", as manufactured by the K.T. Snyder Co., Houston, Texas or and approved equal. Each section of the manhole must be inspected and stamped by an accredited testing laboratory. Manholes must be cured for 28 days prior to painting. Reinforcement bars shall be as shown on the drawings.
- C. Mortar shall be composed of one (1) part cement and two (2) parts sand.
- D. Concrete used in manhole construction shall conform to ASTM Designation C94, Ready Mixed Concrete, have a 28 day compressive strength of 4000 psi and be Type II, Acid Resistant. Forms of concrete in manholes shall be approved pattern, carefully constructed. Any irregularities or porous spots in the concrete that may appear on removal of the forms shall be immediately plastered with cement mortar in such manner as to give satisfactory, neat and watertight job.
- E. While pouring concrete for manholes or plastering manholes great care shall be taken not to allow mortar to get into the sewer lines. The Contractor shall provide two plumbers test plugs of each size sewer pipe on the job to prevent this possibility.
- F. Manhole flow channels are to be as shown on the Drawings with smooth and carefully shaped bottoms, built-up sides and benching constructed from concrete. Channels will conform to the dimension of the adjacent pipe and provide for even changes in size, grade, and alignment. The channels must be constructed so that they will not restrict the use of pipe plugs.
- G. After the manholes are completed, the inside and outside surfaces of the walls shall be coated with two coats of a heavy-duty coal tar epoxy coating containing not less than 72.9% by volume non-volatile solids. The masonry surface may be damp but not

wet. If necessary, the Contractor shall utilize blowers to achieve the necessary drying. The first coat shall be thinned approximately 15% with a thinner recommended and furnished by the manufacturer. The total dry film thickness of the finished coating shall not be less than 10 mils. The coating shall be Coal-Tar Epoxy or equal applied in accordance with the manufacturer's recommendations. The Contractor shall take all necessary precautions to protect the workmen against toxic or harmful fumes during the painting operations.

- H. Where additional pipe connections or modifications or existing factory made openings are required on new or existing precast concrete manholes, all cutting relative thereto is to be performed only by a power driven abrasive wheel or saw. Such connections to existing manholes are to be installed in accordance with the details for new units shown in the Standard Details, and are to be caulked water tight with non-shrinking grout.
- I. Brick manholes may be used only upon the approval of the Engineer.

3.09 MANHOLE FRAMES AND COVERS

- A. Castings shall be of uniform quality, free from blow holes, porosity, hard spots, shrinkage, defects, cracks or other injurious defects. They shall be smooth and well cleaned by shot blasting and, unless otherwise specified, shall be coated with coal tar pitch varnish of a type which will make a smooth coating, tough and tenacious when cold, not tacky and not brittle.
- B. Material used in the manufacture of the castings shall conform to ASTM Specifications A48 Class 30 Iron for gray iron castings.
- C. All castings shall be manufactured true to pattern with a close fit of component parts. Round frames and covers in roadway and traffic areas shall be of non-rocking design or with machined bearing surfaces so that fitting parts will not rattle or rock under traffic.
- D. Frames and covers shall have a minimum total weight of 400 pounds. Covers shall have a weight not less than 150 pounds.
- E. Manhole covers in roadway and traffic areas shall have a minimum thickness along the rim of 1-3/4". All covers shall have the words as indicated on the Drawings in raised 2" letters cast into the top.
- F. Unless otherwise shown or specified, frames and covers shall be manufactured by U.S. Foundry & Manufacturing Corporation. Covers shall have concealed watertight pickholes similar to U.S. Foundry & Manufacturing Corporation Drawing No. 402A-AK. Frames and covers for manholes constructed within the swale area of the rights-of-way or easements and where directed by the Engineer shall be a watertight type construction and shall be U.S. Foundry & Manufacturing Corporation watertight or equal with a minimum of 4 (stainless steel) cap screws and 1/8" neoprene gasket.

3.10 MANHOLE LINER

- A. Lining material furnished under this Technical Special Provision shall be a prepackaged mortar mix, including all cement, aggregates, and any required additives. It is the intent of this Technical Special Provision that the Contractor only be required to add the proper amount of potable water so as to produce concrete suitable for spray application. Do not add portland cement, other aggregates, or any admixtures whatsoever to lining material. Typical package weights shall not be less than 50 lbs and shall be identical for all material furnished on this project.
- B. The chemical composition of the cement portion as well as the aggregates of the mortar mix shall be as follows:

Al ₂ O ₃	CaO	FeO + Fe ₂ O ₃	SiO ₂
39-44%	34-38%	9-15%	6-8%

- C. The properties of the mortar mix under standard laboratory conditions are typically as follows:

Compressive Strength (ASTM C109)	> 5,500 psi	24 hours
Flexural Strength (ASTM C348)	> 900 psi	24 hours
Splitting Tensile Strength (ASTM C496)	> 550 psi	24 hours
Slant Shear test (ASTM C882)	> 2,500 psi	28 days
Shrinkage at 28 days (ASTM C157)	<0.07%	
Freeze/Thaw after 300 Cycles (ASTM C666)	< 102	

- D. In addition, the mortar mix shall be designed to withstand long-term exposure to a bacterially corrosive hydrogen sulfide environment that may be expected to produce a pH of 1 on normal Portland cement based concrete or typical brick and mortar surfaces.
- E. Water used in mixing shall be fresh, clean, potable water, free from injurious amounts of oil, acid, alkali, vegetable, sewage and/or organic matter. Water shall be considered as weighing 8.32 pounds per gallon.
- F. Mortar mix shall be stored with adequate provisions for the prevention of absorption of moisture. It shall be stored in a manner that will permit easy access for inspection and identification of each shipment.

3.11 TESTING

- A. Leakage tests by exfiltration and infiltration, as described below, will be made on all pipe. The Engineer shall have the option of determining which test(s) shall be

employed. Generally, if the groundwater table is below the bottom of the pipe an exfiltration test shall be used. All other pipe shall be tested for infiltration.

- B. Exfiltration tests will be made on the pipe before or after backfilling at the discretion of the Engineer. The length of the sewer to be tested shall be such that the head over the crown of the upstream end is not less than 2 feet and the head over the downstream crown is not more than 6 feet unless directed otherwise by the Engineer. The sewer shall be plugged by pneumatic bags or mechanical plugs in such a manner that the air can be released from the sewer while it is being filled with water. The test shall be continued for one hour and provisions shall be made for measuring the amount of water required to maintain the water at a constant level during this period. If tests results are unsatisfactory, the Engineer may direct the additional test are made on any or all of the pipe.
- C. If any joint shows an appreciable amount of leakage, the jointing material shall be removed and the joint remade. If any pipe is defective, it shall be removed and replaced. If the quantity of water required to maintain a constant level in the sewer for one hour does not exceed 50 gallons per inch of diameter per day per mile of sewer and all the leakage is not confined satisfactory. If the amount of leakage indicates defective joints or broken pipes, they shall be corrected by the Contractor.
- D. Pipe shall be tested for infiltration after the backfill has been placed. Infiltration tests shall be made under the supervision of the Engineer, and the length of line to be tested shall be as directed by the Engineer. The allowable infiltration shall be per latest State Requirements.
- E. Rates of infiltration shall be determined by means of V-notch weirs, pipe spigot or by plugs in the end of the pipe, to be provided and installed by the Contractor in an approved manner, and at such times and locations as may be directed by the Engineer.
- F. If an inspection of the completed sewer or any part thereof shows any manholes, pipes, or joints which allow the infiltration of water in a noticeable stream or jet, the defective work or material shall be replaced or repaired as directed.
- G. All water used in testing and flushing shall be furnished at the Contractor's expense.

3.12 DEFLECTION TESTING

- A. All pipes shall be tested for excessive deflection by means of a "Go, No-Go" mandrel or sewer ball. A 7 ½% deflection mandrel shall be pulled through each manhole section to determine if excessive deflection has taken place. If the mandrel fails to be pulled through the sewer pipe the Contractor shall attempt to pull the mandrel through from the other end of the manhole section. If the mandrel fails to be pulled through, again, the Contractor shall repair or replace that portion of the sewer main which has exceeded the 7 ½% allowable pipe deflection.

- B. The Deflection Mandrel to be used for testing shall be submitted to the Engineer for approval prior to use. Each mandrel shall be constructed to the dimensions as shown in the Uni-Ball Handbook of a P.V.C. Pipe, Chapter 10.
- C. Deflection Testing shall not take place until thirty days following the final backfilling over the pipe. This will allow time for settlement of all the backfill material. The Engineers representative shall be present at all deflection tests.

3.13 CLEANING

- A. At the conclusion of the work the Contractor shall thoroughly clean all of the pipe by flushing with water or other means to remove all dirt, stones, pieces of wood, or other material which may have entered during the construction period. Debris cleaned from the lines shall be removed from the lowest outlet. If, after this outlet, cleaning obstruction remains, they shall be removed. After the pipe is cleaned if the groundwater level is above the pipe, or following a heavy rain, the Engineer will examine the pipe for leaks. If defective pipes or joints are discovered at this time, they shall be repaired by the Contractor.

3.14 FINAL TEST AND INSPECTON

- A. Upon completion of the work, the sewer system or selected sections therein shall be subjected to a final test and inspection. All work in the system or sections therein being tested shall be complete, cleaned and ready for use. Tests shall be as specified herein and shall meet all requirements as to line, grade, cleanliness, infiltration, exfiltration and workmanship.
- B. Inspection of mains shall be by use of a self-contained television system. The facilities shall be provided and operated by the Contractor as specified below:
 - 1. The Contractor shall provide the Owner with Digital Video Disc (DVD) recordings of the interior of all main line gravity sewers 8-inches in diameter and larger. The DVD's shall be recorded by pulling a television camera through the line along the axis of the pipe. The television equipment shall consist of a self-contained camera and a monitoring unit connected by a coaxial cable. These recordings shall be done during the inspection of the mains. Monitors shall be available to the Engineer and Owner during these inspections. Monitors shall also be provided with a screen capture so that, as may be requested by the Engineer or Owner, photographs will be made of a particular portion of the main being viewed. The camera shall be in proper focus so that good, clear recordings showing detail are produced. DVD's shall be identified by audio recordings noting the manhole numbers, distances to service lateral connections, direction of lateral connection, any leaks cracks or pipe defects. Each DVD shall be clearly marked as to the contents and number with an index of all DVD's. DVD's of the completed mains shall be delivered to the Owner. The Contractor shall provide any assistance required by the Engineer to assist the Engineer with visual inspections.

2. The cost of television inspection shall be included in the unit price bid per foot for installing the system. The cost for cleaning the system shall be included in the unit price bid for installing the system.

3.15 PAYMENT

- A. No portion of the collection system shall be included in any estimate for partial payment until it has been made available for visual inspection by the Engineer. Should infiltration appear excessive the Engineer may require the Contractor to perform the infiltration tests as specified above prior to payment. Should the section being tested fail to meet the requirements for infiltration it shall not be included for payment until the leakage has been corrected. Approval by the Engineer or partial payments to the Contractor does not constitute approval of the work.
- B. As-built information and surveys shall be up to date at the end of each pay period. The collection system shall not be included in the partial payments unless certified as-built invert elevations have been submitted.
- C. Depth of cut shall be measured from the invert of the pipe to the existing ground elevation at the time of cut for sewers and from the invert of the deepest sewer to the top of the cast iron rim for manholes. Length of sewers and building laterals shall be determined by horizontal measurement along the backfilled trench and shall include manholes except at junctions or changes in direction where measurement shall be to manhole centers.
- D. Upon completion of all gravity sewers and prior to the final acceptance and making the final pay estimate (or at time so designated by the Engineer), the Contractor shall submit to the Owner-As-Built Drawings and Cut Sheets certified by a Florida Registered Land Surveyor. The As-Built information shall include certification of final line and grade of all gravity sewer lines and invert elevations and rim elevations of all manholes. Basis of measurements shall be as per the above requires.
- E. The Owner reserves right to have a Registered Land Surveyor perform spot checks of As-Built information provided by the Contractor. The Owner shall pay the costs of such survey work. Should any spot checks indicate that any portion of the installation does not comply with these Drawings and Specifications, a recheck shall be performed by another (or third) Registered Land Surveyor agreed to by both Owner and Contractor, at the Contractor's expense. If the recheck confirms the first check, that portion of the work shall be removed and replaced or modified at no additional cost to the Owner until satisfactory compliance is attained.
- F. The cost of preparing all As-Built information and records shall be included in the contract price for the appropriate unit or lump sum item and shall not be an extra or additional charge to the Owner.

3.16 BASIS OF PAYMENT

- A. Gravity sewers shall be paid for at the price stated per foot for the depth of cut required. Manholes shall be paid for at the price state each for the depth of cut and type required. Laterals shall be paid for as lateral connections and lateral lines. Lateral connections shall include the wye or tee branch fitting in the main line, rock bedding as required, single branch wyes as required, and plugs. Lateral connections shall be paid for at the price stated for each required, all cuts. Lateral lines stated for each required, all cuts. Lateral lines shall include the pipe from the connection to the property line including the bends. Lateral lines shall be paid for at the price stated per linear foot, measured horizontally, all cuts. Encasements shall be paid for at the price stated for each type lateral connection installed.
- B. Payment for the above items shall include all materials, equipment and labor for unloading, hauling, storing, installation, supervision, cleaning, restoration, testing and incidentals required to complete work in place, tested and ready for operation.

END OF SECTION

SECTION 02931

SODDING

PART 1 – GENERAL

1.01 WORK INCLUDED

- A. Furnish all labor, materials, equipment and incidentals required to prepare lawn bed and install sodding as shown on contract drawings and as specified herein.
- B. Area to receive sodded grass lawns within the landscape limits shown on the Drawings except as noted herein shall be as designated on the Drawings.

1.02 SUBMITTALS

- A. Provide technical data as specified in Section 01340 for Shop Drawings on all materials or installation procedures required under this Section.
- B. Submit representative topsoil samples for analysis by a private laboratory to determine nutrient deficiencies and outline a proper fertilization program.
- C. Submit as provided in Section 01720 certifications required for all sodding supplied.

PART 2 – PRODUCTS

2.01 SOD

- A. Sod shall be Bahia, St. Augustine or Bermuda to match that of the adjacent property where Sodding is specified.
- B. Sod shall be certified to meet Florida State Plant Board specifications, absolutely true to varietal type, and free from weeds or other objectionable vegetation, fungus, insects and disease of any kind.
- C. Before being cut and lifted, the sod shall have been mowed 3 times with the final mowing not more than 1-week before cutting into uniform dimensions.

2.02 SOIL CONDITIONERS

- A. Fertilizer:
 - 1. Fertilizer shall be a complete fertilizer, the elements of which are derived from organic sources. Fertilizer shall be a standard product complying with State and Federal fertilizer laws.
 - 2. Percentages of nitrogen, phosphorus and potash shall be based on laboratory tests on soils outlined in Paragraph 1.02B and approved by the Engineer. For purpose of bidding, assume 6% nitrogen, 6% phosphorus and 6% potash by weight. At least 50% of the total nitrogen shall contain no less than 3% water-insoluble nitrogen.

3. Fertilizer shall be delivered to the site, mixed as specified, in the original unopened standard size bags showing weight, analysis and name of manufacturer. Containers shall bear the manufacturer's certificate of compliance covering analysis shall be furnished to the Engineer. Store fertilizer in a weather-proof place and in such a manner that it will be kept dry and its effectiveness will not be impaired.
- B. Super phosphate shall be composed of finely ground phosphate rock as commonly used for agricultural purposes containing not less than 20% available phosphoric acid.

PART 3 – EXECUTION

3.01 LAWN BED PREPARATION

- A. Areas to be sodded shall be cleared of all rough grass, weeds and debris, and the ground brought to an even grade as approved.
- B. The soil shall be then thoroughly tilled to a minimum 8-inch depth.
- C. Super phosphate at a rate for bidding purposes of 5-pounds per 1000-square foot and complete fertilizer at a rate for bidding purposes of 16-pounds per 1000-square foot shall be evenly distributed over entire area and cross-disced in to a depth of 4-6-inches.
- D. The areas shall be brought to a proper grade, free of sticks, stones, or other foreign matter over 1 inch diameter or dimension. The surface shall conform to finish grade, less the thickness of sod, free of water-retaining depressions, the soil friable and uniformly firm texture.

3.02 SOD HANDLING AND INSTALLATION

- A. During delivery, prior to planting, and during the planting of the lawn areas, the sod panels shall at all times be protected from excessive drying and unnecessary exposure of the roots to the sun. All sod shall be stacked during construction and planting so as not to be damaged by sweating or excessive heat and moisture.
- B. After completion of soil conditioning as specified above, sod panels shall be laid tightly together so as to make a solid sodded lawn area. On mounds and other slopes, the long dimension of the sod shall be laid perpendicular to the slope. Immediately following sod laying the lawn areas shall be rolled with a lawn roller customarily used for such purposes, and then thoroughly watered.
- C. Bring the sod edge in a neat, clean matter to the edge of all paving and shrub areas. Top dressing with approved, clean, weed free, sand may be required at no additional cost to the Owner if deemed necessary by the Engineer.

3.03 MAINTENANCE

- A. The Contractor shall produce a dense, well-established lawn. The Contractor shall be responsible for the repair and re-sodding of all eroded or bare spots until project acceptance. Repair sodding shall be accomplished as in the original work.
- B. Begin maintenance immediately after planting.
- C. Maintain lawns until final acceptance.
- D. Maintain sod by watering, fertilizing, weeding, mowing, trimming, and other operations such as rolling, regrading and replanting as required to establish a smooth, acceptable lawn, free of eroded or bare areas.
- E. Mowing:
 - 1. Whenever grass reaches a height of 3 inches, it shall be cut back to 2" with all clippings removed.
- F. Watering:
 - 1. Sufficient watering shall be done by the Contractor to maintain adequate moisture for optimum development of the lawn areas. Sodded areas shall receive no less than 1.5- inches of water per week.

3.04 REPAIRS TO LAWN AREAS DISTRIBUTED BY CONTRACTOR'S OPERATIONS

- A. Lawn areas planted under this Contract and lawn areas outside the designated areas damaged by Contractor's operations shall be repaired at once by proper sod bed preparation, fertilizing and re-sodding, in accordance with these specifications.

END OF SECTION

SECTION 03200
CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish all labor, materials, equipment and incidentals required to install all steel bars, steel wire, and wire fabric required for the reinforcement of concrete, as shown on the Drawings and as specified herein.

1.02 RELATED WORK

- A. Concrete is included in Section 03300.
- B. Water-stops are included in Section 03251.

1.03 SUBMITTALS

- A. Submit to the Engineer, as provided in the General Conditions and Section 01340 completely detailed working drawings and schedules of all reinforcement required.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Unless otherwise specified or required, the design, materials, workmanship, and erection shall conform to the requirements of the latest local Building Code and the latest ACI 318 Code. In case of conflict, the latest local Building Code shall govern.
- B. Concrete reinforcement in sizes No.3 (3/8-inch) and larger shall be deformed steel bars of the sizes and shapes indicated on the Drawings. The steel shall be newly rolled stock of domestic manufacture, substantially free from mill scale, rust, dirt, grease, or other foreign matter. Bars shall be of intermediate grade, deformed billet steel conforming to ASTM Specification A615, Grade 60.
- C. Rail-steel bars will not be allowed in the work.
- D. Reinforcement shall be accurately fabricated to the dimensions indicated on the Drawings. Particular care shall be exercised not to have stirrups oversize in order to maintain proper coverage of concrete. Stirrups and tie bars shall be bent around a revolving collar having a diameter not less than 2 times the minimum thickness of the bar. Bends for other bars shall be made around a pin having a diameter not less than 6 times the minimum thickness of the bar except for bars 1 larger than 1-inch, in which case the bends shall be made around a pin of 8-bar diameters. All bars shall be bent cold. Bars reduced in section or with kinks

or bends not shown on the Drawings will not be accepted.

- E. Wire fabric shall conform to ASTM Specification A185 for Welded Steel Wire Fabric for Concrete Reinforcement.
- F. Steel wire shall conform to ASTM Specification A82 for Cold-Drawn Steel 1 for Concrete Reinforcement. Wire ties shall be zinc coated annealed iron of not less than No. 18 gage.

2.02 HANDLING MATERIALS

- A. Reinforcement shall be shipped to the work with bars of the same size and shape fastened in bundles with metal identification tags giving size and mark securely wired on. The identification tags shall be labeled with the same designation as shown on submitted bar schedules and shop drawings.
- B. All bars shall be stored off the ground and shall be protected from moisture and be kept free from dirt, oil, or injurious contaminants.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. No reinforcing bars shall be welded either during fabrication or erection without prior written approval from the Engineer. All bars that have been welded, including tack welds, without such approval shall be immediately removed from the work.
- B. Unless otherwise shown, splices in reinforcement shall be lapped not less than 24 bar diameters. All bar splices shall be staggered wherever possible. When splicing bars of different diameters, the length of lap is based on the larger bar.
- C. Before being placed in position, reinforcement shall be thoroughly cleaned of loose mill and rust scale, dirt, and other coatings that reduce or destroy bond. Where there is delay in depositing concrete after reinforcement is in place, bars shall be re-inspected and cleaned when necessary.
- D. Reinforcement shall be accurately positioned as indicated on the Drawings, and secured against displacement by using wire ties or suitable clips at intersections.
- E. All accessories such as chairs, chair bars, and the like are an integral part of the reinforcement and shall be furnished and installed in sufficient quantity to satisfactorily position all steel and in accordance with the latest (ACI 315) Manual of Standard Practice for Detailing Reinforced Concrete Structures.
- F. Except as otherwise indicated on the Drawings, bars in slabs, beams and girders shall be spliced as per requirements in ACI 315. Splices and laps in columns, piers and struts shall be sufficient to transfer full stress by bond. Splices in adjacent bars shall be staggered if required.
- G. Except as otherwise indicated on the Drawings, reinforcement shall be installed with clearance for concrete coverage as follows:

Footing bottom	3-inch
Formed surfaces in contact with soil or exposed to the weather	2-inch
Columns, beams and shear-walls.....	1-1/2-inch
Slabs on grade	1-1/2-inch
Bottom steel of interior slabs	1-inch
Top steel of interior slabs	3/4-inch
Bottom steel in grid slabs	1-1/2-inch
Interior face of walls	1-inch

- H. All slab reinforcing shall be supported on concrete cubes or wafers of the correct height. Wafers shall contain soft steel wires embedded therein for fastening to reinforcing. Wafers shall have a minimum compressive strength of 3,500 psi and shall have been cured as specified for concrete. Masonry units will not be permitted for supporting steel in bottom mats or elsewhere. For supporting the top steel in slabs, the Contractor shall furnish extra steel supports such as channels if required and shall construct blocks of concrete having the same quality as specified for the structure for use in supporting both top and bottom mat steel. Wood blocks, stones, brick chips, etc., cinder blocks; or concrete building blocks will not be allowed. Alternate methods for supporting top steel in slabs, such as vertical reinforcing fastened to bottom and top mats, may be used if approved by the Engineer.
- I. Alternate methods of supporting bottom reinforcement for slabs and beams not exposed to the weather (such as plastic chairs, but not plastic-tipped bolsters) may be used only if specifically approved by the Engineer.
- J. Reinforcement for vertical surfaces (beams, columns, walls) shall be properly and firmly positioned from the forms at all points by means of stainless steel (tipped) bolsters or equal, subject to Engineer's approval.
- K. Reinforcement which is to be exposed for a considerable length of time after being placed shall be painted with a heavy coat of neat cement slurry.
- L. In no case shall any reinforcing steel be covered with concrete until the amount and position of the reinforcements has been checked by the Engineer and his permission given to proceed with the concreting. The Engineer shall be given ample prior notice of the availability of set reinforcement for checking.

END OF SECTION

SECTION 03251

JOINTS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish all materials, labor, equipment and incidentals required to make all joints tight in the concrete as detailed on the Drawings and as specified herein.

1.02 SUBMITTALS

- A. Submit to the Engineer, as provided in the General Conditions and Section 01340, shop drawings showing placement of forms, form joints major inserts and blockouts.

PART 2 - PRODUCTS

2.01 EXPANSION JOINTS - FLOOR

- A. Floor expansion joints shall be types UX-F100 and UX-J100, 1-inch joint systems as manufactured by MM Systems Corporation, Tucker, Georgia or approved equal.
- B. Retainers shall be extruded aluminum alloy 6063-T5. Aluminum retainers shall be chemically treated to prepare surfaces for complete adhesion of the sealant.
- C. Sealant shall be an electrometric material capable of allowing multidirectional movement while maintaining cohesion and adhesion capabilities. The sealant shall have a maximum hardness of Shore A25 with tensile strength and elongation to meet ASTM 0412. The sealant shall perform between temperatures of -20°F and 150°F. Moisture vapor transmission shall meet ASTM C355.
- D. The joint assembly shall be capable of a minimum of 50-percent movement in any direction from the normal position.
- E. All aluminum surfaces in contact with concrete or masonry shall receive one sprayed-on, factory applied coat of baked-on epoxy primer.
- F. Sealant color shall be selected by the Engineer.

2.02 EXPANSION JOINTS - OTHER

- A. Pre-molded joint filler shall be 3/4-inch thick or as shown on the Drawings and shall be a self-expanding cork, Servicised Products, W.R. Grace and Company, Code No. 4324 equal by W.R. Meadows, Inc., or equal.
- B. Joint sealant shall be a two component synthetic rubber compound based on Thiokol liquid polysulphide polymer by W.R. Grace and Company, Toch Bros., Tremco Co., or equal. Sealant shall develop a Shore Hardness of at least 30 after seven days curing. Back-up material where required shall be approved closed cell polyethylene foam rods of diameters to suit joint conditions.

- C. Primer shall be as recommended by sealant manufacturer.

2.03 WATERSTOPS

- A. Waterstops for construction joints, if so indicated, shall be 8 or 12 inches x 1/2-inch steel and be hot-dipped galvanized unless otherwise shown on the Drawings.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Steel water-stops shall have all joints fully welded and shall be carefully set and held in place so that 4-inches extends straight into concrete placement at each side of joint.
- B. Pre-molded joint fillers shall be installed at all locations shown on the Drawings.
- C. Joint sealant for all joints indicated on the Drawings shall be placed to the depths shown. Preparation of surfaces, priming, and the handling and preparation of materials shall be in complete compliance with the manufacturer's instructions as approved.
- D. Flex-Seal systems shall be installed in accordance with the manufacturer's recommendations.

END OF SECTION

SECTION 03300
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mix design, placement procedures and finishes.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume.

1.4 SUBMITTALS

- A. Product Data: For each type of manufactured material and product indicated.
- B. Design Mixes: For each concrete mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mix water to be withheld for later addition at Project site.
- C. Steel Reinforcement Shop Drawings: Details of fabrication, bending, and placement, prepared according to ACI 315, "Details and Detailing of Concrete Reinforcement." Include material, grade, bar schedules, stirrup spacing, bent bar diagrams, arrangement, and supports of concrete reinforcement. Include special reinforcement required for openings through concrete structures.
- D. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork. Design and engineering of formwork are Contractor's responsibility.
 - 1. Shoring and Re-shoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and installing and removing re-shoring.
- E. Welding Certificates: Copies of certificates for welding procedures and personnel.

- F. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:
- G. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:
 - 1. Cementitious materials and aggregates.
 - 2. Form materials and form-release agents.
 - 3. Steel reinforcement and reinforcement accessories.
 - 4. Fiber reinforcement.
 - 5. Admixtures.
 - 6. Waterstops.
 - 7. Curing materials.
 - 8. Floor and slab treatments.
 - 9. Bonding agents.
 - 10. Adhesives.
 - 11. Vapor retarders.
 - 12. Epoxy joint filler.
 - 13. Joint-filler strips.
 - 14. Repair materials.
- H. Minutes of pre-installation conference.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed concrete Work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for formwork and shoring and re-shoring installations that are similar to those indicated for this Project in material, design, and extent.
- C. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.
 - 1. Manufacturer must be certified according to the National Ready Mixed Concrete Association's Certification of Ready Mixed Concrete Production Facilities.
- D. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

- E. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.
- F. Welding: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code--Reinforcing Steel."
- G. ACI Publications: Comply with the following, unless more stringent provisions are indicated:
 - 1. ACI 301, "Specification for Structural Concrete."
 - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 - 1. Plywood, metal, or other approved panel materials.
 - 2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. High-density overlay, Class 1, or better.
 - b. Medium-density overlay, Class 1, or better, mill-release agent treated and edge sealed.
 - c. Structural 1, B-B, or better, mill oiled and edge sealed.
 - d. B-B (Concrete Form), Class 1, or better, mill oiled and edge sealed.

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- B. Plain-Steel Wire: ASTM A 82, as drawn.

2.3 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:
 - 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected or CRSI Class 2 stainless-steel bar supports.

- B. Joint Dowel Bars: Plain-steel bars, ASTM A 615/A 615M, Grade-60 (Grade-420). Cut bars true to length with ends square and free of burrs.

2.4 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type II.
 - 1. Fly Ash: ASTM C 618, Class C or F.
 - 2. Fly Ash: ASTM C 618, Class F.
 - 3. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- B. Silica Fume: ASTM C 1240, amorphous silica.
- C. Normal-Weight Aggregate: ASTM C 33, uniformly graded, and as follows:
 - 1. Class: Moderate weathering region, but not less than 3M.
 - 2. Nominal Maximum Aggregate Size: 1-inch (25 mm).
 - 3. Combined Aggregate Gradation: Well graded from coarsest to finest with not more than 18-percent and not less than 8-percent retained on an individual sieve, except that less than 8-percent may be retained on coarsest sieve and on No. 50 (0.3-mm) sieve, and less than 8-percent may be retained on sieves finer than No. 50 (0.3 mm).
- D. Water: Potable and complying with ASTM C 94.

2.5 ADMIXTURES

- A. General: Admixtures certified by manufacturer to contain not more than 0.1-percent water-soluble chloride ions by mass of cementitious material and to be compatible with other admixtures and cementitious materials. Do not use admixtures containing calcium chloride.
- B. Air-Entraining Admixture: ASTM C 260.
- C. Water-Reducing Admixture: ASTM C 494, Type A.
- D. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
- E. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.
- F. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
- G. Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Catexol 1000CL; Axim Concrete Technologies.
 - b. MCI 2000 or MCI 2005; Cortec Corporation.

- c. DCI or DCI-S; W. R. Grace & Co., Construction Products Div.
- d. Rheocrete 222+; Master Builders, Inc.
- e. FerroGard-901; Sika Corporation

2.6 WATERSTOPS

- A. Flexible Rubber Waterstops: CE CRD-C 513, for embedding in concrete to prevent passage of fluids through joints. Factory fabricated corners, intersections, and directional changes.
 - 1. Profile: Flat, dumbbell with center bulb.
 - 2. Profile: Flat, dumbbell without center bulb.
 - 3. Profile: Ribbed with center bulb.
 - 4. Profile: Ribbed without center bulb.
 - 5. Profile: As indicated.
- B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- C. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Rubber Waterstops:
 - a. Greenstreak.
 - b. Progress Unlimited Inc.
 - c. Westec Barrier Technologies; Div. of Western Textile Products, Inc.
 - d. Williams Products, Inc.
- D. Self-Expanding Strip Waterstops: Manufactured rectangular or trapezoidal strip, sodium bentonite or other hydrophylic material for adhesive bonding to concrete.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Volclay Waterstop-RX; Colloid Environmental Technologies Co.
 - b. Conseal CS-231; Concrete Sealants Inc.
 - c. Swellseal Joint; De Neef Construction Chemicals (U.S.) Inc.
 - d. Hydrotite; Greenstreak.
 - e. Mirastop; Mirafi Moisture Protection, Div. of Royal Ten Cate (USA), Inc.
 - f. Adeka Ultra Seal; Mitsubishi International Corporation.
 - g. Superstop; Progress Unlimited Inc.

2.7 FLOOR AND SLAB TREATMENTS

- A. Slip-Resistive Aggregate Finish: Factory-graded, packaged, rustproof, non-glazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery with emery aggregate containing not less than 50-percent aluminum oxide and not less than 25-percent ferric oxide; unaffected by freezing, moisture, and cleaning materials.

- B. Non-pigmented Mineral Dry-Shake Floor Hardener: Factory-packaged dry combination of Portland cement, graded quartz aggregate and plasticizing admixture.
- C. Pigmented Mineral Dry-Shake Floor Hardener: Factory-packaged dry combination of Portland cement, graded quartz aggregate, coloring pigments, and plasticizing admixture. Use coloring pigments that are finely ground, non-fading mineral oxides interground with cement.
 - 1. Colors: Match Architect's samples.
 - 2. Colors: As indicated by referencing manufacturer's designations.
 - 3. Colors: As selected by Architect from manufacturer's full range for these characteristics.
- D. Penetrating Liquid Floor Treatment: Chemically reactive, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; colorless; that penetrates, hardens, and densifies concrete surfaces.
- E. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
- F. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Unpigmented Mineral Dry-Shake Floor Hardener:
 - a. Non-Metallic Floor Hardener; Burke Group, LLC (The).
 - b. Concolor; ChemMasters.
 - c. Conshake 500; Conspec Marketing & Manufacturing Co., Inc.
 - d. Quartz Tuff; Dayton Superior Corporation.
 - e. Surflex; Euclid Chemical Co.
 - f. Tycron; Kaufman Products, Inc.
 - g. Colorhard; Lambert Corporation.
 - h. Quartzplate; L&M Construction Chemicals, Inc.
 - i. Maximent; Master Builders, Inc.
 - j. Floor Quartz; Metalcrete Industries.
 - k. Hard Top; Richmond Screw Anchor Co.
 - l. Lithochrome Color Hardener; L. M. Scofield Co.
 - m. Harcol; Sonneborn, Div. of ChemRex, Inc.
 - n. Durag Premium; Sternson Group.
 - o. Hard Top; Symons Corporation.
 - 2. Pigmented Mineral Dry-Shake Floor Hardener:
 - a. Non-Metallic Floor Hardener; Burke Group, LLC (The).
 - b. Concolor; ChemMasters.
 - c. Conshake 600; Conspec Marketing & Manufacturing Co., Inc.
 - d. Quartz Tuff; Dayton Superior Corporation.
 - e. Surflex; Euclid Chemical Co.
 - f. Tycron; Kaufman Products, Inc.
 - g. Colorhard; Lambert Corporation.
 - h. Quartzplate; L&M Construction Chemicals, Inc.
 - i. Maximent; Master Builders, Inc.
 - j. Floor Quartz; Metalcrete Industries.
 - k. Lithochrome Color Hardener; L. M. Scofield Co.
 - l. Harcol; Sonneborn, Div. of ChemRex, Inc.

- m. Colorplete; Sternson Group.
- 3. Penetrating Liquid Floor Treatment:
 - a. Titan Hard; Burke Group, LLC (The).
 - b. Chemisil Plus; ChemMasters.
 - c. Intraseal; Conspec Marketing & Manufacturing Co., Inc.
 - d. Ashford Formula; Curecrete Chemical Co., Inc.
 - e. Day-Chem Sure Hard; Dayton Superior Corporation.
 - f. Euco Diamond Hard; Euclid Chemical Co.
 - g. Seal Hard; L&M Construction Chemicals, Inc.
 - h. Vexcon Starseal PS; Vexcon Chemicals, Inc.

2.8 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Solvent-Borne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
- F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
- G. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, 18 to 22-percent solids.
- H. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
- I. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
- J. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
- K. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Evaporation Retarder:
 - a. Cimfilm; Axim Concrete Technologies.
 - b. Finishing Aid Concentrate; Burke Group, LLC (The).
 - c. Spray-Film; ChemMasters.
 - d. Aquafilm; Conspec Marketing & Manufacturing Co., Inc.
 - e. Sure Film; Dayton Superior Corporation.

- f. Eucobar; Euclid Chemical Co.
- g. Vapor Aid; Kaufman Products, Inc.
- h. Lambco Skin; Lambert Corporation.
- i. E-Con; L&M Construction Chemicals, Inc.
- j. Confilm; Master Builders, Inc.
- k. Waterhold; Metalcrete Industries.
- l. Rich Film; Richmond Screw Anchor Co.
- m. SikaFilm; Sika Corporation.
- n. Finishing Aid; Symons Corporation.
- o. Certi-Vex EnvioAssist; Vexcon Chemicals, Inc.
- 2. Clear, Solvent-Borne, Membrane-Forming Curing Compound:
 - a. AH Clear Cure; Anti-Hydro International, Inc.
 - b. Spartan-Cote; Burke Group, LLC (The).
 - c. Spray-Cure & Seal 15; ChemMasters.
 - d. Conspec #1-15-percent solids; Conspec Marketing & Manufacturing Co., Inc.
 - e. Day-Chem Cure and Seal; Dayton Superior Corporation.
 - f. Diamond Clear; Euclid Chemical Co.
 - g. Nitocure S; Fosroc.
 - h. Cure & Seal 309; Kaufman Products Inc.
 - i. Lambco 120; Lambert Corporation.
 - j. L&M Dress & Seal 18; L&M Construction Chemicals, Inc.
 - k. CS-309; W. R. Meadows, Inc.
 - l. Seal N Kure; Metalcrete Industries.
 - m. Rich Seal 14-percent UV; Richmond Screw Anchor Co.
 - n. Kure-N-Seal; Sonneborn, Div. of ChemRex, Inc.
 - o. Flortec 14; Sternson Group.
 - p. Cure & Seal 14-percent; Symons Corporation.
 - q. Clear Seal 150; Tamms Industries Co., Div. of LaPorte Construction Chemicals of North America, Inc.
 - r. Acrylic Cure; Unitex.
 - s. Certi-Vex AC 309; Vexcon Chemicals, Inc.
- 3. Clear, Waterborne, Membrane-Forming Curing Compound:
 - a. AH Clear Cure WB; Anti-Hydro International, Inc.
 - b. Klear Kote WB II Regular; Burke Chemicals.
 - c. Safe-Cure & Seal 20; ChemMasters.
 - d. High Seal; Conspec Marketing & Manufacturing Co., Inc.
 - e. Safe Cure and Seal; Dayton Superior Corporation.
 - f. Aqua Cure VOX; Euclid Chemical Co.
 - g. Cure & Seal 309 Emulsion; Kaufman Products Inc.
 - h. Glazecote Sealer-20; Lambert Corporation.
 - i. Dress & Seal WB; L&M Construction Chemicals, Inc.
 - j. Vocomp-20; W. R. Meadows, Inc.
 - k. Metcure; Metalcrete Industries.
 - l. Cure & Seal 150E; Nox-Crete Products Group, Kinsman Corporation.
 - m. Rich Seal 14-percent E; Richmond Screw Anchor Co.
 - n. Kure-N-Seal WB; Sonneborn, Div. of ChemRex, Inc.
 - o. Florseal W.B.; Sternson Group.
 - p. Cure & Seal 14-percent E; Symons Corporation.

- q. Seal Cure WB 150; Tamms Industries Co., Div. of LaPorte Construction Chemicals of North America, Inc.
- r. Hydro Seal; Unitex.
- s. Starseal 309; Vexcon Chemicals, Inc.
- 4. Clear, Waterborne, Membrane-Forming Curing Compound, 18 to 22-percent Solids:
 - a. Klear Kote WB II 20-percent; Burke Chemicals.
 - b. Safe-Cure & Seal 20; ChemMasters.
 - c. Conspec 21; Conspec Marketing & Manufacturing Co., Inc.
 - d. Diamond Clear VOX; Euclid Chemical Co.
 - e. SureCure Emulsion; Kaufman Products Inc.
 - f. Glazecote Sealer-20; Lambert Corporation.
 - g. Dress & Seal WB; L&M Construction Chemicals, Inc.
 - h. Vocomp-20; W. R. Meadows, Inc.
 - i. Metcure 0800; Metalcrete Industries.
 - j. Cure & Seal 200E; Nox-Crete Products Group, Kinsman Corporation.
 - k. Rich Seal 18-percent E; Richmond Screw Anchor Co.
 - l. Kure-N-Seal W; Sonneborn, Div. of ChemRex, Inc.
 - m. Florseal W.B.; Sternson Group.
 - n. Cure & Seal 18-percent E; Symons Corporation.
 - o. Seal Cure WB STD; Tamms Industries Co., Div. of LaPorte Construction Chemicals of North America, Inc.
 - p. Hydro Seal 800; Unitex.
 - q. Starseal 0800; Vexcon Chemicals, Inc.
- 5. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound:
 - a. Spray-Cure & Seal Plus; ChemMasters.
 - b. UV Super Seal; Lambert Corporation.
 - c. Lumiseal Plus; L&M Construction Chemicals, Inc.
 - d. CS-309/30; W. R. Meadows, Inc.
 - e. Seal N Kure 30; Metalcrete Industries.
 - f. Rich Seal 31-percent UV; Richmond Screw Anchor Co.
 - g. Cure & Seal 31-percent UV; Symons Corporation.
 - h. Certi-Vex AC 1315; Vexcon Chemicals, Inc.
- 6. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound:
 - a. Klear-Kote Cure-Sealer-Hardener, 30-percent solids; Burke Group, LLC (The).
 - b. Polyseal WB; ChemMasters.
 - c. UV Safe Seal; Lambert Corporation.
 - d. Lumiseal WB Plus; L&M Construction Chemicals, Inc.
 - e. Vocomp-30; W. R. Meadows, Inc.
 - f. Metcure 30; Metalcrete Industries.
 - g. Vexcon Starseal 1315; Vexcon Chemicals, Inc.

2.9 RELATED MATERIALS

- A. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- B. Joint-Filler Strips: ASTM D 1752, cork or self-expanding cork.

- C. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752, cork or self-expanding cork.
- D. Epoxy Joint Filler: Two-component, semi-rigid, 100-percent solids, epoxy resin with a Shore A hardness of 80 per ASTM D 2240.
- E. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- F. Epoxy-Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class and grade to suit requirements, and as follows:
 - 1. Type II, non-load bearing, for bonding freshly mixed concrete to hardened concrete.
 - 2. Types I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
 - 3. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- G. Reglets: Fabricate reglets of not less than 0.0217-inch- (0.55-mm-) thick galvanized steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.
- H. Dovetail Anchor Slots: Hot-dip galvanized steel sheet, not less than 0.0336-inch (0.85 mm) thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.10 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8-inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150, Portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8- to 1/4- inch (3 to 6 mm) or coarse sand as recommended by underlayment manufacturer.
 - 4. Compressive Strength: Not less than 4100 psi (29 MPa) at 28-days when tested according to ASTM C 109/C 109M.
- B. Repair Topping: Traffic-bearing, cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4- inch (6 mm).
 - 1. Cement Binder: ASTM C 150, Portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.

3. Aggregate: Well-graded, washed gravel, 1/8- to 1/4 -inch (3 to 6 mm) or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5700 psi (39 MPa) at 28-days when tested according to ASTM C 109/C 109M.

2.11 CONCRETE MIXES

- A. Prepare design mixes for each type and strength of concrete determined by either laboratory trial mix or field test data bases, as follows:
 1. Proportion normal-weight concrete according to ACI 211.1 and ACI 301.
- B. Use a qualified independent testing agency for preparing and reporting proposed mix designs for the laboratory trial mix basis.
- C. Slab-on-Grade: Proportion normal-weight concrete mix as follows:
 1. Compressive Strength (28 Days): 3000 psi (20.7 MPa).
 2. Minimum Cementitious Materials Content: 520- lb/cu. yd. (309 kg/cu. m).
 3. Maximum Slump: 5-inches (125 mm).
- D. Suspended Slabs: Proportion normal-weight concrete mix as follows:
 1. Compressive Strength (28-Days): 4000 psi (27.6 MPa).
 2. Maximum Slump: 5-inches (125 mm).
 3. Inches (125 mm).
- E. Building Frame Members: Proportion normal-weight concrete mix as follows:
 1. Compressive Strength (28-Days): 4000 psi (27.6 MPa).
 2. Maximum Slump: 5-inches (125 mm).
 3. Maximum Slump for Concrete Containing High-Range Water-Reducing Admixture: 8- inches (200 mm) after admixture is added to concrete with 2- to 4- inch (50- to 100-mm) slump.
- F. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than Portland cement in concrete as follows:
 1. Fly Ash: 25-percent.
 2. Combined Fly Ash and Pozzolan: 25-percent.
 3. Ground Granulated Blast-Furnace Slag: 50-percent.
 4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50-percent Portland cement minimum, with fly ash or pozzolan not exceeding 25-percent.
 5. Silica Fume: 10-percent.
 6. Combined Fly Ash, Pozzolans, and Silica Fume: 35-percent with fly ash or pozzolans not exceeding 25-percent and silica fume not exceeding 10-percent.
 7. Combined Fly Ash or Pozzolans, Ground Granulated Blast-Furnace Slag, and Silica Fume: 50-percent Portland cement minimum, with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10-percent.

- G. Maximum Water-Cementitious Materials Ratio: 0.40 for corrosion protection of steel reinforcement in concrete exposed to chlorides from deicing chemicals, salt, saltwater, brackish water, seawater, or spray from these sources.
- H. Air Content: Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content as follows within a tolerance of plus 1 or minus 1.5-percent, unless otherwise indicated:
 - 1. Air Content: 5.5-percent for 1-1/2-inch- (38-mm-) nominal maximum aggregate size.
 - 2. Air Content: 6-percent for 1-inch- (25-mm-) nominal maximum aggregate size.
 - 3. Air Content: 6-percent for 3/4-inch- (19-mm-) nominal maximum aggregate size.
- I. Limit water-soluble, chloride-ion content in hardened concrete to 0.15-percent by weight of cement.
- J. Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing admixture or high-range water-reducing admixture (superplasticizer) in concrete, as required, for placement and workability.
 - 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 - 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
 - 4. Use corrosion-inhibiting admixture in concrete mixes where indicated.

2.12 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.13 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and ASTM C 1116, and furnish batch ticket information.
 - 1. When air temperature is between 85 and 90-deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2-hours to 75-minutes; when air temperature is above 90- deg F (32 deg C), reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.
 - 1. For mixer capacity of 1- cu. yd. (0.76 cu. m) or smaller, continue mixing at least one and one-half minutes, but not more than five minutes after ingredients are in mixer, before any part of batch is released.
 - 2. For mixer capacity larger than 1- cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1- cu. yd. (0.76 cu. m).
 - 3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mix type, mix time, quantity, and

amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until concrete structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
 - 1. Class A, 1/8-inch (3 mm).
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical. Kerf wood inserts for forming keyways, reglets, recesses, and the like, for easy removal.
 - 1. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use Setting Drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor bolts, accurately located, to elevations required.
 - 2. Install reglets to receive top edge of foundation sheet waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
 - 3. Install dovetail anchor slots in concrete structures as indicated.

3.3 REMOVING AND REUSING FORMS

- A. General: Formwork, for sides of beams, walls, columns, and similar parts of the Work, that does not support weight of concrete may be removed after cumulatively curing at not less than 50-deg F (10 deg C) for 24-hours after placing concrete provided concrete is hard enough to not be damaged by form-removal operations and provided curing and protection operations are maintained.
- B. Leave formwork, for beam soffits, joists, slabs, and other structural elements, that supports weight of concrete in place until concrete has achieved the following:
 - 1. 28-day design compressive strength.
 - 2. At least 70-percent of 28-day design compressive strength.
 - 3. Determine compressive strength of in-place concrete by testing representative field- or laboratory-cured test specimens according to ACI 301.
 - 4. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- C. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- D. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 SHORES AND RESHORES

- A. Comply with ACI 318 (ACI 318M), ACI 301, and recommendations in ACI 347R for design, installation, and removal of shoring and re-shoring.
- B. Plan sequence of removal of shores and re-shore to avoid damage to concrete. Locate and provide adequate re-shoring to support construction without excessive stress or deflection.

3.5 VAPOR RETARDERS

- A. Vapor Retarder: Place, protect, and repair vapor-retarder sheets according to ASTM E 1643 and manufacturer's written instructions.
- B. Fine-Graded Granular Material: Cover vapor retarder with fine-graded granular material, moisten, and compact with mechanical equipment to elevation tolerances of plus 0- inch (0 mm) or minus 3/4- inch (19 mm).
- C. Granular Fill: Cover vapor retarder with granular fill, moisten, and compact with mechanical equipment to elevation tolerances of plus 0- inch (0 mm) or minus 3/4-inch (19 mm).
 - 1. Place and compact a 1/2-inch- (13-mm-) thick layer of fine-graded granular material over granular fill.

3.6 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
 - 1. Shop- or field-weld reinforcement according to AWS D1.4, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire fabric in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.7 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.

2. Form from preformed galvanized steel, plastic keyway-section forms, or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2- inches (38 mm) into concrete.
 3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
 6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness, as follows:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8- inch (3 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Dowel Joints: Install dowel sleeves and dowels or dowel bar and support assemblies at joints where indicated.
1. Use dowel sleeves or lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.8 WATERSTOPS

- A. Flexible Waterstops: Install in construction joints as indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of Work. Field-fabricate joints in waterstops according to manufacturer's written instructions.
- B. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, bonding or mechanically fastening and firmly pressing into place. Install in longest lengths practicable.

3.9 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement, unless approved by Architect.
- C. Before placing concrete, water may be added at Project site, subject to limitations of ACI 301.
 - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mix.
- D. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation.
- E. Deposit concrete in forms in horizontal layers no deeper than 24-inches (600 mm) and in a manner to avoid inclined construction joints. Place each layer while preceding layer is still plastic, to avoid cold joints.
 - 1. Consolidate placed concrete with mechanical vibrating equipment. Use equipment and procedures for consolidating concrete recommended by ACI 309R.
 - 2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the vibrator. Place vibrators to rapidly penetrate placed layer and at least 6-inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix constituents to segregate.
- F. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
 - 1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - 2. Maintain reinforcement in position on chairs during concrete placement.
 - 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 - 4. Slope surfaces uniformly to drains where required.
 - 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, free of humps or hollows, before excess moisture or bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- G. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows, when hot-weather conditions exist:
 - 1. Cool ingredients before mixing to maintain concrete temperature below 90-deg F (32- deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total

amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.10 FINISHING FORMED SURFACES

- A. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Remove fins and other projections exceeding 1/8-inch (3 mm) in height.
 1. Apply to concrete surfaces exposed to public view or to be covered with a coating or covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, or painting.
 2. Do not apply rubbed finish to smooth-formed finish.
- B. Rubbed Finish: Apply the following to smooth-formed finished concrete:
 1. Smooth-Rubbed Finish: Not later than 1-day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
 2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part Portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white Portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36-hours.
 3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part Portland cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white Portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.
- C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.11 FINISHING FLOORS AND SLABS

- A. General: Comply with recommendations in ACI 302.1R for screeding, re-straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes.
1. Apply scratch finish to surfaces indicated and to surfaces to receive concrete floor topping or mortar setting beds for ceramic or quarry tile, Portland cement terrazzo, and other bonded cementitious floor finishes.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Re-straighten, cut down high spots, and fill low spots. Repeat float passes and re-straightening until surface is left with a uniform, smooth, granular texture.
1. Apply float finish to surfaces indicated, to surfaces to receive trowel finish, and to floor and slab surfaces to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.
- D. Trowel Finish: After applying float finish, apply first trowel finish and consolidate concrete by hand or power-driven trowel. Continue troweling passes and re-straighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
1. Apply a trowel finish to surfaces indicated and to floor and slab surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin film-finish coating system
 2. Finish surfaces to the following tolerances, measured within 24-hours according to ASTM E 1155/E 1155M for a randomly trafficked floor surface:
 - a. Specified overall values of flatness, F(F) 25; and levelness, F(L) 20; with minimum local values of flatness, F(F) 17; and levelness, F(L) 15.
 - b. Specified overall values of flatness, F (F) 35; and levelness, F (L) 25; with minimum local values of flatness, F (F) 24; and levelness, F (L) 17; for slabs-on-grade.
 - c. Specified overall values of flatness, F (F) 30; and levelness, F (L) 20; with minimum local values of flatness, F (F) 24; and levelness, F (L) 15; for suspended slabs.
 - d. Specified overall values of flatness, F (F) 45; and levelness, F (L) 35; with minimum local values of flatness, F (F) 30; and levelness, F (L) 24.
 3. Finish and measure surface so gap at any point between concrete surface and an unleveled freestanding 10-foot- (3.05-m-) long straightedge, resting on two high spots and placed anywhere on the surface, does not exceed the following:
 - a. 1/4- inch (6.4 mm).
 - b. 3/16- inch (4.8 mm).
 - c. 1/8- inch (3.2 mm).
- E. Trowel and Fine-Broom Finish: Apply a partial trowel finish, stopping after second troweling, to surfaces indicated and to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. Immediately after second troweling, and when concrete is still plastic, slightly scarify surface with a fine broom.
- F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
- G. Slip-Resistive Aggregate Finish: Before final floating, apply slip-resistive aggregate finish where indicated and to concrete stair treads, platforms, and ramps. Apply according to manufacturer's written instructions and as follows:
1. Uniformly spread 25- lb/100 sq. ft. (12 kg/10 sq. m) of dampened slip-resistive aggregate over surface in one or two applications. Tamp aggregate flush with surface, but do not force below surface.
 2. After broadcasting and tamping, apply float finish.
 3. After curing, lightly work surface with a steel wire brush or an abrasive stone, and water to expose slip-resistive aggregate.
- H. Mineral Dry-Shake Floor Hardener Finish: After initial floating, apply mineral dry-shake materials to surfaces according to manufacturer's written instructions and as follows:
1. Uniformly apply mineral dry-shake materials at a rate of 100 lb/100- sq. ft. (49 kg/10 sq. m), unless greater amount is recommended by manufacturer.
 2. Uniformly distribute approximately two-thirds of mineral dry-shake materials over surface by hand or with mechanical spreader, and embed by power floating. Follow power floating with a second mineral dry-shake application, uniformly distributing remainder of material, and embed by power floating.
 3. After final floating, apply a trowel finish. Cure concrete with curing compound recommended by dry-shake material manufacturer and apply immediately after final finishing.

3.12 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment.
- D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel-finish concrete surfaces.

3.13 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with recommendations in ACI 305R for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing by one or a combination of the following methods:
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than 7-days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12- inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than 7-days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer recommends for use with floor coverings.
 - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within 3-hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - 4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within 3-hours after initial application. Repeat process 24-hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.14 LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.
 - 1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
 - 2. Do not apply to concrete that is less than 7-days old.
 - 3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.
- B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions.

3.15 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 - 1. Defer joint filling until concrete has aged at least six months. Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semi-rigid epoxy joint filler full depth in saw-cut joints and at least 2- inches (50 mm) deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.16 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part Portland cement to two and one-half parts fine aggregate passing a No. 16 (1.2-mm) sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2- inch (13 mm) in any dimension in solid concrete but not less than 1- inch (25 mm) in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

2. Repair defects on surfaces exposed to view by blending white Portland cement and standard Portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01- inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 2. After concrete has cured at least 14-days, correct high areas by grinding.
 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
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4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4- inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 6. Repair defective areas, except random cracks and single holes 1- inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least 3/4- inch (19 mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mix as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 7. Repair random cracks and single holes 1- inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72- hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.17 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified independent testing and inspecting agency to sample materials, perform tests, and submit test reports during concrete placement according to requirements specified in this Article.
- B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
 - 1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mix exceeding 5- cu. yd. (4 cu. m), but less than 25- cu. yd. (19 cu. m), plus one set for each additional 50 -cu. yd. (38 cu. m) or fraction thereof.
 - 2. Testing Frequency: Obtain at least one composite sample for each 100- cu. yd. (76- cu. m) or fraction thereof of each concrete mix placed each day.
 - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mix, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 - 3. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
 - 4. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
 - 5. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40- deg F (4.4 deg C) and below and when 80-deg F (27 deg C) and above, and one test for each composite sample.
 - 6. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
 - 7. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of four standard cylinder specimens for each composite sample.
 - a. Cast and field cure one set of four standard cylinder specimens for each composite sample.
 - 8. Compressive-Strength Tests: ASTM C 39; test two laboratory-cured specimens at 7- days and two at 28-days.
 - a. Test two field-cured specimens at 7-days and two at 28-days.
 - b. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at age indicated.
- C. When strength of field-cured cylinders is less than 85-percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.

- D. Strength of each concrete mix will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
- E. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48-hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28- days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-and 28-day tests.
- F. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
- G. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by Architect.

END OF SECTION 03300

SECTION 03315

GROUT

PART 1 GENERAL

1.01 WORK INCLUDED

- A. The Contractor shall furnish all materials for grout in accordance with the provisions of this Section and shall form, mix, place, cure, repair, finish, and do all other work as required to produce finished grout, all in accordance with the requirements of the Contract Documents.

1.02 RELATED WORK

- A. Section 01340 – “Submittals and Substitutions”
- B. Section 03300 – “Cast-in-Place Concrete”

1.03 REFERENCES

- A. Specifications, codes, and standards shall be as specified in Section 03300 “Cast-in-Place Concrete,” and as referred to herein.
- B. Additional Commercial Standards: CRD-C 621 Corps of Engineers Specification for Non-Shrink Grout

1.04 SUBMITTALS

- A. The Contractor shall submit certified test results verifying the compressive strength, shrinkage, and expansion requirements specified herein; and manufacturer’s literature containing instructions and recommendations on the mixing, handling, placement and appropriate uses for each type of grout used in the work.

PART 2 - PRODUCTS

2.01 NON-SHRINK GROUT

- A. Non-shrink grout shall be a pre-packaged, non-organic, non-gas liberating, non-metallic, cement-based grout requiring only the addition of water. Manufacturer’s instructions shall be printed on each bag or other container in which the materials are packaged. The specific formulation for each class of non-shrink grout specified herein shall be that recommended by the manufacturer for each particular application.

2.02 Non-shrink grouts shall have a minimum 28-day compressive strength of 5000 psi, shall have no shrinkage (0.0-percent) and a maximum 4.0-percent expansion in the plastic state when tested in accordance with ASTM C 827, and shall have no shrinkage (0.0-percent) and a maximum of 0.2 percent expansion in the hardened state when tested in accordance with CRD C 621.EPOXY GROUT

- A. Epoxy mortar (grout) shall be used to set items specified. Epoxy mortar (grout) shall be a pre-packaged mix containing aggregate and epoxy mortar adhesive; utilize "Permatop" as manufactured by Permagile Corp. of America, or approved equal.

2.03 CURING MATERIALS

- A. Curing materials shall be as recommended by the manufacturer.

2.04 CONSISTENCY

- A. The consistency of grouts shall be that necessary to completely fill the space to be grouted for the particular application. Dry pack consistency is such that the grout is plastic and moldable but will not flow. Where "dry pack" is called for in the Contract Documents, it shall mean a grout of the above described consistency.

2.05 MEASUREMENT OF INGREDIENTS

- A. Pre-packaged grouts shall have ingredients measured by means recommended by the manufacturer.

PART 3 – EXECUTION

3.01 GENERAL

- A. All surface preparation, curing, and protection of cement grout shall be as specified in Section 03300 "Cast-in-Place Concrete". The finish of the grout surface shall match that of the adjacent concrete.
- B. All mixing, surface preparation, handling, placing, consolidation, and other means of execution for pre-packaged grouts shall be done according to the instructions and recommendations of the manufacturer.

3.02 CONSOLIDATION

- A. Grout shall be placed in such a manner, for the consistency necessary for each application, so as to assure that the space to be grouted is completely filled.

END OF SECTION

SECTION 03350
CONCRETE FINISHING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Work included: Provide finishes on cast-in-place concrete as called for on the Drawings, specified herein, and needed for a complete and proper installation.

1.02 RELATED DOCUMENTS

- A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.03 RELATED WORK

- A. Related Sections:
 - 1. Section 03300 - "Cast-in-Place Concrete".
 - 2. Section 03480 - "Precast Concrete Specialties".

1.04 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Except as may be modified herein or otherwise directed by the Engineer, comply with ACI 301 - "Specifications for Structural Concrete for Buildings."

1.05 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340 - "Submittals and Substitutions".
- B. Product Data: Within 35-calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section.
 - 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
 - 3. Manufacturer's recommended installation procedures which, when approved by the Engineer, will become the basis for accepting or rejecting actual installation procedures used for this work.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent provisions of Section 01640 – “Product Handling”.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. General:
 - 1. Carefully study the Drawings and these Specifications, and determine the location, extent, and type of required concrete finishes.
 - 2. As required for this work, provide the materials specified herein, or equals approved in advance by the Engineer.
- B. Concrete Materials: Comply with pertinent provisions of Section 03300 - "Cast-in-Place Concrete", except as may be modified herein.
- C. Liquid Bonding Agent: "Weld-Crete", manufactured by the Larsen Products Corporation.
- D. Curing and Protection Paper:
 - 1. Approved products:
 - a. "Sisalkraft, Orange Label", or;
 - b. Equal products complying with ASTM C171.
 - 2. Where concrete will be exposed and will be subjected to abrasion, such as floor slabs, use non-staining paper such as "Sisalkraft, Seekure 896," or equal paper faced with polyethylene film.
- E. Liquid Curing Agents:
 - 1. Where application of specified finish materials will be inhibited by use of curing agents, cure the surface by water only; do not use chemical cure.
 - 2. For chemical curing, use "Hunt TLF" manufactured by Hunt Process Company, Inc.
- F. Floor Sealer: Acceptable products:
 - 1. "Superkote Special Clear Sealer" manufactured by Ven-Chem Company, Inc., P. O. Box 3186, Santa Barbara, California, 93105, (213)342-1195.
 - 2. "Supershield" manufactured by James Darcey Company, Inc., 19712 Merridy Street, Chatsworth, California, 91311, (213)349-3705.
- G. Slip-Resistant Abrasive Aggregate:
 - 1. Provide aluminum oxide, 14/36 grading.
 - 2. Acceptable manufacturers:
 - a. Carborundum Company.
 - b. Norton Company.
 - c. L. M. Scofield Company.

2.02 OTHER MATERIALS

- A. Contractor shall provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject for the approval of the Engineer.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 FINISHING OF FORMED SURFACES

- A. General:
 - 1. After removal of forms, give the concrete surfaces one or more of the finishes specified below where so indicated on the Drawings.
 - 2. Revise the finishes as needed to secure the approval of the Engineer.
- B. As-cast finish:
 - 1. Rough form finish:
 - a. Leave surfaces with the texture imparted by forms, except patch tie holes and defects.
 - b. Remove fins exceeding 1/4-inch in height.
 - 2. Smooth form finish:
 - a. Coordinate as necessary to secure form construction using smooth, hard, uniform surfaces, with number of seams kept to a practical minimum and in a uniform and orderly pattern.
 - b. Patch tie-holes and defects.
 - c. Remove fins completely.
- C. Rubbed Finished:
 - 1. Provide these finishes only where specifically called for, and then only on a "smooth form finish" base as described above.
 - 2. Smooth rubbed finish:
 - a. Produce on newly hardened concrete no later than the day following form removal.
 - b. Wet the surfaces, and rub with carborundum brick or other abrasive until uniform color and texture are produced.
 - c. Do not use a cement grout other than the cement paste drawn from the concrete itself by the rubbing process.
 - 3. Grout cleaned finish:
 - a. Do not start cleaning operations until all contiguous surfaces to be cleaned are completed and accessible.
 - b. Do not permit cleaning while the work progresses.
 - c. Mix one part Portland cement and 1-1/2 parts fine sand with sufficient water to produce a grout having the consistency of thick paint.
 - d. Substitute white Portland cement for part of the gray Portland cement as required to produce a color matching the color of surrounding concrete, as determined by a trial patch.
 - e. Wet the surface of the concrete sufficiently to prevent absorption of water from the grout, and apply the grout uniformly with brushes or spray gun.
 - f. Immediately after applying the grout, scrub the surface vigorously with a cork float or stone to coat the surface and fill all air bubbles and holes.
 - g. While the grout is still plastic, remove all excess grout by working the surface with a rubber float, sack, or other means.
 - h. After the surface whites from drying (about 30-minutes at normal temperatures), rub vigorously with clean burlap.
 - i. Keep the surface damp for at least 36-hours after final rubbing.

- D. Unspecified Finish: If the finish of formed surfaces is not specifically called out elsewhere in the Contract Documents, provide the following finishes as applicable.
1. Rough form finish:
 - a. For all concrete surfaces not exposed to public view.
 2. Smooth form finish:
 - a. For all concrete surfaces exposed to public view.

3.03 FINISHING SLABS

- A. Definition of Finishing Tolerances:
 - 1. "Class A": True plane within 1/8-inch in 10-feet as determined by a 10-foot straightedge placed anywhere on the slab and in any direction.
 - 2. "Class B": True plane within 1/4-inch in 10-feet as determined by a 10-foot straightedge placed anywhere on the slab and in any direction.
 - 3. "Class C": True plane within 1/4-inch in two feet as determined by a 2-foot straightedge placed anywhere on the slab and in any direction.
- B. Scratched Finish: After the concrete has been placed, consolidated, struck off, and leveled to a Class C tolerance, roughen the surface with stiff brushes or rakes before the final set.
- C. Floated Finish:
 - 1. After the concrete has been placed, consolidated, struck off, and leveled, do not work the concrete further until ready for floating.
 - 2. Begin floating when the water sheen has disappeared and when the surface has stiffened sufficiently to permit the operation.
 - 3. During or after the first floating, check the planeness of the surface with a ten foot straightedge applied at not less than two different angles.
 - 4. Cut down high spots and fill low spots to produce a surface with a Class B tolerance throughout.
 - 5. Re-float the slab immediately to a uniform sandy texture.
- D. Troweled Finish:
 - 1. Provide a floated finish as described above, followed by a power troweling and then a hand troweling.
 - a. Produce an initial surface which is relatively free from defects, but which still may show some trowel marks.
 - b. Provide hand troweling when a ringing sound is produced as the trowel is moved over the surface.
 - c. Thoroughly consolidate the surface by hand troweling.
 - 2. Provide a finished surface essentially free from trowel marks, uniform in texture and appearance, and in a plane of Class A tolerance.
 - a. For concrete on metal deck, Class B plane tolerance is acceptable.
 - b. On surfaces intended to support floor coverings, use grinding or other means as necessary and remove all defects of such magnitude as would show through the floor covering.
- E. Broom Finish:
 - 1. Provide a floated finish as described above.
 - 2. While the surface is still plastic, provide a textured finish by drawing a fiber bristle broom uniformly over the surface.
 - 3. Unless otherwise directed by the Engineer, provide the texturing in one direction only.
 - 4. Provide "light", "medium" or "coarse" texturing as directed by the Engineer or otherwise called for on the Drawings.
- F. Unspecified Finish: If the finish of slab surfaces is not specifically called for elsewhere in the Contract Documents, provide the following finishes as applicable:

1. Scratched finish:
 - a. For surfaces scheduled to receive bond-applied cementitious applications.
2. Floated finish:
 - a. For surfaces intended to receive roofing.
3. Troweled finish:
 - a. For floors intended as walking surfaces.
 - b. Floors scheduled to receive floor coverings or waterproof membrane.
4. Broom finish:
 - a. Exterior pedestrian ramps.
5. Non-slip finish:
 - a. Platforms, steps, and landings.
 - b. Exterior pedestrian ramps.

3.04 CURING AND PROTECTION

- A. Beginning immediately after placement, protect concrete from premature drying, excessively hot and cold temperatures, and mechanical injury.
- B. Preservation of Moisture:
 1. Unless otherwise directed by the Engineer, apply one of the following procedures to concrete not in contact with forms immediately after completion of placement and finishing:
 - a. Ponding or continuous sprinkling.
 - b. Application of absorptive mats or fabric kept continuously wet.
 - c. Application of sand kept continuously wet.
 - d. Continuous application of steam (not exceeding 150-degrees Fahrenheit) or mist spray.
 - e. Application of waterproof sheet materials specified in Part 2 of this Section.
 - f. Application of other moisture-retaining covering as approved by the Engineer.
 - g. Application of the curing agent specified in Part 2 of this Section or elsewhere in the Contract Documents.
 2. Where forms are exposed to the sun, minimize moisture loss by keeping the forms wet until they can be removed safely.
 3. Cure concrete by preserving moisture as specified above for at least seven days.
- C. Temperature, Wind, and Humidity:
 1. Cold weather:
 - a. When the mean daily temperature outdoors is less than 40-degrees Fahrenheit, maintain the temperature of the concrete between 50-degrees Fahrenheit and 70-degrees Fahrenheit for the required curing period.
 - b. When necessary, provide proper and adequate heating system capable of maintaining the required heat without injury due to concentration of heat.
 - c. Do not use combustion heaters during the first 24-hours unless precautions are taken to prevent exposure of the concrete to exhaust

gases which contain carbon dioxide.

2. Hot weather: When necessary, provide wind breaks, fog spraying, shading, sprinkling, ponding, or wet covering with a light colored material, applying as quickly as concrete hardening and finishing operations will allow.
3. Rate of temperature change: Keep the temperature of the air immediately adjacent to the concrete during and immediately following the curing period as uniform as possible and not exceeding a change of 5-degrees Fahrenheit in any one hour period, or 50-degrees Fahrenheit in any 24-hour period.

D. Protection from Mechanical Injury:

1. During the curing period, protect the concrete from damaging mechanical disturbances such as heavy shock, load stresses, and excessive vibration.
2. Protect finished concrete surfaces from damage from construction equipment, materials, and methods, from the application of curing procedures, and from rain and running water.
3. Do not load self-supporting structures in such a way as to overstress the concrete.

END OF SECTION

SECTION 03480

PRECAST CONCRETE SPECIALTIES

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. General: The Contractor shall furnish all materials, labor and equipment to precast manholes, wet-wells, valve pits, meter pits and other utility structures as shown on the Drawings.

1.02 RELATED DOCUMENTS

- A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 1. Section 02221 – “Trenching, Bedding, and Backfill for Pipe”
 - 2. Section 03200 – “Concrete Reinforcement”

1.03 REQUIREMENTS, GENERAL

- A. Manholes shall have an invert channel shaped to correspond with the lower half of the pipe. The top of the shelf shall be at the elevation indicated and shall be sloped to drain toward the flowing-through channel. Every effort shall be made by the Contractor to construct watertight structures.
- B. The forms, dimensions, concrete, and construction methods shall be approved by the Engineer in advance of construction.

1.04 QUALITY ASSURANCE

- A. Quality Assurance: Use a pre-casting plant which has been certified by the precast concrete institute and has been engaged for more than five-years in the manufacturing of precast utility structures.

1.05 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340 – “Submittals and Substitutions”.
- B. Product Data: Within 21-calendar days after award of the Contract, submit the following:
 - 1. Materials list of items proposed to be provided under this Section.
 - 2. Manufacturer's specifications, catalog cuts, and other data needed to prove compliance with the specified requirements.
 - 3. Manufacturer's recommend installation procedures which, when approved by the Engineer, will become the basis for accepting or rejecting actual installation procedure used on the work.
 - 4. Shop Drawings showing complete details and reinforcement schedules for

fabrication, assembly and installation.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent provisions of Section 01640 – “Product Handling”.
- B. The quality of all materials, the process of manufacture, and the finished sections shall be subject to inspection and approval by the Engineer, or other representatives of the Owner. Such inspection may be made at the places, and the sections shall be subject to rejection at any time on account of failure to meet any of the Specification requirements; even though sample sections may have been accepted as satisfactory at the place of manufacture. Sections rejected after delivery to the job shall be marked for identification and shall be removed from the job at once. All sections which have been damaged after delivery will be rejected, and if already installed, shall be acceptably repaired, if permitted, or removed and replaced, entirely at the Contractor's expense.
- C. At the time of inspection, the section will be carefully examined for compliance with the ASTM designation specified below and these Specifications, and with the approved manufacturer's drawings. All sections shall be inspected for general appearance, dimensions, "scratch-strength", blisters, cracks, roughness, soundness, etc. The surface shall be dense and close-textured.
- D. Imperfections may be repaired, subject to the approval of the Engineer, after demonstration by the manufacturer that strong and permanent repairs result. Repairs shall be carefully inspected before final approval. Cement mortar used for repairs shall have a minimum compressive strength of 4,000 psi at the end of 7-days and 5,000 psi at the end of 28-days, when tested in 3-inch by 6-inch cylinder stored in the standard manner. Epoxy mortar may be utilized for repairs subject to the approval of the Engineer.
- E. Each section of the utility structure must be inspected and stamped at the casting yard by an accredited testing laboratory.

PART 2 - PRODUCTS

2.01 PRECAST CONCRETE MANHOLE SECTIONS

- A. Precast concrete manhole barrel sections and eccentric top sections shall conform to Specifications for Precast Reinforced Concrete Manhole Sections, ASTM C478, except as otherwise specified below. The method of constructions shall conform to the detailed Drawings appended to these specifications and the following additional requirements:
 - 1. The minimum wall thickness for the various size barrel sections shall be 8-inches, unless otherwise specified herein and approved by the Engineer.
 - 2. Barrel sections shall have tongue and groove joints. Joints shall have round rubber gaskets performed and set in specially provided indentations. The round rubber gasket shall conform to ASTM C443 standard specifications, or Federal Specification SS-S-00210 (GSA-FSS), "Ram-Nek" as manufactured by the K.T. Snyder Co., Houston, Texas, or approved equal.
 - 3. Concrete shall conform to ASTM C94, Type 2 cement, with a minimum compressive strength of 4,000 psi, unless otherwise specified herein. Mortar shall be composed of one part cement to two parts sand.

4. The date of manufacture and the name or trademark of the manufacturer shall be clearly marked on the inside of each precast section. Each precast section of the structure must be inspected and stamped by an accredited testing laboratory.

5. Sections shall be cured by an approved method for at least 28-days prior to painting, and shall not be shipped until at least 2-days after having been painted.
 6. Top sections shall be eccentric cone type unless otherwise specified.
 7. Precast concrete slab tops, where required, shall be capable of supporting the overburden plus a live load equivalent to AASHTO H-20 loading.
 8. The tops of base sections shall be suitable shaped to mate with the precast barrel sections.
 9. Reinforcement bars for wet wells shall be as specified on the Drawings.
 10. The exterior of sanitary sewer structures shall be coated with Tnemec heavy duty coal tar epoxy (16 mils thick), containing not less than 72-percent by volume non-volatile solids.
- B. Precast electrical hand-holes and covers shall be as specified and as shown on the Drawings.
- C. Precast leveling rings for setting cast iron frames over manholes shall be 2-inch thick and have one No. 2 continuous reinforcing steel bar.
- D. Where pipes enter or exit sanitary sewer structures, a "Kor-N-Seal" molded neoprene boot with stainless steel internal and external bonds as manufactured by the National Pollution Control Systems, Inc., Nashua, New Hampshire, or an approved equal shall be provided, unless otherwise specified.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Manholes and other precast structures shall be constructed to the dimensions as shown on the Drawings and as specified in these Specifications.
- B. The base section shall be cast-in-place concrete, as specified in Section 03300 "Cast-in-Place Concrete", placed on a thoroughly compacted gravel sub-base. The tops of the cast-in-place base section shall be shaped to mate with the precast barrel section, and shall be adjusted in grade so that the top of the section is at the approximately correct elevation. Precast concrete structure sections shall be set so as to be vertical and with section in true alignment, with a maximum allowed tolerance of 1/2-inch, unless otherwise specified. The Contractor shall install the precast sections in a manner that will result in a watertight joint.
- C. Precast base sections, conforming to all requirements of ASTM C478 and above listed requirements for precast sections may be used.
- D. The outside and inside joint shall be filled with mortar and finished flush with the adjoining surfaces. Allow joints to set for 24-hours before coating. While setting concrete for manholes or while plastering manholes, great care shall be taken not to allow mortar or other materials to get into the sewer lines. The Contractor shall provide two plumbers test plugs of each size sewer pipe on the job to plug the lines during the work of this section.
- E. Backfilling shall be performed in a careful manner, bringing the fill up evenly on all

sides. If leaks appear in the structures, the inside joints shall be caulked to the satisfaction of the Engineer.

- G. Where holes must be cut in the precast sections to accommodate pipes, cutting shall be done prior to setting them in place to prevent any subsequent jarring which may loosen the mortar joints. All cutting is to be performed only by power driven abrasive wheels or saws.
- F. Cast iron frames specified shall be placed over precast concrete leveling rings, shimmed and set in Portland cement mortar to the required grade. No more than 3-courses of leveling rings shall be used.
- G. Brick may be used for leveling only upon the approval of the Engineer.
- H. New pipe connections to new and existing manholes are to be caulked watertight with non-shrinking grout in accordance with the details shown on the Drawings.

END OF SECTION

SECTION 03610

FLOWABLE FILL

PART 1 – GENERAL

1.01 WORK INCLUDED

- A. Furnish all labor, materials, equipment and incidentals required to cut, repair, demolish, excavate or otherwise modify parts of existing structures or appurtenances as shown on the Drawings and as specified herein as necessary to complete the work under this Contract.
- B. Work under this Section shall include pumping flowable fill to existing structures.
- C. Work under this section shall be required as shown on the Drawings.
 - 1. At miscellaneous locations throughout the project site where old asbestos-cement pipelines are to be abandoned.

1.02 RELATED DOCUMENTS

- A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.03 RELATED WORK

- A. Excavation and backfill are included in Division 2 Site Work.
- B. Manhole floors and benches are specified on drawings.

1.04 EXISTING CONDITIONS

- A. No existing structure or concrete shall be shifted, cut, removed, or otherwise altered until authorization is given by the Engineer.
- B. When removing materials or portions of existing structures and when making openings in existing structures, the Contractor shall take all precautions and use all necessary barriers and other protective devices so as not to damage the structures beyond the limits necessary for the new work, nor to damage the structures or contents by falling or flying debris. Unless otherwise permitted, line drilling will be required in cutting existing concrete.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Use flowable fill manufactured at plants that qualify as approved sources in accordance with the FDOT Standard Operating Procedure for Ready-Mix concrete.
- B. Deliver flowable fill using concrete construction equipment. Place flowable fill by chute, pumping or other methods approved by the Engineer. Tremie flowable fill through water.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Meet the following requirements:
 - Fine Aggregate*
 - Portland Cement (Types I, II, or III)
 - Fly Ash, Slag and other Pozzolanic Materials S
 - Air Entraining Admixtures**
 - Water (Potable)

*Any clean fine aggregate with 100% passing a 3/8-inch mesh sieve and not more than 15-percent passing a No. 200 sieve may be used.

**High air generators or foaming agents may be used in lieu of conventional air entraining admixtures and may be added at jobsite and mixed in accordance with manufacturer's recommendation.

Mix Design:

Flowable Fill is a mixture of Portland cement, fly ash, fine aggregate, air entraining admixture and water. Flowable fill contains a low cementitious content for reduced strength development.

Submit mix designs to the Engineer for approval. The following are suggested mix guides for excavatable and non-excavatable flowable fill:

	Excavatable	Non-Excavatable
Cement Type I	75-100 lb/yd ³	75-100 lb/yd ³
Fly Ash	None	150-600 lb/yd ³
Water	*	*
Air**	5-35%	5-15%
28-Day Compressive Strength**	Maximum 100 psi	Minimum 125 psi
Unit Weight (Wet)**	90-110 lb/yd ³	100-125 lb/yd ³

*Mix Designs shall produce a consistency that will result in a flowable self-leveling product at time of placement.

**The requirements for percent air, compressive strength and unit weight are for laboratory designs only and are not intended for jobsite acceptance requirements.

Fine Aggregate shall be proportioned to yield 1 yd.

PART 3 – EXECUTION

3.01 CONSTRUCTION REQUIREMENTS

- A. Use straps, soil anchors or other approved means of restraint to ensure correct alignment when flowable fill is used as backfill for pipe or where flotation or misalignment may occur.
- B. Protect flowable fill from freezing for a period of 36-hours after placement.
- C. Place flowable fill to the designated fill line without vibration or other means of compaction. Do not place flowable fill during inclement weather, e.g. rain or ambient temperatures below 40°F. Take all necessary precautions to prevent any damages caused by the hydraulic pressure of the fill during placement prior to hardening. Provide the means to confine the material within the designated space.

3.02 ACCEPTANCE

- A. Acceptance of flowable fill will be based on the following documentation and a minimum temperature of flowable fill at the point of delivery of 50°F.
- B. Furnish a delivery ticket to the Engineer for each load of flowable fill delivered to the worksite. Ensure that each ticket contains the following information:
 - 1. Project designation
 - 2. Date
 - 3. Time
 - 4. Class and quantity of flowable fill.
 - 5. Actual batch proportions.
 - 6. Free moisture content of aggregates.
 - 7. Quantity of water withheld.
- C. Leave the fill undisturbed until the material obtains sufficient strength. Sufficient strength is 35 psi penetration resistance as measured using a hand held penetrometer in accordance with FM 1-T 197. Provide a hand held penetrometer to measure the penetration resistance of the hardened flowable fill.

3.03 BASIS OF PAYMENT.

- A. When the item of flowable fill is included in the Contract, payment will be made at the Contract unit price per cubic yard. Such price and payment will include all cost of the mixture, in place and accepted, determined as specified above. No

measurement and payment will be made for material placed outside the neat line limits or outside the adjusted limits, or for unused or wasted material.

END OF SECTION

SECTION 03700

MODIFICATIONS AND REPAIR TO EXISTING CONCRETE

PART 1 – GENERAL

1.01 WORK INCLUDED

- A. Furnish all labor, materials, equipment and incidentals required to cut, repair, demolish, excavate or otherwise modify parts of existing structures or appurtenances as shown on the Drawings and as specified herein as necessary to complete the work under this Contract.
- B. Work under this Section shall also include connecting new concrete to existing concrete.

1.02 RELATED WORK

- A. Excavation and backfill are included in Division 2.
- B. Concrete is included in Section 03300.

1.03 GENERAL

- A. No existing structure or concrete shall be shifted, cut, removed, or otherwise altered until authorization is given by the Engineer.
- B. When removing materials or portions of existing structures and when making openings in existing structures, the Contractor shall take all precautions and use all necessary barriers and other protective devices so as not to damage the structures beyond the limits necessary for the new work, nor to damage the structures or contents by falling or flying debris. Unless otherwise permitted, line drilling will be required in cutting existing concrete.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Epoxy Bonding Compound:
 - 1. The epoxy bonding compound shall be furnished in two components for combining immediately prior to use in accordance with the manufacturer's written instructions and as stipulated in these Specifications.
 - 2. The components of the epoxy resin system shall conform to the following requirements.

- a. Component A - Component A shall be a modified epoxy resin of the epichlorohydrin bisphenol A condensation type, containing suitable viscosity control agents and having an epoxide equivalent of 180-200.
 - b. Component B - Component B shall be primarily a reaction product of an alkyl glycidyl ether and a poly-functional aliphatic amine containing suitable viscosity agents modified with 2, 4, 6 tri (dimethylamino-methyl) phenol.
 - c. The component ratio of B:A shall be 1:1 by volume.
 - d. The resultant compound shall be polysulfide free.
3. PROPERTIES OF MIXED COMPONENTS
- | | |
|--|---------------------------------|
| Solids Content | -100% by weight |
| Pot Life | - 20-30 min at 73° F |
| Tack-Free Time (thin film) | - 3-5 hrs at 73° F |
| Final Cure ASTM D-695
(75% ultimate strength) | - 3 days at 73° F |
| Initial Viscosity (A+B) | - 2400-3200 cps
min at 73° F |
| Color mixed | - Straw |
4. PROPERTIES OF CURED MATERIAL
- | | |
|---|--|
| Neat Material | |
| Tensile Strength
(ASTM D-638) | - 5300 PSI min at
14-days 73° F cure |
| Tensile Elongation
(ASTM 0-638 modified) | - 4.8% at 14-days,
73° F cure |
| Compressive Strength
(ASTM 0-695) | - 7000 PSI in at
28-days 73° F cure |
| Compressive Modulus
(ASTM 0-695) | - 250,000 PSI min at
28-days 73° F cure |
| Water Pick-Up
(ASTM 0570) | - 1.0% max |
| Bond Strength
(Plastic to Hardened) | - 1500 PSI min
14-days, 73° F cure |
| Deflection Temperature
(ASTM - D1525) | - 180° F min |
5. Epoxy bonding compound shall be Sikadur Hi—Mod as manufactured by Sika Chemical Corp., Lyndhurst, N.J., or equal as manufactured by W.R. Grace Co., Cambridge, MA, or Adhesive Engineering Co., Lawrence, MA be polysulfide free.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Field measurements shall be taken at the required buildings and at the required yard structures to determine the amount of concrete to be removed and/or repaired and the amount of patching to be done.

3.02 CONSTRUCTION METHODS

- A. Where new concrete is to be made integral with existing concrete, either of the following methods as noted, shown or specified in Contract Drawings shall be used by the Contractor:
 - 1. Bonding to a saturated surface.
 - 2. Bonding by using bonding agent.
 - 3. Use of anchor bolts, expansion bolts or dowels in connecting concrete.

3.03 MODIFYING OR REPAIRING EXISTING CONCRETE

- A. Remove concrete to the depths shown or required. Roughen contact surfaces by chipping, sandblasting, scarifying or other approved methods. Thoroughly clean the surface removing loose particles and dust.
- B. Cut off projecting reinforcement when required to provide at least 1-inch cover. Where shown, reinforcement shall be bent across cut face and covered with new concrete.
- C. Thoroughly wash the roughened concrete surfaces and keep the surfaces saturated for at least 6-hours before placing new concrete. All free water shall be removed prior to placing the concrete. An epoxy bonding compound as specified may be used in lieu of saturating surface for 6-hours.
- D. Cement mortar, where required, shall be placed to a thickness slightly in excess of the finished surface and shall be steel trowel-finished, flush with the adjacent surface.
- E. When the finish surface is not specified to be coated the color of new concrete in the exposed surfaces shall match the color of the existing adjoining concrete as closely as possible.
- F. Cement mortar shall consist of 1-part Portland cement and 2-parts of sand by volume. No accelerating ad-mixtures shall be employed in surface treatment. Where shown on the Drawings, a non-shrink grout shall be used for patching and filling.

3.04 CONNECTIONS, NEW CONCRETE TO EXISTING CONCRETE

- A. The Contractor shall drill 1-1/2-inch holes for dowels. The drilled hole shall first be filled with epoxy bonding compound, then dowels shall be inserted by tapping. These holes shall be blown clear of loose particles and dust prior to installing epoxy bonding compound. Where shown on the Drawings, expansion bolts shall be installed in place of bonded dowels.
- B. Unless otherwise noted on the Drawings, No. 5 dowels set 12-inches into the concrete, and projecting 12-inches, 24-inches on center shall be used.
- C. Where it is necessary to expose existing reinforcement, the reinforcing rods shall be cleaned by wire brushing and new reinforcement shall be hooked into existing

reinforcement and lapped or welded as directed. Reinforcing rods shall have at least 3/4-inch clearance around each bar.

- D. All mixing and application of the epoxy shall be done in strict accordance with the printed instructions of the approved manufacturer. The Contractor shall submit to the Engineer, when requested, evidence indicating that the proposed applicators are fully qualified to perform the work and any proposed applicator found to be not qualified shall, be removed forthwith by the Contractor.
- E. Preparation of Concrete Surfaces:
1. Surfaces must be clean and sound. Surfaces may be dry, damp, or wet, but free of standing water. Remove dust, laitance, grease, curing compounds, impregnations, waxes, foreign particles, and disintegrated materials by mechanical abrasion methods such as sandblasting.
 2. If the concrete surfaces are sound and it is only necessary to remove laitance, grease or dust, the Contractor may, with the prior written approval of the Engineer, forego sandblasting and wash the concrete with a degreasing and etching chemical applied in accordance with the manufacturer's (ProSoCo, Inc. Kansas City, Kansas, Sure-Klean Degreaser & Etch, or approved equal written instructions and as stipulated in these Specifications hereinafter.
 3. Degreasing and Etching Chemical;
Color: Water White; Flash Point: Above 150-degree VF; Weight/ gallon: 9.0 lbs; Composition and Materials: A blend of organic and inorganic acids with a special solvent system incorporating wetting agents for emulsification.
 4. Application of degrease and etching compound.
Pre-wet concrete surfaces with clean water. Brush concentrated cleaner onto concrete surface. Let stand 3 to 4-minutes and reapply, brushing stained areas vigorously. Rinse off with fresh water applied at a minimum pressure of 800 psi. and a minimum volume of five gallons per minute.
- F. Proportioning/Mixing/Applying Epoxy Compound:
1. Volumetric ratio of bonding compound is 1:1 (B: A). To mix, proportion 1 part-B and 1 part-A into clean pail. Mix thoroughly for 3-minutes with a steel mixing paddle on low- speed (400 to 600 rpm) drill until blend is a uniform straw color. Mix only that amount of epoxy that can be used in 30-minutes at 73-degrees F.
 2. Application for Bonding:
 - a. The area to be overlaid shall be covered with one coat of the epoxy compound applied with long-nap paint rollers, brushes, brooms or by spray. The rate of application shall be 80-sq. ft. /gal. maximum on smooth concrete (20 mils). As the concrete increases in roughness, the rate of coverage decreases proportionately.
 - b. While the epoxy compound is still tacky (3-5 hrs. at 73° F) place the concrete. If the bonding compound should harden before the

concrete is placed, apply a fresh coat over the hardened coat and proceed.

3. Application for Grouting: To prepare a grout to anchor bolts or level base plates, mix the epoxy compound with granules recommended and supplied by the epoxy manufacturer. The amount of granules used should be the maximum amount possible while still maintaining a pourable consistency. The ratio should be approximately 1:1 -1/2 by loose volume (Granules). See technical data on anchor bolt grouting and grouting base plates published by the manufacturer.
4. Limitations:
 - a. Do not thin the epoxy bonding compound. Solvents will prevent proper cure.
 - b. Use only oven-dry granules to avoid encapsulation of moisture. Exposure to temperatures (after cure) above 180-degrees F (dry) and 120- degrees F (wet) not recommended.

G. WEATHER LIMITATIONS

1. The epoxy compound shall be placed only when both the concrete surface temperature and the ambient temperature is 40-degrees F and rising.

H. SAFETY

1. The Contractor shall require applicators to wear protective clothing, gloves, goggles and barrier creams.

3.05 OPENINGS IN CONCRETE

- A. Where openings are required for pipes, thimbles for gates, gate stems or other installations in existing concrete structures, the Contractor shall cut the existing concrete within the limits required, as shown on Drawings or specified, expose the existing reinforcing steel and perform the work in such a manner as to prevent damage to the existing adjacent structures or equipment.
- B. Unless otherwise permitted, line drilling will be required.
- C. Where concrete is cut to provide openings for gate stems, pipe sleeves shall be accurately installed and grouted in place in an approved manner.
 - 1. The exposed reinforcement shall be cleaned by wire brushing, then cut and bent to permit the installation and finally bent around the new pipe or thimble. Additional reinforcement shall be provided as shown on the Contract Drawings for typical reinforcing details of openings in walls and slabs, except as otherwise shown, specified or required.
 - 2. After installation of pipelines and thimbles, etc., the existing concrete shall be prepared as specified above in Paragraph 3.03C and the void between the outside of the pipe or thimble and the existing concrete shall be filled with non-shrink grout.

END OF SECTION

SECTION 05500

METAL FABRICATIONS

PART 1- GENERAL

1.01 WORK INCLUDED

- A. Furnish all labor, materials, equipment, and incidentals required and install covers, access hatches, grates, frames, manhole castings, catch basin castings and other miscellaneous metal fabrications as shown on the Drawings and specified herein. Metal items include but are not limited to the following:
 - 1. All metal frames, ladders, stair rails, floor opening frames including gratings and supports.
 - 2. Prefabricated access hatches and frames.
 - 3. Anchors or anchor bolts except those specified to be furnished with equipment.
 - 4. Railings, posts and supports both interior and exterior.
 - 5. Cast iron frames, covers, grates, drain leaders and drains.
 - 6. Stair nosings, steel plates, overhead steel door frames, angle frames, plates and channels.

1.02 RELATED WORK

- A. Pipe is specified in Division Two and Fifteen.

1.03 COORDINATION

- A. The work of this Section shall be completely coordinated with the work of other Sections. Verify at the site both the dimensions and work of other trades adjoining items of work in this Section before fabrication and installation of items herein specified.
- B. Furnish to the pertinent trades all items included under this Section that are to be built into the work of other Sections.

1.04 SHOP DRAWINGS AND SAMPLES

- A. Detail drawings, as provided for in the General Conditions and Section 01340, showing sizes of members, method of assembly, anchorage and connection to other members shall be submitted to the Engineer for approval before fabrication.
- B. Samples shall be submitted at the request of the Engineer for concurrent review with Shop Drawings.

1.05 FIELD MEASUREMENTS

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

1.06 REFERENCE SPECIFICATIONS

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

Structural Steel	ASTM A36
Welded & Seamless Steel Pipe	ASTM A53
Gray Iron Castings	ASTM A48, Class 30
Galvanizing, general	ASTM A123
Galvanizing, hardware	ASTM A153
Galvanizing, assemblies	ASTM A386
Aluminum (Extended Shapes)	6053 T5 (Alum, Alloy)
Aluminum (Extended Pipe)	6063 T6 (Alum, Alloy)
Aluminum Bars Structural	6061 T6 (Alum Alloy)
Bolts and Nuts	ASTM, A325
Stain, Steel Bolts & Fasteners	AISI, Type 304
Stain, Steel Plate & Sheet, Wire	AISI, Type 316
Welding Rods for Steel	AWS Spec. for Arc Welding

PART 2 – PRODUCTS

2.01 ANCHORS, BOLTS AND FASTENING DEVICES

- A. Anchors, bolts, etc. shall be furnished as necessary for installation of the work of this Section.
- B. Compound masonry anchors shall be of the type shown or required and shall be equal to Star Slug in compounded masonry anchors manufacture's by Star Expansion Industries, equal by Phillips Drill Co., Rahiplug, or approved equal. Anchors shall be minimum "two unit" type.
- C. The bolts used to attach the various members to the anchors shall be the sized shown or required. Stainless steel shall be attached to concrete or masonry by means of stainless steel machine bolts and iron or steel shall be attached with steel machine bolts unless otherwise specifically noted.
- D. For structural purposes, unless otherwise noted, expansion bolts shall be Simpson Wedge-All, Redhead Trubolt, or Hilti "Kwik-Bolt" (or equal). When length of bolt is not called for on the Drawings, the length of bolt provided shall be sufficient to place the wedge portion of the bolt a minimum of 3-inch behind the reinforcing steel within the concrete. Material shall be as noted on the Drawings if not listed, hot dipped galvanized steel.

2.02 ALUMINUM

A. Grating:

1. All grating for stairways, platforms, landings, cross-wal, floor plates, etc. shall be constructed of cold-forged plain aluminum bearing bars Type 6053-T6 Alloy or as shown on the plans. Bars shall be welded together to form a diamond shaped pattern between bearing bars spaced per loading requirements. The bearing bars shall be sized and sp aced according to the manufacturer. "Table of Safe Loads" for the anticipated loading conditions. Gratings shall be capable of supporting a minimum live loading of 60 psf over the entire span of the grating.
2. Aluminum grating shall be of the size shown on the drawings. All openings 2- inches and greater in diameter shall be handed with a bar of the same depth and thickness as the main bearing bars of the grating, or furnished with continuous cross bridges. Each cut bar shall be welded to the band if banding is utilized. The ends of all grating sections shall be likewise banded. Clamps and bolts used for attaching grating to supporting member shall be stainless steel. All grating shall be clamped unless noted otherwise. Champs shall be as recommended by the manufacturer.

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

C. Aluminum Handrails: see Section 05521

2.03 STEEL ITEMS

- A. Sleeves shall be stainless steel and floors with end joints as shown on the Drawings. All pipe sleeves shall have center anchor around circumference as shown.
- B. Structural steel angle and channel doorframes shall be provided as shown on the Drawings and shall be galvanized. Frames shall be fabricated with not less than three anchors on each jamb.
- C. All miscellaneous lintels and closures not shown on the Drawings shall be galvanized steel and shall be provided as a part of this Section.
- D. Miscellaneous steel pipe for sleeves and lifting attachments and other uses as required shall be Schedule 40 pipe fabricated according to the Details as shown on the Drawings.
- E. Frames, covers and grates for manholes, catch basins and inlets shall be of a good quality, strong, tough, even grained cast iron except as otherwise specified below. Castings shall be as manufactured by the U.S. Foundry, or equal. Size

shall be as shown on the Drawings. Covers have to have letters "WATER", "SEWER", or "DRAIN" as applicable, embossed on top. Covers shall have concealed watertight pickholes similar to U.S. Foundry & Manufacturing Corporation Design No. Type "K". Frames and covers for manholes constructed within the floor area of the buildings shall be of a watertight type construction and shall be US Foundry & Manufacturing Corp. Drawing No. 1110 (28G) watertight or equal with a minimum of 4 (stainless steel) cap screws and 1/8-inch neoprene gasket.

- F. Provide solid manhole and handhole covers and frames for electrical and telephone underground systems.
- G. Stringers for stairways, platforms, landings, crosswalks, crossovers, etc. shall be structural steel of the shape and size required to support the anticipated loads for the purposes intended.
- H. Wheel guards shall be ductile cast iron 30-inches in height. All wheel guards shall be Model R-4982, Type A (for doorways) as manufactured by Neenah Foundry Company or approved equal.
- I. Staff (Stream) gauges shall be iron frame coated with baked enamel to resist corrosion and discoloration. Staff gauge shall be Style "A", 4-inches wide with white background and black gradations mark at every foot and tenths of a foot as manufactured by the Ben Meadows Company.
- J. Miscellaneous steel shall be fabricated and installed in accordance with the Drawings and shall include: beams, angles, support brackets, and door frames. Splice plates anchor bolts (except for equipment furnished in Divisions 11, 13, 14 and 15); lintels and any other miscellaneous steel called for on the Drawings and not otherwise specified.

PART 3 – EXECUTION

3.01 FABRICATION

- A. All miscellaneous metal work shall be formed true to detail with clean, straight, sharply defined profiles and smooth surfaces of uniform color and texture and free from defects impairing strength of durability.
- B. Connections and accessories shall be of sufficient strength to safely withstand stresses and strains to which they will be subjected. Steel accessories and connections to steel or cast iron shall be steel, unless otherwise specified. Threaded connections shall be made so that the threads are concealed by fitting.

- C. Welded joints shall be rigid continuously welded or spot-welded as specified or shown. The face of welds shall be dressed flush and smooth. Exposed joints shall be close fitting and jointed where least conspicuous.
- D. Welding of parts shall be in accordance with the Standard Code for Arc and Gas Welding in Building Construction of the AWS and shall only be performed where shown, specified, or permitted by the Engineer. All welding shall be performed only by welders certified as to their ability to perform welding in accordance with the requirements of the AWS Code. Component parts of built-up members to be welded shall be adequately supported and clamped or held by other adequate means to hold the part in proper relation for welding.
- E. Welding of aluminum work shall be on the unexposed side as much as possible in order to prevent pitting or discoloration.
- F. All aluminum finish exposed surfaces, except as specified below, shall have manufacturer's standard mill finish. Aluminum handrails shall be given an anodic oxide treatment in accordance with the Aluminum Association Specification AA-C22-A41. A coating of methacrylate lacquer shall be applied to all aluminum before shipment from the factory.
- G. Castings shall be of good quality, strong, tough, even-grained, smooth, free from scale, lumps, blisters, sand holes, and defects of any kind which render them unfit for the service for which they are intended. Castings shall be thoroughly cleaned and will be subjected to hammer inspections in the field by the Engineer. All furnished surfaces shown on the Drawings and/or specified shall be machined to a true plane surface and shall be true and seat at all points without rocking. Allowances shall be made in the patterns so that the thickness specified or shown shall not be reduced in obtaining finished surfaces. Castings will not be acceptable if the actual weight is less than 95- percent of the theoretical weight computed from the dimensions shown. The Contractor shall provide facilities for weight in castings in the presence of the Engineer showing true weights, certified by the supplier.
- H. All steel finish work shall be thoroughly cleaned by effective means of all loose mill scale, rust, and foreign matter before shipment and shall be given one shop coat of primer compatible with finish coats specified in Painting Section after fabrication, but before shipping. Paint shall be applied to dry surfaces and shall be thoroughly and evenly spaced and well worked into joints and other open spaces. Abrasions in the field shall be touched up with prior immediately after erection. Final painting is specified in Painting Section 09900.
- I. Galvanizing, where required, shall be the hot-dip zinc process after fabrication. Following all manufacturing operations, all items to be galvanized shall be thoroughly cleaned, pickles, fluxed, and completely immersed in a bath of molten zinc. The resulting coating shall be adherent and shall be the normal coating to be obtained by immersing the items in a bath of molten zinc and allowing them to remain in the batch until their temperature becomes the same as the bath. Coating shall be not less than 2 oz. per sq. ft. of surface.

3.02 INSTALLATION

- A. Install all items furnished except items to be imbedded in concrete or other masonry which shall be installed under Division 3 and Division 4 respectively. Items to be attached to concrete or masonry after such work is completed shall be installed in accordance with the details shown. Fastening to wood plugs in masonry will not be permitted. All dimensions shall be verified at the site before fabrication is started.
- B. All steel surfaces to come in contact with exposed concrete or masonry shall receive a protective coating of an approved heavy bitumastic trowling mastic applied in accordance with the manufacturer's instructions prior to installation.
- C. Where aluminum contacts a dissimilar metal, apply a heavy brush coat of zinc-cromate primer followed by two coats of aluminum metal and masonry paint to dissimilar metal.
- D. Where aluminum contacts masonry or concrete, apply a heavy coat of approved alkali resistant paint to the masonry or concrete.
- E. Where aluminum contacts wood, apply two coats of aluminum metal and masonry paint to the wood.

END OF SECTION

SECTION 15062

DUCTILE IRON PIPE AND FITTINGS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Furnish, install, and test ductile iron pipe and fittings, complete in place, all in accordance with the requirements of the Contract Documents.

1.02 RELATED WORK

- A. Section 01340 – Submittals and Substitutions
- B. Section 02221 – Trenching, Bedding, & Backfill for Pipe
- C. Section 02223 – Excavation Below Normal grade and gravel Refill
- D. Section 15065 – PVC Water Main Pipe
- E. Section 15110 – Valves & Appurtenances

1.03 DESCRIPTION OF SYSTEMS

- A. Piping and fittings shall be installed in those locations and depths as shown on the Drawings.
- B. The equipment and materials specified herein are intended to be standard ductile iron pipe and fittings used in transporting water and wastewater.

1.04 QUALIFICATIONS

- A. Iron pipe and fittings shall be furnished by manufacturers who are fully experienced, reputable, and qualified in the manufacture of the materials. The pipe and fittings shall be designed, constructed, and installed in accordance with the best practices and methods and shall comply with the Specifications in all respects.

1.05 STANDARDS

- A. ANSI/AWWA C104/A21.4 American National Standard for Cement-Mortar Lining for Ductile Iron and Gray Iron Pipe and Fittings for Water.
- B. ANSI/AWWA C105/A21.5 American National Standard for Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquids.
- C. ANSI/AWWA C110/A21.10 American National Standard for ductile iron and gray iron fittings 3 inch through 48 inch for Water and

Other Liquids.

- D. ANSI/AWWA C111/A21.11 American National Standard for Rubber Gasket Joints for Ductile and Gray Iron Pressure Pipe and Fittings.
- E. ANSI/AWWA C115/A21.15 American National Standard for Flanged Ductile Iron and Gray Iron Pipe with Threaded Flanges.
- F. ANSI/AWWA C150/A21.50 American National Standard for the Thickness Design of Ductile Iron Pipe.
- G. ANSI/AWWA C151/A21.51 American National Standard for Ductile Iron Pipe, Centrifugally Cast in Meal Molds or Sand-Lines molds, for Water or Other Liquids.
- H. ANSI/AWWA C600: American Water Works Association Standard for Installation of Ductile Iron Water Mains and their Appurtenances.
- I. ANSI/AWWA C606: American Water Works Association Standard for Grooved End Pipe and Fittings.
- J. ASME/ANSI B16.1: Cast Iron Pipe Flanges and Flanged Fittings, Class 125.
- K. ASME/ANSI B16.5: Pipe Flanges and Flanged Fittings, Class 150 (Flat Face Flange).
- L. ASME/ANSI B16.42: Ductile Iron Pipe flanges and Flanged Fittings, Class 150 (Flat Face Flange).
- M. ASTM A307 Grade B: Low-Carbon Steel Bolts for Flanged Pipe.

1.06 SUBMITTALS

- A. Shop Drawings: The Contractor shall submit Shop Drawings of pipe and fittings in accordance with the requirements in Section 01340 - Submittals and Substitutions.
- B. Submit pipe mill and test certifications from manufacturer.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. American Ductile Iron Pipe Company
- B. United States Pipe and Foundry Company

- C. McWane Cast Iron Pipe Company
- D. Clow Water Systems Company

2.02 PIPE

- A. Pipe shall be centrifugally cast in metal molds or sand lined molds in accordance with ANSI A21.51 (AWWA C151) of grade 60-42-10 ductile iron. The above standard covers ductile iron pipe with nominal pipe sizes from three inches up to and including sixty-four inches in diameter.

2.03 COMPRESSION JOINT PIPE

- A. Pipe shall conform to ANSI/AWWA C151/A21.51 and C150/A21.50.
- B. Fittings shall conform to ANSI/AWWA C110/A21.10.
- C. Rubber gaskets shall conform to ANSI/AWWA C111/A21.11.
- D. Thickness shall be minimum pressure Class 350 through 12-inch and pressure Class 250 in sizes 14-inch and larger.
- E. Install compression joint pipe below ground. Provide sufficient quantities of lubricant and gaskets.

2.04 FLANGED PIPE

- A. Ductile iron pipe above grade in wet well and in vaults shall be flanged. All ductile iron pipe below grade shall have thrust restrained mechanical joints.
- B. Pipe and fittings shall conform to ANSI/AWWA C115/A21.15.
- C. Thickness shall be minimum pressure Class 350 through 12-inch and pressure Class 250 in sizes 14-inch and larger.
- D. Flanges and flanged fittings shall be flat face conforming to ANSI/AWWA C110/A21.10. Full face 1/8-inch thick rubber ring gaskets shall conform to ANSI/AWWA C110/A21.10.
- E. Flanges shall be ductile iron. Cast iron flanges will not be allowed.
- F. Flanged ductile iron pipe shall have factory applied screwed long hub flanges. Flanges shall be faced and drilled after being screwed on the pipe, with flanges true to 90 degrees with the pipe axis and shall be flush with end of pipe conforming to ANSI B16.1 Class 125.
- G. Bolts for flange pipe shall be low-carbon steel conforming to ASTM A307 Grade B, except where noted.

2.05 MECHANICAL JOINT PIPE

- A. Pipe shall conform to ANSI/AWWA A21.50/C151 and C150/A21.50.
- B. Mechanical and push-on type rubber gaskets shall be in accordance with ANSI A21.11 (AWWA C 111).
- C. Thickness shall be minimum pressure Class 350 through 12-inch and pressure Class 250 in sizes 14-inch and larger.
- D. Rubber gaskets shall conform to ANSI/AWWA C111/A21.11.
- E. Bolts for mechanical joint pipe shall be tee-head design. Nuts and bolts shall be high-strength low alloy steel.
- F. Restrained joints through sixty-four inch nominal pipe size shall be FLEX-RING, or LOK-RING joints manufactured by American Cast Iron Pipe Co., TR-FLEX joints by U.S. Pipe and Foundry Company, or approved equal. Restrained joints on fittings shall be retainer gland mechanical joints, or the fittings may be specifically arranged for joining with restrained joint pipe. Fast-Grip gaskets shall not be allowed.
- G. Mechanical joint pipe shall be installed below ground.
- H. Furnish with sufficient supply of accessories, i.e., gaskets, bolts, and glands, as required for each joint.

2.06 FITTINGS

- A. Shall be manufactured in accordance with ANSI A21.10 (AWWA C110) for nominal pipe sizes three inches to 64-inches, and shall be either flanged or mechanical joint. Other fittings, not included in ANSI A21.10 (AWWA C110) shall conform in design and performance to the requirements of this Standard.
- B. Shall have a rated pressure equal to or greater than the specified working pressure for pipe sizes of three inches to 64-inches (350 psi fittings available through and including 24-inches, only).
- C. Grey iron fittings which conform to the specifications contained herein may be used with ductile iron pipe providing the piping systems minimum working pressure is met or exceeded.
- D. Compact fittings shall be used in lieu of standard fittings, per AWWA C153.

2.07 GROOVED END PIPE

- A. Grooved end pipe and fittings shall be acceptable for above-ground installation. Pipe shall conform to ANSI/AWWA C606.
- B. Grooved end pipe shall be minimum thickness to conform to former thickness Class 53.
- C. Grooved end joints shall be flexible type, radius cut grooved, conforming to AWWA

C606.

- D. Grooved end fittings shall be ANSI B16.1, radius cut grooved, rigid joint, as manufactured by Victaulic Company, Gustin-Bacon, or approved equal.
- E. Grooved end pipe adapter flanges shall be ductile iron, ASTM A536, as manufactured by Victaulic, Gustin-Bacon, or approved equal.
- F. Bolts and nuts shall be stainless steel.
- G. Gaskets for grooved end joints shall be the manufacturer's flush-seal type specifically designed for cast surfaces. Properties shall be as designated in ASTM D 2000. Dimensions shall conform to AWWA C606. Lubricant shall be manufacturer's standard.
- H. Install in accordance with manufacturer's printed instructions. Dress cut ends of pipe for couplings and adapters as recommended.

2.08 COATINGS

- A. A coating of epoxy primer and color coded epoxy in conformance with the Painting Sections shall be applied to a pipe prior to shipment of all piping.
- B. Pipe specially coated shall be so identified with label indicating "Special Coating".
- C. Force main pipe shall be painted with a "green stripe"; water main pipe shall be painted with a "blue" stripe.

2.09 LININGS

- A. All ductile iron pipe and fittings shall be lined with a standard cement mortar lining in accordance with ANSI/AWWA C104/A21.4.
- B. Linings need not be seal coated unless recommended by the manufacturer.

2.10 RESTRAINED JOINTS

- A. Location and number of restrained joints shall be as shown on the drawing or be field determined in accordance with the necessary laying lengths when installing the pipe.
- B. Joint shall be the standard design of the pipe and fitting manufacturer and shall provide a 2:1 safety factor.
- C. Restrained joints shall be designed for a pressure class rating of 350 psi in sizes 4-inch through 12-inch and 250 psi for 14-inch through 64-inch, unless shown otherwise on the Drawings.

- D. Bolts and nuts for restrained joints shall be low alloy, high strength steel.

PART 3 EXECUTION

3.01 HANDLING PIPE AND FITTINGS

- A. Care shall be taken in loading, transporting and unloading to prevent injury to the pipe, coatings, and linings. Pipe or fittings shall not be dropped. All pipe or fittings shall be examined before laying, and no piece shall be installed which is found to be defective.
- B. If any defective pipe is discovered after it has been laid, it shall be removed and replaced with a sound pipe in a satisfactory manner at no additional expense to the Owner. All pipe and fittings shall be thoroughly cleaned before laying, shall be kept clean until they are used in the work, and when installed or until they are used in the work, and when installed or laid, shall conform to the lines and grades required.

3.02 LAYING PIPE AND FITTINGS

- A. Ductile iron pipe and fittings shall be installed in accordance with requirements of ANSI/AWWA C600 except as otherwise provided herein.
- B. All pipe shall be sound and clean before laying. When laying is not in progress, including lunchtime, the open ends of the pipe shall be closed by watertight plugs or other approved means.
- C. Suitable excavations shall be made in the trench bottom to receive pipe with raised bells.
- D. As soon as the excavation is completed to the normal grade of the bottom of the trench, immediately place screen gravel or crushed stone (where applicable) bedding in the trench, and then the pipe shall be firmly bedded in this material to conform accurately to the line and grade indicated on the Drawings. Blocking under the pipe will not be permitted. Bedding shall conform with minimum AWWA Type-2 condition unless otherwise specified.
- E. When cutting pipe is required, the cutting shall be done by machine, leaving a smooth cut at right angles to the axis of the pipe. Cut ends of pipe to be used with a "Tyton" type bell shall be beveled to conform to the manufactured spigot end. The lining shall remain undamaged.

3.03 JOINTS

- A. Push-on joints shall be made in strict accordance with the manufacturer's instructions. Pipe shall be laid with bell ends looking ahead. A rubber gasket shall be inserted in the groove of the bell end of the pipe, and the joint surfaces cleaned and lubricated. The plain end of the pipe is to be aligned with the bell of the pipe to which it is to be joined, and pushed home with a jack or by other means. After joining the pipe, a metal feeler shall be used to make certain that the rubber gasket

is correctly located.

- B. Mechanical joints at valves, fittings, and where designated on the Drawings and as specified, shall be in accordance with the "Notes on Method of Installation" under ANSI A21.11 and the instructions of the manufacturer. To assemble the joints in the field, thoroughly clean the joint surfaces and rubber gasket with soapy water before tightening bolts. Bolts shall be tight to the specified torque. Under no condition shall extension wrenches, pipe over handle or ordinary ratchet wrenches be used to secure greater leverage.
- C. Ball joints, where designated on the Drawings and as specified, shall be installed in strict accordance with the manufacturer's instructions. Where ball joint assemblies occur at the face of structures or tanks, the socket end shall be at the structure or tank and the ball end assembled to the socket.
- D. Flanged joints shall be in accordance with ANSI A21.15 including its Appendix "A" and the instructions of the manufacturer. Flanged joints shall be fitted so that the contact faces bear uniformly on the gasket and then are made up with relatively uniform bolt stress.
- E. All valves, hydrants, fittings and other appurtenances needed upon the pipe lines shall be set and jointed as indicated on the Drawings or as required by the manufacturer.
- F. Unless otherwise noted, underground piping shall be push-on joint or mechanical joint with restraints as needed and above ground or exposed piping shall be flanged or grooved end.
- G. Deflected bell pipe shown on the Drawings is shown only as an assistance in illustrating a preferred means of installation in specific locations, and is not intended to indicate all deflected bell pipe necessary to effect the installation as shown in plan and profile views. The cost of all such deflections shall be included within the bid price for furnishing and installing the pipe.
- H. When it is necessary to deflect pipe from a straight line in either the vertical or horizontal plane, or where long radius curves are permitted, the amount of deflection shall not exceed deflection recommended by manufacturer.

3.04 RESTRAINED JOINTS

- A. Section of piping designated on the Drawings as having restrained joints or those requiring restrained joints shall be constructed using mechanical or compression joint pipe and fittings, manufacturer's standard, equal to U.S. Pipe TR-FLEX, or where permitted by the Engineer with Meg-A-lug, JCM, Dependo-lok, Uniflange, or equal restraining devices. Mechanical joint ductile iron pipe retainer glands will not be permitted unless approved by the Engineer.
- B. Restrained pipe joints that achieve restraint by incorporating cut out sections in the wall of the pipe shall have a minimum wall thickness at the point of cut out that corresponds with the minimum specified wall thickness for the rest of the pipe.

- C. The minimum number of restrained joints required for resisting forces at fittings and changes in direction of pipe shall be determined from the length of restrained pipe on each side of fittings and changes in direction necessary to develop adequate resisting friction with the soil. The formula and parameters given in the latest edition of the Ductile Iron Pipe Handbook shall be used to determine the minimum requirements.

	L	=	1.5PA (1-COS X)/fW
Where L	=	length of pipe on each side of fitting or change in direction	
P	=	test pressure, 150 psi, unless otherwise noted	
A	=	cross-sectional area in square inches based on outside diameter (O.D.) of pipe	
X	=	angle of bend or change in direction in degrees	
f	=	coefficient of soil friction = 0.4 (maximum), modify if pipe is poly-wrapped	
W	=	Wt. earth + Wt. pipe + Wt. water in pipe	
Wt. earth	=	(density of soil*) (depth of cover in feet) (O.D. in feet) (2)	
*		Maximum 120 -lbs. /C.F. at and above maximum water table elevation and 60- lbs. /C.F. below the maximum water table elevation.	

- D. The Contractor shall also provide restrained joints in accordance with the above criteria wherever thrust blocks are not used in conjunction with below ground fittings on lines 10-inches in diameter or less.

3.05 PRESSURE & LEAKAGE TESTS

- A. Hydrostatic pressure and leakage test shall conform with AWWA C600, with the exception that the Contractor shall furnish all gauges, meters, pressure pumps and other equipment needed to test the line.
- B. The pressure required for the field hydrostatic pressure test shall be 150 psi. the Contractor shall provide temporary plugs and blocking necessary to maintain the required test pressure Corporation cocks at least 3/4 inches in diameter, pipe riser and angle globe valves shall be provided at each pipe dead-end in order to bleed air from the line. Duration of pressure test shall be at least 2-hours. The cost of these items shall be included as a part of testing.
- C. The leakage test shall be a concurrent test, at the maximum operating pressure as determined by the Engineer, with the pressure test and shall be not less than 2-hours in duration. All leaks evident at the surface shall be repaired and leakage eliminated regardless of total leakage as shown by test. Lines which fail to meet tests shall be repaired and re-tested as necessary until test requirements are compiled with. Defective materials, pipes, valves and accessories shall be removed and replaced. The pipe lines shall be tested in such sections as may be directed by the Engineer by shutting valves or installing temporary plugs as required. The pipe shall be filled with water, all air removed and the test pressure maintained in the

pipe for the entire test period by means of a force pump to be furnished by the Contractor. Accurate means shall be provided for measuring the water required at this pressure. The amount of water required is a measure of the leakage.

- D. The amount of leakage which will be permitted shall be in accordance with AWWA C600 for all pressure lines. No amount of leakage is allowed for pipe under the LA Right-of-Way per FDOT requirements.
- E. The Contractor must submit his plan for testing to the Engineer for review at least 10-days before starting the test. The Contractor shall remove and adequately dispose of all blocking materials and equipment after completion and acceptance of the field hydrostatic test, unless otherwise directed by the Engineer. Any damage to the pipe coating shall be repaired by the Contractor. Lines shall be totally free and clean prior to final acceptance.

3.06 CLEANING AND FLUSHING

- A. The pipe shall be thoroughly cleaned of all foreign matter before installation. It is the Contractor's responsibility to insure cleanliness of the pipe during installation and backfilling. At the conclusion of the work, the Contractor shall thoroughly clean all of the pipe, if necessary, by flushing with water of other materials which may have entered during the construction period. Debris cleaned from the lines shall be removed from the lowest outlet. If, after this cleaning, obstructions remain, they shall be removed. After the pipe is cleaned, the Engineer will examine the pipe for leaks. If defective pipes or joints are discovered at this time, they shall be repaired by the Contractor.

3.07 DISINFECTING

- A. Before being placed in service, all potable water pipelines shall be chlorinated in accordance with AWWA C601, "Standard Procedure for Disinfecting Water Mains". The procedure shall be approved by the Engineer. The location of the chlorination and sampling points will be determined by the Engineer in the field. Taps for chlorination and sampling shall be uncovered and backfilled by the Contractor as required.
- B. The general procedure for chlorination shall be first to flush all dirty or discolored water from the lines, and then introduce chlorine in approved dosages through a tap at one end, while water is being withdrawn at the other end of the line. The chlorine solution shall remain in the pipeline for at least 24-hours.
- C. Following the chlorination period, all treated water shall be flushed from the lines at their extremities and replaced with water from the distribution system. Bacteriological sampling and analysis of the replacement water shall then be made by the Engineer in full accordance with AWWA C601. The Contractor will be required to re-chlorinate, if necessary. The line shall not be placed in service until the requirements of the State and County Public Health Department are met.
- D. Special disinfecting procedures shall be used in connection to existing mains, and where the method outlined above is not practical.

- E. The Contractor shall make all arrangements necessary with the Health Department for the collection and examination of samples of water from disinfected water mains. These samples shall be examined for compliance with Department of Health and Rehabilitative Services requirements. Sampling shall be made daily and continuously until two successive examinations be found unsatisfactory, the line shall be flushed and disinfected again. The cost of sampling, flushing and disinfecting shall be included in the contract price and no additional charge shall be made to the Owner for this work.

END OF SECTION

SECTION 15065

POLYVINYL CHLORIDE (PVC) WATER MAIN PIPE

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish all labor, materials, equipment and incidentals required to install 4-inch through 12-inch PVC pressure mains, cast iron fittings, and appurtenances as specified herein.

1.02 RELATED WORK

- A. Section 02221 Trenching, Beddings, and Backfill for Pipe.
- B. Section 15062 Ductile Iron Pipe & Fittings
- C. Section 15110 Valves and Appurtenances

1.03 DESCRIPTION OF SYSTEMS

- A. PVC mains shall be installed in those locations and depths as shown on the Drawings.
- B. The equipment and materials specified herein is intended to be standard types of PVC Pressure Mains (A WW A C900 and C905) and cast iron fittings for use in transporting water and wastewater.

1.04 QUALIFICATIONS

- A. All of the PVC pipe and cast-iron fittings shall be furnished by manufacturers who are fully experienced, reputable, and qualified in the manufacture of the materials to be furnished. The pipe and fittings shall be designed, constructed, and installed in accordance with AWWA Standards for PVC Pipe and using the best practices and methods as specified herein. The pipe manufacturer shall supply a one year warranty from date of shipment of their products. All pipes and fittings shall have NSF product certification and be U.L. product certified.

1.05 SUBMITTALS

- A. Submit to the Engineer within 30-days after execution of the Contract a list of materials to be furnished the names of the suppliers and the date of delivery of materials to the site.
- B. All PVC pipe and cast-iron fittings to be installed under this Contract shall be

inspected and tested at the foundry as required by the standard specifications to which the material is manufactured. Furnish to the Engineer in duplicate sworn certificates of such tests and their results. In addition, all PVC pipe and cast iron fittings to be installed under this Contract may be inspected at the foundry for compliance with these Specifications by an independent testing laboratory selected by the Owner. The manufacturer's cooperation shall be required in these inspections. The cost of foundry inspection requested by the Owner of all pipe approved for this contract, will be borne by the Owner.

- C. Shop Drawings shall be submitted to the Engineer for approval and shall include dimensioning, methods and locations of supports and all pertinent technical specifications for all piping to be furnished. Shop Drawings shall be prepared by the pipe manufacturer.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. The PVC mains shall be un-plasticized polyvinyl chloride (PVC) plastic pipe with integral bell containing a locked in ring and spigot joints for the conveyance of crude wastewater and treated water.
- B. Pipe 4-inches through 12-inches shall meet the requirements of AWWA C900, "Polyvinyl Chloride (PVC) Pressure Pipe" and shall be Class 150 pipe meeting the requirements of DR18. Pipe 14-inches through 24-inches shall meet the requirements of AWWA C905 "PVC Water Transmission Pipe" and shall be Class 150 pipe meeting the requirements of DR-21.
- C. All pipe shall be suitable for use as a pressure conduit. Provisions must be made for expansion and contraction at each joint with an electrometric ring. The bell shall consist of an integral wall section with a locked-in, solid cross section electrometric ring which meets the requirements of ASTM D1869 and F-447. The bell section shall be designed to be at least as strong as the pipe wall and meet the requirements of AWWA C900 and C905. Sizes and dimensions shall be as shown in this specification.
- D. Standard laying lengths shall be 20-feet (+ 1-inch) for all sizes. One hundred percent of the total footage of pipe of any class and size shall be furnished in standard lengths. Each standard length of pipe shall be factory tested to four times the class pressure of the pipe specified for a minimum of 5-records. The integral bell shall be tested with the pipe.
- E. The pipe stiffness using F / Y for PVC class water is contained in the table below:

<u>Class</u>	<u>DR</u>	<u>F / AY (psi)</u>
100	25	129
150	18	364
200	14	815

- F. Fittings for use with PVC water main pipe shall be cast iron as specified under Section 15062.
- G. The manufacturer shall randomly select samples of pipe and test them in accordance with ASTM 01599 and shall withstand, without failure, pressure listed below when applied in 60-70 seconds. Class 100 shall have a minimum burst pressure of 535 psi at 73 F. Class 150 shall have a minimum burst pressure of 755 psi and Class 200 shall have a minimum burst pressure of 985 psi.
- H. Pipe shall withstand, without failure at 73 F, an impact of a falling missile, Type C, at the following levels, according to ASTM 02444.

<u>Pipe Size (in)</u>	<u>Impact (ft / lbs)</u>
4	100
6	100
8	100
10	120
12	120

- I. Watermains shall be blue, forcemains shall be green and re-use mains shall be magental.
- J. Pipe joints to be restrained, shall be harnessed with the "Meg-A-Lug" type joint restraint system for PVC pipe, the location of restrained joints are shown on the Drawings

PART 3 - EXECUTION

3.01 HANDLING PVC PIPE AND FITTINGS

- A. Care shall be taken in loading, transporting, and unloading to prevent injury to the pipe. Pipe and fittings shall not be dropped. All pipe and fittings shall be examined before laying, and no piece shall be installed which is found to be defective. Any damage to the pipe shall be cause for rejection as directed by the Engineer.

- B. If any defective pipe is discovered after it has been laid it shall be removed and replaced with a sound pipe in a satisfactory manner at no additional expense to the Owner. All pipe and fittings shall be thoroughly cleaned before laying, shall be kept clean until they are used in the work, and when installed or laid, shall conform to the lines and grades required.

3.02 LAYING PVC PIPE AND FITTINGS

- A. PVC pipe and cast iron fittings shall be installed in accordance with requirements of AWWA Standard Specification except as otherwise provided herein. A firm, even bearing throughout the length of the pipe shall be constructed by tamping selected material at the sides of the pipe up to the spring-line. Blocking will not be permitted.
- B. All pipe shall be sound and clean before laying. When laying is not in progress, including lunchtime, the open ends of the pipe shall be closed by watertight plug or other approved means. Good alignment shall be preserved in laying. The deflection at joints shall not exceed that recommended by manufacturer. Fittings, in addition to those planned, shall be provided, if required, in crossing utilities, which may be encountered upon opening the trench. Solid sleeves shall be used only where approved by the Engineer.
- C. When cutting pipe is required, the cutting shall be done by machines, leaving a smooth cut at right angles to the axis of the pipe. Cut ends of pipe to be used with a compression joint shall be beveled to conform to the manufactured spigot end.
- D. Joining Pipe:
 - 1. Push-on joints shall be made in strict accordance with the manufacturer's instructions. Pipe shall be laid with bell ends looking ahead. A rubber gasket shall be inserted in the groove of the bell end of the pipe, and the joint surfaces cleaned and lubricated. The plain end of the pipe is to be aligned with the bell of the pipe to which it is to be joined, and pushed home with a jack or by other means.
 - 2. Mechanical joints at valves, fittings, and where designated on the drawings and as specified, shall be in accordance with the "Notes on Method of Installation" under ANSI Specification A21 .11 and the instructions of the manufacturer. To assemble the joints in the field, thoroughly clean the joint surfaces and rubber gasket with soapy water before tightening the bolts. Bolts shall be tightened to the specified torques. Under no condition shall extension wrenches or pipe over

handle or ordinary ratchet wrench be used to secure greater leverage.

- E. All valves, fittings and other appurtenances needed upon the pipelines shall be set and jointed as indicated on the Drawings or as required by the manufacturer.
- F. Unless otherwise noted, underground fittings shall be mechanical joint with restraints as needed.
- G. Deflected bell pipe shown on the Drawings is shown only as an assistance illustrating a preferred means of installation in specific locations, and is not intended to indicate all deflected bell pipe necessary to effect the installation as shown in plan and profile views. The cost of all such deflections shall be included within the bid price for furnishing and installing the pipe.
- H. If dewatering the trench is impossible due to unstable soil and groundwater conditions the Contractor may install the PVC Pipe underwater. If pipe is installed underwater bedding and haunching materials shall be approved by the Engineer before installing. PVC pipe is buoyant when installed underwater therefore; the Contractor shall take all precautions necessary to prevent pipe floatation by placing backfill material on the pipe as it is assembled or by other means acceptable to the Engineer.
- I. The Contractor shall install an electronic pipe detection device, i.e., "Detecto Tape" directly above the pipe during the backfilling operations. The brightly colored plastic-coated metal strips or tape shall be designed specifically for the purpose of pipe detection and shall include warning labels to the excavator.

3.03 PRESSURE AND LEAKAGE TESTS OF UNDERGROUND PRESSURE PIPING

- A. Hydrostatic pressure and leakage test shall conform with Section 4 of AWWA C600-77 Specification with the exception that the Contractor shall furnish all gauges, meters, pressure pumps and other equipment needed to test the line.
- B. The pressure required for the field hydrostatic pressure test shall be 150 psi. The Contractor shall provide temporary plugs and blocking necessary to maintain the required test pressure. Corporation cocks at least 3/4-inches in diameter, pipe riser and angle globe valves shall be provided at each pipe dead-end in order to bleed air from the line. Duration of pressure test shall be at least two hours. The cost of these items shall be included as a part of testing.
- C. The leakage test shall be a concurrent test at the maximum operating pressure as determined by the Engineer with the pressure test and shall be

of not less than 2 hours duration. All leaks evident at the surface shall be repaired and leakage eliminated regardless of total leakage as shown by test. Lines which fail to meet tests shall be repaired and retested as necessary until test requirements are complied with. Defective materials, pipes, valves and accessories shall be removed and replaced. The pipelines shall be tested in such sections as may be directed by the Engineer by shutting valves or installing temporary plugs as required. The line shall be filled with water and all air removed and the test pressure shall be maintained in the pipe for the entire period by means of a force pump to be furnished by the Contractor. Accurate means shall be provided for measuring the water required to maintain this pressure. The amount of water required is a measure of the leakage.

- D. The amount of leakage which will be permitted shall be in accordance with AWWA C600 Standards for all pressure lines.
- E. The Contractor must submit his plans for testing to the Engineer for review at least 10-days before starting the test. The Contractor shall remove and adequately dispose of all blocking material and equipment after completion and acceptance of the field hydrostatic test, unless other directed by the Engineer. Any damage to the pipe coating shall be repaired by the Contractor. Lines shall be totally free and clean prior to final acceptance.
- F. Pipe joints shall be restrained to resist separating. Use Meg-A-Lug type joint restraints.

3.04 CLEANING AND FLUSHING

- A. The pipe shall be thoroughly cleaned of all foreign matter before installation.
- B. It is the responsibility to insure cleanliness of the pipe during installation and backfilling. At the conclusion of the work, the Contractor shall thoroughly clean all of the pipe, if necessary, by flushing with water or other materials which may have entered during the construction period. Debris cleaned from the lines shall be removed from the lowest outlet. If pipe is cleaned and if the groundwater level is above the pipe, or following a heavy rain the Engineer will examine the pipe for leaks. If defective pipes or joints are discovered at this time, they shall be repaired by the Contractor.

3.05 DISINFECTING

- A. Before being placed in service, all potable water pipelines shall be chlorinated in accordance with AWWA C601, "Standard Procedure for Disinfecting Water Mains". The procedure shall be approved by the Engineer. The location of the chlorination and sampling points will be determined by the Engineer in the field. Taps for chlorination and sampling shall be uncovered and backfilled by the Contractor as required.

- B. The general procedure for chlorination shall be first to flush all dirty or discolored water from the lines, and then introduce chlorine in approved dosages through a tap at one end, while water is being withdrawn at the other end of the line. The chlorine solution shall remain in the pipeline for at least 24-hours.
- C. Following the chlorination period, all treated water shall be flushed from the lines at their extremities and replaced with water from the distribution system. Bacteriological sampling and analysis of the replacement water shall then be made by the Engineer in full accordance with AWWA C601. The Contractor will be required to re-chlorinate, if necessary. The line shall not be placed in service until the requirements of the State and County Public Health Department are met.
- D. Special disinfecting procedures shall be used in connection to existing mains, and where the method outlined above is not practical.
- E. The Contractor shall make all arrangements necessary with the Health Department for the collection and examination of samples of water from disinfected water mains. These samples shall be examined for compliance with Department of Health and Rehabilitative Services requirements. Sampling shall be made daily and continuously until two successive examinations be found unsatisfactory, the line shall be flushed and disinfected again. The cost of sampling, flushing and disinfecting shall be included in the contract price and no additional charge shall be made to the Owner for this work.

END OF SECTION

SECTION 15110

VALVES AND APPURTENANCES

PART 1 – GENERAL

1.01 WORK INCLUDED

- A. Furnish labor, materials, equipment and incidentals required an ready for operation of all valves, couplings, and connectors, etc., as shown on the Drawings and as specified herein.
- B. The equipment shall include, but not be limited to the following:
 - 1. Gate Valves
 - 2. Ball Valves
 - 3. Plug Valves
 - 4. Check Valves
 - 5. Flexible Couplings
 - 6. Butterfly Valves
 - 7. Flanges Coupling Adapters
 - 8. Unions
 - 9. Valve Boxes
 - 10. Corporation Cocks
 - 11. Air Release Valves
 - 12. Stopple Plugging
 - 13. Tapping Sleeve and Valve

1.02 RELATED WORK

- A. Section 02221 – “Trenching, Bedding, and Backfill for Pipe”
- B. Section 15062 – “Ductile Iron Pipe and Fittings”
- C. Section 15065 – “Polyvinyl Chloride (PVC) Water Main Pipe

1.03 DESCRIPTION OF SYSTEMS

- A. Equipment and materials specified herein are intended to be standard items for use in controlling the flow of wastewater.

1.04 QUALIFICATIONS

- A. All of the types of valves and appurtenances shall be products of well established reputable firms who are fully experienced, and qualified in the manufacture of the particular equipment to be furnished. The equipment shall be designed, constructed and installed in accordance with the best practices and methods and shall comply with these specifications as applicable.

1.05 SUBMITTALS

- A. Submit, within 30-days after Contract execution, a list of valves to be furnished, the names of the suppliers and the date of delivery.
- B. Complete Shop Drawings of all valves and appurtenances shall be submitted in accordance with the requirements of Section 01340 - "Submittals and Substitutions".

1.06 TOOLS

- A. Special tools, handles or wrenches, if required for normal operation and maintenance of the specified valves, shall be supplied with the equipment furnished.

PART 2 – PRODUCTS

2.01 GENERAL

- A. All valves and appurtenances shall be of the size shown on the Drawings and all similar valves shall be from one manufacturer.
- B. Valves and appurtenances shall have the name of the manufacturer and the working pressure for which they are designed cast in raised letters upon some appropriate part of the body.
- C. All valves shall open left, counter-clockwise.

2.02 GATE VALVES

- A. Exposed gate valves unless otherwise specified or approved, shall be iron body, bronze mounted, wedge disc gate valves with flanged ends and conforming to the AWWA Standards Specification for Gate Valves for Ordinary Water Works Service, Designation C500-86 rated 150 psi WOG, minimum. Exposed valves shall be outside screw and yoke type. Buried gate valves shall be mechanical joint, ANSI Standard 21.11 except where shown otherwise.
- B. Face to face dimension shall conform to ANSI Standard Face to Face and End to End Dimensions of Ferrous Valves, (ANSI B16.10) for 125-pound cast iron valves.
- C. Bronze gate rings shall be fitted into grooves of dovetail or similar shape in the gates. For grooves or other shapes, the rings shall be firmly attached to the gates with bronze rivets.
- D. Gate valves shall have a resilient rubber seated ring or wedge permanently bonded to the wedge disc and complying with AWWA C509-80.
- E. Stuffing box follower bolts shall be of steel and the nuts shall be of bronze.

- F. The design of the valves shall be such as to permit packing the valves without undue leakage while they are wide open and in service. O-ring stuffing boxes may be used.
- G. Where indicated on the Drawings or necessary due to location, size, or inaccessibility, chain wheel operators shall be furnished with the valves. Such operators shall be designed with adequate strength for the valves with which they are supplied and to provide for easy operation of the valve. Chains for valve operators shall be galvanized.
- H. Where required, gate valves shall be provided with a box cast in the slab and a box cover. Length of box shall be slab thickness. All buried valves shall have cast iron, sliding type valve boxes as shown on the Drawings. Box cover opening shall be for valve stem and nut. Valve wrenches and extension stems shall be provided by the manufacturer to actuate the valves. The box and cover shall be equal to those manufactured by Rodney Hunt Machine Company, Clow Corporation, or equal.
- I. Gate valves shall be as manufactured by the Mueller Company, Clow Valve Company, American Darling, or equal.

2.03 BALL VALVES FOR PVC PIPE

- A. Ball valves for PVC pipe shall be of PVC Type-1 with union, socket, threaded or flanged ends as required. Ball valves shall be full port, full flow, all plastic construction, 150 psi rated with Teflon seat seals and T-handles. PVC ball valves shall be as manufactured by Celanese Piping Systems, Inc., Nibco True-Bloc, Wallace and Tiernan Inc., Plastiline, Inc., or equal.
- B. All valves shall be mounted in such a position that valve position indicators are plainly visible when standing on the floor.

2.04 PLUG VALVES

- A. Plug valves shall be non-lubricated eccentric type with resilient faces plugs, and shall be furnished with end connections as shown on the Drawings. Flanged valves shall be faced and drilled to the ANSI B16.1 Class 125 Standard. Mechanical joint ends shall be AWWA C111. Bell ends shall be to the AWWA C100 Class B. Grooved ends shall be AWWA C606.
- B. Port areas for valves shall be 80% or greater of full pipe area.
- C. Valve bodies shall be of ASTM A126 Class B cast iron in compliance with AWWA Standard C507-73 Section 5.1 and AWWA Standard C504-80. All exposed nuts, bolts, springs, washers, etc. shall be zinc plated. Resilient plug facings shall be of Neoprene or Hycar on a single piece plug. The plug shall be of sufficient construction so that no strengthening member is required opposite the face.
- D. Valves shall be furnished with corrosion resistant seats which comply with AWWA Standard C507, Section 7, paragraph 7.2, and with AWWA Standard

C504, Section 3.5. The seat shall be in the body only. Seat ring shall be adjustable and replaceable.

- E. Valves shall be furnished with replaceable, sleeve-type bearings in the upper and lower journals. These bearings shall comply with AWWA Standard C507-73, Section 8, paragraphs 8.1, 8.3, and 8.5, and with AWWA Standard C504, Section 3.6.
- F. Valve shaft seals or packing shall be adjustable and replaceable without removing the valve from service or interrupting service with flow in either direction. Shaft seals shall comply with AWWA Standard C507-73, Section 10, and with AWWA C507-70, Section 111.
- G. Valve pressure ratings shall be as follows and shall be established by hydrostatic tests as specified by ANSI Standard B16.1. Pressure ratings shall be 175 psi for valves through 12-inch, 150 psi for valves in sizes 14-inch through 36-inch, and 125 psi for valves in sizes 42-inch through 54-inch. Valves shall be capable of providing drip-tight shutoff up to the full valve rating with pressure in either direction.
- H. All valves 8-inches and larger shall be equipped with gear actuators. All gearing shall be enclosed suitable for running in oil with seals provided on all shafts to prevent entry of dirt and water into the actuator. All shaft bearings shall be furnished with permanently lubricated bronze bearing bushings. Actuator shall clearly indicate valve position and an adjustable stop shall be provided. Construction of actuator housing shall be semi-steel.
- I. Plug valves installed such that actuators are 6-feet or more above the floor, shall have chainwheels and chains provided.
- J. Where shown on the Drawings, plug valves shall be installed with extended shafts and actuators. Actuators for extended shafts shall be mounted on floor stands where indicated on the Drawings or shall be removable handwheels where floor stands are not called for. Six-inch sleeves shall be provided for extended shafts in all floors; where necessary, covers shall be provided. Shafts shall be of adequate strength to operate the valve. Floor stands and covers, where called for shall be cast iron. Floor stands shall be equipped with valve position indicators and a lock for the handwheel.
- K. All plug valves shall be installed so that the direction of flow through the valve is in accordance with the manufacturer's recommendations.
- L. Valves and actuators shall be as manufactured by Pratt, DeZurik, M&H, Victaulic, or equal.

2.05 CHECK VALVES

- A. Check valves for cast iron and ductile iron pipelines shall be swing type and shall meet the material requirements of AWWA Specification C508. The valves shall iron body, bronze mounted, single disc, 150 psi minimum working water pressure, non-shock, and hydro statically tested at 300 psi. Ends shall be 125-

pounds ANSI B16.1 flanges or 125-pound ANSI 2.1 threaded fittings depending upon location.

- B. When there is no flow through the line, the disc shall hang lightly against its seat in practically a vertical position. When open, the disc shall swing clear of the waterway.
- C. Check valves shall bronze seat and body rings, extended bronze hinge pins and bronze nuts on the bolts of bolted covers.
- D. Valves shall be so constructed that disc and body seat may easily be removed and replaced without removing the valve from the line. Valves shall be fitted with an extended hinge arm with outside lever and weight. Springs with various tensions shall be provided and springs approved by the Engineer shall be installed.
- E. Check valves for cast and ductile iron pipelines shall be as manufactured by Pratt, M&H, American Darling, or equal.
- F. Check valves for PVC pipe shall be of PVC Type-1, Series BC with union, socket, threaded or flanged ends as required. PVC ball check valves shall be as manufactured by Celanese Piping Systems, Inc., Nibco Chemtrol, Wallace & Tiernan, Inc., Plastiline, Inc., or equal.

2.06 BUTTERFLY VALVES

- A. Butterfly valves and operators shall conform to the AWWA Standard Specifications for Rubber Seated Butterfly Valves, Designation C504, except as hereinafter specified. Valves, except as specified hereinafter, shall be Class 150A or B and equal to those manufactured by Henry Pratt Company or approved equal. The valve discs shall be constructed of cast iron conforming to ASTM A-48, Class 40 or ductile iron conforming ASTM A536, Grade 65 - 45 - 12 or C.I. ASTM A-126 Class B with Nickel/Chrome (80% - 20%) disc edge.
- B. The face to face dimensions of flanged end valves shall be in accordance with Table 3 of above mentioned AWWA Specification for short-body valve. Adequate two-way thrust bearings shall be provided. Flange drilling shall be in accordance with ANSI B16.1.
- C. Valve-seats shall be a natural rubber or synthetic rubber compound. Valve-seats 24-inches and larger shall be field adjustable and replaceable without dismounting operator disc or shaft and without removing the valve from the line. All retaining segments and adjusting devices shall be of corrosion resistant material with stainless Nylock screws and be capable of a 1/8-inch adjustment. Valves 20-inches and smaller shall have bonded or mechanically restrained seats as outlined in AWWA C504. Where rubber seat is mounted on valve-body, the mating edge of the valve-disc shall be Type-316 18-8 stainless steel or nickel/Chrome 80% - 20%. Where rubber seat is mounted on the valve-disc, the valve-body shall be fitted with an 18 - 8 stainless steel seat offset from the shaft,

mechanically restrained and covering 360-degrees of the peripheral opening or seating surface.

- D. The valve-body shall be constructed of close grain cast iron per ASTM A126, Class B with integrally cast-hubs for shaft bearing housings of the through boss-type. Permanently self-lubricating corrosion resistant sleeve-type bearings shall be provided and shall be sized to withstand bearing loads. Bearing loads shall not exceed 20-percent of the compressive strength of the bearing or shaft material and shall not exceed 2,500 psi. A stuffing box of liberal dimensions shall be provided at the operator end of the vane-shaft. Packing shall be of the self-compensating type especially selected for the operating pressures to be encountered. A sealing element utilizing O-rings shall be considered.
- E. The valve-shaft shall be turned, ground, and polished constructed of 18-8 stainless steel and designed for both torsional and shearing stresses when the valve is operated under its greatest dynamic or seating torque. Shaft shall be of either a one piece unit extending full-size through the valve-disc and valve-bearing or it may be of a stub-shaft design.
- F. In general, the butterfly-valve operators shall conform to the requirements of Section 3.8 of the AWWA Standard Specifications for Rubber Seated Butterfly Valves, Designation C504, and as herein specified.
- G. Gearing for the operators where required, shall be totally enclosed in a gear-case in accordance with paragraph 3.8.3 of the above mentioned AWWA Standard Specification.
- H. The manual operators shall conform to Section 3.8.1 of the above mentioned AWWA Standard Specifications and hand-wheels shall turn clockwise to close the valves. Operators shall have indicators to show position of the valve-disc. Operators shall be rigidly attached to the valve-body or to its floor stand.

2.07 FLEXIBLE COUPLINGS

- A. Flexible couplings shall be either the split-type or the sleeve-type as shown on the Drawings. Coupling shall be restrained joint type and may be the Victaulic-type.
 - 1. Split type coupling shall be used with all interior piping and with exterior piping as noted on the Drawings. The couplings shall be mechanical type for radius-groove piping. The couplings shall mechanically engage and lock-grooved pipe-ends in a positive couple and allow for angular deflection and contraction and expansion.
 - 2. Couplings shall consist of malleable iron, ASTM Specification A47, Grade 32510 housing-clamps in two or more parts, a single chlorinated butyl composition sealing gasket with a "C" shaped cross-section and internal sealing lips projecting diagonally inward, and two or more oval track-head type bolts with hexagonal heavy nuts conforming to ASTM Specification

A183 and A194 to assemble the housing clamps. Bolts and nuts shall be hot dipped galvanized after fabrication.

3. Sleeve-type couplings shall be used with all buried piping. The couplings shall be of steel and shall be Dresser Style 38, Smith Blair Style 413, or approved equal. The coupling shall be provided with hot dipped galvanized steel bolts and nuts unless indicated otherwise.
4. All couplings shall be furnished with the pipe stop removed.
5. Couplings shall be provided with gaskets of a composition suitable for exposure to the liquid within the pipe.

2.08 UNION

- A. Unions on ferrous pipe 2-inches in diameter and smaller shall be 150-pounds malleable iron, zinc-coated. Unions on water piping 2-1/2-inches in diameter and larger shall be flange-pattern, 125-pound class, zinc-coated. Gaskets for flanged-unions shall be of the best quality fiber or plastic. Unions shall not be concealed in walls, ceilings or partitions.

2.09 FLANGED COUPLING ADAPTER

- A. Coupling adapter shall be Smith-Blair Model No. 912, or equal. Body and follower flange shall be iron. Bolt circle, size and spacings shall conform to ASA 125 flange. Gasket shall be Smith-Blair Grade 30 or 60, or equal. O-Ring shall be grade 60. Cross and tee-bolts shall conform to ANSI A 21.11.

2.10 VALVE BOXES

- A. All buried valves shall have cast iron two or three piece valve boxes with cast iron covers. Valve boxes shall be provided with suitable heavy bonnets and to extend to such elevation at or slightly above the finished grade surface as directed by the Engineer. The barrel shall be one or two-piece, screw-type, having 5 1/4-inch shaft. Covers shall have 'WATER' or 'SEWER' cast into the top. All valves shall have actuating nuts extended to within 6-inches of the top of valve box cover.
- B. Valve boxes shall be provided with concrete base and as shown on the Drawings.
- C. A tee handled gated wrench of suitable length shall be furnished to operate all valves with valve boxes.

2.11 CORPORATION COCKS

- A. Corporation cocks for connections to cast iron, ductile iron or steel piping shall be all brass or bronze suitable for 150 psi operating pressure and similar to Mueller Co. H-10046 or equal by Clow Corp., and shall be of sizes required and noted on the Drawings.

2.12 AIR RELEASE VALVES

- A. Air release valves with below ground exhaust or intake shall be furnished and installed by the Contractor at such locations as indicated on the Drawings and as directed by the Engineer in the field. The bid price for air release valves shall include all costs for selling, delivering and installing the air release valves and accessories complete, including tapping the main, furnishing and installing the tapping saddle, plug valve and valve box, the belowground air release valve, the enclosure and foundation and all necessary piping and appurtenances, as shown on the Drawings and specified herein.
- B. Sewer air release valves shall be specially designed for use on sewage force mains. The valves shall be screw connection with a cast iron body and internal stainless steel trim parts. All working parts shall be located in the upper portion of the internal chamber. The lower chamber shall contain a ball float which shall activate the valve mechanism. Valve bodies shall be suitable for 150 psi working pressure. The orifice size shall be as indicated on the drawings. The Combination Sewage Air Valves shall consist of two separate valve bodies one Release Sewage Air and one Sewage Air and Vacuum Valve. Valves shall be piped into a compact assembly and shall include provisions to back flush the valves. The sewage air release valve shall functions automatically to release constrained air to the atmosphere. The Sewage Air and Vacuum Valve shall exhaust large quantities of air during the filling of the system and allows air to reenter during drainage or when a vacuum occurs. Once air is exhausted, the valve shall seat tightly to prevent sewage leakage.
- C. The connection to the main shall be by a stainless steel tapping saddle, as shown on the Drawings.
- D. Air Valve enclosure (manholes) shall have the inside and outside surfaces of the walls coated with 20-coats of a heavy duty coal tar epoxy coating containing not less than 72.9-percent by volume non-volatile solids. The masonry surface may be damp but not wet. If necessary, the Contractor shall utilize blowers to achieve the necessary drying. The first coat shall be thinned approximately 15-percent with a thinner recommended and furnished by the manufacturer. The total dry film thickness of the finished coating shall not be less than 10 mils. The coating shall be coal-tar epoxy or equal applied in accordance with the manufacturer's recommendations. The Contractor shall take all necessary precautions to protect the workmen against toxic or harmful fumes during the painting operations.

2.13 STOPPLE PLUGGING

- A. The Contractor shall install large diameter line plug in an active 30-inch diameter forcemain. The temporary plug shall be used to install as 30-inch Plug Valve and other pipe fittings and shall be as manufactured by the T.D. Williamson, Inc. of Tulsa, Oklahoma.
- B. This work is usually performed by a Specialty Contractor with experience in line stopping and installations of stopple plugging machines.
- C. The stopple plugging machine shall be made of iron or steel and shall consist of three main sections; a hydraulic cylinder or jack-screw, plugging head housing and a plugging head. The unit and its housing shall be capable of handling 150 psi design pressures.

2.14 TAPPING SLEEVE AND VALVE

- A. Tapping Sleeves shall be cast iron or cast ductile iron, mechanical joint, gasketed as manufactured by Clow Corporation, American Flow Control, or approved equal. Upon completion of the taps point sleeve and valve with 10 mils of cold tar epoxy.
- B. Tapping valves shall be iron body and have restrained type mechanical joints, be designed for tapping with over-sized seat rings and be manufactured by Clow Corp., American Flow Control or approved equal.
- C. Fabricated steel sleeves shall not be acceptable. However, stainless steel sleeves may be considered.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Valves and appurtenances shall be installed in the locations shown, true to alignment and rigidly supported. Any damage to the above items shall be repaired to the satisfaction of the Engineer before they are installed.
- B. Install floor boxes, brackets, extension rods, guides, the various types of operators and appurtenances that are in masonry floors or walls, and install concrete inserts for hangers and supports as soon as forms are erected and before concrete is poured. Before setting these items, the Contractor shall check all plans and figures which have a direct bearing on their location and he shall be responsible for the proper location of these valves and appurtenances during the construction of the structures.
- C. Flanged joints shall be made with hot dipped galvanized bolts, nuts and washers. Mechanical joints shall be made with mild corrosion resistant alloy steel bolts and

nuts. All exposed bolts shall be painted the same color as the pipe. All buried bolts and nuts shall be heavily coated with 2-coats of bituminous paint.

- D. Prior to assembly of split couplings, the grooves as well as other parts shall be thoroughly cleaned. The ends of the pipes and outside of the gaskets shall be moderately coated with petroleum jelly, cup grease, soft soap or graphite paste, and the gasket shall be slipped over one pipe end. After the other pipe has been brought to the correct position, the gasket shall be centered properly over the pipe ends with the lips against the pipes. The housing sections shall then be placed. After the bolts have been inserted, the nuts shall be tightened until the housing sections are firmly in contact, metal-to-metal, without excessive bolt tension.
- E. Prior to the installation of sleeve-type couplings, the pipe ends shall be cleaned thoroughly. Soapy water may be used as a gasket lubricant. A follower and gasket, in that order, shall be slipped over each pipe to a distance of about 6-inches from the end, and the middle ring shall be placed on the already laid pipe end until it is properly centered over the joint. The other pipe end shall be inserted into the middle pipe already laid. The gaskets and followers shall then be pressed evenly and firmly into the middle ring flares. After the bolts have been inserted and all nuts have been made up fingertight, diametrically opposite nuts shall be progressively and uniformly tightened all around the joint, preferably by use of a torque wrench of the appropriate size and torque for the bolts.

3.02 SHOP PAINTING

- A. Ferrous surfaces of valves and appurtenances shall receive an exterior coating of rust-inhibitive primer. Interior coatings shall be the manufacturer's standard except that vales for potable water lines shall be coated with paints approved by EPA, FDA, and AWWA for potable water service. All pipe connection openings shall be capped after shop painting to prevent the entry of foreign matter prior to installation.

3.03 FIELD PAINTING

- A. All metal valves and appurtenances specified herein and exposed to view will be painted as part of the work. Paint valves as specified for pipe in Section 09850 - "Painting".

3.04 INSPECTION AND TESTING

- A. Completed pipe shall be subjected to hydrostatic pressure test for 2-hours at 200-percent full working pressure. All leaks shall be repaired and lines re-tested until approved by the Engineer.

END OF SECTION

Mission:

To protect, promote & improve the health of all people in Florida through integrated state, county & community efforts.



Rick Scott
Governor

Celeste Phillip, MD, MPH
State Surgeon General & Secretary

Vision: To be the Healthiest State in the Nation

Notification of Acceptance of Use of a General Permit

Permittee:

Leighton Walker
Utilities Engineer
City of Riviera Beach
600 W. Blue Heron Blvd.
Riviera Beach, FL 33404
lcwalker@rivierabch.com

Permit Number: 138288-212-DSGP

Issue Date: 02/10/2017

Expiration Date: 02/09/2022

County: Palm Beach

Project Name: Riviera Heights W 1st St to W 3rd St Neighborhood Improvements

Water Supplier: City of Riviera Beach

PWS ID: 4501229

Dear Mr. Walker:

On February 2, 2017 the Florida Department of Health-Palm Beach County, as an approved local program of the Florida Department of Environmental Protection, received a "Notice of Intent to Use the General Permit for Construction of Water Main Extensions for PWSs" [DEP Form No. [62-555.900\(7\)](#)], under the provisions of Rule [62-4.530](#) and Chapter [62-555](#), Florida Administrative Code (F.A.C.). The proposed project includes:

Construction of approximately 4,179 LF of 6" DIP water main to replace existing water main located along Avenue O and West 1st through West 3rd Street in the City of Riviera Beach, Florida.

Based upon the submitted Notice and accompanying documentation, this correspondence is being sent to advise that the Department does not object to the use of such general permit at this time. Please be advised that the permittee is required to abide by Rule [62-555.405, F.A.C.](#), all applicable rules in Chapters [62-4](#), [62-550](#), [62-555](#), F.A.C., and the General Conditions for All General Drinking Water Permits (found in [62-4.540, F.A.C.](#)).

When any existing asbestos cement (AC) pipes are replaced under this permit, the permittee shall do so in accordance with the applicable rules of the Federal Asbestos Regulation and Florida DEP requirements. For specific requirements applicable to AC pipes, the permittee should contact the Air and Waste Management section managers prior to commencing any such activities at (561) 837-5900 #3. Please be aware that a notification is required to be submitted to the Department for a regulated project.

The permittee shall comply with all sampling requirements specific to this project. These requirements are attached for review and implementation. Pursuant to Rule [62-555.345, F.A.C.](#), the permittee shall submit a certification of construction completion [DEP Form No. [62-555.900\(9\)](#)] to the Department and obtain approval, or clearance, from the Department before placing any water main extension constructed under this general permit into operation for any purpose other than disinfection or testing for leaks.

Florida Department of Health

Palm Beach County, Division of Environmental Public Health
P.O. Box 29, 800 Clematis Street, West Palm Beach, FL 33402
PHONE: 561-837-5900 • FAX: 561-837-5294

FloridaHealth.gov, Flhealthpalmbeach.org



Accredited Health Department
Public Health Accreditation Board

Within 30 days after the sale or legal transfer of ownership of the permitted project that has not been cleared for service in total by the Department, both the permittee and the proposed permittee shall sign and submit an application for transfer of the permit using Form [62-555.900\(8\), F.A.C.](#), with the appropriate fee. The permitted construction is not authorized past the 30-day period unless the permit has been transferred.

This permit will expire five years from the date of issuance. If the project has been started and not completed by that time, a new permit must be obtained before the expiration date in order to continue work on the project, per Rule [62-4.030, F.A.C.](#)

Sincerely,
For the Division Director



Darrel J. Graziani, P.E., R.S.
Environmental Administrator – Water Programs
Environmental Public Health

c: Project Engineer: Suzanne Dombrowski, P.E.
Utility: Same

Civil Penalty May Be Incurred
if this project is placed into operation before obtaining a clearance from this office.

Requirements for clearance upon completion of projects are as follows:

1) Clearance Form

Submission of a fully completed Department of Environmental Protection (DEP) Form [62-555.900\(9\)](#) *Certification of Construction Completion and Request for Clearance to Place Permitted PWS Components into Operation.*

2) Record Drawings, if deviations were made

Submission of the portion of record drawings showing deviations from the DEP construction permit, including preliminary design report or drawings and specifications, if there are any deviations from said permit (Note that it is necessary to submit a copy of only the portion of record drawings showing deviations and not a complete set of record drawings.).

3) Bacteriological Results

Copies of satisfactory bacteriological analysis (a.k.a. Main Clearance), taken within sixty (60) days of completion of construction, from locations within the distribution system or water main extension to be cleared, in accordance with Rules [62-555.315\(6\)](#), [62-555.340](#), and [62-555.330](#), F.A.C. and American Water Works Association (AWWA) Standard C 651-92, as follows:

- Connection to an existing system
- The end point of the proposed addition
- Any water lines branching off a main extension
- Every 1,200 feet on straight runs of pipe

Each location shall be sampled on two consecutive days, with sample points and chlorine residual readings clearly indicated on the report. A sketch or description of all bacteriological sampling locations must also be provided. **All samples shall be collected by an employee of a state certified laboratory or a certified operator and be reported on DEP Reporting Format 62-550.730.**

For further clarification contact:
Jay Hardman, P.E.
Florida Department of Health Palm Beach
Plan Review & Permit Section
800 Clematis Street, 4th Floor
West Palm Beach, FL 33401
561-837-5900 #5



NOTICE OF INTENT TO USE THE GENERAL PERMIT FOR CONSTRUCTION OF WATER MAIN EXTENSIONS FOR PWSs

INSTRUCTIONS: This notice shall be completed and submitted by persons proposing to construct projects permitted under the "General Permit for Construction of Water Main Extensions for Public Water Systems" in Rule 62-555.405, F.A.C. AT LEAST 30 DAYS BEFORE BEGINNING CONSTRUCTION OF A WATER MAIN EXTENSION PROJECT, complete and submit one copy of this notice to the appropriate Department of Environmental Protection (DEP) District Office or Approved County Health Department (ACHD) along with payment of the proper permit processing fee. (When completed, Part II of this notice serves as the preliminary design report for a water main extension project, and thus, it is unnecessary to submit a separate preliminary design report or drawings, specifications, and design data with this notice.) All information provided in this notice shall be typed or printed in ink. The DEP permit processing fee for projects requiring the services of a professional engineer during design is \$650, and the DEP permit processing fee for projects not requiring the services of a professional engineer during design is \$500.* Some ACHDs charge a county permit processing fee in addition to the DEP permit processing fee. Checks for permit processing fees shall be made payable to the Department of Environmental Protection or the appropriate ACHD. NOTE THAT A SEPARATE NOTIFICATION AND A SEPARATE PERMIT PROCESSING FEE ARE REQUIRED FOR EACH NON-CONTIGUOUS PROJECT.†

* Except as noted in paragraphs 62-555.520(3)(a) and (b), F.A.C., projects shall be designed under the responsible charge of one or more professional engineers licensed in Florida.

† Non-contiguous projects are projects that are neither interconnected nor located nearby one another (i.e., on the same site, on adjacent streets, or in the same neighborhood).

I. General Project Information

A. Name of Project: **Riviera Heights W 1st St to W 3rd St Neighborhood Improvements**

B. Description of Project and Its Purpose:

The proposed improvements includes replacement of the existing watermain, totaling 4,179 feet of 6" DIP watermain. Existing water services will be transferred from existing water main to new water main. Existing water main will be abandoned and grouted. Additional project improvements include lining of existing gravity sewer main, installation of drainage improvements and roadway restoration.

C. Location of Project

1. County Where Project Located: Palm Beach County
2. Description of Project Location:

This project is bounded by W 1st Street to the south, W 3rd Street to the north, Avenue O to the west, and Australian Avenue to the east.

D. Estimate of Cost to Construct Project: \$1,670,000

E. Estimate of Dates for Starting and Completing Construction of Project:
July 2017 - January 2018

F. Permittee

PWS/Company Name: City of Riviera Beach Utility District		PWS Identification No.: 4501229	
PWS Type:	☒ Community	☐ Non-Transient Non-Community	☐ Transient Non-Community
Contact Person: Leighton Walker		Contact Person's Title: Utilities Engineer	
Contact Person's Mailing Address: 600 W Blue Heron Blvd			
City: Riviera Beach		State: FL	Zip Code: 33404
Contact Person's Telephone Number: 561-845-4185		Contact Person's Fax Number: 561-840-7292	
Contact Person's E-Mail Address: lcwalker@rivierabch.com			

* This information is required only if the permittee is a public water system (PWS).

G. Public Water System (PWS) Supplying Water to Project

PWS Name: City of Riviera Beach Utility District		PWS Identification No.: 4501229	
PWS Type:	☒ Community	☐ Non-Transient Non-Community	☐ Transient Non-Community
PWS Owner: Leighton Walker			
Contact Person: Leighton Walker		Contact Person's Title: Utilities Engineer	
Contact Person's Mailing Address: 600 W Blue Heron Blvd			
City: Riviera Beach		State: FL	Zip Code: 33404
Contact Person's Telephone Number: 561-845-4185		Contact Person's Fax Number: 561-840-7292	
Contact Person's E-Mail Address: lcwalker@rivierabch.com			

NOTICE OF INTENT TO USE THE GENERAL PERMIT FOR CONSTRUCTION OF WATER MAIN EXTENSIONS FOR PWSs

Project Name: Riviera Heights W 1st St to W 3rd St Neighborhood Improvements	Permittee: City of Riviera Beach
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H. Public Water System (PWS) that Will Own Project After It Is Placed into Permanent Operation

PWS Name: City of Riviera Beach Utility District		PWS Identification No.: * 4501229	
PWS Type: *	☐ Community	☐ Non-Transient Non-Community	☐ Transient Non-Community
☐ Consecutive			
PWS Owner: Leighton Walker			
Contact Person: Leighton Walker		Contact Person's Title: Utilities Engineer	
Contact Person's Mailing Address: 600 W Blue Heron Blvd			
City: Riviera Beach		State: FL	Zip Code: 33404
Contact Person's Telephone Number: 561-845-4185		Contact Person's Fax Number: 561-840-7292	
Contact Person's E-Mail Address: lcwalker@rivierabch.com			

* This information is required only if the owner/operator is an existing PWS.

I. Professional Engineer(s) or Other Person(s) in Responsible Charge of Designing Project*

Company Name: Chen Moore and Associates		
Designer(s): Suzanne Dombrowski	Title(s) of Designer(s): Senior Engineer	
Qualifications of Designer(s):		
☒ Professional Engineer(s) Licensed in Florida – License Number(s): 69918		
☐ Public Officer(s) Employed by State, County, Municipal, or Other Governmental Unit of State†		
☐ Plumbing Contractor(s) Licensed in Florida – License Number(s): ^		
Mailing Address of Designer(s): 500 Austrailian Avenue South, Suite 530		
City: West Palm Beach	State: FL	Zip Code: 33401
Telephone Number of Designer(s): 561-746-6900 ext. 1035	Fax Number of Designer(s): 561-746-8333	
E-Mail Address(es) of Designer(s): sdombrowski@chenmoore.com		

* Except as noted in paragraphs 62-555.520(3)(a) and (b), F.A.C., projects shall be designed under the responsible charge of one or more professional engineers licensed in Florida.

† Attach a detailed construction cost estimate showing that the cost to construct this project is \$10,000 or less.

^ Attach documentation showing that this project will be installed by the plumbing contractor(s) designing this project, documentation showing that this project involves a public water system serving a single property and fewer than 250 fixture units, and a detailed construction cost estimate showing that the cost to construct this project is \$50,000 or less.

II. Preliminary Design Report for Project

A. Service Area, Water Use, and Service Pressure Information

1. Design Type and Number of Service Connections, and Average Daily Water Demands and Maximum-Day Water Demands, in the Entire Area to Be Served by the Water Mains Being Constructed Under this Project:

A = Type of Service Connection	B = Number of Service Connections	C = Average Daily Water Demand Per Service Connection, gpd	D = Total Average Daily Water Demand ^a , gpd (Columns BxC for Residential Service Connections)	E = Total Maximum-Day Water Demand ^b , gpd
Single-Family Home			0	
Mobile Home			0	
Apartment			0	
Commercial, Institutional, or Industrial Facility ^a				
Total	0		0	0

a. Description of Commercial, Institutional, or Industrial Facilities and Explanation of Method(s) Used to Estimate Average Daily Water Demand for These Facilities:

Proposed construction includes replacement of the existing water main. Existing water services will be transferred from existing water main to new water main. No additional water services will be installed.

b. Explanation of Peaking Factor(s) or Method(s) Used to Estimate Maximum-Day Water Demand:

Proposed construction includes replacement of the existing water main. Existing water services will be transferred from existing water main to new water main. No additional water services will be installed.

NOTICE OF INTENT TO USE THE GENERAL PERMIT FOR CONSTRUCTION OF WATER MAIN EXTENSIONS FOR PWSs

Project Name: Riviera Heights W 1st St to W 3rd St Neighborhood Improvements

Permittee: City of Riviera Beach

2. Explanation of Peaking Factor(s) or Method(s) Used to Estimate Design Peak-Hour Water Demand and, for Small Water Systems that Use Hydropneumatic Tanks or that Are Not Designed to Provide Fire Protection, Peak Instantaneous Water Demand:

Proposed construction includes replacement of the existing water main. Existing water services will be transferred from existing water main to new water main. No additional water services will be installed.

3. Design Fire-Flow Rate and Duration:

A hydrant analysis was not performed. Pipe sizing is based on Riviera Beach Utility District Instruction.

4. Design Service Pressure Range:

40-60 psi

B. Project Site Information

1. ATTACH A SITE PLAN OR SKETCH SHOWING THE SIZE AND APPROXIMATE LOCATION OF NEW OR ALTERED WATER MAINS, SHOWING THE APPROXIMATE LOCATION OF HYDRANTS, VALVES, METERS, AND BLOW-OFFS IN SAID MAINS, AND SHOWING HOW SAID MAINS CONNECT TO THE PUBLIC WATER SYSTEM SUPPLYING WATER FOR THE PROJECT.
2. Description of Any Areas Where New or Altered Water Mains Will Cross Above or Under Surface Water or Be Located in Soil that Is Known to Be Aggressive:

This project does not have any new or altered water mains that will cross surface water; nor will the new water main be located in soil that is known to be aggressive.

C. Information About Compliance with Design and Construction Requirements

1. If this project is being designed to comply with the following requirements, initial in ink before the requirements. If any of the following requirements do not apply to this project or if this project includes exceptions to any of the following requirements as allowed by rule, mark "X" before the requirements and complete Part II.C.2 below. *RSWW* = *Recommended Standards for Water Works* as incorporated into Rule 62-555.330, F.A.C.

sm

- a. This project is being designed to keep existing water mains and service lines in operation during construction or to minimize interruption of water service during construction. [RSWW 1.3.a; exceptions allowed under FAC 62-555.330]

sm

- b. All pipe, pipe fittings, pipe joint packing and jointing materials, valves, fire hydrants, and meters installed under this project will conform to applicable American Water Works Association (AWWA) standards. [FAC 62-555.320(21)(b), RSWW 8.0, and AWWA standards as incorporated into FAC 62-555.330; exceptions allowed under FAC 62-555.320(21)(c)]

ss

- c. All public water system components, excluding fire hydrants, that will be installed under this project and that will come into contact with drinking water will conform to NSF International Standard 61 as adopted in Rule 62-555.335, F.A.C., or other applicable standards, regulations, or requirements referenced in paragraph 62-555.320(3)(b), F.A.C. [FAC 62-555.320(3)(b); exceptions allowed under FAC 62-555.320(3)(d)]

ss

- d. All pipe and pipe fittings installed under this project will contain no more than 8.0% lead, and any solder or flux used in this project will contain no more than 0.2% lead. [FAC 62-555.322]

ss

- e. All pipe and pipe fittings installed under this project will be color coded or marked in accordance with subparagraph 62-555.320(21)(b)3, F.A.C., using blue as a predominant color. (Underground plastic pipe will be solid-wall blue pipe, will have a co-extruded blue external skin, or will be white or black pipe with blue stripes incorporated into, or applied to, the pipe wall; and underground metal or concrete pipe will have blue stripes applied to the pipe wall. Pipe striped during manufacturing of the pipe will have continuous stripes that run parallel to the axis of the pipe, that are located at no greater than 90-degree intervals around the pipe, and that will remain intact during and after installation of the pipe. If tape or paint is used to stripe pipe during installation of the pipe, the tape or paint will be applied in a continuous line that runs parallel to the axis of the pipe and that is located along the top of the pipe; for pipe with an internal diameter of 24 inches or greater, tape or paint will be applied in continuous lines along each side of the pipe as well as along the top of the pipe. Aboveground pipe will be painted blue or will be color coded or marked like underground pipe.) [FAC 62-555.320(21)(b)3]

X

- f. All new or altered water mains included in this project are sized after a hydraulic analysis based on flow demands and pressure requirements. ATTACH A HYDRAULIC ANALYSIS JUSTIFYING THE SIZE OF ANY NEW OR ALTERED WATER MAINS WITH AN INSIDE DIAMETER OF LESS THAN THREE INCHES. [FAC 62-555.320(21)(b) and RSWW 8.1]

NOTICE OF INTENT TO USE THE GENERAL PERMIT FOR CONSTRUCTION OF WATER MAIN EXTENSIONS FOR PWSs

Project Name: Riviera Heights W 1st St to W 3rd St Neighborhood Improvements

Permittee: City of Riviera Beach

- SM g. The inside diameter of new or altered water mains that are included in this project and that are being designed to provide fire protection and serve fire hydrants will be at least six inches. [FAC 62-555.320(21)(b) and *RSWW* 8.1.2]
- SM h. New or altered water mains that are included in this project and that are not being designed to carry fire flows do not have fire hydrants connected to them. [FAC 62-555.320(21)(b) and *RSWW* 8.1.5]
- SM i. This project is being designed to minimize dead-end water mains by making appropriate tie-ins where practical. [FAC 62-555.320(21)(b) and *RSWW* 8.1.6.a]
- SM j. New or altered dead-end water mains included in this project will be provided with a fire or flushing hydrant or blow-off for flushing purposes. [FAC 62-555.320(21)(b) and *RSWW* 8.1.6.b]
- SM k. Sufficient valves will be provided on new or altered water mains included in this project so that inconvenience and sanitary hazards will be minimized during repairs. [FAC 62-555.320(21)(b) and *RSWW* 8.2]
- SM l. New or altered fire hydrant leads included in this project will have an inside diameter of at least six inches and will include an auxiliary valve. [FAC 62-555.320(21)(b) and *RSWW* 8.3.3]
- SM m. All fire hydrants that will be installed under this project and that will have unplugged, underground drains will be located at least three feet from any existing or proposed storm sewer, stormwater force main, pipeline conveying reclaimed water regulated under Part III of Chapter 62-610, F.A.C., or vacuum-type sanitary sewer; at least six feet from any existing or proposed gravity- or pressure-type sanitary sewer, wastewater force main, or pipeline conveying reclaimed water not regulated under Part III of Chapter 62-10, F.A.C.; and at least ten feet from any existing or proposed "on-site sewage treatment and disposal system." [FAC 62-555.314(4)]
- X n. At high points where air can accumulate in new or altered water mains included in this project, provisions will be made to remove the air by means of air relief valves, and automatic air relief valves will not be used in situations where flooding of the valve manhole or chamber may occur. [FAC 62-555.320(21)(b) and *RSWW* 8.4.1]
- X o. The open end of the air relief pipe from all automatic air relief valves installed under this project will be extended to at least one foot above grade and will be provided with a screened, downward-facing elbow. [FAC 62-555.320(21)(b) and *RSWW* 8.4.2]
- X p. New or altered chambers, pits, or manholes that contain valves, blow-offs, meters, or other such water distribution system appurtenances and that are included in this project will not be connected directly to any sanitary or storm sewer, and blow-offs or air relief valves installed under this project will not be connected directly to any sanitary or storm sewer. [FAC 62-555.320(21)(b) and *RSWW* 8.4.3]
- SM q. New or altered water mains included in this project will be installed in accordance with applicable AWWA standards or in accordance with manufacturers' recommended procedures. [FAC 62-555.320(21)(b), *RSWW* 8.5.1, and AWWA standards as incorporated into FAC 62-555.330]
- SM r. A continuous and uniform bedding will be provided in trenches for underground pipe installed under this project; backfill material will be tamped in layers around underground pipe installed under this project and to a sufficient height above the pipe to adequately support and protect the pipe; and unsuitably sized stones (as described in applicable AWWA standards or manufacturers' recommended installation procedures) found in trenches will be removed for a depth of at least six inches below the bottom of underground pipe installed under this project. [FAC 62-555.320(21)(b), *RSWW* 8.5.2]
- SM s. All water main tees, bends, plugs, and hydrants installed under this project will be provided with thrust blocks or restrained joints to prevent movement. [FAC 62-555.320(21)(b) and *RSWW* 8.5.4]
- SM t. New or altered water mains that are included in this project and that will be constructed of asbestos-cement or polyvinyl chloride pipe will be pressure and leakage tested in accordance with AWWA Standard C603 or C605, respectively, as incorporated into Rule 62-555.330, F.A.C., and all other new or altered water mains included in this project will be pressure and leakage tested in accordance with AWWA Standard C600 as incorporated into Rule 62-555.330. [FAC 62-555.320(21)(b)1 and AWWA standards as incorporated into FAC 62-555.330]
- SM u. New or altered water mains, including fire hydrant leads and including service lines that will be under the control of a public water system and that have an inside diameter of three inches or greater, will be disinfected and bacteriologically evaluated in accordance with Rule 62-555.340, F.A.C. [FAC 62-555.320(21)(b)2 and FAC 62-555.340]
- X v. New or altered water mains that are included in this project and that will be installed in areas where there are known aggressive soil conditions will be protected through use of corrosion-resistant water main materials, through encasement of the water mains in polyethylene, or through provision of cathodic protection. [FAC 62-555.320(21)(b) and *RSWW* 8.5.7.d]

NOTICE OF INTENT TO USE THE GENERAL PERMIT FOR CONSTRUCTION OF WATER MAIN EXTENSIONS FOR PWSs

Project Name: Riviera Heights W 1st St to W 3rd St Neighborhood Improvements

Permittee: City of Riviera Beach

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w. New or relocated, underground water mains included in this project will be laid to provide a horizontal distance of at least three feet between the outside of the water main and the outside of any existing or proposed vacuum-type sanitary sewer, storm sewer, stormwater force main, or pipeline conveying reclaimed water regulated under Part III of Chapter 62-610, F.A.C.; a horizontal distance of at least six feet between the outside of the water main and the outside of any existing or proposed gravity-type sanitary sewer (or a horizontal distance of at least three feet between the outside of the water main and the outside of any existing or proposed gravity-type sanitary sewer if the bottom of the water main will be laid at least six inches above the top of the sewer); a horizontal distance of at least six feet between the outside of the water main and the outside of any existing or proposed pressure-type sanitary sewer, wastewater force main, or pipeline conveying reclaimed water not regulated under Part III of Chapter 62-610, F.A.C.; and a horizontal distance of at least ten feet between the outside of the water main and all parts of any existing or proposed "on-site sewage treatment and disposal system." [FAC 62-555.314(1); exceptions allowed under FAC 62-555.314(5)]

508

x. New or relocated, underground water mains that are included in this project and that will cross any existing or proposed gravity- or vacuum-type sanitary sewer or storm sewer will be laid so the outside of the water main is at least six inches above the other pipeline or at least 12 inches below the other pipeline; and new or relocated, underground water mains that are included in this project and that will cross any existing or proposed pressure-type sanitary sewer, wastewater or stormwater force main, or pipeline conveying reclaimed water will be laid so the outside of the water main is at least 12 inches above or below the other pipeline. [FAC 62-555.314(2); exceptions allowed under FAC 62-555.314(5)]

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y. At the utility crossings described in Part II.C.1.w above, one full length of water main pipe will be centered above or below the other pipeline so the water main joints will be as far as possible from the other pipeline or the pipes will be arranged so that all water main joints are at least three feet from all joints in vacuum-type sanitary sewers, storm sewers, stormwater force mains, or pipelines conveying reclaimed water regulated under Part III of Chapter 62-610, F.A.C., and at least six feet from all joints in gravity- or pressure-type sanitary sewers, wastewater force mains, or pipelines conveying reclaimed water not regulated under Part III of Chapter 62-610, F.A.C. [FAC 62-555.314(2); exceptions allowed under FAC 62-555.314(5)]

X

z. New or altered water mains that are included in this project and that will cross above surface water will be adequately supported and anchored, protected from damage and freezing, and accessible for repair or replacement. [FAC 62-555.320(21)(b) and RSWW 8.7.1]

X

aa. New or altered water mains that are included in this project and that will cross under surface water will have a minimum cover of two feet. [FAC 62-555.320(21)(b) and RSWW 8.7.2]

X

bb. New or altered water mains that are included in this project and that will cross under surface water courses greater than 15 feet in width will have flexible or restrained, watertight pipe joints and will include valves at both ends of the water crossing so the underwater main can be isolated for testing and repair; the aforementioned isolation valves will be easily accessible and will not be subject to flooding; the isolation valve closest to the water supply source will be in a manhole; and permanent taps will be provided on each side of the isolation valve within the manhole to allow for insertion of a small meter to determine leakage from the underwater main and to allow for sampling of water from the underwater main. [FAC 62-555.320(21)(b) and RSWW 8.7.2]

X

cc. This project is being designed to include proper backflow protection at those new or altered service connections where backflow protection is required or recommended under Rule 62-555.360, F.A.C., or in *Recommended Practice for Backflow Prevention and Cross-Connection Control*, AWWA Manual M14, as incorporated into Rule 62-555.330, F.A.C.; or the public water system that will own this project after it is placed into operation has a cross-connection control program requiring water customers to install proper backflow protection at those service connections where backflow protection is required or recommended under Rule 62-555.360, F.A.C., or in AWWA Manual M14. [FAC 62-555.360 and AWWA Manual M14 as incorporated into FAC 62-555.330]

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dd. Neither steam condensate, cooling water from engine jackets, nor water used in conjunction with heat exchangers will be returned to the new or altered water mains included in this project. [FAC 62-555.320(21)(b) and RSWW 8.8.2]

NOTICE OF INTENT TO USE THE GENERAL PERMIT FOR CONSTRUCTION OF WATER MAIN EXTENSIONS FOR PWSs

Project Name: Riviera Heights W 1st St to W 3rd St Neighborhood Improvements	Permittee: City of Riviera Beach
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2. Explanation for Requirements Marked "X" in Part II.C.1 Above, Including Justification, Documentation, Assurances, and/or Alternatives as Required by Rule for Exceptions to Requirements in Part II.C.1:

(f) A hydraulic analysis was not performed. Pipe sizing is based on Riviera Beach Utility District instruction. The minimum pipe diameter in the project is 6-inches.

(n)-(o) Air relief valves have not been included. There are multiple water service lines off of the distribution mains which will provide air relief.

(p) No chambers, pits, or manholes for the water system are proposed.

(v) There are no known aggressive soil conditions within the project area.

(z)-(bb) There are no surface water crossings included in the project.

(cc) The proposed water service lines will connect to the existing water meters. No backflow devices have been proposed.

I completed Part II of this notice, and the information provided in Part II and on the attachment(s) to Part II is true and accurate to the best of my knowledge and belief.

Signature, Seal, and Date of Professional Engineer (PE) or
Signature and Date of Other Person in Responsible Charge of
Designing Project:*



[Handwritten Signature]

1/19/17

Printed/Typed Name: *Suzanne Dombrowski*

License Number of PE or License Number or Title of Other
Person in Responsible Charge of Designing Project:*

Portion of Preliminary Design Report for Which Responsible:

Signature, Seal, and Date of Professional Engineer (PE) or
Signature and Date of Other Person in Responsible Charge of
Designing Project:*

Printed/Typed Name:

License Number of PE or License Number or Title of Other
Person in Responsible Charge of Designing Project:*

Portion of Preliminary Design Report for Which Responsible:

* Except as noted in paragraphs 62-555.520(3)(a) and (b), F.A.C., projects shall be designed under the responsible charge of one or more PEs licensed in Florida. If this project is being designed under the responsible charge of one or more PEs licensed in Florida, Part II of this notice shall be completed, signed, sealed, and dated by the PE(s) in responsible charge. If this project is not being designed under the responsible charge of one or more PEs licensed in Florida, Part II shall be completed, signed, and dated by the person(s) in responsible charge of designing this project.

NOTICE OF INTENT TO USE THE GENERAL PERMIT FOR CONSTRUCTION OF WATER MAIN EXTENSIONS FOR PWSs

Project Name: Riviera Heights W 1st St to W 3rd St Neighborhood Improvements

Permittee: City of Riviera Beach

III. Certifications

A. Certification by Permittee

I am duly authorized to sign this notice on behalf of the permittee identified in Part I.F of this notice. I certify that, to the best of my knowledge and belief, this project complies with Chapter 62-555, F.A.C. I also certify that construction of this project has not begun yet and that, to the best of my knowledge and belief, this project does not include any of the following construction work:

- construction of water mains conveying raw or partially treated drinking water;
- construction of drinking water treatment, pumping, or storage facilities or conflict manholes;
- construction of water mains in areas contaminated by low-molecular-weight petroleum products or organic solvents;
- construction of an interconnection between previously separate public water systems or construction of water mains that create a "new system" as described under subsection 62-555.525(1), F.A.C.; or
- construction of water mains that will remain dry following completion of construction.

(A specific construction permit is required for each project involving any of the above listed construction work.)

I understand that, if this project is designed under the responsible charge of one or more professional engineers (PEs) licensed in Florida, the permittee must retain a Florida-licensed PE to take responsible charge of inspecting construction of this project for the purpose of determining in general if the construction proceeds in compliance with the Department of Environmental Protection construction permit, including the approved preliminary design report, for this project. I understand that the permittee must have complete record drawings prepared for this project. I also understand that the permittee must submit a certification of construction completion to the Department and obtain written approval, or clearance, from the Department before the permittee places this project into operation for any purpose other than disinfection or testing for leaks.

Signature and Date

1/20/2017

Leighton Walker

Printed or Typed Name

Utilities Engineer

Title

B. Certification by PWS Supplying Water to Project

I am duly authorized to sign this notice on behalf of the PWS identified in Part I.G of this notice. I certify that said PWS will supply the water necessary to meet the design water demands for this project. As indicated below, the water treatment plant(s) to which this project will be connected has(have) the capacity necessary to meet the design water demands for this project, and I certify that all other PWS components affected by this project also have the capacity necessary to meet the design water demands for this project. I certify that said PWS is in compliance with applicable planning requirements in Rule 62-555.348, F.A.C.; applicable cross-connection control requirements in Rule 62-555.360, F.A.C.; and to the best of my knowledge and belief, all other applicable rules in Chapters 62-550, 62-555, and 62-699, F.A.C.; furthermore, I certify that, to the best of my knowledge and belief, said PWS's connection to this project will not cause said PWS to be in noncompliance with Chapter 62-550 or 62-555, F.A.C. I also certify that said PWS has reviewed the preliminary design report for this project and that said PWS considers the connection(s) between this project and said PWS acceptable as designed.

- Name(s) of Water Treatment Plant(s) to Which this Project Will Be Connected:

City of Riviera Beach Utility District WTP/PWSID: 4501229

- Total Permitted Maximum Day Operating Capacity of Plant(s), gpd: ~~10.24 MGD~~ 17.5 MGD
- Total Maximum Day Flow at Plant(s) as Recorded on Monthly Operating Reports During Past 12 Months, gpd:

~~9.5 MGD~~

10.24 MGD

Signature and Date

1/20/2017

Leighton Walker

Printed or Typed Name

Utilities Engineer

Title

C. Certification by PWS that Will Own Project After It Is Placed into Permanent Operation

I am duly authorized to sign this notice on behalf of the PWS identified in Part I.H of this notice. I certify that said PWS will own this project after it is placed into permanent operation. I also certify that said PWS has reviewed the preliminary design report for this project and that said PWS considers this project acceptable as designed.

Signature and Date

1/20/2017

Leighton Walker

Printed or Typed Name

Utilities Engineer

Title

NOTICE OF INTENT TO USE THE GENERAL PERMIT FOR CONSTRUCTION OF WATER MAIN EXTENSIONS FOR PWSs

Project Name: Riviera Heights W 1st St to W 3rd St Neighborhood Improvements	Permittee: City of Riviera Beach
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D. Certification by Professional Engineer(s) in Responsible Charge of Designing Project*

I, the undersigned professional engineer licensed in Florida, am in responsible charge of designing this project. I certify that, to the best of my knowledge and belief, the design of this project complies with Chapter 62-555, F.A.C. I also certify that, to the best of my knowledge and belief, this project is not being designed to include any of the following construction work:

- construction of water mains conveying raw or partially treated drinking water;
- construction of drinking water treatment, pumping, or storage facilities or conflict manholes;
- construction of water mains in areas contaminated by low-molecular-weight petroleum products or organic solvents;
- construction of an interconnection between previously separate public water systems or construction of water mains that create a "new system" as described under subsection 62-555.525(1), F.A.C.; or
- construction of water mains that will remain dry following completion of construction.

(A specific construction permit is required for each project involving any of the above listed construction work.)

Signature, Seal, and Date:  1/19/17	Signature, Seal, and Date:
Printed/Typed Name: Suzanne Dombrowski	Printed/Typed Name:
License Number: 69918	License Number:
Portion of Preliminary Design Report for Which Responsible:	Portion of Preliminary Design Report for Which Responsible:

* Except as noted in paragraphs 62-555.520(3)(a) and (b), F.A.C., projects shall be designed under the responsible charge of one or more professional engineers (PEs) licensed in Florida. If this project is being designed under the responsible charge of one or more PEs licensed in Florida, Part III.D of this notice shall be completed by the PE(s) in responsible charge. If this project is not being designed under the responsible charge of one or more PEs licensed in Florida, Part III.D does not have to be completed.



NOTICE OF INTENT TO USE THE GENERAL PERMIT FOR CONSTRUCTION OF WATER MAIN EXTENSIONS FOR PWSs

INSTRUCTIONS: This notice shall be completed and submitted by persons proposing to construct projects permitted under the "General Permit for Construction of Water Main Extensions for Public Water Systems" in Rule 62-555.405, F.A.C. AT LEAST 30 DAYS BEFORE BEGINNING CONSTRUCTION OF A WATER MAIN EXTENSION PROJECT, complete and submit one copy of this notice to the appropriate Department of Environmental Protection (DEP) District Office or Approved County Health Department (ACHD) along with payment of the proper permit processing fee. (When completed, Part II of this notice serves as the preliminary design report for a water main extension project, and thus, it is unnecessary to submit a separate preliminary design report or drawings, specifications, and design data with this notice.) All information provided in this notice shall be typed or printed in ink. The DEP permit processing fee for projects requiring the services of a professional engineer during design is \$650, and the DEP permit processing fee for projects not requiring the services of a professional engineer during design is \$500.* Some ACHDs charge a county permit processing fee in addition to the DEP permit processing fee. Checks for permit processing fees shall be made payable to the Department of Environmental Protection or the appropriate ACHD. NOTE THAT A SEPARATE NOTIFICATION AND A SEPARATE PERMIT PROCESSING FEE ARE REQUIRED FOR EACH NON-CONTIGUOUS PROJECT.†

* Except as noted in paragraphs 62-555.520(3)(a) and (b), F.A.C., projects shall be designed under the responsible charge of one or more professional engineers licensed in Florida.

† Non-contiguous projects are projects that are neither interconnected nor located nearby one another (i.e., on the same site, on adjacent streets, or in the same neighborhood).

I. General Project Information

A. Name of Project: **Riviera Heights W 1st St to W 3rd St Neighborhood Improvements**

B. Description of Project and Its Purpose:

The proposed improvements includes replacement of the existing watermain, totaling 4,179 feet of 6" DIP watermain. Existing water services will be transferred from existing water main to new water main. Existing water main will be abandoned and grouted. Additional project improvements include lining of existing gravity sewer main, installation of drainage improvements and roadway restoration.

C. Location of Project

1. County Where Project Located: Palm Beach County
2. Description of Project Location:

This project is bounded by W 1st Street to the south, W 3rd Street to the north, Avenue O to the west, and Australian Avenue to the east.

D. Estimate of Cost to Construct Project: \$1,670,000

E. Estimate of Dates for Starting and Completing Construction of Project:
December 2016 - June 2017

F. Permittee

PWS/Company Name: City of Riviera Beach Utility District		PWS Identification No.: * 4501229	
PWS Type: *	☒ Community	☐ Non-Transient Non-Community	☐ Transient Non-Community ☐ Consecutive
Contact Person: Leighton Walker		Contact Person's Title: Utilities Engineer	
Contact Person's Mailing Address: 600 W Blue Heron Blvd			
City: Riviera Beach		State: FL	Zip Code: 33404
Contact Person's Telephone Number: 561-845-4185		Contact Person's Fax Number: 561-840-7292	
Contact Person's E-Mail Address: lcwalker@rivierabch.com			

* This information is required only if the permittee is a public water system (PWS).

G. Public Water System (PWS) Supplying Water to Project

PWS Name: City of Riviera Beach Utility District		PWS Identification No.: 4501229	
PWS Type:	☒ Community	☐ Non-Transient Non-Community	☐ Transient Non-Community ☐ Consecutive
PWS Owner: Leighton Walker			
Contact Person: Leighton Walker		Contact Person's Title: Utilities Engineer	
Contact Person's Mailing Address: 600 W Blue Heron Blvd			
City: Riviera Beach		State: FL	Zip Code: 33404
Contact Person's Telephone Number: 561-845-4185		Contact Person's Fax Number: 561-840-7292	
Contact Person's E-Mail Address: lcwalker@rivierabch.com			

STAFF REPORT DISTRIBUTION LIST

ADDRESSES

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2391 Avenue L
Riviera Beach FL 33404

City of Riviera Beach City Engineer
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Riviera Beach FL 33404
tbailey@rivierabch.com

Dept of Environmental Protection - West Palm Beach
400 North Congress Avenue
Suite 200
West Palm Beach FL 33401
monica.sovacool@dep.state.fl.us

Div of Recreation and Park - District 5 - Ernest Cowan,
FDEP
13798 Se Federal Highway
Hobe Sound FL 33455
ernest.cowan@dep.state.fl.us

Lake Worth Drainage District
13081 Military Trail
Delray Beach FL 33484
mbrady@lwdd.net

Lake Worth Drainage District
13081 Military Trail
Delray Beach FL 33484
pmartin@lwdd.net

Palm Beach County - Environmental Res Management
2300 N. Jog Road
4th Floor
West Palm Beach FL 33411-2743
bgentry@pbcgov.org

Palm Beach County School District of Palm Beach County
3300 Summit Blvd
West Palm Beach FL 33406-1492
chad.girard@palmbeachschools.org

Town of Jupiter Utilities David Brown
Po Box 8900
Jupiter FL 33468
davidb@jupiter.fl.us

Natural Resources Defense Council
40 W 20th St
New York NY 10011
bsewell@nrdc.org

Solid Waste Authority - Thomas A. Sirna, P.G.
7501 North Jog Road
West Palm Beach FL 33412
tsirna@swa.org