INVITATION FOR BID

SANITARY SEWER LINING & REHABILITATION
IFB NO. 25-04-15

Attachment A

Specifications

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SECTION 01010

SUMMARY OF WORK

PART 1 - GENERAL

1.01 GENERAL

A. The Work to be performed under this Contract shall consist of furnishing all tools, equipment, materials, supplies, and manufactured articles and for furnishing all transportation and services, including fuel, power, water, and essential communications, and for the performance of all labor, work, or other operations required for the fulfillment of the Contract in strict accordance with the Contract Documents. The Work shall be complete and all work, materials, and services not expressly shown or as called for in the Contract Documents which may be necessary for the complete and proper construction of the Work in good faith shall be performed, furnished, and installed by the CONTRACTOR as though originally so specified or shown, at no increase in cost to the OWNER.

1.02 WORK COVERED BY CONTRACT DOCUMENTS

A. The Project consists of furnishing all labor, materials and equipment for:

1 Sanitary sewer rehabilitation projects which may include, but are not limited to the following:

a. Cured-in-place lining of sanitary sewer mains and laterals.

b. Sanitary sewer main and lateral replacement.

c. Chemical Grouting.

d. Manhole repairs by lining and manhole replacements.

e. Performing point repairs.

f. All work considered to be incidental to the aforementioned tasks.

B. Prior to construction, the CONTRACTOR shall identify existing utilities. The CONTRACTOR will be responsible for the coordination

of his work with the associated utility owner and permitting agencies having jurisdiction over the existing utilities or the associated work.

C. The Work also includes providing temporary sanitary sewer service of service laterals bypass pumping or plugging, if needed, and other appurtenant and miscellaneous items and work for a completed project.

D. Work shall be performed to ensure a minimum of traffic disruption or sewer down time as necessary, and work must be coordinated with affected residents and utility personnel. Whenever the property owners' use of the sanitary sewer must be interrupted by the Work, the CONTRACTOR shall notify the residents well in advance of the interruption. This notification shall be accomplished with door hanger notification cards to be placed at the addresses of affected customers. Property owners shall be informed when service interruption will take place and the approximate duration. This notice shall be provided a minimum of 24 hours in advance of commencement of service intrusion. The CONTRACTOR shall make every effort to minimize inconvenience to the public and property owners.

E. The CONTRACTOR shall perform all work in strict accordance with all applicable OSHA Standards. Particular attention is drawn to those safety requirements involving man entry in confined spaces. Prior to entering manholes and other confined spaces the atmosphere shall be evaluated by the CONTRACTOR to determine the presence of toxic, flammable or explosive vapors or lack of oxygen in accordance with local, state, or federal safety regulations. CONTRACTOR shall follow all procedures outline by OSHA's Confined Space Entry requirements.

F. The CONTRACTOR shall warrant to the OWNER that the equipment used on this Contract where covered by patents or license agreements is furnished in accordance with such agreements and that the prices included herein cover all applicable royalties and fees in accordance with such license agreements. The CONTRACTOR shall defend, indemnify and hold the OWNER harmless from and against any and all costs, loss, damage or expense arising out of or in any way connected with any claim of infringement of patent, trademark or violation of license agreement.

G. The OWNER shall request from the CONTRACTOR a Bid for a television survey of a particular section of the sewer system. The Bid shall include a detailed cost Bid using the contract line items and a construction schedule showing the suggested time of

completion. The suggested time of completion shall be reviewed by the OWNER to determine the total number of calendar days that will be allowed to fully complete the work. The CONTRACTOR shall not be permitted to start any construction until said schedule is submitted by issuance of a work order and a Notice to Proceed.

H. As the results of the ongoing sewer system evaluation survey become available, specific collection system rehabilitation work orders will be developed for the technologies and remedial construction services in the Bid. The OWNER reserves the right to select the technology and scope of work for each work order. CONTRACTOR unit prices established under this selection process will determine the total cost of each work order. The OWNER shall request from the CONTRACTOR a Bid for said work. The Bid shall include a detailed cost Bid using the contract line items and a construction schedule showing the suggested time of completion. The suggested time of completion shall be reviewed by the OWNER to determine the total number of calendar days that will be allowed to fully complete the work. The CONTRACTOR shall not be permitted to start any construction until said schedule is submitted by issuance of a work order and a Notice to Proceed.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01025

MEASUREMENT AND PAYMENT

PART 4 - GENERAL

4.01 WORK INCLUDED

A. Payments to the CONTRACTOR shall be made on the basis of the Bid as full and complete payment for furnishing all materials, labor, tools and equipment, and for performing all operations necessary to complete the work included in the Contract Documents. Such compensation shall also include payments for any loss or damages arising directly or indirectly from the work, or from any discrepancies between the actual quantities of work and those shown in the Contract Documents.

B. The prices stated in the Bid include all costs and expenses for taxes, labor, equipment, materials, commissions, transportation, charges and expenses, patent fees and royalties, labor for handling materials during inspection, together with any and all other costs and expenses for performing and completing the work as shown on the details and specified herein. The Basis of Payment for an item at the price shown in the Bid shall be in accordance with its description of the item in this Section and as related to the work specified. Unit prices will be applied to the actual quantities furnished and installed in conformance with the Contract Documents. The items listed below, refer to and are the same pay items listed in the Bid. They constitute all of the pay items for the completion of the work. No direct or separate payment will be made for providing miscellaneous temporary or accessory work, services, field offices, layout surveys, job signs, sanitary requirements, testing, safety devices, approval and record drawings, water supplies, power, maintenance of traffic, site preparation, removal of waste, site cleanup, watchmen, bonds, insurance, mobilization, demobilization, and any other requirements of the General Conditions. Compensation for all such services, equipment and materials shall be included in the prices stipulated for the unit pay items listed herein.

C. The CONTRACTOR's attention is called to the fact that the quotations for the various items of work are intended to establish a total price for completing the work in its entirety. Should the CONTRACTOR feel that the cost for any item of work has not been established in the Bid or this Section, the cost for that Work shall be included in some other applicable Bid Item, so that the Bid for the project reflects the total price for completing the work in its entirety.

It is intended that all work required to complete this Contract will be included in the various items as described herein.

D. In the event that repairs to laterals, mains, manholes, force mains, utilities, or any other public or private property are required due to damage caused by the CONTRACTOR's operations, the CONTRACTOR shall provide and employ all necessary labor, equipment, and materials, at no additional cost, to complete such repairs in accordance with applicable provisions of these specifications.

E. The OWNER will not provide any space or place to store materials for this project. No payment will be made for stored materials.

4.02 MEASUREMENT

A. The quantities for payment under this Contract shall be determined by actual measurement of the completed items, in place, ready for service and accepted by the OWNER unless otherwise specified. The OWNER will witness all field measurements.

B. When depths of cuts are indicated in the bid items, they shall be measured vertically from the existing grade at excavation point, paved or unpaved, to the pipe invert.

C. The quantities stated in the Bid are approximate only and are intended to serve as a basis for the comparison of bids and to fix the approximate amount of the cost of the Project. The OWNER does not expressly or impliedly agree that the actual amount of the work to be done in the performance of the contract will correspond with the quantities in the Bid; the amount of work to be done may be more or less than the said quantities and may be increased or decreased by the OWNER as circumstances may require. The increase or decrease of any quantity shall not be regarded as grounds for an increase in the unit price or in the time allowed for the completion of the work. Although, if any quantity in the Bid is increased or decreased by 25% of the amount in the Bid form, or any item(s) or work is extended or increased by 25% of the amount in the Bid form, the OWNER retains the right to re-negotiate the unit price of said item(s).

4.03 CONTRACT DURATION

A. As specified in the Form of Contract.

4.04 PERFORMANCE AND PAYMENT BONDS

A. As specified in the Instructions to Bidders.

4.05 PAYMENT ITEMS

A. Cured-in-Place Pipe Lining

1 Install cured-in-place liner in gravity mains (Items 1 to 21)

a. This work will be measured and paid at the unit price per linear foot of liner as delineated by the pipe size and depth brackets named in the Bid. Measurement shall be made based on the horizontal projection of the centerline of the permanently installed liner between manholes, including the laying length of fittings along the run, measured to the nearest foot from the inside wall of manhole to inside wall of manhole for each section lined. Each unit price bid shall include, but not be limited to, sewer pipe cleaning and preparation of the existing sewer, including blocking or plugging incoming lines; removal, transportation and disposal of material generated by cleaning and preparation; pre- and post-construction television surveys; chemical sealing if necessary; pipe lining; cleaning; testing; cleanup; documentation and reporting; and all labor, materials and equipment required to provide a complete and acceptable liner installation.

b. Payment for bypass pumping and service lateral connections, if required will be paid for under a separate item.

c. Light, medium, heavy, and specialty cleaning of sanitary sewers shall be considered incidental to the Work and no separate measurement or payment will be made.

d. No separate measurement or payment shall be made for pre and post television inspection for lining purposes, the same being considered incidental to the Work. Payment for television inspection, not associated with pre and post television inspection for relining purposes, shall be paid for on a linear foot basis.

e. Payment for traffic control, if required will be paid for under a separate item.

B. Cured-in-Place Sectional Lining

1 Install cured-in-place sectional pipe liners (Items 23 to 40)

a. Items 23, 25, 27, 29, 31, 33, 35, 37 and 39 will be measured and paid at the unit price per each cured-in-place sectional pipe liner installed up to 6 feet, as delineated by the pipe size brackets named in the Bid. Each unit price bid shall provide full compensation for all work including, but not limited to, furnishing and installing section of epoxy impregnated fiberglass liner; pipe cleaning; television inspections; all labor, materials and equipment specified or not which will provide a complete and acceptable liner installation.

b. Items 24, 26, 28, 30, 32, 34, 36, 38 and 40 will be paid for in addition to the price paid under corresponding Items 23, 25, 27, 29, 31, 33, 35, 37 or 39 as applicable, at the unit price bid per linear foot of liner installed beyond 6 feet and up to 9 feet. This item will be full compensation for additional costs associated with work of installing sectional liner beyond 6 feet. Any sectional liner extending beyond 9 feet and up to 12 feet shall be paid for as two single liners under Items 23, 25, 27, 29, 31, 33, 35, 37 or 39.

c. Payment for bypass pumping, if required (other than because of damage caused by the CONTRACTOR), will be paid for under a separate item.

C. Cured-in-Place Lateral Lining

1 Install cured-in-place liner in 4-inch and 6-inch laterals (includes 25 feet of lateral) (Items 47, 49 and 51)

a. This item of work will be measured and paid at the unit price per each lateral lined. Each unit price bid shall include, but not be limited to, all necessary or required labor, equipment, tools, and materials for sewer pipe cleaning and preparation of the existing sewer, including blocking or plugging incoming lines; removal, transportation, and disposal of material generated by cleaning and preparation; pre- and post-construction television surveys; chemical joint sealing if necessary; pipe liner; cleaning; testing; cleanup; documentation and reporting; and all labor, materials and equipment required to provide a complete and acceptable liner installation.

b. Light, medium, heavy, and specialty cleaning of sanitary sewers shall be considered incidental to the Work and no separate measurement or payment will be made.

c. No separate measurement or payment shall be made for pre and post television inspection for relining purposes, the same being considered incidental to the Work. Payment for television inspection, not associated with pre and post television inspection for relining purposes, shall be paid for on a linear foot basis.

d. Payment for traffic control, if required will be paid for under a separate item.

2 Install cured-in-place liner in 4-inch and 6-inch laterals (per linear foot beyond 25 feet of lateral) (Items 48, 50 and 52)

a. This item of work will be measured and paid for at the unit price per foot of sewer laterals lined in addition to and Items 47, 49 and 51. Each unit price bid shall include, but not be limited to , all necessary or required labor, equipment, tools, and materials for sewer pipe cleaning and preparation of the existing sewer, including blocking or plugging incoming lines; removal, transportation, and disposal of material generated by cleaning and preparation; pre- and post-construction television surveys; chemical joint sealing if necessary; pipe liner; cleaning; testing; cleanup; documentation and reporting; and all labor, materials and equipment required to provide a complete and acceptable liner installation.

b. Light, medium, heavy, and specialty cleaning of sanitary sewers shall be considered incidental to the Work and no separate measurement or payment will be made.

c. No separate measurement or payment shall be made for pre and post television inspection for relining purposes, the same being considered incidental to the Work. Payment for television inspection, not associated with pre and post television inspection for relining purposes, shall be paid for on a linear foot basis.

d. Payment for traffic control, if required will be paid for under a separate item.

3 One piece main and lateral cured-in-place liner extending into the lateral 3 feet (0 to 8 feet in depth) (Items 53, 55 and 57)

a. This item of work will be measured and paid at the unit price per each lateral lined. Each unit price bid shall include, but not be limited to, all necessary or required labor, equipment, tools, and materials for traffic control, sewer pipe cleaning and preparation of the existing sewer, including blocking or plugging incoming lines; removal, transportation, and disposal of material generated by cleaning and preparation; pre- and post-construction television surveys; pipe liner; cleaning; testing; cleanup; documentation and reporting; and all labor, materials and equipment required to provide a complete and acceptable liner installation.

4 One piece main and lateral cured-in-place liner extending into the lateral 3 feet (greater than 8 feet in depth) (Items 54, 56 and 58)

a. This item of work will be measured and paid at the unit price per each lateral lined. Each unit price bid shall include, but not be limited to, all necessary or required labor, equipment, tools, and materials for traffic control, sewer pipe cleaning and preparation of the existing sewer, including blocking or plugging incoming lines; removal, transportation, and disposal of material generated by cleaning and preparation; pre- and post-construction television surveys; pipe liner; cleaning; testing; cleanup; documentation and reporting; and all labor, materials and equipment required to provide a complete and acceptable liner installation.

5 One piece main and lateral cured-in-place liner extending beyond 3 feet into the lateral (all depths) (Item 59)

a. This item of work will be measured and paid at the unit price per foot of laterals lined in addition to Items 53 to 58. Each unit price bid shall include, but not be limited to, all necessary or required labor, equipment, tools, and materials for traffic control, sewer pipe

cleaning and preparation of the existing sewer, including blocking or plugging incoming lines; removal, transportation, and disposal of material generated by cleaning and preparation; pre- and post-construction television surveys; pipe liner; cleaning; testing; cleanup; documentation and reporting; and all labor, materials and equipment required to provide a complete and acceptable liner installation.

6 Transitional liner 6-inch to 4-inch (Item 60)

a. This item of work will be measured and paid at the unit price per transitional liner provided and installed in association with the performance of Item 61.

D. Reinstate laterals and grout annular space

1 Reinstate laterals and grout annular space (Item 62)

a. This item of work will be measured and paid at the unit price per each lateral reinstated and shall include, but not be limited to, blocking or plugging incoming line; removal, transportation and disposal of material generated by cleaning and preparation; television surveys, furnishing the equipment necessary to internally cut out the liner to a least 95 percent of the area of the lateral, cutting out the coupon; wire-brushing the cut to remove jagged edges; recovering all waste material from the sewer; service pipe cleaning; sealing the lateral connection to the liner including the first joint of the lateral connection; grouting the annular space; performing all repairs required due to damage caused by the CONTRACTOR, and all appurtenant and miscellaneous items and work.

b. If the CONTRACTOR damages the host pipe during lateral reinstatement, the CONTRACTOR shall repair the host pipe to the satisfaction of the OWNER at no additional cost.

c. If grouting of the annular space at the reinstated lateral results in residual grout in greater than 50 percent the area of the lateral, such grout shall be removed at no additional cost.

E. Testing sewer joints

1 Testing sewer joints (Items 63 to 71)

a. This item of work will be measured and paid for at the unit price per each joint of pipe tested as delineated by the pipe size brackets named in the Bid. Each unit price bid shall include all work including but not limited to setups, flow isolation, testing, maintenance, transportation, traffic control, labor, work, materials, reporting and documentation, or any other costs associated with pipe joint test.

F. Testing and sealing sewer joints

1 Testing and sealing sewer joints (Items 72 to 80)

a. These items of work will be measured and paid for at the unit price per each joint of pipe tested and sealed as delineated by the pipe size brackets named in the Bid. Each unit price bid shall include all work including but not limited to setups, flow isolation, testing, maintenance, transportation, traffic control, labor, work, materials, reporting and documentation, or any other costs associated with pipe joint testing and sealing.

G. Root removal

1 Root removal (Items 100 to 108)

a. This item of work will be measured and paid for at the unit price per linear foot for each sewer size bracket named in the Bid. Measurement of lines shall be made based on the horizontal projection of the centerline of the pipe between manholes, measured to the nearest foot from inside wall of manhole to inside wall of manhole, not including the manhole chamber, in the pipe which root removal/treatment was performed.

b. Each unit price bid for root removal and chemical root treatment in sewer lines shall include: cleaning; all mechanical methods of root removal specified or not; all herbicides or chemical treatment specified or not and/or all equipment, materials and labor which shall be used to provide an open sewer (no blockages or constructions due to roots or vegetation) to an acceptable condition and ready for any and all repairs.

c. The OWNER may authorize root removal as a separate pay item when root intrusion is sufficiently heavy to prevent the completion of inspection, or following completion of successful cleaning and inspection. Root removal not authorized in writing by the OWNER shall be considered part of the cleaning operation and shall not be considered a separate pay item.

d. Sewer line or manhole cleaning is not a separate bid item. The prices for all cleaning of sewers and manholes; verification of adequate cleaning by pulling double squeegees; hoses; nozzles; water; labor; materials and/or any other work required to clean the sewers to a degree acceptable for television inspection and subsequent repairs shall be included in the bid item in which the rehabilitation occurs.

H. Chemical grout for sealing sewer joints

1 Chemical grout for sealing sewer joints (Item 109)

a. This item or work will be measured and paid for at the unit price per gallon of grout used to seal sewer joint regardless of pipe size. The price shall include all setups, maintenance, transportation, traffic control, labor, work, materials or any other costs associated with chemical grouting of sewer joints. Chemical grout for sealing sewer laterals will not be paid for by this item.

I. Sealing 4-inch and 6-inch lateral joints with Chemical Grout

1 Sealing 4-inch and 6-inch lateral joints with Chemical Grout (up to 20 feet) (Item 110)

a. This item of work will be measured and paid for at the unit price per each lateral pipe sealed. The price bid shall include all setups, maintenance, labor, work, materials or any other costs associated with chemical grouting of the lateral joints. Measurement shall be made based on the length of the lateral plug used less the initial 20 linear feet. Chemical grout will not be paid for separately, and shall be included in the unit price bid for this item.

J. Sealing 4-inch and 6-inch lateral joints with Chemical Grout

1 Sealing 4-inch and 6-inch lateral joints with Chemical Grout (beyond 20 feet) (Item 111)

a. This item of work will be measured and paid for at the unit price per linear foot of lateral pipe sealed beyond the first 20 feet of lateral. The price bid shall include all setups, maintenance, labor, work, materials or any other costs associated with chemical grouting of the lateral joints. Measurement shall be made based on the horizontal projection of the centerline of the pipe between sewer main and property line. Chemical grout will not be paid for separately, and shall be included in the unit price bid for this item.

K. Excavated point repairs

1 Excavated point repairs of gravity mains and laterals (includes 15 feet of pipe) (Items 112, 114, 116, 118, 120, 122, 124, 126 and 128)

a. This work, of whatever nature, will be measured and paid for at the unit price per each as delineated by pipe size and depth brackets as named in the Bid. Payment of the unit price per each shall provide full compensation for all necessary and required work including, but not limited to pre- and post-construction television inspection; smoke testing; traffic control; excavation; removal, transportation, and disposal of material generated by cleaning and preparation; transportation and handling costs; furnishing and installing all materials including pipe (a minimum of 6 feet and a maximum of 15 feet), pipe joint material including lubricant, pipe bedding, repair sleeves, flexible banded couplings and adapters, rigid sleeves with compression joints, embedment materials, wyes or tees and the reconnection of service laterals; flow isolation; backfill; compaction; complying with the State of Florida Trench Safety Act; supporting and protecting existing utilities as required; dewatering; sheeting and shoring, if necessary; testing; cleanup; final cleanup; all labor, materials and equipment required to provide a complete and acceptable pipe installation, including all appurtenances, in accordance with the Contract Documents, the manufacturer’s specifications and compliance with all applicable regulatory requirements; and all incidentals related to point repairs to achieve a repaired segment

of sewer gravity main or lateral complete in place, tested, and ready for use.

b. Asphalt and concrete repair, if required, will be paid for as a separate item.

2 Excavated point repairs of gravity mains and laterals (per linear foot beyond 15 feet of pipe) (Items 113, 115, 117, 119, 121, 123, 125, 127 and 129)

a. This work, of whatever nature, will be measured and paid for at the unit price per linear foot beyond the first 15 feet as delineated by pipe size and depth brackets as named in the Bid. Payment of the unit price per each shall provide full compensation for all necessary and required work including, but not limited to pre- and post-construction television inspection; smoke testing; traffic control; excavation; removal, transportation, and disposal of material generated by cleaning and preparation; transportation and handling costs; furnishing and installing all materials including pipe (beyond 15 feet), pipe joint material including lubricant, pipe bedding, repair sleeves, flexible banded couplings and adapters, rigid sleeves with compression joints, embedment materials, wyes or tees and the reconnection of service laterals; flow isolation; backfill; compaction; complying with the State of Florida Trench Safety Act; supporting and protecting existing utilities as required; dewatering; sheeting and shoring, if necessary; testing; cleanup; final cleanup; all labor, materials and equipment required to provide a complete and acceptable pipe installation, including all appurtenances, in accordance with the Contract Documents, the manufacturer's specifications and compliance with all applicable regulatory requirements; and all incidentals related to point repairs to achieve a repaired segment of sewer gravity main or lateral complete in place, tested, and ready for use. Multiple payments can be made under this item if the repair exceeds 15 feet.

b. Asphalt and concrete repair, if required, will be paid for as a separate item.

L. Install polyethylene fused-on-saddle

1 Install polyethylene fused-on saddle (open trench) (Item 131)

a. This item of work will be measured and paid at the unit price per each lateral reinstated and shall include, but not be limited to, furnishing all labor, equipment, and material necessary to install prefabricated polyethylene saddles by electrofusion in accordance with the manufacturer's recommendations, complete and in place.

b. The starting point for this item of work will the performance of a point repair (one of Items 112 to 129) to expose the main, to provide an open trench with the sewer main located and exposed, as well as subsequent backfill and compaction.

M. Exploratory excavation

1 Exploratory excavation (Items 132 to 134)

a. Shall include vacuum excavation services for locating utilities 0 to 5 feet in depth below ground or pavement surface, including excavation, backfill, asphalt/concrete removal and disposal, compaction, surface restoration, primary locating services and appurtenances.

b. Payment will be made at the contract unit cost for each pothole including survey.

c. For exploratory excavations greater than 5 feet in depth, payment will be made at the contract unit cost for each vertical foot below 5 feet excavated. This item shall be paid in addition to the contract unit cost for the first 5 feet of depth.

N. Replace gravity pipe

1 Replace gravity pipe (Items 136 to 189)

a. This work will be measured and paid at the unit price per linear foot of pipe as delineated by the pipe size and depth brackets named in the Bid. This item shall include replacement of an entire line segment from manhole to manhole. Payment of the unit price per linear foot shall provide full compensation for all necessary and required work including, but not limited to pre- and post construction television inspection; traffic control; excavation; removal, transportation, and disposal of material generated by cleaning and

preparation; transportation and disposal of material generated by cleaning and preparation; transportation and handling costs; furnishing bedding, flexible banded couplings and adapters, rigid sleeves with compression joints, embedment materials, wyes or tees and the reconnection of service laterals; flow isolation; backfill; compaction; complying with the State of Florida Trench Safety Act; supporting and protecting existing utilities as required; dewatering; sheeting and shoring, if necessary; cutting pipe; making all connections within the lines to existing sewers and structures; testing; cleanup; final cleanup; all labor, materials and equipment required to provide a complete and acceptable pipe installation, including all appurtenances, in accordance with the Contract Documents, the manufacturer's specifications and compliance with all applicable regulatory requirements; and all incidentals related to point repairs to achieve a repaired sewer gravity main complete in place, tested, and ready for use.

b. Asphalt and concrete repair, if required, will be paid for as a separate item.

c. The quantity for payment shall be the horizontal projection of the centerline of the newly installed pipe, measured to the nearest one-tenth of a foot.

O. Replace sewer service lateral

1 Replace sewer service lateral (Items 191 to 193)

a. This work will be measured and paid at the unit price per linear foot as delineated by pipe depth brackets named in the Bid. Payment of the unit price per linear foot shall provide full compensation for all necessary and required work including, but not limited to pre- and post construction television inspection; traffic control; excavation; removal, transportation, and disposal of existing pipe regardless of type; removal, transportation, and disposal of material generated by cleaning and preparation; transportation and disposal of material generated by cleaning and preparation as well as unsuitable subsoil material; transportation and handling costs; furnishing and installing all sewer lateral pipe and fittings, pipe bedding, wyes or tees; reconnection of service laterals; flow isolation; backfill;

maintaining sewage flow during construction as required; backfill, compaction; complying with the State of Florida Trench Safety Act; supporting and protecting existing utilities as required; dewatering; sheeting and shoring, if necessary; cutting pipe; making all connections within the lines to existing sewers and structures; testing; cleanup; final cleanup; all labor, materials and equipment required to provide a complete and acceptable pipe installation, including all appurtenances, in accordance with the Contract Documents, the manufacturer's specifications and compliance with all applicable regulatory requirements; and all other appurtenant and miscellaneous items and work related to service replacement to achieve a repaired service lateral complete in place, tested, and ready for use.

b. Asphalt and concrete repair, if required, will be paid for as a separate item.

c. The quantity for payment shall be the horizontal projection of the centerline of the permanently installed pipe, measured to the nearest one-tenth of a foot from inside manhole wall or center line of main line sewer to the property line.

P. Manhole repairs

1 Realign, grout and seal manhole casing (Items 195 and 196)

a. This item of work will be measured and paid for at the unit price per each manhole, regardless of size of frame and type of surface features which must be restored. Realignment may be horizontal, vertical, or both. Payment of the unit price per each will provide complete compensation for lifting, removing, cleaning and recoating the cast iron frame; removing and replacing the mortar bedding on the top of the manhole wall; reseating the frame in its correct position; patching as required; surface restoration; cleanup; labor, tools and equipment; and all incidentals as necessary to attain a water-tight junction between manhole wall and cast iron frame, including the installation of an aromatic urethane internal manhole sealing system, complete in place.

2 Install manhole chimney seal (Item 197)

a. This item of work will be measured and paid for at the unit price per each seal installed. Payment of the unit price per each will provide complete compensation for furnishing and installing manhole chimney seals, labor, tools, equipment and incidentals necessary for a complete in place, acceptable installation, with no leakage through or around the seal.

3 Seal visible infiltration through manhole walls, bench and invert (Items 198 and 199)

a. This item of work will be measured and paid for at the unit price per each manhole, regardless of depth or size (or number and flow rate of visible leaks encountered). Payment shall be made per unit price per each for sealing or patching all visible leaks by injecting chemical grout; including dewatering (or other means acceptable to the ENGINEER) to relieve hydrostatic pressure outside the manhole.

4 Repair manhole bench and invert (Item 200)

a. This item of work will be measured and paid at the unit price of manhole invert repaired. Payment of the unit price will provide compensation for cleaning and patching the manhole bench and flow channels, isolation of the manhole by plugging entering lines, testing labor, tools and equipment and all incidentals and materials needed to restore the manhole bench and invert.

5 Replace manhole bench and invert (Item 201)

a. This item of work will be measured and paid at the unit price of manhole invert repaired. Payment of the unit price will provide compensation for cleaning; injecting chemical grout to stop active infiltration, if necessary; furnishing labor, equipment, and all materials or combination of materials applying them; removal and re-installing flow channel and benches; isolation of the manhole by plugging entering lines; testing labor, tools and equipment; and all incidentals necessary to obtain a watertight, sealed manhole bench and invert.

6 Replace standard manhole frame and cover (Item 202)

a. This item of work will be measured and paid for at the unit price per each, regardless of size. Payment of the unit price per each will provide compensation for furnishing and installing the new frame and cover; salvaging and transporting the location designated by the OWNER of all replaced cast iron materials; cutting, removal and replacement of surface materials as necessary, cleanup; labor, tool and all incidentals necessary to obtain a new cast iron cover, including the installation of an aromatic urethane internal manhole sealing system, complete in place.

7 Replace watertight manhole frame and cover (Item 203)

a. This item of work will be measured and paid for at the unit price per each, regardless of size. Payment of the unit price per each will provide compensation for furnishing and installing the new frame and cover; salvaging and transporting the location designated by the OWNER of all replaced cast iron materials; cutting, removal and replacement of surface materials as necessary, cleanup; labor, tool and all incidentals necessary to obtain a new cast iron cover, including the installation of an aromatic urethane internal manhole sealing system, complete in place.

8 Install cementitious manhole liner or cementitious manhole liner with epoxy overlay (Items 204 to 207)

a. This item of work will be measured and paid for at the unit price per vertical foot of manhole wall. Measurement will be made from the bench, at its highest point, to the bottom of the frame. Payment of the unit price per vertical foot will provide compensation for cleaning of the wall; furnishing and applying an aromatic urethane sealant to the top portion of the cone and the manhole ring; manufacturer's representative's presence or assistance if required; isolation of the manhole by plugging entering lines; testing labor, tools and equipment; and all incidentals necessary to obtain a watertight, sealed manhole wall and bench complete.

b. Payment for bypassing pumping, if required (other than because of damage caused by the CONTRACTOR), will be paid for under a separate item.

Q. Manhole replacement

1 Manhole replacement (Items 209 to 222)

a. This item of work will be measured and paid for at the unit price per each precast manhole installed, with or without drop connections, and depth brackets as named in the Bid. Payment of the unit price per each will provide complete compensation for all necessary and required traffic control; excavation; removal, transportation, and disposal of existing structure; removal, transportation and disposal of material generated by cleaning and preparation; transportation and handling costs; cutting pipe; furnishing and installing all materials, including pipe; pipe joint material, repair sleeves, manhole base, wall sections, cone chimney, frame and cover, and embedment materials; isolation of reaches of sewers by plugging; excavation; backfill; compaction; complying with the State of Florida Trench Safety Act; supporting and protecting existing utilities as required; dewatering; sheeting and shoring, if necessary; cleanup; surface restoration; connection of all existing piping to new manholes; final cleanup; testing; all labor, materials and equipment required to provide a complete and acceptable installation, including all appurtenances, in accordance with the Contract Documents, the manufacturer's specifications and compliance with all applicable regulatory requirements; and all incidentals related to new manhole construction complete in place, tested, and ready for use.

b. Bypass pumping, if required, will be paid for as a separate item.

R. Asphalt roadway replacement (Item 224)

1 The unit price bid for Asphalt Roadway Replacement shall provide full compensation for all work including, but not limited to furnishing all labor, equipment and material required for cutting, removing, protecting and replacing all existing asphalt paving and subgrade removed or damaged under this Contract; limerock base, prime coat, tack coat, asphalt, compaction, traffic markings, and maintenance of traffic. Payment will only be made if asphalt paving is encountered within the "Limits of Construction". Limit of construction shall be within 7.5 feet each side of the

centerline of the pipe and no more than 5.0 feet beyond the end of the new pipe installed. All other replacement due to removal or damage as a result of the CONTRACTOR's operation shall be at the CONTRACTOR's expense.

2 Payment for Asphalt Roadway Replacement will be made once and shall include both temporary and permanent Asphalt Roadway Replacement and will be made per square yard, based on base and asphalt thickness dimensions as required, installed and accepted.

S. Pavement overlay (Item 225)

1 Item for construction pavement repairs (1-inch thick asphaltic concrete wearing surface overlay) will be paid for at the unit price bid times the number of square yards of overlay installed where directed by the ENGINEER, and the price bid shall provide full compensation for all work including, but not limited to, furnishing all materials, labor and equipment for a complete installation. Pavement overlay will be in addition to the asphalt concrete pavement restoration.

T. Concrete sidewalk replacement (Item 226)

1 The unit price bid for Concrete Sidewalk Replacement shall provide full compensation for all work including, but not limited to, furnishing of all labor, equipment and material required for cutting, removing, protecting and replacing all existing concrete sidewalk removed or damaged under this Contract, concrete formwork, reinforcing, placing finishing and curing. Payment will only be made if concrete sidewalks are encountered within the "Limits of Construction" as described herein. All other replacement due to removal or damage as a result of the CONTRACTOR's operation shall be at the CONTRACTOR's expense.

2 Payment for Concrete Sidewalk Replacement will be made per square yard installed and accepted.

U. Concrete curb and gutter replacement (Item 227)

1 The unit price bid for Concrete Curb and Gutter Replacement shall provide full compensation for all work including, but not limited to, furnishing of all labor, equipment and material required for cutting, removing, replacing all existing concrete curbs and gutters removed or damaged under this Contract. Payment will only be made if curbs and gutters are encountered within the "Limits of Construction"

as described herein. All other replacement due to removal or damage as a result of the CONTRACTOR's operation shall be at the CONTRACTOR's expense.

2 Payment for Concrete Curb and Gutter Replacement will be made per linear foot installed and accepted.

V. Asphalt driveway replacement (Item 228)

1 The unit price for Asphalt Driveway Replacement shall provide full compensation for all work including, but not limited to, furnishing of all labor, equipment and material required for cutting, removing, protecting and replacing all existing asphalt driveways removed or damaged under this Contract; limerock base, prime coat, tack coat, asphalt and compaction. Payment will only be made if asphalt driveways are encountered within the "Limits of Construction" as described herein. All other replacement due to removal of damage as a result of the CONTRACTOR's operation shall be at the CONTRACTOR's expense.

2 Payment for asphalt driveway replacement will be made per square yard installed and accepted.

W. Concrete driveway replacement (Item 229)

1 The unit price for Concrete Driveway Replacement shall be provide full compensation for all work including , but not limited to, furnishing of all labor, equipment and material required for cutting, removing, protecting and replacing all existing concrete driveways removed or damaged under this Contract, concrete, formwork, reinforcing, placing, finishing and curing. Payment will only be made if sidewalks are encountered within the "Limits of Construction" as described herein. All other replacement due to removal of damage as a result of the CONTRACTOR's operation shall be at the CONTRACTOR's expense.

2 Payment for concrete driveway replacement will be made per square yard installed and accepted.

X. Sod replacement (Item 230)

1 Sod replacement will be paid for at the unit price bid and shall be provide full compensation for all work including , but not limited to, furnishing of all labor, equipment and material required for replacing, planting sod removed or damaged under this Contract. Payment will only be made if sodded

areas are encountered within the “Limits of Construction” as described herein. Measurement of payment shall be the number of square feet actually removed and replaced within the Limits of Construction. All other replacement due to removal of damage as a result of the CONTRACTOR’s operation shall be at the CONTRACTOR’s expense.

2 Payment for sod replacement will be made per square foot installed and accepted.

Y. Bypass pumping

1 Bypass Pumping (Items 231 to 239)

a. These items shall provide full compensation for bypass pumping operations required for sewer and manhole repair work. The CONTRACTOR shall attempt to perform the sewer work without bypass pumping. However, if, in the opinion of the OWNER bypass pumping is necessary, it will be identified as a payment item. The pay item is a charge per day for all bypass pumping operations during a specific sewer repair, including services, regardless of the number pumps required. Bypass pumping shall be bid on the basis of sewer size which is bypassed.

b. These items shall include, but not be limited to, all necessary and required traffic control; pumps; piping; gasoline/diesel fuel; maintenance; transportation and storage; temporary bypass and service piping; labor; materials and/or any other costs associated with bypass pumping.

c. Plugging or blocking a sewer line shall be included in the appropriate bid item for which the flow must be stopped, and shall be considered incidental work and no additional payment shall be considered.

Z. Traffic control

1 Traffic control (flagmen, each) (Item 240)

a. Payment shall be at the unit price bid, per each man-hour.

2 Traffic control (arrow board, each) (Item 241)

a. Measurement shall be on a unit basis per each by actual count of arrow boards in place.

b. Payment shall be at the unit price bid, per each arrow board and shall include full compensation for furnishing and placing all materials and furnishing all equipment, labor, and incidentals necessary to complete the work as specified.

3 Traffic control (barricade, each) (Item 242)

a. Measurement shall be on a unit basis per each by actual count of barricades in place.

b. Payment shall be at the unit price bid, per each barricade and shall include full compensation for furnishing and placing all materials and furnishing all equipment, labor, and incidentals necessary to complete the work as specified.

4 24 – hour mobilization (Item 243)

a. Measurement shall be per emergency mobilization performed.

b. Payment shall be at the unit price bid, per emergency mobilization performed, provided in the Bid and shall include full compensation for all additional labor, materials, equipment and incidentals required to complete an emergency mobilization, if so requested by the OWNER, in association with any other work under this contract.

AA. Work in rear-yard easement

1 Work in rear-yard easement (Items 22, 41, 46, 61, 81, 130, 135, 190, 194, 208 and 223)

a. Payment shall be at the unit price bid, per easement repair performed, provided in the Bid and shall include full compensation for all additional labor, materials, equipment and incidentals required to perform work away from vehicular traveled ways, is so requested by the OWNER or ENGINEER, in association with any other work under this contract. This item will be paid in addition to the price paid under the corresponding work item, and will only be paid when the area and presents restrictions to vehicular access from roads,

alleys, driveways, or other features suitable for access by the installation vehicles. This item shall be full compensation for all additional cost associated with working in an easement area.

b. When the CONTRACTOR's judges that this item is applicable, the CONTRACTOR shall obtain the ENGINEER's concurrence on such judgment in advance of performing the work.

END OF SECTION

SECTION 01065

PERMITS AND FEES

PART 1 - GENERAL

1.01 GENERAL

A. Obtain and pay for all construction permits

B. Schedule all inspections and obtain all written approvals of the agencies required by the permits and licenses.

C. Comply with all conditions specified in each of the permits and licenses.

D. A copy of the permits obtained by the OWNER will be furnished to the CONTRACTOR

1.02 DEWATERING ACTIVITIES

A. Prior to any dewatering activities, the CONTRACTOR shall obtain all regulatory permits and approvals and submit copies of the permits and a dewatering plan to the ENGINEER. The dewatering plan shall address, at a minimum, the dewatering method, pump capacities, pumping duration, noise abatement, point of discharge and associated ground and surface water quality protection and monitoring. The CONTRACTOR shall coordinate with the South Florida Water Management District and Miami-Dade County Department of Environmental Resources Management regarding the applicable rules and regulations. Dewatering shall not be permissible for any construction activity on this project.

END OF SECTION

SECTION 01090

REFERENCE STANDARDS

PART 1 - GENERAL

1.01 GENERAL

A. Titles of Sections and Paragraphs: Captions accompanying specification sections and paragraphs are for convenience of reference only, and do not form a part of the Specifications

B. Applicable Publications: Whenever in these Specifications references are made to published specifications, codes, standards, or other requirements, it shall be understood that wherever no date is specified, only the latest specifications, standards, or requirements of the respective issuing agencies which have been published as of the date of the opening of bids, shall apply; except to the extent that said standards or requirements may be in conflict with applicable laws, ordinances, or governing codes. No requirements set forth herein shall be waived because of any provision of, or omission from, said standards or requirements.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of other requirements of the specifications, all work specified herein shall conform to or exceed the requirements of all applicable codes and the applicable 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 locally applicable edition of the Florida Building Code. The latest edition of the code as approved and used by the local agency as of the date of award, as adopted by the agency having jurisdiction, shall apply to the Work herein, including all addenda, modifications, amendments, or other lawful changes thereto.

C. In case of conflict between codes, reference standards, Drawings and the other Contract Documents, the most stringent requirements shall govern. All conflicts shall be brought to the attention of the OWNER for clarification 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 portions of those referenced codes, standards, and Specifications listed herein.

E. References herein to “OSHA Regulations for Construction” shall mean Title 29 Part 1926, Construction Safety and Health Regulations, Code of Federal Regulations (OSHA), including all changes and amendments thereto.

F. References herein to “OSHA Standards” shall mean Title 29, Part 1910, Occupational Safety and Health Standards, Code of Federal Regulations (OSHA), including all changes and amendments thereto.

1.03 ABBREVIATIONS AND ACRONYMS

AA	-	Aluminum Association
AAMA	-	Architectural Aluminum Manufacturers Association
AASHTO	-	American Association of State Highway and Transportation Officials
ACI	-	American Concrete Institute
AIEE	-	American Institute of Electrical Engineers (Now IEEE)
AIMA	-	Acoustical and Insulating Materials Association
AISC	-	American Institute of Steel Construction
AISI	-	American Iron and Steel Institute
ANSI	-	American National Standard Institute
APTA	-	American Public Transit Association
APWA	-	American Public Works Association
ASCE	-	American Society of Civil Engineers
ASHRAE	-	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	-	American Society of Mechanical Engineers
ASTM	-	American Society for Testing and Materials
AWPA	-	American Wood Preservers Association
AWPB	-	American Wood Preservers Bureau
AWS	-	American Welding Society
AWWA-	American Water Works Association	
CRSI	-	Concrete Reinforcing Steel Institute
CS	-	Commercial Standard
FM	-	Factory Mutual Engineering and Research
FS	-	Federal Standard
IEEE	-	Institute of Electrical and Electronic Engineers
IPCEA	-	Insulated Power Cable Engineers Association
MIL	-	Military Standardization Documents
NAAMM	-	National Association of Architectural Metal Manufacturers
NBFU	-	National Board of Fire Underwriters
NBS	-	National Bureau of Standards
NEC	-	National Electrical Code
NEMA	-	National Electrical Manufacturers Association
NFPA	-	National Fire Protection Association
NSF	-	National Science Foundation
OSHA	-	U.S. Dept. of Labor, Occupational Safety and Health Association

PCI	-	Prestressed Concrete Institute
SDI	-	Steel Decks Institute
SJI	-	Steel Joists Institute
SMACNA	-	Sheet Metal and Air Conditioning Contractors' National Association
SSPC	-	Structural Steel Painting Council
UL	-	Underwriter's Laboratories, Inc.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.01 DEFINITIONS

A. The term “submittals” shall mean shop drawings, if any, manufacturer’s drawings, catalog sheets, brochures, descriptive literature, diagrams, schedules, calculations, material lists, performance charts, test reports, office and field samples, and items of similar nature which are normally submitted for the OWNER’s review for conformance with the design concept and compliance with the Contract Documents.

1.02 GENERAL REQUIREMENT FOR SUBMITTALS

A. Project data shall include manufactures’ standard schematic drawings modified to delete information which is not applicable to the project. Each copy of descriptive literature shall be clearly marked to identify pertinent information as it applies to the project.

B. Where samples are required, they shall be adequate to illustrate materials, equipment or workmanship, and to establish standards by which completed Work is judged. Provide sufficient size and quantity to clearly illustrate functional characteristics of product and material, with integrally related parts and attachment devices.

C. All submittals shall be marked to identify the project, CONTRACTOR, subcontractor, or supplier; pertinent Contract Documents; and specification section if applicable.

D. Prior to submittal to the OWNER, the CONTRACTOR shall review and check submittals, and shall indicate review by his stamp, initials, and date.

E. If the submittals indicate deviations from the Contract Documents, the CONTRACTOR shall advise the OWNER, in the letter of transmittal of the deviation and the reasons thereof. All deviations and variances shall be clearly marked on the submittal with a bold red mark. All additional costs resulting from modifications requested by the CONTRACTOR shall be borne by the CONTRACTOR.

F. In the event the OWNER does not specifically reject the use of material or equipment at variance to that which is in the Contract Documents or specified, the CONTRACTOR shall, at no additional expense to the OWNER, and using methods reviewed by the OWNER, make any changes necessary to accommodate the material and equipment.

G. Additional information on particular items, such as special drawings, schedules, calculations, performance curves, and material details shall be provided when specifically requested in the Specifications.

H. Where manufacturers' brand names are given in the Specifications the CONTRACTOR shall submit names and descriptive literature of such materials and products proposed for use in this Contract.

I. No material shall be fabricated or shipped unless the applicable drawings or submittals have been reviewed and approved by the OWNER and returned to the CONTRACTOR.

J. All bulletins, brochures, instructions, parts lists, and warranties packaged with and accompanying materials and products delivered to and installed in the project shall be saved and transmitted to the OWNER.

1.03 SUBMITTAL PROCEDURES

A. Scheduling and Handling

a. The CONTRACTOR shall schedule submittals well in advance of the need for the material or equipment for proposed scope of work and shall allow time to make delivery of material or equipment after submittal is approved.

b. The CONTRACTOR shall develop a submittal schedule that allows sufficient time for initial review, correction, resubmission, and final review of all submittals. The OWNER shall review and return submittals to the CONTRACTOR as expeditiously as possible but the amount of time required for review will vary depending on the complexity and quantity of data submitted. In no case will a submittal schedule be acceptable which allows less than 30 days for initial review by the OWNER. The time for review shall in no way be justification for delays or additional compensation to the CONTRACTOR.

c. The OWNER's review of submittals covers only general conformity to the Contract Documents and general conformity with dimensions and elevations. The CONTRACTOR shall be responsible for accuracy of dimensions and elevations. The CONTRACTOR shall be responsible for accuracy of dimensions and elevations. No quantities will be determined or verified by the OWNER. The CONTRACTOR is responsible for any errors, omissions, or deviations from the contract requirements. Review of submittals in no way relieves the CONTRACTOR from his

obligation to furnish required items according to the Contract Documents.

d. The CONTRACTOR shall submit nine (9) copies of submittal documents unless otherwise specified in the following paragraphs.

e. The CONTRACTOR shall revise and resubmit submittals as required and identify all changes made since previous submittal.

f. The CONTRACTOR shall assume the risk for material or equipment that is fabricated or delivered prior to approval. No material or equipment shall be incorporated into the Work or included in periodic progress payments until approval has been obtained in the specified manner.

B. Transmittal Form and Numbering

1. The CONTRACTOR shall transmit each submittal with a Submittal Form approved by the OWNER.

2. The CONTRACTOR shall sequentially number each transmittal form beginning with the number 1.

3. The CONTRACTOR shall revise submittals with original number and sequential alphabetic suffix.

4. Videotapes submittal number shall be in accordance with requirements of this section.

C. CONTRACTOR's Stamp

1. The CONTRACTOR shall apply CONTRACTOR's stamp, initials, and date certifying that the items have been reviewed in detail and are correct and in accordance with Contract Documents, except as noted by any requested variance.

2. As a minimum, CONTRACTOR's Stamp shall include:

a. CONTRACTOR's name

b. Job number

c. Submittal number

d. Certification statement that the CONTRACTOR has reviewed the submittal and it is in compliance with the Contract Documents.

e. Signature line for CONTRACTOR

f. The CONTRACTOR shall place CONTRACTOR's Stamp on the front page of each document.

1.04 CONSTRUCTION PROGRESS SCHEDULES

A. The CONTRACTOR shall submit Construction Progress Schedules in accordance with Section 01310 - Construction Project Schedules.

1.05 SHOP AND ERECTION DRAWINGS, PRODUCT DATA, AND SAMPLES

A. The CONTRACTOR shall submit shop and erection drawings, product data, and samples in accordance with Section 01340 - Shop and Erection Drawings, Product Data, and Samples.

1.06 OPERATIONS AND MAINTENANCE DATA

A. When specified in Specification sections, the CONTRACTOR shall submit manufacturers' printed instructions for delivery, storage, assembly, installation, start-up, operation, adjusting, finishing, and maintenance.

B. The CONTRACTOR shall identify conflicts between manufacturers' instruction and Contract Documents.

1.07 MANUFACTURERS' CERTIFICATES

A. When specified in Specification section, the CONTRACTOR shall submit manufacturers' certificate of compliance for review by the OWNER, and for project records.

B. The CONTRACTOR shall submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or product, but must be acceptable to the OWNER.

1.08 CONSTRUCTION PHOTOGRAPHS

A. When required by Specification sections, the CONTRACTOR shall submit photographs taken prior to start of construction to show original site conditions.

B. When required by Specification sections, the CONTRACTOR shall submit photographs monthly with pay estimate.

C. The CONTRACTOR shall make two prints; color, matte, finish; 3x5 inch size; mounted on 8-1/2x11 inch soft card stock, with left edge binding margin for three-hole punch. The CONTRACTOR shall submit one print to the OWNER and retain the other prints.

1. For linework, the CONTRACTOR shall provide photographs at a frequency that will document the Work before and, as the Work is being backfilled.

D. The CONTRACTOR shall identify photographs with date, time, orientation, and project identification.

1.09 PROJECT RECORD DOCUMENTS

A. The CONTRACTOR shall submit Project Record Documents in accordance with Section 01700 - Project Closeout

1.10 VIDEO

A. The CONTRACTOR shall submit television videotapes as required in Section 02752 – Television Survey

B. Transmittal forms for videotapes shall be numbered sequentially.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01310

CONSTRUCTION PROGRESS SCHEDULES

1.01 REFERENCES

A. Associated General CONTRACTOR of America (AGC) Publication: “The Use of CPM in Construction - A Manual for General CONTRACTORs and the Construction Industry.”

1.02 REQUIREMENTS

A. The project management scheduling tool, “Critical Path Method” commonly called CPM, shall be used by the CONTRACTOR for the planning and scheduling of all work required under the Contract Documents.

1.03 QUALIFICATIONS

A. The CONTRACTOR shall submit evidence of CPM capability for Engineer’s review.

1.04 FORMAT

A. The CONTRACTOR shall prepare a network analysis system using the Critical Path Method, as outlined in AGC - The Use of CPM in Construction.

1.05 CONTENT

A. Show complete sequence of construction by activity, which dates for beginning and completion of each element of construction.

B. Identify each item by Specification section number.

C. Identify work of separate stages and other logically grouped activities.

D. Provide sub-schedules for each stage of work identified in Section 01010 - Summary of Work.

E. Provide sub-schedules to define critical portions of the entire schedule.

F. Include conferences and meeting in schedule.

G. Show accumulated percentage of completion of each item and total percentage of work completed, as of the first day of each month.

H. Provide separate schedule of submittal dates for shop and erection drawings, product data, and samples, and dates reviewed submittals will

be required from Engineer. Indicate decision dates for selection of finishes.

1.06 REVISIONS TO SCHEDULES

A. The CONTRACTOR shall indicate progress of each activity to date of submittal, and projected completion date of each activity.

B. The CONTRACTOR shall identify activities modified since previous submittal, major change in scope, and other identifiable changes.

C. The CONTRACTOR shall provide narrative report to define problem areas, anticipated delays, and impact on Schedule. The CONTRACTOR shall report corrective action taken, or proposed, and its effect including the effect of changes on schedules for separate CONTRACTORs.

1.07 SUBMITTAL PROCEDURES

A. Submittal requirements shall include:

1. Logic network and/or time phased bar chart, computer generated, utilizing the precedent diagram method.

2. Computerized network analysis.

a. Activity sort by early start, organized by related elements.

b. Activity sort by float, organized by related elements.

c. Activity sort by predecessor/successor.

3. Schedule of shop drawing submittals.

4. Schedule of values (lump sum price breakdown).

B. Within seven (7) working days after Notice to Proceed, the CONTRACTOR shall submit a network diagram describing the activities to be accomplished in the project and their dependency relationships, (predecessor/successor) as well as a tabulated schedule as defined in this section. The schedule produced and submitted shall indicate a project completion date the same as the Contract completion date. The CONTRACTOR shall meet with the Engineer to review the proposed plan and schedule.

C. Upon completion of the Engineer’s review of the submittal, the Engineer will return the schedule with comments. The CONTRACTOR shall revise the network diagram as required and resubmit the network diagram and tabulated schedule shall be reviewed by the Engineer. The network

diagram and tabulated schedule shall constitute the project work schedule unless a revised schedule is required due to substantial changes in the Work scope, a change in Contract Time, or delinquency by CONTRACTOR requiring a recovery schedule. When the network diagram and tabulated schedule have been accepted, the CONTRACTOR shall submit to the Engineer nine (9) copies of all schedule information.

D. The CONTRACTOR, if requested by the Engineer, shall provide a revised work schedule. The revised work schedule shall include a new diagram and tabulated schedule designed to show how the CONTRACTOR intends to accomplish the Work to meet the completion date. The form and method employed by the CONTRACTOR shall be the same as for the original schedule.

1.08 SCHEDULING RESPONSIBILITIES

A. It is understood that the construction schedule and all revised information must be produced by the CONTRACTOR and subcontractors as to how they envision the Work to be accomplished. Similarly, all progress information to be provided by and through the CONTRACTOR must be an accurate representation of the CONTRACTOR's, the subcontractor's, or the supplier's actual performance. The schedule shall at all times remain an accurate reflection of the CONTRACTOR's actual or projected sequencing of the Work. Once accepted by the Engineer, adherence to the established CPM schedule shall be obligatory upon the CONTRACTOR and the subcontractors for the Work under the Contract.

B. Progress of the Work

1. The CONTRACTOR shall start and complete the work as specified in each individual Notice to Proceed and shall be executed with such progress as may be required to prevent delay to the general completion of the project.

2. The CONTRACTOR agrees that whenever it becomes apparent from the current monthly CPM Schedule update that delays to the critical path have resulted and, hence, the Contract completion date will not be met, or when so directed by the Engineer, the CONTRACTOR shall take some or all of the following actions at no additional cost to the Owner:

a. Increase construction manpower in such quantities and crafts as will substantially eliminate the backlog of Work.

b. Increase the number of working hours per shift, shifts per working day, or days per week, the amount of construction equipment, or any combination of the foregoing to substantially eliminate the backlog of Work.

c. Reschedule activities to achieve maximum practical concurrence of accomplishment of activities, and comply with the revised schedule.

d. The CONTRACTOR shall submit to the Engineer for review a written statement of the steps intended to be taken to remove or arrest the delay to the critical path in the accepted schedule. If the CONTRACTOR should fail to submit a written statement of the steps as required by the Contract, the Engineer may direct the level of effort in manpower (trades), equipment, and work schedule (overtime, weekend, and holiday work, etc.), to be employed by the CONTRACTOR in order to remove or arrest the delay to the critical path in the accepted schedule, and the CONTRACTOR shall promptly provide such level of effort at no additional cost to the Owner.

1.09 CHANGE ORDERS

A. Upon approval of a Change Order, the approved change shall be reflected in the next scheduled submittal by the CONTRACTOR.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01340

SHOP AND ERECTION DRAWINGS, PRODUCT DATA, AND SAMPLES

PART 1 - GENERAL

1.01 SHOP AND ERECTION DRAWINGS

A. The CONTRACTOR shall furnish to the OWNER detailed shop drawings for work that is to be fabricated and erection drawings of equipment that is to be installed. These drawings shall show the principal dimensions of the materials or equipment to be furnished, foundation Plans, number and position of all anchor bolts, together with the manufacturer's specifications, parts lists, descriptive literature, and operating instructions. Materials shall not be fabricated nor equipment shipped until these drawings have been reviewed and approved by the OWNER. Review of these drawings shall not relieve the CONTRACTOR for the correctness of all dimensions and for the correct fitting of all parts, or for the satisfactory installation and operation in service of all materials and equipment specified, or for the requirement that the Contract Documents be satisfied and observed.

B. The CONTRACTOR shall submit shop drawings for review as required by the Contract Documents. Prior to submittal to the OWNER, Shop Drawings shall be reviewed and signed by the CONTRACTOR.

C. The CONTRACTOR's Stamp shall be placed on each drawing.

D. Shop drawings shall accurately and distinctly present the following:

1. Field dimensions clearly identified as such.

2. Arrangement and section views.

3. Relation to adjacent materials or structure including complete information for making connections between the work under this Contract and work under other contracts.

4. Kinds of materials and products.

5. Where necessary for clarity, the CONTRACTOR shall identify details by reference to drawing sheet and detail numbers or schedule as shown on the Contract Plans.

E. Drawings shall be to scale, and shall be a true representation of the specific item to be furnished.

1.02 PRODUCT DATA

A. The CONTRACTOR shall submit product data for review as required in Contract Document sections.

B. The CONTRACTOR's Stamp shall be placed on each data item submitted.

C. The CONTRACTOR shall mark each copy to identify applicable products and construction methods to be used in this project. The CONTRACTOR shall supplement manufacturers' standard data to provide information unique to this project, where required by the Contract Documents.

D. For products specified only by reference standard, the CONTRACTOR shall give manufacturers, trade names, model or catalog designation, and applicable reference standard.

1.03 SAMPLES

A. The CONTRACTOR shall submit samples for review as required by the Specifications. Prior to submittal to the OWNER, samples shall be checked by the CONTRACTOR to ensure that they conform to requirements of the Contract Documents.

B. CONTRACTOR's Stamp shall be placed on each sample or on a firmly attached sheet of paper.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01400

QUALITY CONTROL

PART 1 - GENERAL

1.01 QUALITY ASSURANCE

A. The CONTRACTOR shall monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. The CONTRACTOR shall comply with manufacturer's instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, the CONTRACTOR shall request clarification from the OWNER before proceeding.

D. The CONTRACTOR shall comply with specified standards as minimum quality for the Work except where more stringent tolerance, codes, or specified requirements indicate higher standards or more precise workmanship.

E. All Work shall be performed by persons qualified to produce required and specified quality.

F. The CONTRACTOR shall verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. The CONTRACTOR shall not subcontract work involving excavation, including pipe replacement point repairs, point repairs at manhole connections, manhole replacement, and service lateral reconnection and repair.

1.02 CONTROL OF WORK

A. Authority of OWNER

1. The OWNER shall give all orders and directions contemplated under this Contract relative to the execution of the Work. The OWNER shall determine the amount, quality, acceptability, and fitness of the several kinds of Work and materials that are to be paid for under this Contract and shall decide all questions that may arise in relation to said Work and the construction thereof. The OWNER's estimates and decisions shall be final and conclusive, except as otherwise expressly provided herein. Should any questions arise between the parties relative to the Contract, the

determination or decision of the OWNER shall be precedent to the right of the CONTRACTOR to receive any money or payment for Work.

2. The OWNER shall decide the meaning and intent of any portion of the Specifications and of any Contract Documents where the same may be found obscure or to be in dispute.

3. Any differences or conflicts in regard to their work that may arise between the CONTRACTOR under this Contract and other CONTRACTORs performing work for the OWNER shall be adjusted and determined by the OWNER.

4. The OWNER shall have the authority to suspend the Work wholly in part, due to failure of the CONTRACTOR to carry out provisions of the Contract; for failure to carry out orders; for such periods as he may deem necessary due to unsuitable weather; for conditions considered unsuitable for prosecution of the Work; or for any other condition or reason deemed to be in the public interest.

5. The OWNER shall have the authority to regulate and coordinate the stages of progress of construction, or items of Work of the respective CONTRACTORs to affect necessary cooperation and satisfactory performance and completion. The OWNER's decision shall be binding in any dispute in the Work arising between CONTRACTORs.

B. Conformity with Contract Documents

1. All Work and all materials furnished shall be in close conformity with the liens, grades, trenching sections, cross-sections, dimensions, material requirements, and testing requirements that are specified (including specified tolerances) in the Plans and Specifications.

2. If the OWNER finds the materials furnished, Work performed, or finished product not within close conformity with the Plans and Specifications, but that the portion of the Work affected will, in his opinion, result in a finished product having a level of safety, economy, durability, and workmanship acceptable, he will advise that the affected Work be accepted and remain in place. In this event, the OWNER will document his determination and recommend a basis of acceptance that may provide for an adjustment in the Contract Price for the affected portion of the Work. The OWNER's determination and recommended Contract Price adjustments will be based on sound judgment and such tests

and retests of affected Work as are, in his opinion, needed. Changes in the Contract Price shall be covered by change order.

3. If the OWNER finds the material furnished, Work performed, or the finished product are not in close conformity with the Plans and Specifications and have resulted in an unacceptable finished product, the affected Work or materials shall be removed and replaced or otherwise corrected by, and at the expense of the CONTRACTOR in accordance with the OWNER's written notification.

4. For the purpose of this subsection, the term "close conformity" shall not be construed as waiving the CONTRACTOR's responsibility to complete the Work in accordance with the Contract Documents. The term shall not be construed as waiving the OWNER's right to insist on strict compliance with the requirements of the Contract Documents during the CONTRACTOR's prosecution of the Work when, in the OWNER's opinion, such compliance is essential to provide an acceptable finished portion of the Work.

5. For the purpose of this subsection, the term "close conformity" is also intended to provide the OWNER with the authority to use sound judgment in his determinations as to acceptance of Work that is not in strict conformity but will provide a finished product equal to or better than that intended by the requirements of the Contract Documents.

C. Cooperation of CONTRACTOR

1. The CONTRACTOR shall, and will, in good workmanlike manner, do and perform all Work and furnish all supplies and materials, machinery, equipment, facilities, and means, necessary for proper completion of all the Work required by the Contract, within the time specified, and in accordance with provisions of these Contract Documents. The Work performed shall be in accordance with the directions of the OWNER. The CONTRACTOR shall furnish, erect, maintain, and remove such temporary works as may be required. The CONTRACTOR alone shall be responsible for the safety, efficiency, and adequacy of his operations, appliances, methods, and for any damage which may result from the failure or improper construction, maintenance, or operation. The CONTRACTOR shall observe, comply with, and be subject to all terms, conditions, requirements, and limitations of the Contract Documents, and shall do, carry on, and complete the entire Work to the satisfaction of the OWNER.

2. If, through acts of neglect on the part of the CONTRACTOR, any other CONTRACTOR or any subcontractor suffers loss or damage on their work, the CONTRACTOR agrees to settle with such other CONTRACTOR or subcontractor by agreement or arbitration. If such other CONTRACTOR or subcontractor shall assert any claim against the OWNER on account of any damage alleged to have been sustained, the OWNER shall notify the CONTRACTOR who shall indemnify and save harmless the OWNER against any such claim.

3. The CONTRACTOR will be supplied with two copies each of the Plans and Specifications. The CONTRACTOR shall have on the Work at all times one copy each of the Contract Documents. A reasonable number of additional copies of Plans and Specifications may be obtained by the CONTRACTOR upon request.

4. The CONTRACTOR shall give constant attention to the Work to facilitate the progress thereof, and he shall cooperate with the OWNER and the Resident Project Representative and with other CONTRACTORs in every way possible. The OWNER shall allocate the Work and suggest the sequence of construction in case of controversy between CONTRACTORs. THE CONTRACTOR SHALL HAVE COMPETENT SUPERINTENDENT ON THE WORK AT ALL TIMES WHO IS FULLY AUTHORIZED AS HIS MANAGER ON THE WORK. The superintendent shall be capable of reading and thoroughly understanding the Plans and Specifications and shall receive and fulfill any instructions from the OWNER or his authorized representative.

D. Construction Layout

1. The OWNER reserves the right to contract for and perform other or additional work on or near the Work covered by this Contract.

2. When separate contracts are let within the limits of any one project, each CONTRACTOR shall conduct his work so as not to interfere with or hinder the progress of completion of the work being performed by other CONTRACTORs. CONTRACTORs working on the same project shall cooperate with each other as directed by the OWNER.

3. Each CONTRACTOR involved shall assume all liability, financial or otherwise, in connection with his contract and shall protect and save harmless the OWNER and OWNER from any and all damages or claims that may arise because of inconvenience, delays, or loss experienced by him because of the presence and

operations of other CONTRACTORs working within the limits of the same project.

4. The CONTRACTOR shall arrange his work and shall place and dispose of the materials being used so as not to interfere with the operation of other CONTRACTORs within the limits of the same project. He shall join his work with that of the others in an acceptable manner shall perform it in proper sequence to that of the others to the satisfaction of the OWNER.

E. Construction Layout

1. The OWNER will furnish the CONTRACTOR with benchmarks, control points, and any other measurements that the OWNER may deem necessary for the proper prosecution and control of the Work.

2. The CONTRACTOR shall satisfy himself as to the accuracy of all measurements before proceeding with the Work. All stakes and markings set by the OWNER for his own use or for the CONTRACTOR's guidance shall be scrupulously preserved by the CONTRACTOR. Any stakes or markings lost or destroyed by the CONTRACTOR's forces through negligence shall be replaced by the OWNER at the CONTRACTOR's expense when so ordered by the OWNER.

3. The CONTRACTOR shall furnish, free of charge, to the OWNER, such incidental labor as he may require in establishing points and lines necessary to the prosecution of the Work to satisfactory completion.

F. Authority and Duties of OWNER's Inspector

1. The OWNER's Inspector shall have full authority to reject any defective material or workmanship and to inform the CONTRACTOR that construction is being improperly performed (if such is the case), subject to final decision of the OWNER. OWNER's Inspectors will not be authorized to revoke, alter, enlarge, or relax the provisions of the Plans and Specifications or to issue any instructions contrary thereto.

2. The CONTRACTOR may request, and the OWNER will issue, written instructions on any important questions which may develop in respect to the acceptance or rejections of materials or workmanship.

G. OWNER's Representative

1. The OWNER may assign a representative to observe the construction of the Work and advise the OWNER of the Work's prosecution. The resident project representative shall not act as inspector. The CONTRACTOR shall continue to deal directly with the OWNER's Inspector as described above. The OWNER's Representative shall have full access to all job records and shall be allowed to take supplemental samples of materials used on the job.

H. Inspection of the Work

1. The OWNER will observe all of the Work in progress. The CONTRACTOR shall furnish the OWNER with every reasonable facility for ascertaining whether or not the Work as performed is in accordance with the requirements and intents of the Plans and Specifications. Should any Work be covered or hidden prior to the approval thereof by the OWNER, it shall be uncovered for examination and recovered at the CONTRACTOR's expense.

2. Should the Contract Work include relocation, adjustment, or any other modification to existing facilities, not the property of the OWNER, authorized representatives of the OWNERs of such facilities shall have the right to inspect such work. Such inspection shall in no case make any facility OWNER a party to the Contract, and shall in no way interfere with the rights of the parties to this Contract.

I. Removal of Unacceptable and Unauthorized work

1. All work that does not conform to the requirements of the Contract, Plans, and Specifications will be considered by the OWNER as provided in this section.

2. Unacceptable Work, whether the result of poor workmanship, use of defective materials, damage through carelessness, or any other cause fount to exist prior to the final acceptance of Work, shall be removed immediately and replaced in an acceptable manner in accordance with the provision of section 01700 - Contract Closeout.

3. No work shall be done without lines and grades having been approved by the OWNER. Work done contrary to the instructions of the OWNER, work done beyond the lines shown on the Plans, except as herein specified or extra work done without authority, will be considered as unauthorized and will not be paid for under the provisions of this Contract. Work so done may be ordered removed or replaced at the CONTRACTOR's expense.

4. Upon failure on the part of the CONTRACTOR to comply forthwith with any order of the OWNER made under the provisions of this

section, the OWNER will have authority to cause unacceptable work to be remedied or removed and replaced and unauthorized work to be removed and to recover the costs incurred by the OWNER from the CONTRACTOR. Said monies may be deducted from any amounts due the CONTRACTOR.

J. Load Restrictions

1. The CONTRACTOR shall comply with all legal load restrictions in the hauling of materials on public roads beyond the limits of the Work. A special permit will not relieve the CONTRACTOR of liability for damage that may result from the moving of material or equipment.

2. The operation of equipment of such weight or so loaded as to cause damage to structures or to any other type of construction will not be permitted. Hauling of materials over a base course or surface course under construction shall be limited as directed by the OWNER. No loads will be permitted on a concrete pavement, base, or structure, before the expiration of the curing period. The CONTRACTOR shall be responsible for all damage done by his hauling equipment and shall correct such damage at his own expense.

K. Maintenance During Construction

1. The CONTRACTOR shall maintain the Work during construction and until the Work is accepted. This maintenance shall constitute continuous and effective Work prosecuted day by day, with adequate equipment and forces so that the Work is maintained in satisfactory condition at all times.

2. All costs of maintenance work during construction and before the project is accepted shall be included in the unit prices bid on the various Contract Items, and the CONTRACTOR will not be paid an additional amount for such work.

L. Failure to Maintain the Work

1. Should the CONTRACTOR at any time fail to maintain the Work as provided in this section, the OWNER shall immediately notify the CONTRACTOR of such noncompliance. Such notification shall specify a reasonable time within which the CONTRACTOR shall be required to remedy such unsatisfactory maintenance to the exigency that exists.

2. Should the CONTRACTOR fail to respond to the OWNER's notification, the OWNER may suspend any work necessary for the

OWNER to correct such unsatisfactory maintenance condition, depending on the exigency that exists. Any maintenance cost incurred by the OWNER shall be recovered from the CONTRACTOR in the manner deemed most appropriate by the OWNER.

M. Test Period and Final Acceptance

1. As each separate principal part of the Work is completed it shall be immediately inspected by the OWNER. If found to be in substantial compliance with the Contract Documents, it shall be tentatively accepted by the OWNER. Thereafter, all such completed and accepted parts of the Work shall be maintained in good condition by and at the expense of the CONTRACTOR until final acceptance by the OWNER of all Work covered by the Contract.

2. After the principal operating parts of the Work have been completed and tentatively accepted, they shall be operated simultaneously as a single unit, by and at the expense of the CONTRACTOR in the presence of the OWNER, for a period of not less than thirty (30) days. During the test period, the CONTRACTOR shall make all such repairs and/or adjustments as may be found necessary to develop the capacities and complete operating functions called for or implied in the Specifications.

3. Operation and maintenance work prior to, during, and after the test period shall be by and at the expense of the CONTRACTOR and shall be continued until all work performed under the Contract has been formally accepted by the OWNER.

4. After the test period has been concluded and the construction of all work under Contract has been completed, the OWNER, the CONTRACTOR, and a representative of the OWNER shall make a joint final inspection of all of the Work. If the Work is not acceptable at the time of such inspection, the OWNER will notify the CONTRACTOR of the defects that must be remedied before final acceptance can be made.

1.03 CONTROL OF MATERIALS

A. Source of Supply and Quality Requirements

1. The materials used in the Work shall conform to the requirements of the Contract Documents. Unless otherwise specified, such materials that are manufactured or processed shall be new (as compared to used or reprocessed).

2. In order to expedite the inspection and testing of materials, the CONTRACTOR shall furnish complete statements to the OWNER as to the origin, composition, and manufacture of all materials used in the Work. Such statements shall be furnished promptly after execution of the Contract, but in all cases prior to delivery of such materials.

3. At the OWNER's option, materials may be approved at the source of supply before delivery is started. If it is found that source's of supply of previously approved materials do not produce specified products; the CONTRACTOR shall furnish materials from other sources.

B. Certification of Compliance

1. The OWNER may permit the use (with the approval of the OWNER), prior to sampling and testing, of certain materials or assemblies when accompanied by manufacturer's certificates of compliance stating that such materials or assemblies fully comply with the requirements of the Contract. The certificate shall be signed by the manufacturer. Each lot of such materials or assemblies delivered to the Work must be accompanied by a certificate of compliance in which the lot is clearly identified.

2. Materials or assemblies used on the basis of certificates of compliance may be sampled and tested at any time and, if found not to be in conformity with Contract requirements, will be subject to rejection whether in place or not.

3. The form and distribution of certificates of compliance shall be as approved by the OWNER.

4. When a material or assembly is specified by "brand name or equal" and the CONTRACTOR elects to furnish the manufacturer's certificate of compliance for each lot of such material or assembly delivered to the Work, such certificate for compliance shall clearly identify each lot delivered and shall certify as to conformance to the specified performance, testing, quality, or dimensional requirements; and suitability of the material or assembly for the use intended in the Contract Work.

5. Should the CONTRACTOR propose to furnish an "or equal" material or assembly the CONTRACTOR shall furnish the manufacturer's certificates of compliance as herein before described for the specified brand name material or assembly. However, the OWNER shall be the sole judge as to whether the proposed "or equal" is suitable for use in the Work.

6. The OWNER reserves the right to refuse permission for use of materials or assemblies on the basis of certificates of compliance.

C. Plant Inspection

1. The OWNER or his authorized representative may inspect, at its source, any specified material or assembly to be used in the Work. Manufacturing plants may be inspected from time to time for the purpose of determining compliance with specified manufacturing methods or materials to be used in the Work and to obtain samples required for the OWNER's acceptance of the material or assembly.

2. Should the OWNER conduct plant inspections, the following conditions shall exist:

   a. The OWNER shall have the cooperation and assistance of the CONTRACTOR and the producer with whom he has contracted for materials.

   b. The OWNER shall have full entry at all reasonable times to such parts of the plants that concern the manufacture or production of the materials being furnished.

   c. If required by the OWNER, the CONTRACTOR shall arrange for adequate office or working space that may be reasonably needed for conducting plant inspections. Office or working space should be conveniently located with respect to the plant.

3. It is understood and agreed that the OWNER shall have the right to retest any material which has been tested and approved at the source of supply after it has been delivered to the site. The OWNER shall have the right to reject only material which, when retested, does not meet the requirement of the Contract Documents.

D. Storage of Materials and Equipment

1. Materials shall be stored to assure the preservation of their quality and fitness for the Work. Stored materials, even though approved before storage, may again be inspected prior to their use in the Work. Stored materials shall be located to facilitate their prompt inspection. The CONTRACTOR shall coordinate the storage of all materials with the OWNER. Storage facilities shall be provided at the expense of the CONTRACTOR, and all costs shall be included in the unit prices bid on the various Contract Items. The CONTRACTOR will not be paid an additional amount for the provision of such storage facilities.

2. Machinery, control equipment, etc. subject to damage by exposure to the elements shall be stored in a bonded warehouse or other locations that have been approved by the OWNER.

3. Unless otherwise in the Contract Documents, the storage of materials and the location of the CONTRACTOR's parked equipment or vehicles shall be as directed by the OWNER. Private property shall not be used for storage purposes without written permission of the private property OWNER or lessee of such property. The CONTRACTOR shall make all arrangements and bear all expenses for the storage of materials on private property. Upon request, the CONTRACTOR shall furnish the OWNER a copy of the property OWNER's permission. All storage sites on private property shall be restored to their original condition by the CONTRACTOR entirely at his own expense, except otherwise agreed to, in writing by the private property OWNER or lessee of the property.

4. The CONTRACTOR shall be responsible for loss, damage, or deterioration of materials and equipment caused by improper protection from the weather or from other sources of damage.

E. Unacceptable Materials

1. Any materials or assembly that does not conform to the requirements of the Contract Documents shall be considered unacceptable and shall be rejected. The CONTRACTOR shall remove any rejected materials or assembly from the site of the Work, unless otherwise instructed by the OWNER.

2. No rejected material or assembly, the defects of which have been corrected by the CONTRACTOR, shall be returned to the site of the Work until such time as the OWNER has approved its use in the Work.

F. OWNER-furnished Materials

1. The CONTRACTOR shall furnish all materials required to complete the Work, except those specified (if any) to be furnished by the OWNER.

2. All costs of handling, transportation from the specified location to the site of Work, storage, and installation of OWNER-furnished materials shall be included in the unit price bid for the Contract Item in which such OWNER-furnished material is used. No additional payment for handling transportation will be made.

3. After any OWNER-furnished material has been delivered to the locations specified, the CONTRACTOR shall be responsible for any demurrage, damage, loss, or other deficiencies that may occur during the CONTRACTOR's handling, storage, or use of such OWNER-furnished material. The OWNER will recover from the CONTRACTOR any cost incurred by the OWNER in making good such loss due to the CONTRACTOR's handling, storage, or use of OWNER-furnished materials.

G. Transportation of Materials.

1. Materials, including pipe, shall be transported in such a manner as to protect the materials from damage. Materials, even though inspected and approved before transportation, may again be inspected and/or tested after delivery to the site. Any damaged and/or unacceptable materials shall be removed from the site and replaced with materials meeting the Contract Documents.

2. The costs of transportation of materials and for replacing damaged or defective materials shall be borne by the CONTRACTOR.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01510

TEMPORARY UTILITIES

PART 1 – GENERAL

1.01 GENERAL REQUIREMENT

A. The CONTRACTOR shall provide for utilities and services for its own operations. The CONTRACTOR shall furnish, install and maintain all temporary utilities during the contract period including removal upon completion of the work.

1.02 JOB CONDITIONS

A. Scheduled Uses: The CONTRACTOR shall, in conjunction with establishment of job progress schedule, establish a schedule for implementation and termination of service for each temporary utility or facility; at earliest feasible time, and, when acceptable to OWNER, change over from use of temporary utility service to permanent service.

PART 2 – PRODUCTS

2.01 MATERIALS

A. The CONTRACTOR shall provide either new or used materials and equipment, which are in substantially undamaged condition and without significant deterioration and which are recognized in the construction industry, by compliance with appropriate standards, as being suitable for intended use in each case. Where a portion of temporary utility is provided for CONTRACTOR by utility company, the CONTRACTOR shall provide remainder with matching and compatible materials and equipment and comply with recommendations of utility company.

PART 3 – EXECUTION

3.01 INSTALLATION OF TEMPORARY UTILITY SERVICES

A. General: Wherever feasible, the CONTRACTOR shall engage the utility company to install temporary service to project, or as a minimum, to make connection to existing utility service; locate services where they will not interfere with total project construction work, including installation of permanent utility services; and maintain temporary services as installed for required period of use; and relocate, modify or extend as necessary from time to time during that period as required to accommodate total project construction work.

B. Approval of Electrical Connections: All temporary connections for electricity shall be subject to approval of the OWNER and the power company representative, and shall be removed in like manner at the CONTRACTOR's expense prior to final acceptance of the work.

C. Separation of Circuits: Unless otherwise permitted by the OWNER, circuits separate from lighting circuits shall be used for all power purposes.

D. Construction Wiring: All wiring for temporary electric light and power shall be properly installed and maintained and shall be securely fastened in place. All electrical facilities shall conform to the requirements of Subpart K of the OSHA Safety and Health Standards for Construction.

3.02 INSTALLATION OF POWER DISTRIBUTION SYSTEM

A. Power: The CONTRACTOR shall provide all necessary power required for its operations under the Contract, and shall provide and maintain all temporary power lines required to perform the work in a safe and satisfactory manner.

B. Temporary Power Distribution: The CONTRACTOR shall provide a weatherproof, grounded, temporary power distribution system sufficient to accommodate performance of entire work of project, including, but not necessarily limited to, temporary electrical heating where indicated, operation of test equipment and test operation of building equipment and systems which cannot be delayed until permanent power connections are operable, temporary operation of other temporary facilities, including permanent equipment and systems which must be placed in operation prior to use of permanent power connections (pumps, HVAC equipment, elevators, and similar equipment), and power for temporary operation of existing facilities (if any) at the site during change-over to new permanent power system. Provide circuits of adequate size and proper power characteristics for each use; run circuit wiring generally overhead, and rise vertically in locations where it will be least exposed to possible damage from construction operations, and result in least interference with performance of the work; provide rigid steel conduit or equivalent raceways for wiring which must be exposed on grade, floors, decks, or other recognized exposures to damage or abuse.

3.03 INSTALLATION OF LIGHTING

A. Construction Lighting: All work conducted at night or under conditions of deficient daylight shall be suitably lighted to insure proper work and to afford adequate facilities for inspection and safe working conditions.

B. Temporary Lighting: The CONTRACTOR shall provide a general, weatherproof, grounded temporary lighting system in every area of

construction work, as soon as overhead floor/roof deck structure has been installed; and provide sufficient illumination for safe work and traffic conditions; and run circuit wiring generally overhead, and rise vertically in locations where it will be least exposed to possible damage from construction operations on grade, floors, decks, or other recognized areas of possible damage or abuse.

3.04 WATER SUPPLY

A. The CONTRACTOR shall provide all facilities necessary to convey the water from the source to the points of use in accordance with the requirements of the Contract Documents. The CONTRACTOR shall pay the fee for water meter and all other charges for water use.

B. The CONTRACTOR shall provide and operate all pumping facilities, pipelines, valves, hydrants, storage tanks, and all other equipment necessary for the adequate development and operation of the water supply system. Water used for domestic purposes shall be free of contamination and shall conform to the requirements of the State and local authorities for potable water. The CONTRACTOR shall be solely responsible for the adequate functioning of its water supply system and shall be solely liable for any claims arising from the use of same, including discharge or waste of water there from.

C. Water Connections: The CONTRACTOR shall not make connection to, or draw water from, any fire hydrant or pipeline without first obtaining permission of the authority having jurisdiction over the use of said fire hydrant or pipeline and from the agency owning the affected water system. For each such connection made, the CONTRACTOR shall first attach to the fire hydrant or pipeline a valve and a meter, if required by the said authority, of a size and type acceptable to said authority and agency. The CONTRACTOR shall pay all permit and water charges.

3.05 INSTALLATION OF SANITARY FACILITIES

A. Toilet Facilities: Fixed or portable chemical toilets shall be provided wherever needed for the use of CONTRACTOR's employees. Toilets at construction job sites shall conform to the requirements of Subpart D, Section 1926.51 of the OSHA Standards for Construction.

B. Sanitary and Other Organic Wastes: The CONTRACTOR shall establish a regular daily collection of all sanitary and organic wastes. All wastes and refuse from sanitary facilities provided by the CONTRACTOR or organic material wastes from any other source related to the CONTRACTOR's operations shall be disposed of away from the site in a manner satisfactory to the OWNER and in accordance with all laws and regulations pertaining thereto.

C. Sewer Connection: The CONTRACTOR shall coordinate with the OWNER for obtaining sewer connection and shall pay all sewer usage charges.

3.06 INSTALLATION OF FIRE PROTECTION

A. Fire Protection: The construction plant and all other parts of the work shall be connected with the CONTRACTOR's water supply system and shall be adequately protected against damage by fire. Hose connections and hose, water casks, chemical equipment, or other sufficient means shall be provided for fighting fires in the temporary structures and other portions of the work, and responsible persons shall be designated and instructed in the operation of such fire apparatus so as to prevent or minimize the hazard of fire.

3.07 OPERATIONS AND TERMINATIONS

A. Inspections: Prior to placing temporary utility services into use, the CONTRACTOR shall inspect and test each service and arrange for governing authorities' required inspection and tests, and obtain required certifications and permits for use thereof.

B. Protection: The CONTRACTOR shall maintain distinct markers for underground lines, and protect from damage during excavating operations.

C. Termination and Removal: When need for a temporary utility service or a substantial portion thereof has ended, or when its service has been replaced by use of permanent services, or not later than time of substantial completion, the CONTRACTOR shall promptly remove installation unless requested by OWNER to retain it for a longer period. The CONTRACTOR shall complete and restore work which may have been delayed or affected by installation and use of temporary utility, including repairs to construction and grades and restoration and cleaning of exposed surfaces.

D. Removal of Water Connections: Before final acceptance of the work on the project, all temporary connections and piping installed by the CONTRACTOR shall be entirely removed, and all affected improvements shall be restored to their original condition, or better, to the satisfaction of the OWNER and to the agency owning the affected utility.

END OF SECTION

SECTION 01560

TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 – GENERAL

1.03 EXPLOSIVES AND BLASTING

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

1.04 DUST ABATEMENT

A. The CONTRACTOR shall furnish all labor, equipment, and means required and shall carry out effective measures wherever and as often as necessary to prevent its operation from producing dust in amounts damaging to property, cultivated vegetation, or domestic animals, or causing a nuisance to persons living in or occupying buildings in the vicinity. The CONTRACTOR shall be responsible for any damage resulting from any dust originating from its operations. The dust abatement measures shall be continued until the CONTRACTOR is relieved of further responsibility by the ENGINEER or OWNER.

1.05 RUBBISH CONTROL

A. During the progress of the work, the CONTRACTOR shall keep the site of the work and other areas used by it in a neat and clean condition, and free from any accumulation of rubbish. The CONTRACTOR shall dispose of all rubbish and waste materials of any nature occurring at the work site, and shall establish regular intervals of collection and disposal of such materials and waste. The CONTRACTOR shall also keep its haul roads free from dirt, rubbish, and unnecessary obstructions resulting from its operations.

B. Disposal of all rubbish and surplus materials shall be off the site of construction in accordance with local codes and ordinances governing locations and methods of disposal, and in conformance with all applicable safety laws, and to the particular requirements of Part 1926 of the OSHA Safety and Health Standards for Construction.

1.06 SANITATION

A. Toilet Facilities: Fixed or portable chemical toilets shall be provided wherever needed for the use of employees. Toilets at construction job sites shall conform to the requirements of Part 1926 of the OSHA Standards for Construction.

B. Sanitary and Other Organic Wastes: The CONTRACTOR shall establish a regular daily collection of all sanitary and organic wastes. All wastes and refuse from sanitary facilities provided by the CONTRACTOR or organic material wastes from any other source related to the CONTRACTOR's operations shall be disposed of away from the site in a manner satisfactory to the OWNER and in accordance with all laws and regulations pertaining thereto.

1.07 CHEMICALS

A. All chemicals used during project construction or furnished for project operation, whether defoliant, soil sterilant, herbicide, pesticide, disinfectant, polymer, reactant or of other classification, shall show approval of either the U.S. Environmental Protection Agency or the U.S. Department of Agriculture. Use of all such chemicals and disposal of residues shall be in strict accordance with the printed instructions of the manufacturer.

1.08 NOISE CONTROL

A. Noise resulting from the CONTRACTOR’s work shall not exceed the noise levels and other requirements stated in local ordinances. The CONTRACTOR shall be responsible for curtailing noise resulting from his operation. He shall, upon written notification from the OWNER of the noise control officers, make any repairs, replacements, adjustments, additions and furnish mufflers when necessary to fulfill requirements.

1.09 EROSION ABATEMENT AND WATER POLLUTION

A. It is imperative that any CONTRACTOR dewatering operation should not contaminate or disturb the environment of the properties adjacent to the work. The CONTRACTOR shall, therefore, schedule and control his operations to continue all runoff water from disturbed surfaces, water from dewatering operations that becomes contaminated with lime silt, muck and other deleterious matter, fuels, oils, bitumens, calcium, chloride, chemicals and other polluting materials.

B. The CONTRACTOR shall construct temporary silting basin (s) of adequate size and provide all necessary materials, operations and controls including, but not limited to, filters, coagulants, screens, and other means necessary to attain the required discharge water quality.

C. The CONTRACTOR shall be responsible for providing, operating and maintaining materials and equipment used for conveying the clear water to the point of discharge. All pollution prevention procedures, materials, equipment, and related items shall be operated and maintained until such time as the dewatering operation is discontinued. Upon the removal of the

materials, equipment and related items, the CONTRACTOR shall restore the area to the condition prior to its commencing work.

1.10 PRECAUTIONS DURING ADVERSE WEATHER

A. During adverse weather, and against the possibility thereof, the CONTRACTOR shall take all necessary precautions so that the work may be properly done and satisfactory in all respects. When require, protection shall be provided by use of tarpaulins, wood and building paper shelters, or other acceptable means. The CONTRACTOR shall be responsible for all changes caused by adverse weather.

B. The OWNER may suspend construction operations at any time when, in his judgment, the conditions are unsuitable or the proper precaution are not being taken, whatever the weather conditions may be, in any season.

1.11 HURRICANE AND STORM WARNINGS

A. During such periods of time as are designated by the United States Weather Bureau as being a hurricane alert, watch or warning, the CONTRACTOR shall perform all precautions as necessary to safeguard the work and property, including the removal of all small equipment materials from the site, lashing all other equipment and materials to each other and to rigid construction, and any other safety measures as indicated below.

B. The CONTRACTOR shall submit to the OWNER, for review and approval, a Plan of Action describing the procedures to be followed by the CONTRACTOR in the event of a Hurricane Alert, Watch, or Warning.

C. Upon Notification of a Hurricane Alert:

1. Upon issuance of a Hurricane Alert by the County Manager, all CONTRACTORs performing work within the right-of-way of a designated evacuation route shall immediately secure their work, backfill all excavations within the right-of-way and suitably prepare the roadway surface for full traffic flow. This work shall be completed within 24 hours of issuance of the alert. Work shall not recommence until the “All Clear” is issued by the County Manager.
2. CONTRACTORs performing at all other locations shall remove all unnecessary debris, materials, and equipment from the job site. The CONTRACTOR shall also keep his crew on standby on weekends and holidays during the Hurricane Alert period.

3. CONTRACTORs shall implement their approved plan of Action to protect the project and the public.

4. For work within the public right-of-ways, the CONTRACTOR will be notified by the OWNER to suspend his construction operations. The CONTRACTOR will backfill all open trenches, remove all construction equipment and materials from the right-of-way and secure operations pending further notice.

1.12 PERIODIC CLEANUP AND BASIC SITE RESTORATION

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

B. The CONTRACTOR shall perform the cleanup work on a regular basis and as frequently as ordered by the OWNER. Basic site restoration in a particular area shall be accomplished immediately following the installation of completion of the required facilities in that area. Furthermore, such work shall also be accomplished, when ordered by the OWNER, if partially completed facilities must remain incomplete for some time period due to unforeseen circumstances.

C. Upon failure of the CONTRACTOR to perform periodic clean-up and basic restoration of the site to the OWNER's satisfaction, the OWNER may, upon 5 days prior written notice to the CONTRACTOR, employ such labor and equipment as it deems necessary for the purpose, and all costs resulting therefore shall be charged to the CONTRACTOR and deducted from amounts of money that it may be due.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01570

TRAFFIC REGULATIONS AND MAINTENANCE OF TRAFFIC

PART 1 - GENERAL

1.01 TRAFFIC CONTROL

A. CONTRACTOR shall obey all traffic laws and comply with all the requirements, rules and regulations of the Florida State Department of Transportation, United States Department of Transportation Manual of Uniform Traffic Control Devices, the County, and other local authorities having jurisdiction, to maintain adequate warning signs, lights, barriers, etc., for the protection of traffic on public roadways.

B. The CONTRACTOR shall maintain traffic and protect the public from all damage to persons and property within the Contract limits, in accordance with the Contract Documents and all applicable state, county and local regulations. He shall conduct his operations so as to maintain and protect access, for vehicular and pedestrian traffic, to and from all properties and business establishments adjoining or adjacent to those streets affected by his operations, and to subject the public to a minimum of delay and inconvenience. Suitable signs, barricades, railing, etc., shall be erected and the work outlined by adequate lighting at night. Danger lights shall be provided as required. Watchmen and flagmen shall be provided as may be necessary for the protection of traffic.

C. Maintenance of Traffic Plans: When required for specific repairs, the CONTRACTOR shall immediately prepare and submit Maintenance of Traffic (M.O.T.) Plans for approval by authorities having jurisdiction. The traffic maintenance plan must meet the requirements of such authorities. Said M.O.T. Plans shall be in written form with sketches or drawings as necessary and shall comply with the State of Florida Department of Transportation standards for M.O.T. and the United States Department of Transportation Manual of Uniform Traffic Control Devices in construction areas. The Plans shall be submitted as soon as possible and not later than two weeks prior to any applicable construction work. A copy of the approval shall be provided to the OWNER.

D. The CONTRACTOR shall maintain one copy of the approved M.O.T. plan at the construction site for inspection. The OWNER reserves the right to observe the M.O.T. plan in use and to make any changes as field conditions warrant. Any changes shall supersede the plan and be done at the CONTRACTOR’s expense.

E. The CONTRACTOR and his personnel are cautioned against parking vehicles in the business zones for any extended period of time. If

necessary, the CONTRACTOR shall obtain offsite parking areas for his personnel.

F. All dirt spilled from the CONTRACTOR's trucks on existing pavements shall be removed by the CONTRACTOR whenever in the opinion of the OWNER the accumulation is sufficient to cause the formation of mud, dust, interference with traffic or create a traffic hazard.

G. The CONTRACTOR shall comply with all traffic regulations and perform maintenance of traffic as part of his site operation.

PART 2 - PRODUCTS – (Not Used)

PART 3 - EXECUTION – (Not Used)

END OF SECTION

SECTION 01600

MATERIALS AND EQUIPMENT

PART 1 - GENERAL

1.01 PRODUCTS

A. Products shall include the means, materials, equipment, or systems forming Work as approved by the OWNER. Products will not include machinery and equipment used for preparation, fabrication, conveying, and installation of Work. Products may also include existing materials or components designated for reuse.

B. The CONTRACTOR shall not reuse materials and equipment designated to be removed except as approved by the OWNER or specified in the Contract Documents.

1.02 TRANSPORTATION AND HANDLING

A. The CONTRACTOR shall transport and handle products in accordance with manufacturers' instructions.

B. The CONTRACTOR shall promptly inspect shipments to ensure that the products comply with requirements, quantities are correct, and products are undamaged.

C. The CONTRACTOR shall provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

D. The CONTRACTOR shall make arrangements for transportation, delivery, and handling of equipment and materials required for timely completion of the Work.

1.03 DELIVERY

A. The CONTRACTOR shall arrange deliveries of products to accommodate the short-term site completion schedules and in ample time to facilitate inspection prior to installation. The CONTRACTOR shall avoid deliveries that cause lengthy storage or overburden of limited storage space.

B. The CONTRACTOR shall coordinate deliveries to avoid conflict with Work and conditions at the site and to accommodate the following:

1. Work of other CONTRACTORs or the OWNER.

2. Limitation of storage space

3. Availability of equipment and personnel for handling products.

4. OWNER's use of premises.

C. The CONTRACTOR shall have products delivered to the site in manufacturers' original, unopened, labeled containers.

D. Immediately upon delivery, the CONTRACTOR shall inspect shipment to ensure that:

1. The product complies with requirement of Contract Documents

2. Quantities are correct.

3. Container and packages are intact and labels are legible.

4. Products are properly protected and undamaged.

1.04 PRODUCT HANDLING

A. The CONTRACTOR shall coordinate the off-loading of materials and equipment delivered to the job site. If necessary to move stored materials and equipment during construction, the CONTRACTOR shall relocate materials and equipment at no additional cost to the Owner.

B. The CONTRACTOR shall provide equipment and personnel necessary to handle products by methods to prevent damage to products or packaging.

C. The CONTRACTOR shall provide additional protection during handling as necessary to prevent breaking, scraping, marring, or otherwise damaging products or surrounding areas.

D. The CONTRACTOR shall handle products by methods to prevent over bending or over stressing.

E. The CONTRACTOR shall lift heavy components only at designated lifting points.

F. The CONTRACTOR shall handle materials and equipment in accordance with Manufacturers' recommendations.

G. The CONTRACTOR shall not drop, roll, or skid products off deliver vehicles. The CONTRACTOR shall hand carry or use suitable materials handling equipment.

1.05 STORAGE OF MATERIAL

A. The CONTRACTOR shall store and protect materials in accordance with manufacturers' recommendations and requirements of these Specifications.

B. The CONTRACTOR shall make necessary provisions for safe storage of materials and equipment. The CONTRACTOR shall place loose soil materials, and materials to be incorporated into the Work to prevent damage to any part of the Work or existing facilities and to maintain free access at all times to all parts of the Work and to utility service company installations in the vicinity of the Work. The CONTRACTOR shall keep material and equipment neatly and compactly stored in locations that will cause a minimum of inconvenience to other CONTRACTORs, public travel, adjoining owners, tenants, and occupants. The CONTRACTOR shall arrange storage in a manner to provide easy access for inspection.

C. The CONTRACTOR shall restrict storage to areas available on the construction site for storage of material and equipment as shown on Plans or as approved by the OWNER.

D. The CONTRACTOR shall provide off-site storage and protection when on-site storage in not adequate.

E. The CONTRACTOR shall not use lawns, grass plots, or other private property for storage purposes without written permission of the property owner or other person in possession or control of such premises.

F. The CONTRACTOR shall protect stored materials and equipment against loss or damage.

G. The CONTRACTOR shall store materials and products in Manufacturers' unopened containers.

H. Materials delivered and stored along the line of the Work shall be neatly, safely, and compactly stacked along the work site in such a manner as to cause the lease inconvenience and damage to property owners and the general public, and shall not be closer than 3 feet to any fire hydrant. Public and private drives and street crossings shall be kept open.

I. Damage to lawns, sidewalks streets, or other improvements shall be repaired or replaced by the CONTRACTOR to satisfaction of the OWNER and the property owner at no additional cost to the OWNER.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01700

PROJECT CLOSEOUT

PART 1 - GENERAL

1.01 CONTRACTOR'S RESPONSIBILITY FOR THE WORK

A. Until final acceptance by the OWNER as provided for in these Contract Documents, the Work shall be under the charge and care or the CONTRACTOR, and he shall take every necessary precaution to prevent injury or damage to the Work or any part thereof by the action of the elements or from any other cause whatsoever, whether arising from the execution or from the non-execution of the Work. The CONTRACTOR shall rebuild, repair, restore, and make good, at his own expense, all injuries or damage to any portion of the Work occasioned by any of the forenamed causes before acceptance.

1.02 CLOSEOUT PROCEDURES

A. The CONTRACTOR shall submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work has been completed in accordance with Contract Documents and ready for OWNER's review.

B. The CONTRACTOR shall provide submittals to the OWNER as required by governing or other authorities.

C. The CONTRACTOR shall submit final Application for Payment.

1.03 CONTRACT COMPLETION

A. The Contract will be considered fulfilled, except as provided in any bond or by law, and the warranty specified in individual sections when all the Work has been completed, the final inspection made, and final acceptance and final payment have been made by the OWNER.

B. After final inspection and upon receipt of satisfactory evidence of payment for all labor and materials used in the Work, the OWNER will notify the OWNER, in writing, of his acceptance of the Work performed under the contract and of his recommendations in respect to final payment to the CONTRACTOR.

1.04 FINAL SUBMITTALS

A. Before the final acceptance of the project, the CONTRACTOR shall submit to the OWNER certain records, certification, etc., which are specified elsewhere in the Contract Documents. Missing, incomplete or unacceptable items, as determined by the OWNER, shall constitute

grounds for withholding final payment to the CONTRACTOR. A partial list of such items appears below, but it shall be the CONTRACTOR's responsibility to submit any other items which are required in the Contract Documents:

1. Written test results of project completion

2. Written guarantees, where required

3. Certificates of inspection and acceptance by local governing agencies having jurisdiction.

4. Video tapes and logs of all lines televised

5. Pre-construction photos

6. Releases from all parties who are entitled to claims against the subject project, property, or improvement pursuant to the provisions of law.

1.05 FINAL CLEANUP

A. The CONTRACTOR shall promptly remove from the vicinity of the completed work, all rubbish, unused materials, concrete forms, construction equipment, temporary structures and facilities, construction signs, tools, scaffolding, materials, supplies and equipment which may have been used in the performance of the work. The contractor shall broom clean paved surfaces and rake clean other surfaces of grounds. Final acceptance of the work by the owner will be withheld until the contractor has satisfactorily complied with foregoing requirements for final cleanup of the project site.

PART 2 - PRODUCT (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01740

WARRANTIES

PART 1 - GENERAL

1.01 ONE YEAR WARRANTY

A. Unless specified otherwise by individual specification sections, the CONTRACTOR shall warrant the fitness and soundness of all Work done and materials and equipment put in place under the Contract for a period of one (1) year after the completion of the Contract, and neither the payment of the final estimate nor any provision in Contract Documents nor partial or entire occupancy of the premises by the Owner shall constitute an acceptance of Work not done in accordance with the Contract Documents or relieve the CONTRACTOR of liability in respect to any express warranties or responsibility for faulty materials or Workmanship. The CONTRACTOR shall remedy all defects in the Work and pay for any damage to other Work resulting there from, which shall appear within a period of one year from the date of final acceptance of the Work, unless a longer period is specified in individual sections. The OWNER will give notice of observed defects with reasonable promptness. The accepted date of the beginning of the one- (1) year warranty shall be the date of final estimate payment to the CONTRACTOR by the OWNER.

1.02 FORM OF SUBMITTALS

A. Warranty shall be bound in commercial quality 8-1/2 x 11 inch, three D side ring binders with durable plastic covers.

B. Identify each binder with typed or printed title WARRANTIES with title of project; name, address, and telephone number of CONTRACTOR, equipment supplier, and name of responsible company principal.

C. Table of Contents shall be neatly typed with each item identified with the number and title of the specification section in which specified, and the name of the product or Work item.

D. Each warranty shall be separated with index tab sheets keyed to the Table of Contents listing. The CONTRACTOR shall provide full information, using separate type sheets as necessary. The CONTRACTOR shall list subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

1.03 PREPARATION OF SUBMITTALS

A. The CONTRACTOR shall obtain warranties executed in duplicate by responsible subcontractors, suppliers, and manufacturers, within ten (10) days after completion of the applicable item of Work. Except for items put into use with OWNER's permission, the CONTRACTOR shall leave date of beginning of time of warranty until the Date of Completion is determined.

B. The CONTRACTOR shall verify that documents are in proper form, contain full information, and are notarized.

C. The CONTRACTOR shall co-execute submittals when required.

D. The CONTRACTOR shall retain warranties until time specified for submittal.

1.04 TIME OF SUBMITTALS

A. For equipment or component parts of equipment put into service during construction with OWNER's permission, the CONTRACTOR shall submit documents within ten (10) days after acceptance.

B. The CONTRACTOR shall make other submittals within ten (10) days after Date of Substantial Completion, prior to final Application for Payment.

C. For items of Work for which acceptance is delayed beyond Date of Completion, the CONTRACTOR shall submit within ten (10) days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 02221

1.13 TRENCHING AND BACKFILLING

1. PART 1 - GENERAL

1.01 WORK INCLUDED

A. Perform clearing, excavating, backfilling and grading as required for the construction of the utility systems consisting of piping and appurtenances as specified herein. All construction shall adhere to Miami-Dade County Water and Sewer Department and Miami-Dade County Public Works Department Standards.

2. PART 2 - PRODUCTS

2.01 BEDDING MATERIAL

A. Bedding Material: Pearock, drainfield limerock or similar material approved by the OWNER in wet trenches, and limerock screenings, sand or other fine inorganic material approved by the OWNER in dry trenches.

2.02 BACKFILL MATERIAL

A. Backfill Material: Suitable fill material containing no stones or rocks larger than 6-inches in diameter, and, when placed within 1-foot of piping and appurtenances, containing no stones or rocks larger than 2-inches in diameter (1-inch for PVC).

B. PART 3 - EXECUTION

3.01 EXCAVATION

A. Perform all excavation of every description and of whatever substances encountered, by open cut. Carefully support and protect from injury all existing utilities such as pipes, poles and structures and in case of damage, restore at no cost to the OWNER.

B. Keep trench walls vertical, and, if required to protect the safety of workmen, the general public, this or other work or structures, or to maintain trench widths within the limits hereinafter specified, provide proper sheeting and bracing. Provide safety measures in compliance with OSHA requirements and, for trenches 5-feet and deeper, comply with all requirements of the Florida Trench Safety Act. If interlocking steel sheeting is used, it must be removed without disturbing the bedding, filter

fabric, pipe or alignment of the pipe. Any damage to the pipe bedding, filter fabric, pipe or alignment of the constructed utility caused by removal of sheeting will be cause for rejection of the affected portion of the work. Excavate not more than 100-feet of trench ahead of pipe laying operations at one time unless a greater length of open trench is approved by the OWNER.

C. A substantially and safely constructed movable shield, "box" or "mole" may be used in place of sheeting when the trench is opened immediately ahead of the shield and closed immediately behind the shield as pipe laying proceeds inside the shield.

D. Excavate pipe trenches to a width within the limits of the top of the pipe and the trench bottom so as to provide a clearance on each side of the pipe barrel, measured to the face of the excavation or sheeting, if used, of 8-inches to 12-inches. Where the pipe size exceeds 12-inches, provide a clearance of 12-inches to 15-inches. Excavate all pipe trenches to a level 6-inches minimum below the outside bottom of the proposed pipe barrel.

E. In excavation for appurtenances, provide a clearance between their outer surfaces and the face of the excavation or sheeting, if used, of not less than 12-inches. Excavate manhole excavations to sufficient depth to permit their construction on the undisturbed bottom of the excavation.

F. Store and dispose of materials removed from the trenches in such a manner that they will not interfere unduly with traffic on public streets. Do not place on private property. In congested areas, remove to convenient places of storage such materials as cannot be stored adjacent to the trench or used immediately as backfill.

G. Transport all materials suitable for use as backfill to areas where not enough suitable material is available from the excavation.

H. Haul excess suitable material to a designated area within the limits of the City as directed by the OWNER. Upon completion of the work, clean up and finish grade the disposal area.

I. Remove from the site and dispose of all unsuitable excavated materials unless otherwise directed by the OWNER.

3.02 REMOVAL OF WATER

A. Dewater all excavations containing water and maintain them free from water before and during installation of pipes and structures. In the event this cannot be accomplished economically, the Alternate Method of Construction specified in Article 3.07 hereinafter may be used upon approval by the OWNER.

B. Provide all necessary pumps, underdrains, well-point systems, and other means for removing water from trenches and other parts of the work. Continue dewatering operations until the backfill has progressed to a sufficient depth over the pipe to prevent flotation or movement of the pipe and is above the natural water table.

C. Dispose of water from the trenches and excavations in such a manner as will not contravene any permit conditions or cause injury to public health, to public or private property, to the work completed or in progress, to the surface of the streets, or cause any interference with the use of the same by the public. Before starting the excavation, submit to the OWNER for approval proposed methods of handling trench water and locations at which the water will be disposed of. Obtain all permits required for dewatering operations.

3.03 PIPE BEDDING

A. After pipe trenches have been excavated to the proper depths, backfill the resulting excavation with approved pipe bedding material, as specified in paragraph 2.01 herein, up to the level of the lower one-third of the proposed pipe barrel. Tamp, compact and shape this material to provide a proper bedding for the pipe. Provide bedding under the branch of all fittings to furnish adequate support and bearing under the fitting.

B. Backfill any excess excavation below the levels required for installation of the pipe bedding, with approved bedding material, tamped, compacted and shaped to provide proper support for the proposed pipe, at no additional cost to the OWNER.

3.04 TRENCH STABILIZATION

A. Where soft or unstable conditions are encountered in trench bottoms, stabilize such areas so as to provide proper bedding or foundations for the proposed installation at no additional cost to the OWNER prior to placing the bedding material. In no event will pipe installation be permitted when such conditions exist.

3.05 BACKFILL

A. Backfilling of utility trenches will not be allowed until installation of pipe and appurtenances have been approved. Uncover or expose for inspection at no cost to the OWNER any work which is covered or concealed without the knowledge and consent of the OWNER.

B. Provide backfill material as specified in paragraph 2.02A, with no stones or rocks larger than 2-inches in diameter (1-inch for PVC) within 1-foot of

piping and appurtenances and no stones or rocks larger than 6-inches in diameter in any backfill.

C. If a sufficient quantity of suitable backfill material is not available from the trench or other excavations within the site of the work, provide and install additional material suitable for this purpose.

D. Place backfill material in 6-inch layers and compact to not less than 90 percent of its maximum density as defined hereafter to a depth of 12-inches over the top of the pipe. Exercise particular attention and care in obtaining thorough support for the branch of all service connection fittings and to preserve the alignment and gradient of the installed pipe.

E. After the backfill has been placed to a level 12-inches over the pipe, place the remainder of the backfill in layers not to exceed 9-inches, and compact with mechanical vibrators or other suitable equipment to obtain a density of the backfilled material of not less than 98 percent of its maximum density as hereinafter defined.

F. Within paved areas of trench excavation, reconstruct the base and surfacing.

G. Partially backfill no more than 300-feet of trench with pipe in place at any time unless otherwise approved by the OWNER.

3.06 COMPACTION AND DENSITIES

A. Determine maximum density of the material in trenches by ASTM D 1557 (AASHTO T 180).

B. Determine field density of the backfill material in place by ASTM D 2922 (AASHTO T 238).

C. Laboratory and field density tests which, in the opinion of the OWNER, are necessary to establish compliance with the compaction requirements of these specifications, will be conducted at the OWNER's expense. Tests will be made at depths and locations selected by the OWNER.

D. Rework and recompact, at no additional cost to the OWNER, trench backfill which does not comply with the specified densities, as indicated by such tests, until the required compaction is obtained. Retesting will be performed at the CONTRACTOR's expense.

3.07 ALTERNATE METHOD OF CONSTRUCTION

A. General:

1. If subsurface conditions are such as to make dewatering impossible, or only possible through the use of unusual and costly methods, the CONTRACTOR, with the concurrence, in writing, of the OWNER, may elect to employ the following alternate method of construction in such specific portions of the work as agreed by the OWNER.

2. In using the alternate method of construction described hereinafter, comply with the required standards of construction established in the preceding parts of this Section. No additional payment will be made to the CONTRACTOR for excavation, backfill, sheeting work or materials, or for any other costs incurred as a result of the use of this alternate method of construction.

3. Subject to all of the requirements stated hereinabove, including written approval of the OWNER, perform construction in accordance with the following provisions and with all requirements of Article 3.01 through Article 3.07, inclusive, of these Specifications unless otherwise specifically modified herein.

B. Removal of Water: The installation of pipe, manholes and appurtenances under water will be permitted and the requirements of Article 3.02, Removal of Water, will be waived.

C. Excavation:

1. Perform excavation of pipe trenches to the level of the bottom of the proposed pipe bedding in accordance with Article 3.01, Excavation. If rock, such as limerock or other similar hard, cemented material providing firm, unyielding trench bottoms is encountered at the level of the bottom of the proposed pipe bedding, no additional excavation will be required. If material such as sand, marl, or other material which cannot be classified as rock, as hereinabove defined, is encountered at the level of the bottom of the proposed pipe bedding, excavate the pipe trench to an additional depth of 10-inches minimum, below that level. This additional excavation, and the additional backfilling made necessary thereby, is an essential part of this alternate construction method and no additional payment will be made for this work, regardless of the type of material encountered.

2. Perform excavation for manholes to be installed under water to a depth, below the outside bottom of the proposed structure, which will provide a minimum space of 12-inches in rock, or 24-inches in sand, as the same are defined hereinabove, for the placement of bedding material as specified in 2.01 A.

3. Modify the excavation of pipe trenches at their junction with excavations for manholes by longitudinally sloping the bottom of the pipe trench for the last 10 feet to meet the bottom of the manhole excavation.

D. Trench Overcut: Trench overcut provisions herein shall be used only under direct authorization by the OWNER. If, after excavating the trench to a depth of 2 feet 6 inches below the outside bottom elevation of the proposed pipe barrel, and the soil at that depth is still unsatisfactory as foundation material because it contains marl, muck, organic matter, or other unsuitable material, and the OWNER authorizes overcut, the pipe trench shall be excavated further in one-foot increments until either a suitable foundation material is found, or the CONTRACTOR is directed by the OWNER to stop trench overcut operation and begin backfilling. In no case will trench overcut be more than 6 feet in depth, i.e., to a point 8.5 feet below the bottom of the pipe.

Selected backfill shall then be compacted in 6-inch layers up to the bottom of the proposed 6 inches of pipe bedding.

E. Pipe and Manhole Bedding: Place bedding material in the pipe trench or manhole excavation up to the level of the lower one-third of the proposed pipe barrel, or to the outside bottom of the proposed manhole as applicable. Tamp and compact this bedding material to provide a proper bedding for the pipe or manhole.

F. Backfill:

1. After the pipe is installed, backfill in accordance with the provisions of Article 3.05 Backfill, except use bedding material to backfill around the pipe and to a level even with the top of the pipe bell.

2. If the Alternate Method of Construction is used, carefully lift all backfill material, including bedding material, into the trench and release to fall freely therein when the bucket or container is at or just above water level. Do not dump or push backfill material into trenches containing water. Below the existing water level, carefully ram backfill material into place in uniform layers. Above the water level, place and compact backfill material as specified in Article 3.05 Backfill and Article 3.06 Compaction and Densities.

3.08 RESTORATION OF EXISTING SURFACES

A. Restore all grassed areas disturbed by the trenching operations by resodding.

B. Restore all paved areas disturbed by the trenching operations by repaving.

END OF SECTION

SECTION 02500

RESTORATION AND CLEANUP

PART 1 - GENERAL

1.01 WORK INCLUDED

A. This section covers the work necessary to provide and coordinate the restoration and cleanup of areas disturbed during construction.

B. All areas disturbed or damaged during construction shall be restored to conditions existing prior to the work.

1.03 SUBMITTALS

A. Submitted construction progress schedule should indicate restoration, by restoration type following the sequencing specified herein. Final cleanup time should also be referenced to the progress schedule.

B. Submittals shall be in accordance with Section 01300 - Submittals.

PART 2 - PRODUCTS

2.01 ROCK FOR UNPAVED ACCESS ROADWAYS

A. Rock shall be selected to match existing adjacent material.

PART 3 - EXECUTION

3.01 ROCK ACCESS ROADWAY RESTORATION

A. Replace gravel where disturbed to match existing type. Thickness required shall match thickness of existing gravel.

3.02 SODDING

A. Sod shall be placed to the extent to achieve the conditions existing prior to the work.

B. Properly prepare subgrade prior to placing sod. Remove excess materials, hand rake and level as necessary to place sod evenly and at grades to match adjacent existing surfaces. Finish sod installation shall provide unimpeded sheet flow of surface water drainage.

C. Lay sod to form a solid mass with tight-fitting joints. Butt ends and sides of sod strips. Do not overlap. Stagger strips to offset joints in courses. Tamp or roll sod lightly to insure uniform contact with subgrade. Fill minor cracks between pieces of sod with sifted soil.

D. Where necessary to prevent slippage of new installed sod, peg or pin sod securely using 1" x 1" x 6" wood pegs, driven flush with top of sod.

E. Water sod thoroughly with a fine spray immediately after installation.

F. Do not install sod on Friday, Saturday or Sunday, unless provisions are made to water manually or automatically.

G. CONTRACTOR shall make arrangements to water installed sod through Final Completion of project. Minimum watering frequency required is two waterings per week.

3.03 RESTORATION SEQUENCE

A. Remove and dispose of excess fill materials.

B. Properly sod areas requiring restoration.

END OF SECTION

SECTION 02510

PART 2 - ASPHALTIC CONCRETE SURFACE COURSE

PART 3 - PART 1 - GENERAL

1.01 WORK INCLUDED

A. Furnish all labor, materials, equipment, tools and transportation and perform all work necessary for the construction of asphaltic concrete surface courses composed of a mixture of aggregates, mineral filler and asphalt cement properly applied upon a prepared base, in accordance with these Contract Documents and in conformity with the existing lines, grades, and thickness. Unless otherwise directed by the OWNER, furnish Type SP-12.5 asphaltic concrete for surface courses 1-1/2 inches or more in thickness and Type SP-9.5 for surface courses less than 1-1/2 inches. Place asphaltic concrete pavement around concrete structures by hand methods.

1.02 QUALITY ASSURANCE

A. Standards: Comply with the latest edition of the Standard Specifications for Road and Bridge Construction, of the Florida Department of Transportation, hereinafter referred to as FDOT Specifications. The FDOT Specifications are hereby made a part of this Contract to the extent they are applicable thereto and shall be as binding upon the CONTRACTOR as though reproduced herein in their entirety. More specifically, FDOT Specification Section 334 shall govern.

B. Complete and submit laboratory analysis by a Certified Testing Laboratory on all materials and obtain materials acceptance by the Engineer, prior to placement.

1.03 SUBMITTALS

A. Submit manufacturer's/supplier's certificates of compliance with Specifications for all materials proposed in accordance with Section 01340.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Bituminous Material: Superpave PG Asphalt Binder or recycling Manager conforming to FDOT Specifications, Section 916-1 and 916-2.

B. Coarse Aggregate: Stone or slag conforming to FDOT Specifications, Section 901.

C. Fine Aggregate: As specified in FDOT Specifications, Section 902.

D. Mineral Filler: As specified in FDOT Specifications, Section 917-1 and 917-2.

2.02 GENERAL COMPOSITION OF MIXTURE

A. Provide a combination of aggregate (coarse, fine, or mixtures thereof), mineral filler, if required and bituminous material, sized, graded and combined in such proportions that the resulting mixture will meet the grading and physical properties of the approved job mix formula. Use a mixture as stated in FDOT Specification Section 334-3.

2.03 FORMULA FOR JOB MIX

A. Use a job mix formula conforming to the requirements of FDOT Specifications, Section 334-3, and submit test data showing that the material, as produced, meets the requirements.

PART 3 - EXECUTION

3.01 TRANSPORTATION OF MIXTURE

A. Transport the mixture in accordance with FDOT Specifications, Section 330-7, in tight vehicles previously cleaned of all foreign material and, if necessary, cover each load with a waterproof canvas cover of sufficient dimensions to protect it from weather conditions. Thinly coat the inside surface of the truck bodies with soapy water, or a mixture of water with not more than five percent of lubricating oil, but no excess of either. After the truck bodies are coated and before any mixture is placed therein, raise them so that all excess water will drain out. Do not use kerosene, gasoline or similar products to prevent adhesion.

3.02 LIMITATIONS FOR SPREADING

A. Spread the mixture only when the surface is properly prepared and is intact, firm, cured and dry. Do not spread the mixture when the air temperature is less than 40°F, or when the spreading cannot be finished and compacted during daylight hours. Ensure that the temperature of the mix at the time of spreading is not less than that recommended by FDOT Specifications for the particular work.

3.03 PLACING MIXTURE

A. Place the mixture in accordance with FDOT Specifications, Section 330-9.

3.04 COMPACTING MIXTURE

A. Compact the mixture in accordance with FDOT Specifications, Section 330-10.

3.05 JOINTS

A. Form joints in accordance with FDOT Specifications, Section 330-11.

3.06 FIELD QUALITY CONTROL

A. Surface Requirements:

1. For the purpose of testing the finished surface, provide a 10-foot straightedge and a standard template cut to the true cross section of the road and designate an employee whose duty it is to handle the straightedge and template in checking all rolled surfaces, under the direction of the Engineer.

2. Construct the finished surface such that it will not vary more than 1/4-inch from the template cut to the cross section of the road, nor more than 3/16-inch from the 10-foot straightedge applied parallel to the center line of the pavement. Correct any irregularity of the surface exceeding the above limits. Repair depressions which may develop after the initial rolling by loosening or removing the mixture and adding new material to bring the areas to a true surface. Skin patching will not be accepted. Remove such portions of the completed pavement as are defective in surface compaction or in composition, or that do not comply with all other requirements of these Specifications, and replace with suitable mixture, properly laid in accordance with these Specifications and at no cost to the OWNER.

B. Thickness Requirements: Verify by core boring that the thickness of the compacted asphaltic concrete surface course is not less than the thickness of the existing asphalt. Remove and replace to the required thickness any surface course found to be deficient.

C. Testing: Give timely notice to the testing laboratory, engaged by the OWNER of readiness for the required density and other tests. Pay for all retesting required due to non-compliance until satisfactory results are obtained.

D. Protection of Pavement: After the completion of the pavement, allow no vehicular traffic of any kind on the pavement until it has set sufficiently to prevent rutting or other distortion.

END OF SECTION

SECTION 02574

PAVEMENT REMOVAL AND REPLACEMENT

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Furnish all labor, materials, equipment, tools and transportation and perform all work necessary for cutting, removing, protecting and replacing existing pavements of the various types encountered, including driveways, sidewalks, curbs and gutters.

B. Permits: Obtain all necessary permits and provide advance notice to the appropriate authorities, as required, prior to construction operations.

C. Protection Of Existing Improvements: Protect from damage all pavements, sidewalks and other improvements that are to remain within the work area. Repair all damage to such improvements, as a result of the CONTRACTOR's operations, beyond the limits of the work of pavement replacement as described herein, at no additional cost to the OWNER.

1.02 JURISDICTIONAL REQUIREMENTS

A. Perform all work within the rights-of-way of public thoroughfares in accordance with the requirements of the Governmental agency having jurisdiction. All construction shall to adhere to Miami-Dade County Water and Sewer Department and Miami-Dade County Public Works Department Standards.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Use only materials, including limerock, bituminous prime and tack coat, and asphaltic concrete, concrete sidewalk, walkway, driveway and curb meeting the requirements of the FDOT Specifications as follows:

1. Limerock: Miami or Ocala Limerock.

2. Bituminous Prime Coat: Cutback asphalt, Grade RC-70.

3. Bituminous Tack Coat: Emulsified asphalt, Grade RS-2.

4. Asphaltic Concrete: Provide Type SP-12.5 for courses 1½ inches thick or greater and Type SP-9.5 for courses less than 1½ inches thick.

5. Concrete sidewalk, walkway, driveway and curb: Must meet requirements specified in FDOT Specifications, Section 522-2.

PART 3 - EXECUTION

3.01 PREPARATION

A. Pedestrian Crossings: Where the work crosses or interferes with pedestrian crossings, take extreme care and all necessary safety measures to insure the safety of pedestrians.

3.02 REMOVALS

A. Pavement Removal: Where existing pavement is to be removed, cut the surfacing with a mechanical saw prior to trench excavation, leaving a uniform and straight edge, with minimum disturbance to the remaining adjacent surfacing.

B. Sidewalk, Drive, & Curb Removal: Remove portions of concrete sidewalks, curbs, combination curb and gutter, walkways or driveways by initially sawing the structure, with a suitable power saw, as specified above for pavement. When a formed joint in the concrete exists within 3-feet of the proposed saw cut and parallels the proposed saw cut, extend the removal line to the formed joint. After sawing, remove the material.

3.03 RESTORATIONS

A. General: Replace or restore street or roadway pavement cut and removed in equal or better condition than the original.

B. Pavement Restoration - Asphalt:

1. Employ construction methods and equipment generally meeting the requirements established therefore in the FDOT Specifications, but, for trench restoration, modified as necessary to meet narrow strip construction conditions. Obtain approval of the Engineer for such modifications prior to their use. When pavement is removed to the edge of the roadway, extend the replaced base course not less than 6-inches beyond the edge of the surfacing.

2. Compact the limerock base course for its full thickness to not less than 100 percent of maximum density as determined by AASHTO T 180. Determine field density of limerock base in place by AASHTO T 238. Compact the upper surface of the completed base course to an elevation to permit the full depth of the surface course to be constructed without deviating from the grade of the adjacent pavement surface.

3. Upon compaction and completion of the base course, apply a prime coat to the surface and allow curing without sanding for a period of 24-hours.

Take all necessary precautions to protect the primed surface against damage during this interval. If, at the end of 24-hours, it is not proposed to proceed at once with the application of the surface course, give the primed surface a light application of clean sand and open to traffic.

4. Before the prime coat has cured, or if the surface has been sanded, after the sand has been removed and a tack coat applied, place and compact the asphaltic concrete surface course to match the line and grade of the existing surface. Construct joints with existing surface and base straight and neat and, if necessary to obtain a straight neat joint, cut out sufficient existing material and replace it with new material.

C. Concrete Sidewalk, Walkway, Driveway And Curb Restoration:

1. Replace concrete sidewalks, walkways, and curbs required to be removed using 3000 psi concrete.

2. Replace portions of these items to conform to the lines, grades and cross sections of the removed portions. Construct concrete sidewalks and walkways to 4-inch thickness. Replace concrete curbs and gutters to joint neatly to the remaining sections.

3. Replace all existing asphaltic concrete driveways with asphaltic concrete. Special decorative driveways shall be replaced in kind to original conditions.

D. Pavement Restoration - Concrete: Replace rigid pavement with 3000 psi concrete, using high early strength cement. Replace the base course for rigid pavement with limerock base material, compacted to a thickness to match the existing base.

E. Non-surfaced Streets, Alleys and Driveways: Restore with 6-inches of compacted limerock base material placed in the top of the trench.

F. Pavement Markings: Restore pavement stripes and markings which have been disturbed or erased during construction using the same type materials as removed, i.e. paint, reflective, thermoplastic, and of the same width as those disturbed during construction. Use equipment and method of painting conforming to the requirements of the FDOT Specifications and reference Section 02580 of the Contract Documents.

3.04 ASPHALTIC CONCRETE SURFACE COURSE OVERLAY

A. Where pavement overlay is required, asphaltic concrete pavement restoration of the trench cut, as specified herein above, will not be required. Extend the surface course overlay over the reconstructed base course, the temporary asphalt surfacing, the asphalt-sand seal, if used, and the existing pavement to the limits of the full width of the driving lane cut, two lanes if both cut, or the full width of roadway or as otherwise directed by the Engineer. In driveway overlay, extend the overlay the full width of the driveway from edge of pavement or right-of-way to sidewalk.

B. Sweep the roadway surface clean of all dirt and dust, apply a tack coat and construct a 1-inch compacted thickness of Type SP-9.5 asphaltic concrete in accordance with the requirements specified above for pavement restoration. Correct any depressions or deviation from the line and grade of the existing pavement of more than one inch with an asphaltic concrete leveling course prior to placement of the overlay asphalt.

END OF SECTION

SECTION 02580

PAVEMENT MARKINGS AND SIGNS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Furnish and apply permanent reflective pavement marking traffic paint, thermoplastic, glass beads and reflective markers as required for a complete installation.

1.02 QUALITY ASSURANCE

A. Use materials and application methods complying with Florida Department of Transportation Standard Specifications for Road and Bridge Construction (hereinafter called FDOT Specifications), the Manual of Uniform Traffic Control Devices, the Florida Manual on Traffic Control and Safe Practices for Street and Highway Construction, and with Miami-Dade County Public Works Department Specifications and Details.

1.03 SUBMITTALS

A. Submit certificates stating that materials meet FDOT Specifications Sections 706, 711, 971-12, 971-13 and 971-14.

PART 2 - PRODUCTS

2.01 MATERIALS

A. CONTRACTOR shall replace any existing reflective pavement markings, traffic stripes and markings damaged during construction.

B. White and Yellow Permanent Reflective Pavement Markings Paint: Traffic paint codes T1 (white) and T2 (yellow) meeting with requirements of Section 971-12 in the FDOT Specifications and as manufactured by Sherwin-Williams, Tnemac or equal.

C. Thermoplastic: Thermoplastic compound meeting the requirements of Section 711 of the FDOT Specifications.

D. Markers: Reflectorized pavement markers meeting the requirements of Section 706 of the FDOT Specifications.

E. Reflective Tape For Chevrons, Turn Arrows and Markings: Sta-Mark reflective tape manufactured by 3-M, or equal.

F. Glass Beads: Glass beads meeting the requirements of Section 971-14 of the FDOT Specifications.

G. CONTRACTOR shall replace signs damaged during construction. Traffic regulating signs shall conform to the colors, dimensions and requirements of the Manual of Uniform Traffic Control Devices. The CONTRACTOR shall install traffic and warning signs during construction in accordance with OSHA, FDOT and

PART 3 - EXECUTION

3.01 APPLICATION

A. Apply pavement markings to parking areas and non-FDOT roadways not less than 15 calendar days after completion of the pavement surface course. Apply pavement markings on FDOT roadways in accordance with FDOT time requirements.

B. Equipment: Conform to FDOT Specifications Section 710-3.

C. Dimensions and Alignment Tolerances: Conform to FDOT Specifications Section 710-5.

D. Apply traffic paint to clean, dry surfaces as recommended by the manufacturer.

E. Apply 3-M Sta-Mark reflective tape for traffic stripes, arrows, messages and markings in accordance with the manufacturer's specifications and those of the Broward County Public Works Department.

F. Apply thermoplastic compound and glass beads for traffic stripes, arrows, messages and markings in accordance with FDOT Specifications Sections 711-2, 711-3 and 711-4.

G. Install reflectorized pavement markers in accordance with FDOT Specifications Sections 706-4.

H. Protect newly painted stripes and traffic markings in accordance with FDOT Specifications Section 710-7.

I. Preparation of sign blanks and fabrication of reflectorized faces shall conform to the applicable requirements of FDOT Section 700-4 and 700-5.

J. Sign and supports shall be erected in conformance to FDOT requirements and as specified herein. 0017320

END OF SECTION

SECTION 02730

PREPATORY CLEANING AND ROOT REMOVAL

PART 1 - GENERAL

1.01 WORK INCLUDED

A. This Section covers the preparatory cleaning of sewer lines and manholes as needed prior to the internal survey of the sewer lines by closed-circuit television. It also covers the preparatory cleaning and root removal of sewer lines and the cleaning of manholes prior to rehabilitation. The CONTRACTOR shall furnish all necessary material, labor, equipment and services required for cleaning the specific sewer lines.

1.02 GENERAL

A. Sewer Line Cleaning: Removal of foreign materials from sewer lines to restore the sewer to a minimum of 95% of the original carrying capacity, for proper seating of pipe lining, or as required by other specified rehabilitation. It is recognized that there are some conditions such as broken pipe and major blockages that prevent cleaning from being accomplished or where additional damage would result if cleaning were attempted or continued. Should such conditions be encountered, the CONTRACTOR will not be required to clean those specific sewer sections. If, in the course of normal cleaning operations, damage does result from preexisting and unforeseen conditions such as broken pipe, the CONTRACTOR will not be held responsible.

B. Manhole Cleaning: All concrete and masonry surfaces must be cleaned prior to repair. Removal of grease, laitance, loose bricks, mortar, unsound concrete, and other materials from manholes. Water blasting (minimum 1,200 psi), utilizing proper nozzles, shall be the primary method of cleaning; however, other methods, such as wet or dry sandblasting, acid wash, concrete cleaners, degreasers, or mechanical means may be required to properly clean the surface. Surfaces on which these other methods are used shall be thoroughly rinsed, scrubbed, and neutralized to remove cleaning Managers and their reactant products.

C. Television Inspection: Operation necessary to complete an internal inspection for verification of existing conditions prior to performing rehabilitation and to verify for approval of rehabilitated sewer segments. CONTRACTOR shall furnish all labor, materials, equipment, tools, and other incidental services for closed circuit television inspection or work.

D. Light Cleaning: The removal of sand and/or debris occupying up to 25% of the diameter of the pipe.

E. Medium Cleaning: The removal of sand and/or debris occupying between 25% and 50% of the diameter of the pipe.

F. Heavy Cleaning: The removal of sand and/or debris occupying more than 50% of the diameter of the pipe.

G. Specialty Cleaning: The removal of grease, roots, and tuberculation in cast iron pipe; the use of special equipment such as bucket machines; root cutters or internal protruding tap remover or high pressure water blasting.

H. Cleaning and Preparation for Cementitious Liner Rehabilitation

1. The manhole or chamber surface shall be clean, structurally sound and free from oil, grease, loose mortar, paints, protective coatings, efflorescence, laitance and airing compounds. The conditions of the manhole or chamber may require the use of an environmentally safe degreasing compound; if so, the surface shall be thoroughly rinsed to eliminate any residue.

2. Place covers over invert to prevent extraneous material from entering the sewer lines.

3. All foreign material shall be removed from the manhole wall and bench using a high pressure water spray (minimum 4,000). Loose and protruding brick, mortar, and concrete shall be removed using a mason's hammer, chisel and/scraper. Fill any large voids with quick setting patching material.

4. If the 4,000 psi high water pressure water spray is not successful in removing all grease and contaminants, then a chemical wash shall be used to clean and degrease the interior of the manhole or chamber. The entire structure shall be thoroughly water- and/or sand-blasted to remove any loose or deteriorated material. The CONTRACTOR shall clean all accumulations of debris, such as dirt and grease, loose mortar, bricks and concrete, and dispose of properly. Care shall be taken to prevent any loose material from entering outlet sewer lines by inserting a 2-inch or smaller mesh protective screen into the manhole's outlet.

5. Any existing manhole steps shall be removed prior to sealing (waterproofing) the structure walls, and installing liners.

PART 2 - PRODUCTS

2.01 CLEANING EQUIPMENT

A. High-Velocity Jet (Hydrocleaning) Equipment: All high-velocity sewer cleaning equipment shall be constructed for ease and safety of operation. The equipment shall have a selection of two or more high-velocity nozzles. The nozzles shall be capable of producing a scouring action from 15 to 45 degrees in all size lines designated to be cleaned. Equipment shall also include a high-velocity gun for washing and scouring manhole walls and floors and produce at least 4,000-psi pressure. The gun shall be capable of producing flows from a fine spray to a solid stream. The equipment shall carry its own water tank, auxiliary engines, pumps, and hydraulically driven hose reel.

B. Mechanically Powered Equipment or Bucket machines used by the CONTRACTOR shall be in pairs with sufficient power to perform the work in an efficient manner. Machines shall be belt operated or have an overload device. Machines with direct drive that could cause damage to the pipe will not be allowed. The power rodding machine shall be either a sectional or continuous rod type capable of holding a minimum of 750 feet of rod. The rod shall be specifically heat-treated steel. To ensure safe operation, the machine shall be fully enclosed and have an automatic safety clutch or relief valve.

C. Hydraulically Propelled Equipment: The equipment used shall be of a movable dam type and be constructed in such a way that a portion of the dam may be collapsed at any time during the cleaning operation to protect against flooding of the sewer. The movable dam shall be equal in diameter to the pipe being cleaned and shall provide a flexible scraper around the outer periphery to insure removal of grease. If sewer cleaning balls or other equipment which cannot be collapsed is used, special precautions to prevent flooding of the sewers and public or private property shall be taken.

2.02 TELEVISION INSPECTION EQUIPMENT

A. Television inspection equipment used by the Contractor shall conform to the requirements of Section 02752 – Television Survey.

PART 3 - EXECUTION

3.01 SANITARY SEWER SYSTEM CLEANING

A. The CONTRACTOR shall notify the local fire department and the OWNER to obtain approval and water meter, if required, before using fire hydrants.

B. During sewer cleaning operations, satisfactory precautions shall be taken by the CONTRACTOR in the use of cleaning equipment. When hydraulically propelled cleaning tools (which depend upon water pressure to provide their cleaning force) or tools which retard the flow in the sewer line are used, precautions shall be taken to ensure that the water pressure

created does not damage or cause flooding of public or private property being served by the owner. When possible, the flow of wastewater in the sewer shall be utilized to provide the necessary pressure for hydraulic cleaning devices. When additional water from fire hydrants is necessary to avoid delay in normal work procedures, the water shall be conserved and not used unnecessarily. No fire hydrant shall be obstructed in case of a fire in the area served by the hydrant.

C. The designated sewer manhole sections shall be cleaned by the CONTRACTOR using hydraulically propelled, high-velocity jet, or mechanically powered equipment. Selection of the equipment used shall be based on the conditions of lines at the time the work commences. The equipment and methods selected shall be satisfactory to the OWNER. The equipment shall be capable of removing dirt, grease, rocks, sand, and other materials and obstructions from the sewer lines and manholes. If cleaning of an entire section cannot be successfully performed from one manhole, the equipment shall be set up on the other manhole and cleaning again attempted. If, again, successful cleaning cannot be performed or the equipment fails to traverse the entire manhole section, it will be assumed that a major blockage exists and the cleaning effort shall be repeated with other types of equipment.

D. ALL sludge, dirt, sand, rocks, grease, and other solid or semi-solid material resulting from the cleaning operation shall be removed at the downstream manhole of the section being cleaned. Passing material from manhole section to manhole section, which could cause line stoppages, accumulations of sand in wet wells, or damage pumping equipment, shall not be permitted.

E. Under no circumstances shall sludge or other debris removed during these operations be dumped or spilled into the streets, ditches, storm drains or other sanitary sewers. The CONTRACTOR shall remove from the site and properly dispose of all solids or semi-solids recovered during the cleaning operation. The CONTRACTOR shall obtain permits and make arrangements as required to properly dispose of solids.

F. The CONTRACTOR is advised that he shall not dispose of this material by legal or illegal dumping on private or public property, by sale to others, or any means other than those given above.

G. The CONTRACTOR shall keep his haul route and work area(s) neat and clean and reasonably free of odor, and shall bear all responsibility for the cleanup of any spill which occurs during the transport of cleaning/surface preparation by-products and the cleanup of any such material which is authorized by or pursuant to this contract and in accord with applicable law and regulations. The CONTRACTOR shall immediately cleanup any such spill, or waste. If the CONTRACTOR fails to cleanup such spill or

waste immediately, the OWNER shall have the right to cleanup or arrange for its cleanup and may charge to the CONTRACTOR all costs, including administrative costs and overhead, incurred by the OWNER in connection with such cleanup. The OWNER may also charge to the CONTRACTOR any costs incurred or penalties imposed on the OWNER as a result of any spill, dump or discard. Under no circumstances is this material to be discharged into the waterways or any place other than where authorized to do so by the appropriate authority. The term "CONTRACTOR" as used in this section shall include the CONTRACTOR'S subcontractors and other Contractors.

H. The general requirements for vehicles hauling such waste materials are as follows: Transport vehicles must be of type(s) approved for this application by the political jurisdictions involved. General requirements are that the vehicles have watertight bodies, that they be properly equipped and fitted with seals and covers to prohibit material spillage of drainage, and that they be cleaned as often as is necessary to prevent deposit of material on roadways. Vehicles must be loaded within legal weight limits and operated safely within all traffic and speed regulations.

I. The routes used by the CONTRACTOR for the conveyance of this material on a regular basis shall be subject to approval by the governing authority having jurisdiction over such routes.

3.02 ROOT REMOVAL

A. Roots shall be removed by the CONTRACTOR from sections designated to be relined. Special attention shall be used during the cleaning operation to ensure complete removal of roots from the joints. Any roots which could prevent the traveling of the packer or could prevent the proper application of chemical sealants, or could prevent the proper seating and application of cured-in-place, fold-and-formed or sectional cured-in-place liners, shall be removed. Procedures may include the use of mechanical equipment such as rodding machines, bucket machines and winches using root cutters and porcupines, and equipment such as high-velocity jet cleaner. When specifically directed, chemical root treatment shall be used before the root removal operation, and grouting will take place after root removal in accordance with Section 02763 – Chemical Grouting. CONTRACTOR shall capture and remove all roots form the line.

3.03 DISPOSAL OF MATERIALS

A. All solids or semi-solids resulting from the cleaning operations shall be removed from the site and disposed of in accordance with applicable regulations. All materials shall be removed from the site no less often than at the end of each workday. Under no circumstances shall the CONTRACTOR be allowed to accumulate, debris etc., on the site beyond

the stated time, except in totally enclosed containers and as approved by the OWNER. The CONTRACTOR shall submit a plan for disposal of solids to the OWNER.

3.04 TELEVISION INSPECTION

A. Television inspection shall be performed by the CONTRACTOR in accordance with requirements of Section 02752 - Television Survey.

3.05 FINAL ACCEPTANCE

A. Acceptance of sewer line cleaning shall be made upon the successful completion of the television inspection by the CONTRACTOR and shall be to the satisfaction of the ENGINEER. If a TV inspection shows the cleaning to be unsatisfactory, the CONTRACTOR shall be required to re-clean and re-inspect the sewer line until the cleaning is shown to be satisfactory. In areas where television inspection is not performed, the OWNER may require the CONTRACTOR to pull a double squeegee (with each squeegee the same diameter as the sewer) through each manhole section as evidence of adequate cleaning. If lining is to follow the television inspection, particular attention shall be given to the adequacy of the cleaning to ensure that proper seating of the liner can be achieved. It is the CONTRACTOR's responsibility to assure that the lines are properly cleaned to accept the liner.

B. In addition, on all those lines which have sags or dips, to an extent that the television camera lens becomes submerged for three (3) or more feet during the television inspection, the CONTRACTOR shall pull double squeegee and/or sponges through the line in order to remove the water from those dips or sags, or draft the water by means of high-velocity jet cleaners. Water removal shall be performed until the television camera lens will no longer be submerged. This requirement may be waived by the OWNER if the water in which the camera lens is submerged is clear enough to allow the identification of pipe defects, cracks, holes and location of service taps.

END OF SECTION

SECTION 02740

SANITARY SEWAGE SYSTEM

PART 4 - PART 1 - GENERAL

1.01 WORK INCLUDED

A. Provide sanitary sewage system, consisting of sewer pipes, sewer connections and appurtenances as specified herein. All construction shall adhere to Miami-Dade County Water and Sewer Department (MDWASD) and Miami-Dade County Public Works Department Standard specifications and details.

1.02 QUALITY ASSURANCE

A. Storage: Store polyvinyl chloride pipe on level ground, preferably turf or sand, free of sharp objects which could damage the pipe. Stacking of the polyvinyl chloride pipe shall be limited to a height that will not cause excessive deformation of the bottom layers of pipes under anticipated temperatures conditions. Where necessary due to ground conditions store the pipe on wooden sleepers, spaced suitably and of such width as not to allow deformation of the pipe at the point of contact with the sleeper or between supports.

1.03 SUBMITTALS

A. Submit shop drawings, product data, certifications, etc., in accordance with Sections 01300 and 01340.

B. Submit product data or shop drawings for the following:

1. Precast manholes

2. Manhole frames, covers and other castings

3. Manufacturer's Certified Test Report on castings

4. Certified test records for pipe

5. Pipe joint

6. Mill Test Certificates on ductile iron pipe

7. Electronic marker and locator

8. Pipe and manhole adapters

C. Record Information: Prepare and submit to the Engineer drawings showing the stations and left or right offsets of all services (terminal ends) as measured from the nearest downstream manhole along the center line of the sewer, along with the elevations of the north edge of the manhole covers and inverts of all pipes in the manholes.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Type PSM SDR-26 and SDR-35 PVC Sewer Pipe

Type PSM SDR-26 and SDR-35 PVC Sewer Pipe for sewer mains and laterals shall conform to ASTM Standard D 3034, “Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings”, except as modified herein.

1. Pipe shall be made of PVC thermoplastic having a cell classification of 12454-B, 12364-B, 12364-C or 13364-B as defined in ASTM Standard D 1784-90, “Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds”.

2. The PVC compounds used in the manufacture of the gravity sewer pipe shall be as listed in the Plastic Pipe Institute (PPI) Technical Report TR-4.

3. The PVC pipe shall be push-on type, with bells, spigots and elastometric gaskets, in accordance with ASTM Standard D 3034, and in accordance with ASTM Standard D 3212, “Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible elastometric Seals”, except as otherwise modified herein. The gaskets shall be the sole element depended upon to make the joint flexible and watertight. Joints using solvent cement will not be permitted. The pipe bells shall have an annular recess or race to seat and retain the gasket, and the gaskets may be either prepositioned by the manufacturer, or shipped separately in suitable protective containers. Pipe spigots shall be beveled. Pipe bells shall be extruded integral with the pipe barrel with a thickness equal to or greater than that of the barrel.

4. The gaskets shall be fabricated from a high-grade elastometer compound in accordance with ASTM Standard F 477, “Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe”, except as otherwise modified herein. The basic polymer for the gaskets shall be synthetic rubber. Natural rubber gaskets or gaskets with both natural and synthetic rubbers will not be permitted. Gaskets shall be continuous, elastometric, rubber ring type.

5. Nominal laid length of Type PSM SDR-26 and SDR-35 PVC sewer pipe shall be 13 feet.

6. Type PSM SDR-26 and SDR-35 PVC sewer pipe shall be double labeled (180 degrees apart) as follows at intervals of five (5) feet or less:

Date of manufacture – Manufacturer's name & Code
-Nominal size – Cell classification – "Type PSM
SDR-26/SDR-35 PVC Sewer Pipe" – "Specification D 3034"

B. Type PSM SDR -26 and SDR-35 PVC Sewer Fittings

1. Type PSM SDR-26 and SDR-35 PVC Sewer Fittings shall conform to ASTM Standard D 3034 and to the specifications for Type PSM SDR-26/SDR-35 PVC sewer pipe herein, except as modified below.

2. The waterway and bell wall thickness shall be equal to or greater than that specified for pipe, except that for reducing fittings or those with smaller inlets, the wall thickness of each inlet shall be no less than the minimum wall thickness for that size pipe.

C. Ductile Iron Pipe: Provide ductile iron pipe conforming to AWWA C151, Class 50 (ASTM A 746, Class 50), with a bituminous coating on the inside for pipe smaller than 8-inches, a polyethylene lining for pipe 8-inches and larger, and a bituminous coating applied to the outside of all pipes. Use mechanical or push-on joints conforming to AWWA C111, with gaskets of neoprene with plain tips, unless otherwise indicated. For pipe lining, use virgin polyethylene complying with ASTM D 1248, compounded with enough carbon black during manufacture to resist ultra violet rays during above ground storage, fused in place, approximately 30 mils. (.03-inches) in thickness, and tightly adhered to the pipe wall extending from the spigot end to the gasket seat in the bell socket.

D. Concrete and Reinforcing Steel: Use concrete classes for the various purposes as follows:

1. Manhole bottoms, Class A (4000 psi)

2. Precast manholes, Class B (3,000 psi)

3. Pipe encasement, Class C (2500 psi)

4. Protective slabs, Class C (3500 psi)

E. Castings: Provide gray iron castings for manhole frames, covers and other items conforming to ASTM A 48, Class 30, true to pattern in form and dimensions, free of pouring faults and other defects in positions which would impair their strength, or otherwise make them unfit for the service intended and with the seating surfaces between frames and covers machined to fit true. Provide casting with lifting or

“pick" holes and casting patterns conforming to those shown or indicated on the Drawings, and the words SANITARY SEWER cast in all manhole covers. Unless otherwise indicated, use only traffic bearing manhole frames and covers.

F. Brick: Dense, hard burned, shale or clay brick conforming to ASTM C 32, Grade MM or C 62, Grade MW, except with brick absorption 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.

G. Cement Mortar: One part cement and three parts clean sharp sand with lime added in an amount not exceeding ten percent of volume of cement. Mix dry and then wet to proper consistency for use. Use no mortars that have stood for more than one hour.

H. Pipe Adapter:

1. Donut type pipe adapter manufactured from virgin polyvinyl chloride (PVC) or polyurethane, adaptable to similar or dissimilar pipes of the same or different sizes, as manufactured by Fernco Joint Sealer Company, Dickey Company or equal.

2. Flexible couplings manufactured from virgin polyvinyl chloride (PVC) or polyurethane, adaptable to dissimilar pipes of the same or different sizes, as manufactured by Fernco Joint Sealer Company, Can-Tex or equal, and supplied with #300 stainless steel bands.

3. Flexible manhole sleeves for connecting sewer pipe to precast manholes manufactured from a synthetic rubber compound resistant to ozone, weather, acid and water, having a cast-in-place water stop, capable of accommodating settlement up to 15 degrees, and a non-corrosive, non-magnetic type 300 stainless steel strap for binding of the sleeve to the pipe.

I. Electronic Marker System:

1. Electronic Marker: High density polyethylene electronic marker designed to have a 40 year life, capable of operating at a depth of six feet with a special response frequency and colored for sanitary use in conformance with APWA's Uniform Markings and Surface Field Identification by Uniform Color Code Standards.

2. Marker Locator: Provide two portable marker locators capable of locating electronic markers for sanitary use at a depth of 6-feet. Include the cost of the two marker locators in the price for markers.

J. Coal Tar Epoxy: Koppers Bitumastic No. 300M, Tnemec Tneme-Tar No. 46-413 or equal, complying with U.S. Army Corps of Engineers Specification C-200.

K. Manholes: Manholes shall be in accordance with details shown in MDWASD standard specifications and details.

PART 3 - EXECUTION

3.01 PREPARATION

A. Bedding:

1. Pipe Cradle: Upon satisfactory installation of the pipe bedding, as specified in Section 02221, excavate a continuous trough for the pipe barrel and recesses for the pipe bells or couplings by hand digging. When the pipe is laid in the prepared trench, ensure that the pipe barrel receives continuous uniform support and that no pressure is exerted on the pipe joints from the trench bottom.

2. Cleanliness: Thoroughly clean the interior of all pipe of all foreign material before placing in the trench and keep clean during laying operations by means of plugs, or other approved methods. During suspension of work for any reason at any time, place a suitable stopper in the end of the pipe laid to prevent mud or other foreign material from entering the pipe.

3.02 PIPE INSTALLATION

A. Start laying pipe upgrade with spigot ends pointing in the direction of flow. Before pipe is joined, clean gaskets of all dirt and stones and other foreign material and apply to the spigot ends of the pipe and/or pipe gaskets a lubricant as specified by the pipe manufacturer and approved by the Engineer. Apply sufficient pressure to the pipe to properly seat the socket into the bell of the pipe. Install all pipes straight, true to the lines and grades shown on the Drawings in each manhole section. Remove and replace any pipe, which is disturbed or found to be defective after lying.

B. Polyvinyl Chloride Pipe:

1. Transportation: Take care during transportation of the pipe that it is not cut, kinked or otherwise damaged.

2. Handling Pipe: Use ropes, fabric or rubber protected slings and straps when handling pipes. Chains, cables or hooks inserted into the pipe ends will not be allowed. When handling the joined pipeline, take care that the pipe is not

damaged by dragging it over sharp and cutting objects and carefully lower the pipe into the trench to prevent damage to or twisting of the pipe.

3. Special Precautions: Support PVC pipe connected to heavy fittings, manholes and rigid structures in such a manner that no subsequent relative movement between the pipe and the joint with the rigid structures is possible.

C. Ductile Iron Pipe:

1. General

a. Ductile iron pipe shall be installed in accordance with the applicable provisions of ANSI/AWWA C600 and shall conform to the requirements of ANSI/AWWA C151.

b. When specified, polyethylene encasement for ductile iron pipe shall be provided and installed in accordance with ANSI A21.5/AWWA C105.

c. All ductile iron pipe and fittings shall be handled with padded slings or other appropriate equipment. The use of cables, hooks or chains will not be permitted. Stockpiled pipe shall be suitably supported and shall be secured to prevent accidental rolling.

2. Handling and Storage

a. All pipe, fittings, and other relative material, shall be carefully handled and protected against damage, impact shocks, and free fall in accordance with AWWA C600. Pipe shall not be placed directly on rough ground but shall be supported in a manner, which will protect the pipe against injury whenever stored at the trench site or elsewhere. No pipe shall be installed where the lining or coating show defects that may be harmful as determined by the Engineer. Such damaged lining or coating shall be repaired, or new undamaged pipe shall be furnished and installed.

b. All pipe-damaged prior to Substantial Completion shall be repaired or replaced by the Contractor.

c. The Contractor shall inspect each pipe and fitting prior to installation to insure that there are no damaged portions of the pipe.

d. Before placement of pipe, each pipe or fitting shall be thoroughly cleaned of any foreign substance, which may have collected thereon and shall be kept clean at all times thereafter. For this purpose, the openings of all

pipes and fitting in the trench shall be closed during any interruption to the work.

e. Pipe Laying: The pipe shall be installed in accordance with ANSI/AWWA C600.

f. Pipe shall be laid directly on the bedding material. No blocking will be permitted, and the bedding shall be such that it forms a continuous, solid bearing for the full length of the pipe. Excavations shall be made as needed to facilitate removal of handling devices after the pipe is laid. Bell holes shall be formed at the ends of the pipe to prevent point loading at the bells or couplings. Excavation shall be made as needed outside the normal trench section at field joints to permit adequate access to the joints for field connection operations and for application of coating on field joints.

g. Where necessary to raise or lower the pipe due to unforeseen obstructions or other causes, the Engineer may change the alignment and/or the grades. Such change shall be made by the deflection of joints, by the use of bevel adapters, or by the use of additional fittings. However, in no case shall the deflection in the joint exceed 70 percent of the maximum deflection recommended by the pipe manufacturer without written approval of the Engineer. No joint shall be misfit any amount, which will be detrimental to the strength and water tightness of the finished joint.

h. Pipe and Specials Protection: The openings of all pipe and specials shall be protected with suitable bulkheads to prevent unauthorized access by persons, animals, water or any undesirable substance. At all times, means shall be provided to prevent the pipe from floating.

i. Pipe Cleanup: As pipe laying progresses, the Contractor shall keep the pipe interior free of all debris. The Contractor shall completely clean the interior of the pipe of all sand, dirt, mortar splatter and any other debris following completion of pipe laying, pointing of joints and any necessary interior repairs prior to testing and disinfecting the completed pipeline.

D. Service Connections:

1. Restore service connections as required.

2. Extend sewer pipe of the size and type noted to the street right-of-way line and plugged with an approved removable plastic plug. Make all connections and changes of direction using standard fittings designed for the purpose.

3. Where house connections are called for, but no service line is to be installed under this Contract, plug all unused branches of such fittings watertight with a specified plug.

4. Place an electronic marker at least 6-inches above each sanitary sewer service connection, at the property line, buried in a level position and at a depth of not less than 2-feet and not more than 5-feet.

E. Concrete Encasement:

1. Construct Class C (2500 psi) concrete encasement in accordance with MDWASD standard specifications and details. .

2. If, through failure to provide suitable trench sheeting, or other causes, the maximum width for trench excavations, as specified elsewhere in these specifications, is exceeded, construct concrete encasement around the pipe for the length of the excessive excavation at no cost to the Owner.

3. Extend sewer or service pipe encasement to within 6-inches from a pipe joint to protect the pipe from cracking due to uneven settlement of its foundation or the effects of super-imposed live loads.

4. In lieu of concrete encasement, the Contractor may substitute ductile iron pipe, AWWA C151, Class 50, without concrete encasement for the PVC in the encasement area.

3.03 MANHOLE INSTALLATION

A. General:

1. Complete manholes as the work progresses so that testing as prescribed in Article 3.09 may be completed.

2. Prior to the manufacture of precast concrete manholes, submit shop drawings and details in accordance with Section 01300. Manholes which are not manufactured in strict compliance with the approved shop drawings and these Specifications will be rejected.

B. Construction:

1. Provide manholes conforming to the requirements indicated herein:

a. Provide a minimum shell thickness 8-inches and a minimum wall section height of 3 feet.

b. Use Type II cement.

c. Use compression type, neoprene gasket joints of a design approved by the Engineer for joints, whose position in the complete structure are below an elevation of 6-feet above sea level, and fill the unfilled portion of the joint with Ram-Nek plastic joint sealing compound.

d. Lifting holes through the structures are not permitted.

e. Provide a precast base of not less than 8-inches in thickness poured monolithically with the bottom section of the manhole walls.

f. Seal all openings and joints watertight, using a grout acceptable to the Engineer and designed for use in water.

g. Provide precast manhole tops terminating at such elevations as will permit laying up brick courses under the manhole frame to make allowance for future street grade adjustments.

h. Provide drop connections, where required, integral with the precast manholes, as manufactured with the manhole elements at the casting yard.

2. Coat the interior walls with two applications of coal tar epoxy applied as recommended by the coating manufacturer to form a 16-mil dry film thickness.

3. In lieu of a cone section, shallow manholes may substitute an 8-inch thick precast reinforced slab on the top, laid in a full bed of mortar and pointed to form a dense joint.

4. Finish the invert channels smooth and accurately shaped to a semicircular bottom conforming to the inside of the adjacent sewer section. Avoid steep slopes outside the invert channels. Make changes in size and grade gradually and evenly and changes in the direction of the sewer or entering branch, a smooth curve with radius as long as practicable.

5. Utilize approved coupling adapters set in the concrete wall to join PVC pipe to precast concrete manholes.

3.04 ADDITIONAL WORK

A. Complete additional items of construction such as cleanouts, terminal lamp holes, special manholes and other items necessary for the complete installation of the system, and of first-class materials conforming to the applicable portions of these Specifications.

3.05 FIELD QUALITY CONTROL

A. Tests, Inspections and Acceptance of Materials and Workmanship:

1. Workmanship: It is imperative that all sewers and appurtenances be built practically watertight and that the specifications for materials and workmanship are rigidly adhered to. Upon completion, test and gauge all the sewers, or sections thereof, and if leakage is above the allowable limits specified, the sewer will be rejected.

2. Inspection:

   a. On completion of each block or section of sewer, or such other times as the Engineer may direct, clean, test and inspect the block or section of sewer so that upon examination from either and, each section of the sewer shall show a full circle of light between manholes.

   b. Verify that each manhole or other appurtenance to the system is of the specified size and form, is watertight, neatly and substantially constructed, and with the top set permanently to exact position and grade. Make all repairs shown necessary by the inspection, replace broken or cracked pipe and remove all deposits removed leaving the sewer true to line and grade, entirely clean, and ready for use.

3. Closed Circuit Television Inspection: Inspect each sewer line 21-inches in diameter and smaller between manholes by a closed circuit television camera especially designed for and adapted for this purpose. Employ a reputable testing agency approved by the Engineer for this inspection. The Engineer will provide a representative to be present to view the screen when the inspection is in progress. Provide suitable methods of measuring and locating defects found in the lines and enter such data in a log. Correct lines found defective as directed by the Engineer and reinsert the repaired lines with the television camera until found acceptable.

B. Limits Of Infiltration, Exfiltration And Testing:

1. Allowable Limits of Infiltration and Exfiltration or Leakage: 50 gallons per day, per inch of diameter, per mile of pipe, with no allowances for manholes and laterals.

2. Any part or all of the system may be tested for infiltration or exfiltration, as directed by the Engineer. Prior to testing for infiltration, pump out the system so that normal infiltration conditions exist at the time of testing. Determine the amounts of infiltration or exfiltration by pumping into or out of calibrated drums, or by other approved methods.

3. Conduct the exfiltration test by filling the portion of the system being tested with water to a level which will provide a minimum head of 2 feet on a service lateral connected to the test portion or, in the event there are no service laterals in the test portion, a minimum difference in elevation of 5-feet between the crown of the highest portion of the sewer and the test level.

4. Conduct tests on portions of the system not exceeding three manhole runs or more than l,000-feet of main sewer, or as otherwise directed by the Engineer. Run tests continuously for three hours. Where infiltration or exfiltration exceeds the allowable limits, locate and repair the defective pipe, joints, or other faulty construction. If the defective portions cannot be located, remove and reconstruct as much of the work as is necessary in order to conform to the specified allowable limits. Perform testing as the job progresses and start after 2,000-feet of pipe are laid.

5. Provide all labor, equipment and materials and conduct all testing required, under the direction of the Engineer.

END OF SECTION

SECTION 02750

WASTEWATER FLOW CONTROL

PART 5 - GENERAL

5.01 WORK INCLUDED

A. The work specified in this Section includes all labor, materials, accessories, equipment and tools for performing all operations required to bypass pump sewage around a manhole or sewer section in which work is to be performed. The CONTRACTOR shall be prepared to bypass pump sewage as a part of his operations.

B. The CONTRACTOR shall provide all pumps, piping, and other equipment to accomplish this task; perform all construction; obtain all permits; pay all costs; and perform complete restoration of all existing facilities to equal or better condition to the satisfaction of the OWNER.

5.02 SUBMITTALS

A. The CONTRACTOR shall submit a complete and detailed wastewater flow control plan to the OWNER for review, prior to commencing wastewater flow control work.

PART 6 - PRODUCTS

6.01 PIPE FOR FLOW DIVERSION

A. Ductile Iron Pipe: Ductile Iron Pipe and Fittings is acceptable for use for flow diversion during construction.

B. Polyethylene Pipe: Polyethylene material shall comply with the requirement for Type III polyethylene, C-5 and P-34 as tabulated in ASTM D-1248 and have the Plastic Pipe Institute recommended designation pe3406. The material shall also have an average specific base resin density of between 0.94 g/cc and 0.955 g/cc (ASTM D-1505). Pipe made from these resins must have a long-term strength (50 years) rating of 1,250 psi or more per hydrostatic design basis categories of ASTM d-2837. The polyethylene resin shall have an environmental stress crack resistance, condition C as shown in ASTM D-1693, to be greater than 500 hours 20% failure. All pipe shall be made from the manufacturer's own production of the same formulation shall be used. The polyethylene resin shall have an average melt flow index, condition E as shown in ASTM D-1238, not in excess of 0.25 g/10 min. Pipe shall be homogeneous throughout, and free of visible cracks, holes, foreign material, blisters, or other deleterious faults. Diameters and wall thickness

shall be measured in accordance with ASTM D-2122. Pipe joining will be done by thermal butt fusion method in accordance with ASTM D-2657.

C. Acrylonitrile-Butadiene-Styrene (ABS): ABS pipe shall comply with requirements of ASTM D-2751.

PART 7 - EXECUTION

7.01 GENERAL

A. All materials used for wastewater flow control shall be pre-approved by the Engineer prior to commencing wastewater flow control activities.

B. When wastewater flow at the upstream manhole of the sewer section being repaired are above the maximum allowable requirements for television survey, or do not allow the proper sewer or manhole repair, the flows shall be reduced to the levels required by one of the following methods: manual operation of pumping stations by OWNER forces, by the CONTRACTOR plugging/blocking of the flows, or the CONTRACTOR pumping/bypassing of the flows as acceptable to the OWNER.

C. In some applications, the wastewater flow may be plugged and contained within the capacity of the collection system. This shall only be done when it has been determined, that the system can accommodate the surcharging without any adverse impact.

D. For the initial television inspection, before a liner is installed, the CONTRACTOR shall plug the sewer line completely. No flow, except infiltration/inflow, will be allowed through the respective sewer line being televised on the pre-repair television survey or the post-repair television survey.

E. When sewer flow at the upstream manhole of the line being repaired, in the opinion of the OWNER, are too excessive to plug while the rehabilitation is being performed; the CONTRACTOR shall submit a written plan and pump/bypass the flow as acceptable to the OWNER.

F. When existing storm or sanitary sewers are required to be taken up, moved, or rebuilt, the CONTRACTOR, at his own expense, shall provide and maintain temporary outlets and connections for all private or public drains, sewer, and sewer outlets connected to or served by the sewers to be rebuilt, and where necessary, shall provide adequate pumping facilities; and shall maintain these

services until such time as the permanent sewers and connections are built and in service at no cost to the owner.

G. During construction, flows in sections of the existing sewer being rehabilitated by removal and replacement shall be accommodated by temporary flow diversion. Wastewater flow diversion shall be accomplished as specified in this section, unless otherwise shown on the Plans.

H. In sections of the existing sewer being rehabilitated by laying a new line parallel to the existing sewer, the existing sewer may be used to accommodate the existing flow and a temporary flow diversion will not be necessary if the existing sewer is not damaged or its use restricted by the CONTRACTOR'S operations.

I. All pipe material utilized in wastewater flow diversion during construction shall be in good condition, and free of defects, and leaks. The CONTRACTOR at no cost to the owner shall replace any defective material. Upon completion of the job, pipe materials shall be removed from the site.

7.02 DEPTH OF FLOW

A. In performing television inspection, joint testing, and/or sealing and other sewer rehabilitation work, the CONTRACTOR shall control the depth of flow in the sewer within the following guideline:

MAXIMUM FLOW DEPTH			
TELEVISION INSPECTION		JOINT TESTING AND SEALING	
PIPE SIZE	% PIPE DIA.	PIPE SIZE	% PIPE DIA.
6" – 10"	20	6" - 12"	25
12" - 24"	25	15" – 24"	30
27" or larger	30	27" or larger	35

B. When sewer line flow, as measured in the first manhole upstream of the sewer segment being rehabilitated, exceed the maximum depth listed above or inspection of the complete pipe periphery is necessary for effective testing, sealing, or line work, the CONTRACTOR shall implement wastewater flow control methods at no additional cost to the OWNER.

7.03 PLUGGING AND BLOCKING

A. The CONTRACTOR shall insert a sewer line plug into the line at a manhole upstream from the section being inspected or repaired. The plug shall be so designed that all or any portion of the flow can be released. During the survey portion of the operation, flows shall be shut off or reduced to within the maximum flow limits specified. During repairs, the flow shall be shut off or pumped/bypassed, as approved by the OWNER. Wastewater flow shall be restored to normal following completion of work within the subject sewer section.

7.04 PUMPING AND BYPASSING

A. When pumping/bypassing is required, as determined by the OWNER, the CONTRACTOR will supply the necessary pumps, conduits and other equipment to divert the flow of sewage around the manhole section in which work is to be performed. The bypass system shall be of sufficient capacity to handle existing flows plus additional flow that may occur during periods of rain storms. The CONTRACTOR will be responsible for furnishing the necessary labor and supervision to set up and operate the pumping and bypassing system. A “setup” consists of the necessary pumps, conduits and other equipment to divert flow of sewage around a manhole section, from the start to finish of work performed in the manhole section.

B. Pumps and equipment shall be continuously monitored by a maintenance person capable of starting, stopping, refueling and maintaining these pumps during the rehabilitation. If pumping is required on a 24-hour basis, engines shall be equipped in a manner to keep noise to a minimum.

7.05 FLOW CONTROL PRECAUTIONS

A. Surcharging Sewers. Where the raw sewage flow is blocked or plugged, sufficient precautions must be taken to protect the public health. No septic conditions shall be allowed due to CONTRACTOR’S operations. The sewer lines shall also be

protected from damage. The following occurrences shall not be allowed:

1 No wastewater shall be allowed to back up into any home or buildings.

2 No wastewater shall overflow any manholes, cleanouts, or any other access to the sewers.

3 Users upstream of the repair area shall be able to use all their water and sewer utilities without interruption.

B. If any of the above occur or are expected to occur, the CONTRACTOR shall provide bypass pumping to alleviate one or all of the conditions. Additionally, the CONTRACTOR shall observe the conditions upstream of the plug and be prepared to immediately start bypass, if needed. It is the CONTRACTOR'S responsibility to pay for all damage claims.

C. Any sump pumps, bypass pumps, trash pumps, or any other type of pump which pulls wastewater or any type of material out of the manhole or sewer shall discharge the material into another manhole, or appropriate vehicle or container approved by the OWNER. Under no circumstance shall this material be discharged, stored, or deposited on the ground, swale, road, or open environment.

D. The CONTRACTOR shall take appropriate steps to ensure that all pumps, piping, and hoses that carry raw wastewater are protected from traffic. Traffic control shall be performed in accordance with Section 01570 - Traffic Regulations and Maintenance of Traffic.

E. In the event, during "Wastewater Flow Control," that raw wastewater is spilled, discharged, leaked, or otherwise deposited in the open environment, due to the CONTRACTOR'S work, the CONTRACTOR shall be responsible for any cleanup of solids and stabilization of the area affected. This work shall be performed at the CONTRACTOR'S expense with no additional cost to the OWNER. The CONTRACTOR shall also be responsible for notifying the sewer system maintenance personnel and complying with any and all regulatory requirements for cleaning up the spill at no additional cost to the OWNER.

F. During wastewater flow control operations, the CONTRACTOR shall take proper precautions to prevent damage to existing sanitary sewer facilities, flooding, or damage to public or private property.

G. The CONTRACTOR shall be responsible for the removal of any debris sedimentation in the existing sewers, laterals, and manholes, etc., which is attributed to his work under this Contract.

H. The CONTRACTOR shall perform all operations in strict accordance with OSHA regulations and any applicable local safety requirements. Particular attention is directed to safety regulations for excavations and entering confined spaces.

I. It is the CONTRACTOR'S responsibility to notify in writing any property owner having a sewer service connection on the sewer being rehabilitated or replaced that such work is being performed. The CONTRACTOR shall notify property owner's 48 hours prior to commencing sewer rehabilitation or replacement. The Contractor shall be solely responsible for any damage caused by property service connection and backups caused by the sewer rehabilitation operations.

END OF SECTION

SECTION 02752

TELEVISION SURVEY

PART 1 - GENERAL

1.01 WORK INCLUDED

1. The work consists of furnishing all labor, materials, accessories, equipment, tools, transportation, services and technical competence for performing all operations required to execute the internal closed circuit television survey to inspect the entire barrel of sewers up to 36 inches in diameter and sewer service laterals.

2. The survey shall show all defects and determine amount of infiltration entering the sewer system.

3. Prior to any testing, all lines and laterals shall be cleaned of debris, cleaned of tuberculations through mechanical removal and flushed clean. Debris shall be caught and removed from the lines and laterals and shall not be flushed into existing live sanitary sewers.

1.02 GENERAL

1. After cleaning as specified in Section 02730 – Preparatory Cleaning and Root Removal, and before and after rehabilitation operation/replacement work, the pipe sections and laterals shall be visually surveyed by means of closed-circuit television in the presence of the OWNER. The survey shall be performed one manhole-to-manhole section or one lateral at a time and the flow in the section being surveyed shall be suitably controlled as described in Section 02750 – Wastewater Flow Control.

2. Pre and post-construction survey video on CD-ROM shall be delivered to the OWNER on a “one line per CD-ROM” basis with the pre-construction video immediately preceding the post-construction video, accompanied with the corresponding work orders, and pre- and post-TV logs, for each sewer line and lateral surveyed. The video on CD-ROM shall be direct from a live video source into video file, format MPEG1.

1.03 EQUIPMENT

A. Sewer Main

1. The television camera used for the survey shall be one specifically designed and constructed for such survey and shall be of the pan and tilt type. Lighting for the camera shall be suitable to allow a clear picture of the entire periphery of the pipe. Then camera shall be operative in 100%

humidity conditions The camera, television monitor, and other components of the video system shall be capable of producing a minimum 700 line resolution color video picture. The CONTRACTOR shall maintain camera in clear focus at all times. Picture quality and definition shall be to the satisfaction of the OWNER; and if unsatisfactory, equipment shall be removed and replaced with adequate equipment at no additional cost to the OWNER.

2. The video camera shall include a titler feature capable of showing on the tape the following information:

    1. City and State

    2. Date/Time

    3. CONTRACTOR's Name

    4. Line Size, Material, and Depth

    5. Manhole Identification (both manholes) and direction of video

    6. Lateral identification.

    7. On-going Footage Counter

B. Service Lateral

    1. The television camera used for the lateral survey shall be one specifically designed and constructed for such survey. A Sonde locating device shall be attached to the camera. Lighting for the camera shall be suitable to allow a clear picture of the entire periphery of the pipe. The camera shall be operative in 100% humidity conditions. The camera, television monitor, and other components of the video system shall be capable of producing a minimum 700 line resolution color video picture. The CONTRACTOR shall maintain camera in clear focus at all times. Picture quality and definition shall be to the satisfaction of the OWNER; and if unsatisfactory, equipment shall be removed and replaced with adequate equipment at no additional cost to the OWNER.

    2. The camera system shall be able to inspect 3-, 4-, and 6- inch lateral connections up to 70 feet from the sewer mainline. The launcher shall be mounted on a tread tractor that moves through main sewers and positions the inspection camera launcher opposite the lateral line connection.

3. The camera system shall have mini black and white or color, fixed position, “positioning” camera to observe and place the mini color, push, “inspection” camera at the lateral. The inspection camera shall be attached to an 80-foot long push cable with a fiberglass rod core for cable rigidity. The camera head shall point forward while traveling through the sewer mainline.

4. The camera used from a cleanout shall be able to be launched from the cleanout and travel down to the sewer mainline, up to 100 feet. The camera system shall be able to inspect 3-, 4-, and 6-inch lateral connections.

5. The video camera shall include a titler feature capable of showing on the tape the following information:

    1. City and State
    2. Date/Time
    3. CONTRACTOR’s Name
    4. Pipe size and material
    5. Upstream Manhole Number & Distance to Lateral
    6. On-going Footage Counter

6. A Sonde shall be provided for locating unmarked sewer laterals. A sonde is a transmitter tied on a line and moved through a sewer or duct. A receiver on the surface follows its movement, documenting the line location. The pipe position is then marked on the ground. The sonde is pushed farther into the pipe, the receiver relocates the sonde and the pipe position is marked again. This process is repeated until the desired section of pipe is traced. It is pulled out on completion of the locate.

1.04 SUBMITTALS

A. The CONTRACTOR shall submit shop drawings and other information in accordance with Section 01300 – Submittals. The CONTRACTOR’s submittals shall include description of the software to be used and a sample of the video titles to be used, along with a sample of the television survey log to be used.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

3.01 PRE-CONSTRUCTION SURVEY

A. Procedure for Sewer Main

1. Prior to any repair work, the entire sewer line (from manhole to manhole) shall be televised. The camera shall be placed at the center of the manholes and videotaping shall commence prior to entering the pipe. The CONTRACTOR shall show the inside of the manhole walls and the pipe connection to the wall at both the upstream and downstream manhole.

2. The camera shall be moved through the lines in either direction at a moderate rate, stopping when necessary to permit proper documentation of the sewer's condition. In no case shall the television camera be pulled at a speed greater than 30 feet per minute. Manual winches, power winches, TV cable, powered rewinds and tractors or other devices that do not obstruct the camera view or interfere with proper documentation of the sewer conditions shall be used to move the camera through the sewer line. If the camera is being pulled through the sewer line by a hydraulic cleaning unit hose, the cleaning nozzle shall be located a minimum of eight (8) feet away from the camera to allow a clear, unobstructed view. Jet nozzle shall be used in front of camera while televising through a dip to draft out water. If, during the survey operation, the television camera will not pass through the entire manhole section, the CONTRACTOR shall set up his equipment so that the survey can be performed from the opposite manhole. In addition the CONTRACTOR shall stop camera at all point repairs, sectional repairs, and reinstated laterals, and inspect entire repaired pipe section.

3. Whenever non-remote powered and controlled winches are used to pull the television camera through the line, telephones or other suitable means of communication shall be set up between the two manholes of the section being surveyed to insure good communications between each member of the crew.

4. Measurement for location of defects shall be above ground by means of a meter device. Marking on the cable, or the like, which would require interpolation for depth of manhole, will not be allowed. Measurement meters shall be accurate to tenths of a foot over the length of the section being surveyed. Accuracy of the distance meter shall be checked by use of a walking meter, roll-a-tape, electronic distance meter or other suitable device. Manhole numbers and linear footage shall be shown on screen during taping.

5. Movement of the television camera shall be temporarily halted for a minimum of ten seconds at each visible point source of infiltration and/or inflow

until the leakage rate from that source is quantified. The camera shall be stopped at all service connections and the service lateral shall be inspected with the pan and tilt camera. The camera shall also be stopped at active service connections where flow is discharging. If the discharge persists, the property involved shall be checked to determine whether or not the discharge is sewage. If no flows are being discharged from the building, it shall be considered that the observed flow is infiltration/inflow.

B. Procedure for Service Lateral

1. Prior to any repair work, the entire service lateral (from mainline to property line/cleanout, whichever is farther from the mainline) shall be televised.

2. Measurement for location of defects shall be above ground by means of a meter device. Measurement meters shall be accurate to tenths of a foot over the length of the section being surveyed. Accuracy of the distance meter shall be checked by use of a walking meter, roll-a-tape, or other suitable device. Linear footage shall be shown on screen during recording.

3. Movement of the television camera shall be temporarily halted for a minimum of ten seconds at each visible point source of infiltration and/or inflow until the source and flow rate from that point are determined.

4. The inspection shall be performed from either the main sewer or the cleanout with proper equipment specified. If the CONTRACTOR chooses to perform the inspection from the cleanout and the cleanout is either inaccessible or does not exist, he shall install a cleanout to facilitate the inspection. All costs of material equipment, labor, and other costs due to unspecified field conditions shall be borne by the CONTRACTOR. Payment for cleanout installation shall be made by the OWNER as indicated in Section 01025, Measurement and Payment.

5. Above ground horizontal location of lateral shall be marked every (5) feet utilizing surveyor's paint on an asphalt or concrete surface and surveyor's flags in grass. Approximate depth of laterals at these locations shall be recorded on the TV logs.

C. Field Documentation

1. <u>Television Inspection Forms (Survey Logs).</u>

<u>Sewer Main</u>: Printed and electronically stored location records shall be kept by the CONTRACTOR and will clearly show the location in relation to an adjacent manhole of each infiltration point observed during survey. Upstream footage at face of manhole (0) and downstream footage at face of manhole (e.g. 250 shall be shown on the log. The television inspection forms to be utilized by the CONTRACTOR shall be those mandated by NASSCO's (National

Association of Sewer Survey Companies) PACP (Pipe Line Assessment and Certification Program). Both the "Header" and "Details" information of the form shall be entered as indicated in the PACP standards. The survey logs shall include, but not be limited to the following information:

a. Correct pipe segment/manhole numbers/lateral identification

b. Correct address of manhole/lateral location

c. Pipe/Lateral size, length and material

d. Manhole depth (up and downstream)

e. Lift station service area number

f. CD number and index

g. Footage locations, descriptions and estimated leak rates for visible point sources of infiltration inflow.

h. Footage locations and descriptions of structural defects such as obstructions, any remaining root intrusion, offset joints, cracked pipe, fractured pipe, holes, collapses, sags, protruding service connections and/or blockages in the pipe.

The terminology to be used shall follow NASSCO's PACP standards. All information will be recorded and a copy of such electronic records and a hard copy will be supplied to the OWNER.

Service Laterals: Location of the lateral by indicating the upstream manhole number, distance from the upstream manhole, lateral connection to the main line (left, center or right), and address of the customer serviced by the lateral, shall be noted on the television survey log. Printed and electrically stored location records shall be kept by the CONTRACTOR and will clearly show the location, in relation to the cleanout or the mainline of each infiltration point observed during survey. Footage shall be shown on the log. In addition, other points of significance such as unusual conditions, roots, broken pipe, presence of scale and corrosion, and other discernible features will be recorded and a copy of such records will be supplied to the OWNER.

2. Photographs. Digital photographs of the television picture of problems shall be taken by the CONTRACTOR upon request of the OWNER.

3. Video Recordings. The purpose of video (CD-ROM) recording shall be to supply a visual and audio record of problem areas of the lines that may be replayed. CD-ROM recording playback shall be at the same speed that it was recorded. Slow motion or stop motion

playback features shall be supplied by the CONTRACTOR. Once recorded, the CD-ROM becomes property of the OWNER. The CONTRACTOR shall have all CD-ROM and necessary playback equipment readily accessible for review by the OWNER during the Project.

4. Audio. All CD-ROM shall have audio record. State date, time, operator's name, area, upstream manhole number to downstream manhole number, pipe size and material, upstream manhole depth, and TV survey will be from up- to downstream, or down- to upstream. The CONTRACTOR shall verbally state station and position of all laterals and defects.

3.02 POST-CONSTRUCTION SURVEY

A. Procedure

1. The same procedures shall be used as indicated in Section 3.01 PRE-CONSTRUCTION SURVEY.

2. In addition, the CONTRACTOR shall stop camera at all point repairs, sectional repairs, and reinstated laterals, and inspect entire repaired pipe section.

3. The CONTRACTOR shall invert white foreground to black as needed in the line section with light background.

B. Documentation

1. The same documentation shall be provided as indicated in Section 3.01 PRECONSTRUCTION SURVEY.

3.03 LOCATION OF A LATERAL FROM RESIDENCE

A. Procedure

1. Run a sonde through a roof vent to locate cleanout as well as unmarked sewer lateral. A sonde is a transmitter tied on a line and moved through a sewer or duct. A receiver on the surface follows its movement, documenting the line location. The pipe position is then marked on the ground. The sonde is pushed farther into the pipe, the receiver relocates the sonde and the pipe position is marked again. This process is repeated until the desired section of pipe is traced. It is pulled out on completion of the locate.

B. Documentation

1. Above ground horizontal location of lateral shall be marked every (5) feet utilizing surveyor's paint on an asphalt or concrete surface and surveyor's flags in grass. Approximate depth of laterals at these locations shall be recorded on the TV logs. Location of buried cleanouts, or location for the purposes of installing a new cleanout shall be marked by two measured distances to permanent recoverable objects. CONTRACTOR shall furnish a schematic of these locations with sufficient detail to be able to relocate from above ground, at a later date.

END OF SECTION

SECTION 02753

MANHOLE REHABILITATION

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Manhole rehabilitation shall be accomplished by the application of materials that will improve the overall structural condition of the manhole. The intent of this portion of the work is to provide for aspects of sewer manhole rehabilitation and sealing using various procedures either singularly or in combination, including type of repair, methods of repair, materials and equipment as required for each manhole scheduled for rehabilitation.

1.02 REFERENCES

A. American Society of Testing and Materials (ASTM)

B. American National Standards Institute (ANSI)

1.03 SUBMITTALS

A. Shop drawings and product data in accordance with Section 01300 – Submittals

B. Qualification

1. The qualification of the Manhole Rehabilitation Contractor shall be submitted. These qualifications shall include detailed description of the following:

a. Name, business address and telephone number of the Manhole Rehabilitation CONTRACTOR.

b. Name(s) of all supervisory personnel to be directly involved with Manhole Rehabilitation for this project.

c. The CONTRACTOR shall sign and date the information provided and certify that to the extent of his knowledge, the information is true and accurate, and that the supervisory personnel will be directly involved with and used on this project. Substitutions of personnel and/or methods will not be allowed without written authorization of the OWNER.

d. Specialty technicians shall be certified by the equipment manufacturer and/or its authorized representative. Certifications shall be submitted to the OWNER.

e. The CONTRACTOR shall provide his references of previous project lists going back five years including his customers' name, address, and telephone number.

f. The CONTRACTOR shall have a minimum of 5 years experience in the wastewater manhole industry using one of the specified manhole rehabilitation products. In addition, CONTRACTOR shall have installed in Florida a minimum of 500 manholes using one of the specified products.

PART 2 - PRODUCTS

2.01 GENERAL

A. All materials used for manhole rehabilitation and repair shall be pre-approved by the OWNER.

B. The installer shall warrant and save harmless the OWNER and the OWNER against all claims for patent infringement and any loss thereof.

C. The CONTRACTOR shall handle and store all materials and shall dispose of all wastes in accordance with applicable regulations.

D. Each lining system shall be designed for application over wet (but not active running water) surfaces without degradation of the final product and the bond between the product and the manhole surfaces. The CONTRACTOR shall adjust manhole bench and invert as needed to accommodate linings and ensure a continuous smooth transition between the lining and the existing sewer pipes.

E. Fiberglass manhole inserts shall be used as directed by the OWNER. This is not an alternative to manhole rehabilitation.

F. All Work shall be performed in strict observance of OSHA regulations, especially those related to confined space entry.

G. The CONTRACTOR shall notify the local fire department and utility company and obtain approval and water meter, if required, before using fire hydrants.

2.02 EQUIPMENT

A. The required equipment shall consist of chemical pumps, chemical grout containers, injection packers, hoses, valves, and any other miscellaneous

equipment required to seal the manhole. The chemical injection pumps shall be equipped with pressure meters to provide for monitoring pressure during the chemical sealant injection process. If necessary, fluid by-pass lines equipped with pressure regulated by-pass valves will be incorporated into the system.

2.03 PREPARATORY INFILTRATION CONTROL PRODUCTS

A. Infiltration Control/Plugging Material

1. A premixed fast-setting, volume-stable waterproof cement plug consisting of hydraulic cement, graded silica aggregates, special plasticizing and accelerating Managers. It shall not contain chlorides, gypsums, plasters, iron particles, aluminum powder or gas-forming Managers, or promote the corrosion or steel it may come in contact with. Set time shall be approximately 1 minute. Ten minute compressive strength shall be approximately 500 psi.

2. Product shall be Premacast-Plug as manufactured by AP/M Permaform, P.O. Box 555, Johnston, IA 50131; Strong-Seal Strong-Plug as manufactured by the Strong Company, Inc., 4505 Emmet Sauders Road, Pine Bluff, Arkansas 71601; Preco-Plug as manufactured by Fosroc Incorporated, 150 Carley Court, Georgetown, Kentucky 40324.

B. Chemical Grouting Material

1. Chemical Grouts may be used for stopping very active infiltration and shall be mixed per manufacturer's recommendations and as specified in Section 02763 – Chemical Grouting. The chemical grout shall be an extremely low viscosity acrylamide resin with gel times from 5 seconds to several hours. Product shall be AV-100 Chemical Grout as manufactured by Avanti International, 822 Bay Star Boulevard, Webster, Texas or approved equal.

2.04 MATERIALS FOR PATCHING, REPOINTING, FILLING, AND REPAIRING NONLEAKING HOLES, CRACKS, AND SPALLS IN CONCRETE AND MASONRY MANHOLES

A. The CONTRACTOR shall use a premixed nonshrink cement-based patching material consisting of hydraulic cement, graded silica aggregates, special plasticizing and accelerating Managers, which has been formulated for vertical or overhead use. It shall not contain chlorides, gypsums, plasters, iron particles, aluminum powder, or gas forming Managers or promote the corrosion of any steel it may come into contact with. Set time (ASTM C-191) shall be less than 30 minutes. One-hour compressive strength (ASTM C-109) shall be a minimum of 200 psi

and the ultimate compressive strength (ASTM C-109) shall be a minimum of 5000 psi. Bond strengths (ASTM C-882 Modified) shall be a minimum of 1700 psi. Product shall be Permacast-Patch as manufactured by AP/M Permaform, Strong-Seal QSR as manufactured by The Strong Company, Inc., Preco-Patch as manufactured by Fosroc Incorporated, or approved equal.

2.05 SPRAY/SPIN APPLIED CEMENTITIOUS LINER

A. The liner material shall be ultra high strength, high build, corrosion resistant, mortar based on Portland cement and Microsilica fortified with a bacteria inhibitor of pure fused calcium aluminate cementitious liner. The liner shall be used to form the structural/structurally enhanced monolithic liner at a minimum thickness of one inch covering all interior manhole surfaces, including the bench, and shall have the following minimum requirements at 28 days:

PROPERTY	TEST METHOD	RESULTS
Tensile Strength	ASTM C-496	600 psi
Compressive Strength	ASTM C-109	8,000 psi
Flexural Strength	ASTM C-293	800 psi
Bond Strength	ASTM C-882	1,000 psi
Shrinkage	ASTM C-596	0%@ 95%R.H.

B. Product shall be PERMACAST MS- 10,000 with CON-SHIELD as manufactured by AP/M Permaform or SewperCoat as manufactured by Lafarge Calcium Aluminates.

2.06 SPRAY/SPIN APPLIED EPOXY LINER

A. Spray/spin applied epoxy liner shall be approved by the OWNER.

B. The epoxy liner material shall be used to form the spray/spin applied structurally enhanced monolithic liner covering all interior surfaces of the manhole including benches and inverts. The finished liner shall conform to the minimum requirements listed below.

PROPERTY	TEST METHOD	RESULTS
Compressive Strength	ASTM D-695	13,000 psi
Tensile Strength	ASTM D-638	7,000 psi
Shrinkage	ASTN D-2566	½ of 1%
Flexural Strength	ASTM D-790	13,000 psi
Bond Strength shall exceed tensile strength of product		
Flexural modulus	ASTM D-790	500,000 psi

1. Composition: 100 percent solids
2. Thickness minimum 100 mils

2.07 SPRAY APPLIED URETHANE RESIN SYSTEM

A. Urethane resin liner shall be approved by the OWNER.

B. The urethane resin based liner material shall be used to form the sprayed on/structural enhanced monolithic liner covering all interior surfaces of the manhole including benches and inverts. The finished liner shall conform to the minimum requirements listed below.

PROPERTY	TEST METHOD	RESULTS
Compressive Strength	ASTM D-695	10,500 psi
Tensile Strength	ASTM D-638	5,000 psi
Shrinkage	ASTN D-2566	½ of 1%
Flexural Strength	ASTM D-790	10,000 psi
Bond Strength shall exceed bond strength of product		
Flexural modulus	ASTM D-790	550,000 psi
Density		81 +/- pcf

1. Thickness minimum ¼ inch

C. The finished manholes shall be corrosion resistant to: Hydrogen Sulfide; 20% Sulfuric Acid; 17% Nitric Acid; 5% Sodium Hydroxide; as well as other common ingredients of the sanitary wastewater environment.

2.08 CURED-IN-PLACE EPOXY RESIN LINER

A. Cured-in-Place Epoxy Resin liner shall be approved by the OWNER.

B. The Cured-in-Place Epoxy resin based liner material shall be used to form a structural enhanced monolithic liner covering all interior surfaces of the manhole including benches and inverts. The finished liner shall conform to the minimum requirements listed below:

PROPERTY	TEST METHOD	RESULTS
Hardness	ASTM 2240-75	85 Shore D
Tensile Strength	ASTM D-63860	12,900 psi
PROPERTY	TEST METHOD	RESULTS
Compressive Strength	ASTM D-69554	18,600 psi
Flexural Strength	ASTM D-79058T	17,400 psi
Ultimate Elongation	ASTM D-63860	6.0%
Bond Strength shall exceed tensile strength of product		
Flexural Modulus	ASTM D-790	550,000 psi

2.09 FIBERGLASS MANHOLE INSERT

A. Fiberglass manhole inserts shall be approved by the OWNER.

B. The fiberglass manhole insert shall be used as directed by the OWNER where other manhole rehabilitation methods are inadequate. The final insert shall conform to the minimum requirements listed below:

PROPERTY	TRANSVERSE	LONGITUDINAL
Compressive Strength	18,000 psi	10,000 psi
Tensile Strength	18,000 psi	5,000 psi
Tensile Modules	26,000 psi	4,500 psi

Flexural Strength	1.4×10^6 psi	0.7×10^6 psi
Flexural modulus	0.6×10^6 psi	0.7×10^6 psi

PART 3 - EXECUTION

3.01 MANHOLE PREPARATION

A. Safety: The CONTRACTOR shall perform all Work in strict accordance with all applicable OSHA regulations. Each method of manhole rehabilitation in this section requires some degree of manhole entry by workers. Particular attention is drawn to those safety requirements regarding confined space entry and respiratory protection from airborne particulate matter or materials during cleaning and product mixing and application.

B. Cleaning: All concrete and masonry surfaces to rehabilitated shall be cleaned prior to applying any lining system. All grease oil, laitance, coatings, loose bricks, mortar, unsound brick or concrete and other foreign materials shall be completely removed. Cleaning methods such as wet or dry sandblasting, concrete cleaners, degreasers, or mechanical means may be required to properly clean the surface. All surfaces on which these methods are used shall be thoroughly rinsed, scrubbed, and neutralized to remove cleaning Managers and their reactant products. Debris resulting from cleaning shall be removed from the manhole and not allowed to be carried downstream.

C. When a cementitious liner is used, manhole interior shall be high-pressure water cleaned and sand blasted to remove all deteriorated concrete and other loose material. As a minimum, four inches of the manhole cover frame area shall also be cleaned by sand blasting. After the cleaning process, the concrete structure shall be washed with a 5-10 percent solution of muriatic acid. The structure shall be cleaned again with high pressure water to remove acid residual and any loose material. The CONTRACTOR shall make provisions during sand blasting operations to contain all sand. No sand shall be allowed into the sanitary sewer lines.

D. Flow Control: The CONTRACTOR shall be responsible for plugging or diverting the flow of wastewater as needed for manhole rehabilitation or fiberglass insert. Wastewater flow control shall be performed as specified in Section 02750 - Wastewater Flow Control.

E. Stopping Infiltration:

1. After completion of the cleaning operation, the CONTRACTOR shall use hydraulic cement to stop infiltration at each identified point leakage into the manhole.
2. If the flow of water into the manhole is too great for stoppage utilizing hydraulic cement conforming to the requirements of this section, the CONTRACTOR shall drill holes at each point of leakage which extend through the manhole wall. Chemical grout sealant injection devices shall be placed into the drilled holes in a

manner to provide a watertight seal between the holes and the injection device.

3. Hoses shall be attached to the injection devices in the manhole from an injection pump. A mixture of a water activated chemical grout sealant shall then be pumped until material refusal is recorded on the pressure gauge of the pumping unit. The CONTRACTOR shall ensure that excessive pumping pressures do not develop that may cause damage to the manhole walls.
4. Once the injection of the chemical sealants have been completed, the injection packers shall be removed and the holes shall be filled and troweled flush with the surface of the manhole wall using a fast-set non-shrinking grout.
5. Excessively leaking manholes will be considered additional manhole preparation. The CONTRACTOR must notify and receive approval from the OWNER before additional preparation begins. Additional manhole preparation without approval from the OWNER will be considered incidental to the Work.

F. Patching: Loose material shall be removed from the area to be patched exposing a sound sub-base. Holes or voids around steps, joints or pipes, spawled areas, and cavities caused by missing or broken brick shall be patched and missing mortar repaired using a nonshrink patching mortar conforming to the requirements of this section. Cracks not subject to movement and greater than 1/16 inch in width shall be routed out to a minimum width and depth of ½ inch and patched with nonshrink patching mortar conforming to the requirements of this section. Bench repair, invert repair, and patching of walls is considered incidental to manhole preparation for liner application.

G. All manholes which have exposed cured-in-place, deformed/reformed, or fold and form pipe segments in the manhole invert channel shall require the use of a concrete bonding adhesive prior to the spray application of the cementitious manhole liner. The bonding Manager shall be any synthetic emulsion specifically formulated for bonding new concrete to existing surfaces. The bonding Manager shall be mixed and applied in accordance with manufacturer's recommendations.

H. All incoming or outgoing pipes shall be plugged or otherwise protected during liner application to prevent clogging. Manhole steps shall be protected during spraying or all laitance removed and steps thoroughly cleaned after spraying. If manhole steps must be removed during liner installation, the CONTRACTOR shall replace the steps. No separate measurement or payment will be made for removal and replacement of the manhole steps, same being considered and integral part of the Work.

I.

3.02 SPRAY/SPIN APPLIED CEMENTITIOUS LINER

A. The CONTRACTOR shall perform all Work in strict accordance with all applicable OSHA regulations. Particular attention is drawn to those safety

requirements regarding confined space entry and respiratory protection form airborne particulate materials during cleaning and product mixing and application.

B. Prior to entering manholes, an evaluation of the atmosphere will be conducted to determine the presence of toxic, flammable vapors, or possible oxygen deficiency. The evaluation shall be in accordance with local, state, and federal safety regulations.

C. The installation of the spray/spin applied cement mortar liner shall be in strict accordance with the manufacturer's written instructions.

D. The finished invert surfaces shall be smooth, free of ridges, and will be sloped in the direction of flow. Special care shall be used to ensure a smooth transition between the new manhole invert and intersecting pipeline inverts such that flow will not be impaired.

E. The flow through the manhole shall be re-established as soon as practical and following the liner manufacturer's recommendation for appropriate curing.

F. The liner shall be installed by a trained, experienced technician who has been certified by the manufacturer. Appropriate personal protection equipment shall be utilized.

3.03 SPRAY/SPIN APPLIED EPOXY LINER

A. Application procedures shall conform to the recommendations of the monolithic surfacing system manufacturer, including material handling, mixing, environmental controls during application, safety, and equipment.

B. The equipment shall be specially designed to accurately ratio and apply the specified materials and shall be regularly maintained and in proper working order.

C. The specified materials must be applied by an approved installer of the monolithic surfacing system.

D. All specified surfaces will be lined with the monolithic resurfacing system to provide the minimum total thicknesses shown in the following table. The cured surfacing shall be monolithic with proper sealing connections to all unsurfaced areas and shall be placed and cured in three applications in conformance with the recommendations of the monolithic surfacing system manufacturer.

MINIMUM EPOXY LINER THICKNESSES	
Depth	Liner Thickness
$\leq$ 10'	60 mils
$\geq$ 10'	80 mils

E. Specially designed spray and/or spincast application equipment shall be used to apply each coat of the system.

F. During application a wet film thickness gage, meeting ASTM D4414 - Standard Practice for Measurement of Wet Film Thickness of Organic Coatings by Notched Gages, shall be used to ensure a monolithic coating and uniform thickness during application.

3.04 SPRAY APPLIED URETHANE RESIN SYSTEM

A. The CONTRACTOR shall perform all Work in strict accordance with all applicable OSHA regulations. Particular attention is drawn to those safety requirements regarding confined space entry and respiratory protection from airborne particulate materials during cleaning and product mixing and application.

B. Prior to entering manholes, an evaluation of the atmosphere will be conducted to determine the presence of toxic, flammable vapors, or possible oxygen deficiency. The evaluation shall be in accordance with local, state, and federal safety regulations.

C. No application of liner shall be made unless the temperature inside the manhole is 50 degrees F or higher.

D. After blocking flow through the manhole and thorough cleaning/predatory work has been achieved, the spray-on urethane shall be applied to the invert, bench, and wall areas to produce a smooth coating and yield the required structural integrity and corrosion resistance. The spray shall be applied such that the entire manhole is a structurally enhanced monolithic liner. The invert and bench liner thickness shall be the same as that required at the bottom of the manhole walls as determined by the manufacturer's standard engineering calculations for groundwater pressure. The minimum thickness of the liner shall be as specified in the following table:

MINIMUM URETHANE RESIN LINER THICKNESSES	
Depth	Liner Thickness
≤ 10'	0.250 INCH
≥ 10'	0.375 INCH

E. The finished invert surfaces shall be smooth, free of ridges, and will be sloped in the direction of flow. Special care shall be used to ensure a smooth transition between the new manhole invert and intersecting pipeline inverts such that flow will not be impaired.

F. The flow through the manhole shall be re-established as soon as practical and following the liner manufacturer's recommendation for appropriate curing.

G. The urethane shall be manually sprayed onto all surfaces by a trained technician who is experienced in the application of a spray applied urethane resin and has been certified by the manufacturer. Appropriate personal protection shall be utilized.

H. A minimum of 30 minutes curing time after the completion of spraying shall be allowed before subjecting the manhole to active flow. A minimum of 3 hours curing time or until all sprayed materials have returned to the ambient temperature of the manhole interior shall be allowed before performing the vacuum method test on the manhole. In extremely cool weather, the manhole shall be protected while curing is in process to maintain the temperatures specified by the manufacturer

3.05 CURED-IN-PLACE EPOXY RESIN LINER

A. The CONTRACTOR shall perform all Work in strict accordance with all applicable OSHA regulations. Particular attention is drawn to those safety requirements regarding confined space entry and respiratory protection from airborne particulate materials during cleaning and product mixing and application.

B. Prior to entering manholes, an evaluation of the atmosphere will be conducted to determine the presence of toxic, flammable vapors, or possible oxygen deficiency. The evaluation shall be in accordance with local, state, and federal safety regulations.

C. The installation of the cured-in-place epoxy resin liner shall be in strict accordance with the manufacturer's written instructions.

D. Once the liner is fully saturated with resin at the job site, it shall be lowered into the structure to the pre-marked position at the cover seat of the manhole entrance ring. The liner shall form a monolithic structure permanently connecting the ring and cover seat to the chimney, corbel, walls, benches, and invert. The liner shall be pressurized at a minimum of 500 lbs. per square foot, and heated by a temperature inversion system of pressurization with steam injection into the high velocity hot air column, creating a steam/convection oven atmosphere to create a liner temperature of approximately 200 degrees F for at least a two hour curing time.

E. Upon completion of the liner curing process, the inflation bladder shall be removed and all lines reopened and the liner cut off at the manhole cover seat.

F. The finished invert surfaces shall be smooth, free of ridges, and will be sloped in the direction of flow. Special care shall be used to ensure a smooth transition between the new manhole invert and intersecting pipeline inverts such that flow will not be impaired.

G. The flow through the manhole shall be re-established as soon as practical and following the liner manufacturer's recommendation for appropriate curing.

H. The liner shall be installed by a trained experienced technician who has been certified by the manufacturer. Appropriate personal protection equipment shall be utilized.

3.06 FIBERGLASS MANHOLE INSERT

A. The CONTRACTOR shall perform all Work in strict accordance with all applicable OSHA regulations. Particular attention is drawn to those safety requirements regarding confined space entry and respiratory protection form airborne particulate materials during cleaning and product mixing and application.

B. Prior to entering manholes, an evaluation of the atmosphere will be conducted to determine the presence of toxic, flammable vapors, or possible oxygen deficiency. The evaluation shall be in accordance with local, state, and federal safety regulations.

C. The installation of fiberglass manhole inserts shall be in strict accordance with the manufacturer's written instructions.

D. Once the frame, cover, and cone section of the existing manhole has been removed, the fiberglass manhole insert shall be lowered into the structure. At this time, the contour of the existing bench shall be marked on the fiberglass insert. The insert shall then be removed and cut along the contour mark. Set the liner into the existing manhole in a concentric manner. Fiberglass is then installed between the bottom of the insert and the existing manhole. Concrete grout shall be poured and compacted evenly in one foot lifts. Finally install cone and frame and cover to grade and backfill according to Section 02222 – Excavation and Backfill.

3.07 TESTING

A. After the specified rehabilitation work has been completed, the manholes shall be visually reviewed and tested in accordance with manufacturer's testing procedures by the CONTRACTOR in the presence of the OWNER and found to acceptable.

1. Visual Review: All rehabilitated manholes shall be visually reviewed for water tightness against leakage of water into the manhole. All visible leaks and defects observed during the review shall be repaired to the OWNER's satisfaction. There shall be no visible infiltration.

2. Exfiltration Testing:

a. Incoming and outgoing sewer and service lines shall be plugged, the plugs restrained and the manhole filled with water to the top of the manhole frame. A soaking period of up to one hour will be allowed if bypassing of the sewage is not required or has been provided for. At the end of this optional soaking period, the manhole shall be refilled with

water and the test begun. The time shall then be recorded and after a period of not less than one hour has passed, the manhole again refilled, the amount required being carefully measured. The maximum allowable rate of exfiltration is 0.1 gallon per hour per vertical foot of depth of the manhole.

b. Manholes that fail the exfiltration test shall be reworked and retested by the CONTRACTOR at no additional compensation and additional manholes will be retested at the CONTRACTOR's expense. Any manholes that are visually leaking are unacceptable, or fail the test shall be reworked and retested.

3. Testing and Verification of Liners:

a. The OWNER's inspector shall verify the thickness of cementitious liners and epoxy coatings with a wet gauge. Any area found to be less than the minimum prescribed thickness shall immediately receive the additional material needed. The resultant lined manhole wall shall be leak-free, smooth and free of honeycomb or areas of segregated aggregate. Epoxy coatings shall be tested at 10,000 volts with a holiday detector for pinholes and holidays. Any defects shall be promptly repaired and re-tested. Inspection and testing shall be performed by the certified applicator in the presence of the OWNER.

4. Spark Test for Epoxy Systems:

a. The CONTRACTOR shall test all of the manholes. After the coating has sufficiently cured, it shall be inspected with high-voltage holiday detection equipment. An induced holiday shall be made on to the coated surface and shall serve to determine the minimum/maximum voltage to be used to test the coating for holidays at that particular area. The spark tester shall be initially set at 100 volts per 1mil of film thickness applied but may be adjusted as necessary to detect the induced holiday. All holidays detected shall be repaired according. All costs for any repairs and additional testing due to spark test failures shall be at the CONTRACTOR's expense.

END OF SECTION

SECTION 02757

POINT REPAIR OF SANITARY SEWERS

PART 4 - GENERAL

4.01 SCOPE

A. The work specified in this Section includes repairs to sections or segments (up to 15 feet) of existing sanitary sewers, mains or service lines, which require excavation from the surface to accurately locate sources of infiltration or inflow and to eliminate them by making necessary repairs.

4.02 GENERAL

A. Methods, procedures and requirements are similar when sections of existing pipe has been crushed, cracked, or settled, or have holes in them and are to be replaced with new pipe. Generally, point repairs are made at specific locations and involve relatively short lengths of sewer or fittings (up to 15 feet) which are to be repaired or replaced. “Isolation” of affected reaches of sewer by plugging and/or bypass pumping, if required, shall be performed or specified in Section 02750- Wastewater Flow Control.

B. Locations where point repairs are to be made available to the CONTRACTOR through Work Orders and will be based on previously performed smoke tests and television surveys. It is understood that the exact location of pipe leaks and failures cannot always be determined before the pipe is exposed because the smoke injected into the existing pipe to detect their presence can migrate through passages in the earth, and overburden, and may not emerge directly over the leak or failure.

C. It is also understood that the smoke testing and closed circuit television surveys performed by others prior to the commencement of this project cannot always determine the precise cause of leakage or failure. The pipe shall be exposed and the source located, examined and evaluated before repairs are made. Additional smoke shall be introduced to the pipe by the CONTRACTOR to aid in the final evaluation and determination of the required work if necessary to locate the area to be repaired.

D. After the designated repairs have been made, the CONTRACTOR will test them as described in this Section of Specifications. The costs of testing will be borne by the CONTRACTOR. If a repaired joint or section should prove to be defective, the CONTRACTOR shall re-perform the work at no additional cost to the OWNER and shall also be responsible for the costs of any retesting required by the ENGINEER.

E. Where work is to be performed on private property, the CONTRACTOR shall consult with the OWNER who will make arrangements and

schedules with the property owners before the CONTRACTOR performs the work.

F. Excavation, backfill, exploratory excavation, sheeting and shoring, dewatering, conflicts with other utilities and miscellaneous work shall conform to the requirements of Section 02221-Trenching and Backfill.

G. All construction shall conform to Miami-Dade County Water and Sewer Department standard specifications and details.

4.03 SUBMITTALS

A. The CONTRACTOR shall submit shop drawings in accordance with Section 01300 - Submittals.

4.04 QUALIFICATIONS

A. The Qualifications of the CONTRACTOR shall be submitted. These Qualifications shall include detailed descriptions of the following:

1. Name, business address and telephone number of the CONTRACTOR.

2. Name(s) of all supervisory personnel to be directly involved with this project.

3. The CONTRACTOR shall sign and date the information provided and certify that to the extent of his knowledge, the information is true and accurate, and that the supervisory personnel will be directly involved with and used on this project. Substitutions of personnel and/or methods will not be allowed without written authorization of the ENGINEER.

4. The CONTRACTOR shall provide his references of previous project lists going back five years including his customers' names, addresses, and telephone numbers.

5. To be qualified, the CONTRACTOR should have a minimum of five years previous experience in the work required in this section and possess a Certified or Registered Underground Utility and Excavation license.

PART 5 - PRODUCTS (NOT USED)

PART 6 - EXECUTION

6.01 PROCEDURES

A. The point repair procedures shall be as follows:

1. Site preparation shall be performed as described in Division 2. When the repairs are to be made on sewers or facilities to be lying under paved surfaces, those surfaces shall be removed to the limits specified for point repairs of the particular size pipe involved (trench width plus two feet for concrete surfaces) unless otherwise acceptable to the ENGINEER.

2. The CONTRACTOR shall excavate and backfill in accordance with Section 02221- Trenching and Backfill. Under no circumstances shall the CONTRACTOR be allowed to remove concrete or asphalt without prior cutting. The saw cutting shall be deep enough to produce an even, straight cut.

3. Dewater, sheet and or brace all excavations in accordance with Section 02221 - Trenching and Backfill. Well points, pumps, sheeting, bracing and/or sock drain shall be used to provide a safe, dry, open hole for all repairs or replacements specified herein.

4. Excavate down to the pipe, completely exposing the pipe up to the next undamaged section of pipe on each side.

5. Locate the leak to be repaired.

6. After the leak or failure is located and exposed, the ENGINEER will identify the method of rehabilitation. One or a combination of the following methods shall be used:

    a. Remove and place sections of pipe or fitting. Remove section(s) of defective pipe or fitting by cutting on each side or lines perpendicular to longitudinal axis of pipe so as to leave “spigot ends” to be connected to replacement pipe. Cut or fabricate replacement section. Make connections using stainless steel shear rings as manufactured by Fernco, or approved equal. Bedding or embedment shall be placed or compacted. As a minimum, a total of (6) feet of piping shall be replaced by the CONTRACTOR.

        In the case of point repairs performed on service laterals the CONTRACTOR shall:

        i. Determine the exact location of the repair by means of television inspection with an electronic locating device (sonde).

        ii. If roots are encountered inside the lateral being repaired, a minimum of 15 feet of lateral shall be replaced.

iii. If the pipe being replaced reaches the private property line, a cleanout shall be installed at that location in both back yard and front yard easements.

iv. Where the ENGINEER has indicated a fused-on saddle, sewer service connections shall be joined to the fold-and-formed pipe by means of electrofusion sewer saddle as manufactured by Central Plastics Company, 1901 W. Independence, Shawnee, OK. 74801, (405) 273-6302, or approved equal. The installation of the saddle shall be done in accordance with manufacture's recommended procedures. The outlet shall be gasketed, sized for ASTM D 3034 SDR 35 PVD pipe. The fusion of the saddle base must be achieved by input of 40 volts of current supplied by a micro-processor manufactured by Central Plastics Company, or approved equal. The CONTRACTOR must receive training by the manufacturer before installing saddle.

b. Cement- stabilizing sand shall be used to supplement the embedment or backfill when accepted by the ENGINEER. This shall exist of two sacks of cement of cubic yard of sand thoroughly mixed. Only a sufficient amount of water shall be added to assure setting-up of the cement. These mixes shall be made before placing in the trench and only enough shall be prepared to allow placing, shaping and tamping before an initial set has taken place. Cement-stabilized sand shall be used for repairs in FDOT paved right of ways.

7. The adequacy of point repairs in sewer mains shall be demonstrated by the CONTRACTOR by testing. For service lines, visual review and acceptance by the ENGINEER will be deemed sufficient. Testing mains may be accomplished by one or two alternate methods, depending on the depth of the line and the difference in elevation of the pipe at the ends of the reach. Smoke testing shall be used if the pipe slope exceeds one percent. Testing shall be performed before backfilling.

a. Smoke-Testing. The reach of sewer in which the repair (or repairs) has been made shall be isolated by plugging the upstream and downstream manholes as necessary not only to temporarily eliminate the flow of sewage through it but also to prohibit the smoke from entering other reaches of sewer. Smoke shall then be introduced into one of the manholes and into the reach using smoke bombs and a blower especially designed and adopted for smoke testing sanitary sewers and acceptable to the ENGINEER. The repaired area shall then be observed for the emergence of smoke for a period of 15 minutes. If none can be seen, the repair shall be to have passed the test.

b. Exfiltration-Testing: This method may be used only on sewers laid on grades less than 1.00 percent. Water, colored with a bright- color dye acceptable for usage in testing, is introduced into the pipe so as to impose a 2-foot static head over the top of the pipe at the point of repair when the pipe in the lower manhole is plugged. Observations shall then be made by the ENGINEER to determine if leakage of the colored water occurs at the repair point. Care shall be taken, when this method is used, that:

i. Not more than 4-feet of static head is induced on the main at the lower end of the reach, and

j. No back-up problems are caused in service lines.

8. Complete placement and compaction of backfill.

9. Restore surface features to at least at good condition as existed before construction began, including roadways, driveways and walks.

6.02 TELEVISION SURVEY

A. Television survey, including Pre-construction Survey and Post Construction Survey as indicated in Section 02752- Television Survey, is required for all repairs of sanitary sewers.

END OF SECTION

SECTION 02758

REPLACEMENT OF SANITARY SEWER PIPE

PART 7 - GENERAL

7.01 SCOPE

A. This Section consists of removing existing collector and service sanitary sewer pipe from manhole to manhole, and furnishing, installing, testing and placing in operation new sewer piping complete in its place, with fittings, adapters, and other appurtenances required for a complete installation.

7.02 GENERAL INFORMATION AND DESCRIPTION

A. The pipe and fittings covered by these specifications shall be furnished by fully qualified manufacturers experience in the fabrication, casting and manufacture of the pipe materials specified herein. The pipe and fittings shall be designed, fabricated and installed in accordance with the best practice of the trade and the standards specified herein.

B. Portions or reaches of existing sanitary sewer lines, whether collector mains or service laterals shall be replaced as specified in this Section. The ENGINEER may authorize additional pipe to be removed and replaced as constructions proceeds and defective sections of pipe are discovered by direct visual observation.

C. Replacement pipe shall be the same size and shall be laid on a uniform grade between the ends of existing pipe which remain in place unless otherwise acceptable to the ENGINEER. It is the CONTRACTOR's complete responsibility to set controls as necessary to attain true line and grade for the replacement pipe.

D. When sewer service lines from adjacent buildings or residences tie directly into the affected run of a collector main, the CONTRACTOR shall set a time schedule for the period of service interrupting in writing and obtain acceptance of it from the ENGINEER. The CONTRACTOR shall then notify the appropriate tenants at least 24 hours in advance of the pending interruption and inform them of its time frame. Temporary pumping or other measures will be required if the period of interruption of service occurs before 8:00 a.m. or after 5:00 p.m. The importance of avoiding extended periods of public inconvenience cannot be overemphasized.

E. All construction shall conform to Miami-Dade County Water and Sewer Department (MDWASD) standard specifications and details.

7.03 SUBMITTALS

The CONTRACTOR shall submit shop drawings in accordance with Section 01300– Submittals.

7.04 QUALIFICATIONS

A. The Qualifications of the CONTRACTORS shall be submitted. These Qualifications shall include detailed descriptions of the following:

1. Name, business, address and telephone number of the CONTRACTOR
2. Name(s) of all supervisory personnel to be directly involved with this project.
3. The CONTRACTOR shall sign and date the information provided and certify that to the extent of his knowledge, the information is true and accurate, and that the supervisory personnel will be directly involved with and used on this project. Substitutions of personnel and/or methods will not be allowed without written authorization of the ENGINEER.
4. The CONTRACTOR shall provide his reference of previous projects lists going back five years including his customers' names, address, and telephone numbers.
5. To be qualified, the CONTRACTOR shall have minimum of five years previous experience in the work required in this section and possess a Certified or Registered, Underground Utility and Excavation license.

PART 8 - PRODUCTS

8.01 GENERAL

A. Piping and valve materials are to conform to MDWASD standard details and specifications.

PART 3 – EXECUTIONS

3.01 GENERAL

A. The CONTRACTOR shall furnish all labor, tools, materials, and equipment necessary for the installation and jointing of the pipe.

B. All piping shall be installed in accordance with the Contract Documents in a neat workmanlike manner and shall be set for accurate line and evaluation. All piping shall be thoroughly cleaned before installation, and care shall be taken to keep the piping clean throughout the installation.

3.02 PREPARATION

A. Traffic Control: The CONTRACTOR is required to obtain all permits, use appropriate traffic regulating devices, notify all appropriate governmental agencies and conform to all the requirements specified in Section 01570 – Traffic Regulations and Maintenance of Traffic.

B. Flow Control: Flow control shall be exercised as required to ensure that no flowing sewage comes into contact with sections of the sewer under repair or replacement.

1. Plugging and Blocking of Flow: A sewer line plug shall be inserted in the line at a manhole upstream from the section to be replaced. The plug shall be so designed that all or any portion of the sewage flows can be released. During the survey, testing and replacement portion of the construction, flows shall be shut off or substantially reduced as acceptable to the ENGINEER. The upstream manhole shall be constantly monitored for degree of surcharging. After the testing, survey or repairs is complete, flows shall be restored to the normal level. See Section 02750 – Wastewater Flow Control for additional information.

2. Pumping and Bypassing of Flow: Wherever lines are blocked of and the possibility of backing up the sewage and causing harm to public and private property is foreseen, it shall be the CONTRACTOR'S responsibility to bypass flow from manhole to manhole.

3. Bypassing shall be accomplished using sewer plugs with pump connections, by pumping down surcharged manholes, or by other methods acceptable to the ENGINEER. All bypassed flow must be discharged to a sanitary sewer. Bypassed flow shall not be allowed to enter any storm line, drainage ditch or street gutter. See Section 02750 – Wastewater Flow Control for additional information.

4. During bypass operation, the pump shall be manned continuously. The CONTRACTOR shall maintain the pump and bypass equipment and shall be responsible for any damages to public or private property due to the malfunction of same.

3.03 REMOVAL AND REPLACEMENT OF SEWER

A. After the limits of a particular portion of existing sewer which is to be removed and replaced, have been established on the ground, operations shall progress generally as follows:

1. Carefully remove or protect surface features in work area. Excavate to completely expose the existing pipe, Taking adequate precautions not to disturb any other existing underground facilities and handling excavated materials as described in other Sections of the Specifications.

2. That section or reach of pipe to be replaced shall be isolated by plugging and/or bypass pumping as described on other Section of these Specifications, or by any other method proposed by CONTRACTOR and acceptable by the ENGINEER.

3. Remove and dispose of the existing pipe and concentrate encasement, if any. This shall be phased and coordinated with its replacement so as to minimize public inconvenience.

4. The trench bottom shall be over excavated a minimum of 8-inches and new embedment material to go beneath the pipe placed and shaped so as to form uniform support of the pipe barrel.

5. Pipe shall be installed and jointed, normally beginning at its low or outlet end and proceeding upstream, with the bell ends facing upstream toward the direction of flow. Make connections to existing or proposed manholes or cleanouts and to existing pipe remaining in place. Install wyes or tees, with branches temporarily plugged to make reconnections to existing service laterals, if any. Complete embedment or encasement and place compacted backfill as necessary to avoid flotation if water should enter the trench.

6. Performed leakage test. When this has been successfully completed and acceptable to the ENGINEER, remove temporary plugs and reconnect wyes or tees to service lines.

7. Complete placement and compaction of backfill.

8. Restore surface features to at least as good condition as existed before construction began, including roadways, driveways and walks.

3.04 EXCAVATION AND BACKFILL

A. The CONTRACTOR shall excavate and backfill in accordance with Section 02221 – Trenching and Backfill. Under no circumstances shall the

CONTRACTOR be allowed to remove concrete or asphalt without prior cutting. The saw cutting shall be deep enough to produce an even, straight cut.

3.05 DEWATERING, SHEETING AND BRACING

A. The CONTRACTOR shall dewater, sheet and or brace all excavations in accordance with Section 02221 – Trenching and Backfill. Well points, points, pumps, sheeting, bracing and /or sock drain shall be used to provide a safe dry, open hole for all repairs or replacements specified herein.

3.06 SHIPPING, HANDLAING AND STORAGE

A. Shipping, handling and storage shall be in accordance with manufacturer's recommendations.

3.07 LAYING PIPE

A. Laying pipe shall be in accordance with Section 15000, "Piping, General".

3.08 INSTALLATION OF SEWER PIPE

A. Sewer pipes shall be installed in accordance with this Section and Section 02740 – Sanitary Sewage System.

3.09 PIPE-TO-PIPE CONNECTIONS

A. Pipe-to-pipe connections shall be made by using stainless steel shear rings as manufactured by Fernco, or approved equal

3.10 PIPE-TO-PIPE MANHOLE

A. When a sound pipe stub-out exists from a manhole to which connections is to be made, a pipe-to-pipe connection shall be made as described above. If one is not present or is faulty, an opening shall be cut in the manhole wall and the connection, consisting of a pipe stub-out with elastomeric waterstop grouted into the opening with non-shrink grout, shall be made. The invert or floor inside the manhole shall be cut and reshaped as necessary.

3.11 TELEVISION SURVEY

A. Television survey, including Preconstruction Survey and Post Construction Survey, as indicated in Section 02752 – Television Survey, is required for all replacement of sanitary sewer pipe.

3.12 TESTING

A. CONTRACTOR shall provide all materials, equipment, and labor to perform testing of installed sewer main piping, services, and manholes as required for acceptance by ENGINEER. The cost for such testing shall be included in the cost of the repair.

B. ENGINEER shall be notified no less than two full working days prior to any proposed testing.

C. The sewer main shall be tested after placement of pipe zone material but before final backfill and surfacing.

D. Testing of the sewer mains shall consist of the following:

1. ENGINEER, OWNER or their representative shall visually inspect each run of piping by lamping to verify consistent line and grade. Any portion of the line which does not exhibit a true alignment and uniform grade, or which shows any defect shall be corrected to the complete satisfaction of the ENGINEER or OWNER

2. Mandrel testing.

a. mandrel (deflection testing) shall be conducted no sooner than 30 days after pipe is backfilled.

b. Mandrel shall be manufactured to provide proofing ring and minimum 9-point bearing with an outside diameter of 95% of the average inside diameter of line to be tested. Contractor shall provide certifications that mandrel meets these requirements prior to testing.

c. Mandrel shall be pulled by hand in the presence of the OWNER and shall pass freely through the line being tested.

d. In the event that mandrel cannot pass freely through the line, pipe shall be excavated, rebedded and backfilled to reduce pipe deflection below 5%. All costs for excavation, rebedding, and repair of deflected pipe shall be borne by CONTRACTOR.

e. CONTRACTOR shall perform mandrel test and make repairs until acceptable deflection results.

3. In the event that line fails testing, CONTRACTOR shall make all required repairs, replacements, or other measures necessary to pass required acceptance tests. All costs for repairs, replacement, and retesting to verify acceptability of installed work shall be borne by the CONTRACTOR at no additional cost to the OWNER.

END OF SECTION

SECTION 02759

REPLACEMENT OF SANITARY SERVICE LATERAL AND CLEANOUT

PART 2 - GENERAL

2.01 SCOPE

A. This Section consists of removing existing sewer service pipe between mainline and the property line, and furnishing, installing, testing and placing in operation new sewer service piping, complete in its place, with fittings, and other appurtenances required for a complete installation.

2.02 GENERAL INFORMATION AND DESCRIPTION

A. The pipe and fittings covered by these specifications shall be furnished by fully qualified manufacturers experienced in the fabrication, casting and manufacture of the pipe materials specified herein. The pipe and fittings shall be designed, fabricated and installed in accordance with the best practice of the trade and the standards specified herein

B. Portions or reaches of existing sanitary sewer service lines shall be replaced as specified in this Section. The ENGINEER and/or OWNER may authorize additional pipe be removed and replaced as construction proceeds and defective sections of pipe are discovered by direct visual observation.

C. Replacement pipe to the property line including cleanout as per OWNER'S minimum standards shall be the same size and shall be laid between the mainline pipe and the existing service pipe which shall remain in place acceptable to the ENGINEER unless decided otherwise by the ENGINEER. It is the CONTRACTOR'S complete responsibility to set controls as necessary to attain true line and grade for the replacement pipe.

D. When replacing sewer service lines from adjacent buildings or residences to the run of a collector main, the CONTRACTOR shall set a time schedule for the period of service interruption in writing and obtain acceptance of it from the ENGINEER. The CONTRACTOR shall then notify the appropriate tenants at least 24 hours in advance of the pending interruption and inform them of its time frame. Temporary pumping or other measures will be required if the period of interruption of service occurs before 8:00 a.m. or after 5:00 p.m. The importance of avoiding extended periods of public inconvenience cannot be overemphasized.

E. All construction shall conform to Miami-Dade County Water and Sewer Department standard specifications and details.

2.03 SUBMITTALS

The CONTRACTOR shall submit shop drawings in accordance with Section 01300 – Submittals.

PART 3 - PRODUCTS

PART 4 - EXECUTION

4.01 GENERAL

A. The CONTRACTOR shall furnish all labor, tools, materials, and equipment necessary for installation and jointing of the pipe. All piping shall be installed in accordance with the Contract Documents in a neat workmanlike manner and shall be set for accurate line and elevation. All piping shall be thoroughly cleaned before installation, and care shall be taken to keep the piping clean throughout the installation.

4.02 PREPARATION

A. Traffic Control. The CONTRACTOR is required to obtain all permits, use appropriate traffic regulating devices, notify all appropriate governmental agencies and conform to all the requirements specified in Section 01570 – Traffic Regulations and Maintenance of Traffic.

B. Flow Control. Flow control shall be exercised as required to ensure that no flowing sewage comes into contact with sections of the sewer under repair or replacement.

1. Plugging and Blocking Flow. A sewer line plug shall be inserted into the main-line when service pipe is disconnected. The plug shall be so designed that all or any portion of the sewage flows cannot be released. During the survey, testing and replacement portion of the construction, flows shall be shut off or substantially reduced as acceptable to the ENGINEER. After the testing, survey or repair is complete, service shall be restored to normal level. See Section 02750 – Wastewater Flow Control for additional information.
2. Pumping and Bypassing of Flow. Wherever lines are blocked off and the possibility of backing up the sewage and causing harm to the public and private property is foreseen, it shall be the CONTRACTOR'S responsibility to bypass flow from the disconnected lateral to a down-stream manhole.
3. Bypassing shall be accomplished using sewer plugs with pump connections or by other methods acceptable to the ENGINEER. All bypassed flow must be discharged to a sanitary sewer. Bypassed flow shall not be allowed to enter any storm line, drainage ditch or street gutter. See Section 02750 – Wastewater Flow Control for additional information.
4. During a bypass operation, the pump shall be manned continuously. The CONTRACTOR shall maintain the pump and bypass equipment and shall be responsible for any damages to public or private property due to the malfunction of same.

4.03 EXCAVATION AND BACKFILL

A. The CONTRACTOR shall excavate and backfill in accordance with Section 02221 – Trenching and Backfill. Under no circumstances shall the

CONTRACTOR be allowed to remove concrete or asphalt without prior cutting. The saw cutting shall be deep enough to produce an even, straight cut.

4.04 DEWATERING, SHEETING AND BRACING

A. The CONTRACTOR shall dewater, sheet and or brace all excavations in accordance with Section 02221 – Trenching and Backfill. Well points, pumps, sheeting, bracing and/or sock drain shall be used to provide a safe, dry, open hole for all repairs or replacements specified herein.

4.05 SHIPPING, HANDLING AND STORAGE

A. Special care in handling shall be exercised during delivery, distribution and storage of pipe to avoid damage and setting up stresses. Damaged pipe will be rejected and shall be replaced at no additional cost to the OWNER. Pipe and fittings stored prior to use shall be stored in such a manner as to keep the interior free from dirt and foreign matter.

B. No pipe shall be dropped from cars or trucks to the ground. All pipes shall be carefully lowered to the ground by mechanical means. In shipping, pipe and fittings shall be blocked in such manner as to prevent damage to castings or lining. Any broken or chipped lining shall be carefully patched. Where it is impossible to repair broken or damaged lining in pipe because of its size, the pipe shall be rejected as unfit for use.

4.06 REMOVAL AND REPLACEMENT OF SEWER LATERAL PIPE AND CLEANOUT

A. Lateral sewers shall be installed in accordance with all the applicable requirements for pipe installation. Branch fittings shall be installed in the main line sewer as it is constructed, in the locations and configuration of the original laterals or as designated by the ENGINEER.

B. The existing laterals shall be hard excavated to a joint, saw cut, clean and square and the appropriate adapter installed to connect the replacement laterals. Care shall be taken to maintain the slopes of the existing laterals. The laterals shall be removed and replaced from the main line to the private property line, or to a point along the existing lateral as determined by the ENGINEER to be in acceptable condition.

C. The CONTRACTOR shall not excavate trenches for laterals on both sides of the street at the same time unless written permission has been secured in advance to close the street.

D. Placement of bedding/cover materials in the trench shall be the same for laterals as provided in Section 02221 – Trenching and Backfill.

E. After the limits of a particular portion of the existing sewer which is to be removed and replaced, have been established on the ground, operations shall progress generally as follows:

1. Carefully remove or protect surface features in work area. Excavate to completely expose the existing pipe, taking adequate precautions not to disturb any other existing underground facilities and handling excavated materials as described in other Sections of the Specifications.

2. That section or reach of pipe to be replaced shall be isolated by plugging and/or by-pass pumping as described in other Sections of these Specification, or by any other method proposed by the CONTRACTOR and acceptable by the ENGINEER.
3. Remove and dispose of the existing pipe and concrete encasement, if any. This shall be phased and coordinated with its replacement so as to minimize public inconvenience.
4. The trench bottom shall be over excavated a minimum of 8-inches and new embedment material to go beneath the pipe placed and shaped so as to form uniform support for the pipe barrel.
5. Pipe shall be installed in accordance with the manufacturer's recommendations and to the grade and slope as its existing conditions. Pipe shall be installed and jointed, normally beginning at its low or outlet end and proceeding upstream, with the bell ends facing upstream. Replace cleanout. Make connections to new sewer main and cleanouts, and to existing pipe remaining in place. Complete embedment or encasement and place compacted backfill as necessary to avoid flotation if water should enter the trench.
6. Perform leakage test. When this had been successfully completed and acceptable to the ENGINEER, remove temporary plugs and reconnect wyes or tees to service lines.
7. Complete placement and compaction of backfill.
8. Restore surface features to at least as good condition as existed before construction began, including roadways, driveways and walks.

4.07 PIPE-TO-PIPE CONNECTIONS

A. Pipe-to-pipe connections shall be made by using stainless steel shear rings as manufactured by Fernco, or approved equal.

4.08 TELEVISION SURVEY

A. Television survey, including Preconstruction Survey and Post Construction Survey, as indicated in Section 02752 –Television Survey, is required for all replacement of sanitary sewer lateral pipe.

END OF SECTION

SECTION 02763

CHEMICAL GROUTING

PART 1- GENERAL

1.01 SCOPE

A. The work specified in the Section includes all labor, materials, accessories, equipment and tools necessary for chemical grouting, sealing, and air testing sanitary sewer pipe joints, pursuant to ASTM F2304-03.

1.02 GENERAL

A. Chemical Root Treatment

1. When so directed by the ENGINEER, the CONTRACTOR shall perform chemical root treatment.

2. The CONTRACTOR shall schedule his work to perform chemical root treatment a minimum of 8 weeks prior to performing the work specified under this Section.

3. When so directed by the ENGINEER, prior to performing chemical grouting, the CONTRACTOR shall remove roots and clean the sewer in accordance with Section 02730 – Preparatory Cleaning and Root Removal.

B. Leak Testing

1. Sewer line joint testing shall be accomplished by applying air pressure to each sewer joint, and monitoring the pressure in the void over a one-minute period. The intent of joint testing is to identify defective joint prior to the joint sealing process and check the effectiveness of the seal.

2. Testing cannot be performed and shall not be required on cracked, structurally unsound, or broken pipe, severely corroded or out-of-round pipe, or on visibly leaking joints.

C. Leak Sealing

1. Sources, or possible sources, of infiltration within the sewer system, are to be sealed to eliminate infiltration.

2. The application of the sealing grout within the pipe shall be by means of remote-controlled equipment designed to be positioned at

the specific joint or crack to be sealed and to apply the grout under sufficient pressure for the grout to pass through the opening and fill voids outside the pipe as well as the opening in the pipe wall. Control of the device and review of the results shall be by operating the closed-circuit television camera and van-mounted monitor conforming to the requirements of Section 02752 – Television Survey. The method of sealing used shall not damage the pipe or change pipe alignment, and the original cross sectional area shall not be permanently reduced or changed.

1.03 QUALIFICATIONS

A. The qualifications of the Grouting CONTRACTOR shall be submitted. These Qualifications shall include detailed descriptions of the following:

1. Name, business address and telephone number of the CONTRACTOR.

2. Name(s) of all supervisory personnel to be directly involved with Grouting for this project.

3. The CONTRACTOR shall sign and date the information provided and certify that to the extent of his knowledge, the information is true and accurate, and that the supervisory personnel will be directly involved with and used on this project. Substitutions of personnel and/or methods will not be allowed without written authorization of the ENGINEER.

4. Specialty technicians shall be certified by the equipment manufacturer and/or its authorized representative. Certifications shall be submitted to the ENGINEER.

5. The CONTRACTOR shall provide his references of previous project lists going back five years including his customers' names, addresses, and telephone numbers.

6. To be qualified, the CONTRACTOR shall have a minimum of five years previous experience in grouting.

PART 2- PRODUCTS

2.01 CHEMICAL JOINT SEALING MATERIALS

A. Chemical joint sealing materials used on this project shall be AV-118 Duriflex, or AV-100 plus activators, initiators and inhibitors recommended by the manufacturer, Avanti International, or an approved equal.

In those lines which had root removal performed, a chemical root inhibitor shall be added to the grout prior to sealing the joints. CONTRACTOR shall submit the chemical to be used for ENGINEER's approval prior to utilization.

PART 3- EXECUTION

3.01 LEAK TESTING EQUIPMENT

A. The basic equipment used shall consist of a television camera, joint testing device such as a packer, and test monitoring equipment. In combinations, the equipment shall be constructed in such a way as to provide means for introducing a test medium under pressure, into the Void area created by the expanding ends of the joint testing device. The testing equipment shall also have the means for regulating the flow rate of the test medium Void area in conjunction with the means for continuously measuring the actual static pressure of the test medium at and within the Void area only. The packer device shall be constructed in such a manner as to allow some flow to pass through its center annulus.

B. Void pressure data shall be transmitted electrically and without the use of the test medium or hoses. All test monitoring shall be above ground and in a location to allow for simultaneous continued observation of the television monitor and test monitoring equipment by the CONTRACTOR. The ENGINEER shall witness the testing operation.

C. Sewer line joint testing shall be accomplished before and after the grouting operation by applying a positive pressure to each sewer joint and monitoring the pressure in the Void. The intent of joint testing is to identify defective joints prior to the joint sealing process and determine the effectiveness of the seal repaired.

3.02 CONTROL TEST PROCEDURES

A. Prior to and during the joint testing phases of the work, the CONTRACTOR shall perform Control, Intermediate, and Final testing in accordance with the latest edition of ASTM F2304.

3.03 JOINT TESTING PROCEDURE

A. Sewer line joints shall be individually tested at a test pressure equal to ½ psi per vertical foot of pipe depth, but in no case exceeding a pressure of 10 psi and in accordance with the following procedures:

1. The packer or testing device shall be positioned within the line in such a manner as to straddle the joint to be tested.

2. The packer ends or testing device ends shall be expanded so as to isolate the joint from the remainder of the line and create a Void area between the packer or testing device and the pipe joint. The ends of the testing device shall be expanded against the pipe with sufficient inflation pressure to contain the test medium within the Void without leakage past the expanded end.

3. The test medium shall be introduced into the Void area until a pressure or flow rate equal or greater that the required test pressure is observed with the Void pressure monitoring equipment.

   a. Air Test – After the void pressure is observed to be equal to or greater than the required test pressure, the airflow shall be stopped and the air test supply line vented. The operator will observe this void pressure for a period of 15 s, if the pressure is maintained, with a pressure drop of less than 1 psi (7 kPa), then the joint will be considered as having passed the test. If the pressure shows additional decay during the recommended time period, it will be considered as having failed and shall be sealed. Upon completion of the sealing, the joint will be retested at the established test criteria (post-test).

   b. Water Test – A liquid (water) shall be introduced into the void area until a pressure equal to or greater than the required test pressure is observed with the void pressure monitoring equipment. If the required test pressure cannot be developed (due to joint leakage), the joint will have failed the test and shall be sealed as specified. The flow rate of the test liquid shall then be regulated to a rate at which the void pressure is observed to be the required test pressure for a period of 30 seconds. A reading of the test liquid flow meter shall then be taken. If the flow rate exceeds ¼ gallon per minute (due to joint leakage), the joint will have failed the test and shall be sealed as specified.

4. The test medium shall be air or liquid.

3.04 TEST RECORDS

A. During the joint testing procedure, complete records shall be kept, to include the following data:

1. Identification of the manhole section tested.

2. Type of pipe.

3. Diameter of pipe.

4. Length of pipe sections between joints.

5. Depth of pipe to surface.

6. Test pressure used and duration of test.

7. Statement indicating the pass/fail test results for each joint tested, Location (stationing) of each joint tested and location of any joints not tested with an explanation for not testing.

B. In the case of “passing” joint, a single pressure reading may be recorded. In the case of a “failing” joint requiring grout, three pressures shall be recorded: the initial “failing” pressure; the zero pressure after grout has been injected and the packer deflated; and the final pressure after the grout has been injected and the packer reinflated.

3.05 JOINT SEALING EQUIPMENT

A. The basic equipment shall consist of a closed circuit television system, necessary chemical sealant containers, pumps, regulators, valves, hoses, etc., and joint sealing packers for the various sizes of sewer pipe. The packer shall be a cylindrical case of a size less than pipe size, with the cables at either end used to pull it through the line. The packer device shall be constructed in such a manner as to allow a restricted amount of sewage to flow at all times. Generally, the equipment shall be capable of performing the specified operations in lines where flows do not exceed the maximum line flows as specified in Section 02750-Wastewater Flow Control. When the packer is inflated, two widely spaced annular bladders shall be formed, each having an elongated shape and producing an annular void around the center portion of the packer.

B. Before starting the work, a performance test demonstration verifying the accuracy and repeatability of the void pressure meter and fluid pumping equipment should be performed. If these test demonstrations fail to show that the readings are accurate, ± 0.5 psi (3 kPa) for void pressure repeatability, and ± 0.1 gal (0.4 L) of chemical pumped into a measured container, the CONTRACTOR shall be required to make the required repair or adjustments to the equipment and gages and retest until the results are satisfactory to the OWNER’s representative. The test demonstration may be required at each work shift during the sealing operation.

3.06 JOINT SEALING PROCEDURE

A. In the preparation and application of the sealing grout, the recommendations of the manufacturer of the grout materials shall be followed. Before joint sealing, chemical grout gel times should be measured and recorded. Gel times should also be measured and

recorded. Gel times should also be measured and recorded whenever a new batch is made and at the end of the shift these gel times' measurements are a very effective and meaningful quality assurance procedure.

B. Joint sealing shall be accomplished by forcing chemical sealing materials into or through infiltration points be a system of pumps, hoses, and sealing packers. Jetting or driving pipes from the surface that could damage or cause undermining of the pipe lines, will not be allowed. Excavating the pipe, which would disrupt traffic, undermine adjacent utilities and structures, will not be allowed. The packer shall be positioned over the area of infiltration by means of a metering device and the closed circuit television in the line. It is important that the procedure used by the CONTRACTOR for positioning the packer be accurate to avoid over-pulling the packer and thus not effectively sealing the point of infiltration. The packer sleeves shall then be expanded using precisely controlled pressures. The pneumatically expanded sleeve or elements shall seal against the inside periphery of the pipe to form a void area at eh point of infiltration, now completely isolated from the remainder of the pipe line. Into this isolated area, sealant materials shall be pumped through the hose system at controlled pressures, which are in excess of groundwater pressures. The pumping, metering, and packer device shall be integrated so that the proportions and quantities of materials can be regulated in accordance with the type and size of the leak being sealed.

C. The grout must be injected beyond the joint interface into the soil surrounding the pipe joint.

D. A color additive (dye) should be added to the grout so that a visual residual layer of grout rings the joint providing confirmation the packer was located over the joint and the void was filled during the sealing operation.

E. No joint shall be considered sealed unless, while under continual pressure, an attempt is made to pump grout to "refusal" (up to ½ gallon per inch diameter pipe size). This is to insure that sufficient chemical has been dispersed into the soil surrounding the joint and that a temporary seal has not been made by applying a minimum amount of chemical grout to the void and the joint area inside the pipe. When chemical grout cannot be pumped to "refusal" within a volume less than or equal to ½ gallon per inch diameter pipe size due to latent physical conditions, no additional work shall be undertaken until authorization to proceed has been given by the OWNER/OWNER's representative.

F. Upon completing the sealing of each individual joint, the packer shall be deflated; moved at least one packer length in either direction, and then repositioned over the joint; with the void pressure meter reading zero pressure, then reinflated and tested as specified in subsection 3.03 – Joint

Test Procedure. Should the void pressure meter not read zero, the CONTRACTOR shall clean his equipment of residual grout material or make the necessary equipment repairs to provide for an accurate void pressure reading. Joints that fail to meet the specified test criteria shall be resealed and retested until the test criteria can be met in order to receive payment.

G. All testing shall be performed by the CONTRACTOR in the presence of the ENGINEER. It shall be the responsibility of the CONTRACTOR to completely seal every leak authorized for sealing to the extent determined by the ENGINEER. If, in the ENGINEER's opinion, it is not necessary to continue with a particular leak, the crew shall move to the next joint or leak. The CONTRACTOR shall remove any small excess sealing grout inside the sewer line. CONTRACTOR shall operate his equipment with care and shall be responsible for any damage to the sewer system or other facilities caused by his operations, and shall repair such damage at his expense and without delay as instructed by the ENGINEER.

3.07 JOINT SEALING RECORDS

A. Included in the records for joint sealing shall be:

1. The test pressure before and after sealing and the duration of the test.

2. The volume of grout material used to seal each joint.

3. The volume of grout placed per section.

4. The gel set time used.

5. The barrel test results.

6. The grouting material used including additives and their respective quantities.

3.08 LATERAL SEALING PROCEDURE

A. The following shall apply to the sealing of all reinstalled laterals after the main has been lines.

1. The total batch shall be no more than 50 gallons. That means reducing the water in each tank by 5 gallons. This will increase the strength of the "gel" by increasing the solids to 12 percent.

2. The "gel" time shall be 10 seconds longer than the time required by the pumps to fill the inside packer void at no time shall the "gel" time be less than 20 seconds.

3.09 TELEVISION SURVEY

A. Television survey, including Preconstruction Survey, Post Construction Survey, and Warranty Survey, as indicated in Section 02752 – Television Survey, is required for all grouted lines.

3.10 WARRANTY

A. All chemical grouting work described herein shall be guaranteed against faulty workmanship and/or materials for a period of 3 years after the completion of the work.

END OF SECTION

SECTION 02764

CURED-IN-PLACE SECTIONAL PIPE LINING

PART 1- GENERAL

1.03 SCOPE

B. The work specified in this section consists of rehabilitating existing sanitary sewer pipe by installing a resin impregnated fiberglass/polyester felt tube into an existing pipe to restore its structural and hydraulic integrity.

1.04 GENERAL

B. The finished sectional pipe liner in place shall be fabricated from materials which, when installed, will be chemically resistant to withstand internal exposure to domestic sewage.

1.04 SUBMITTALS

A. The Contractor shall submit shop drawings and other information to the Engineer for review in accordance with Section 01300, “Submittals”. Included shall be design calculations for the work.

1.05 QUALIFICATIONS

A. The Qualifications of the CONTRACTOR shall be submitted. These Qualifications shall include detailed descriptions of the following:

1. Name, business address and telephone number of the CONTRACTOR.

2. Name(s) of all supervisory personnel to be directly involved with this project.

3. The CONTRACTOR shall sign and date the information provided and certify that to the extent of his knowledge, the information is true and accurate, and that the supervisory personnel will be directly involved with and used on this project, Substitutions of personnel and/or methods will not be allowed without written authorization of the ENGINEER.

4. Specialty technicians shall be certified by the equipment manufacturer and/or its authorized representative. Certifications shall be submitted to the ENGINEER.

5. The CONTRACTOR shall provide his references of previous project lists going back five years including his customers' names, addresses, and telephone numbers.

6. To be acceptable, a minimum of 400 sectional liner installations must be documented.

7. To be acceptable, the installer must have had a minimum of five (5) years active experience in the commercial installation of the product.

PART 2- PRODUCTS

2.02 GENERAL

A. The finished liner shall be fabricated from material as specified in this section which when cured will be chemically resistant to the corrosive effects of the raw sewage and hydrogen sulfide. The cured-in-place sectional pipe shall be the New Life System as manufactured by Stephen's Technologies, Inc. or approved equal.

B. The CONTRACTOR shall submit shop drawings, samples of materials, and design calculations to the ENGINEER for review.

2.03 LINER SIZING

A. The liner shall be fabricated to a size that when installed will neatly fit the internal circumference of the conduit to be repaired as specified by the ENGINEER.

B. The length and number of liners shall be that deemed necessary by the ENGINEER to effectively carry out the repairs. The CONTRACTOR shall verify the lengths in the field before cutting liner to length. In general, the minimum length shall be 6 feet for 8- to 12-inch diameter of pipe, and cover a minimum of 6 inches on either side of the pipe joint.

C. For 15- to 21-inch diameter of pipe, a longer sectional liner may be required.

2.04 LINER MATERIAL

A. The lining material shall be fiberglass matting material and fully impregnated with an epoxy resin as specified.

B. The mixed components of the epoxy resin shall have the following properties:

Item		Criteria
1.	Solids Content	100% by weight
2.	Pot Life	90 minutes at 70 degrees F
3.	Shelf Life	at least 1 year (sealed)
4.	Viscosity	18,000 cps (average at 70 degrees F)
5.	Density	12 pounds per gallon (max.)

C. The cured epoxy resin material shall have the following properties:

Item	Test Value	Reference Standard
Flexural Strength	5,000 psi	ASTM D 790
Flexural Modulus	400,000 psi	ASTM D 790

2.05 LINER DESIGN

A. The required structural CIPP wall thickness shall be based at a minimum, on the physical properties described above and in accordance with the design equations in the appendix of ASTM F 1216, and the following design parameters:

Design Safety Factor	2.0
Retention Factor for Long-Term Flexural Modulus to be used in Design	50%
Ovality*	5%
Groundwater Depth = Pipe Depth (above invert)*	ft.
Soil Depth (above crown)*	ft.
Soil Modulus	700 psi
Soil Density	120 pcf
Live Load	Two H20 passing trucks
Design Condition	Fully deteriorated
**Denotes information which can be provided here or in inspection video tapes or project*	

construction plans. Multiple line segments may require a table of values.

B. The lining manufacturer shall submit to the ENGINEER for review complete design calculations for the liner, signed and sealed by a Professional ENGINEER registered in the State of Florida and certified by the manufacturer as to the compliance of his materials to the values used in the calculations. A safety factor of 2 shall be applied in the design calculation. The host pipe shall be considered fully deteriorated. The liner shall be designed to withstand a live load equivalent to two H-20 passing trucks plus all pertinent dead loads, hydrostatic pressure and grout pressure (if any). For design purposes, the water table shall be considered at grade elevation. The liner shall be designed in accordance with ASTM F 1216. The buckling analysis shall account for the combination of dead load, live load, hydrostatic pressure and grout pressure (if any). The liner side support shall be considered as if provided by soil pressure against the liner. The existing pipe shall not be considered as providing any structural support. Modulus of soil reaction shall be 700, corresponding to a moderate degree of compaction of bedding and a fine-grained soil as shown in AWWA Manual M45, Fiberglass Pipe Design.

C. Liner shall be neither accepted nor installed until design calculations are acceptable to the ENGINEER.

PART 3- EXECUTION

3.11 CLEANING SEWER LINES

A. Prior to any lining of a pipe so designated, it shall be the responsibility of the CONTRACTOR to remove internal deposits from the pipeline in accordance with Section 02730 – Preparatory Cleaning and Root Removal.

3.12 TELEVISION SURVEY

A. Television survey shall be performed in accordance with Section 02752 – Television Survey, including Preconstruction and Post Construction Surveys.

B. The interior of the pipeline shall be carefully surveyed to determine the location and extent of any structural failures. The location of any conditions which may prevent proper installation of lining materials into the pipelines shall be noted so that these conditions can be corrected. A video tape and suitable log shall be kept and turned over to the ENGINEER.

C. For the sewer line with sectional cured-in-place liner installed, a variance for post-TV and tapes shall be allowed as follows:

1. The post-TV shall commence at the upstream manhole (downstream for reverse setups) and shall proceed at a maximum speed of 30 feet per minute until the repair is reached. No panning of defects or laterals needs to be done. Upon reaching the sectional liner, the CONTRACTOR shall stop and carefully pan the beginning and the end of the liner to show that the repair has been successfully completed. If a lateral connection has been lined over and reopened, the CONTRACTOR shall pan this opening and the lateral. The rest of the line shall be televised without stopping until the downstream manhole has been reached.

2. One log (pre-TV log) shall be furnished with a statement under the comments line as to the linear footage of the beginning of the sectional liner, the length of the liner, and the number of laterals reinstated (if any), and their location.

3.13 FLOW BYPASSING

A. The CONTRACTOR, when required, shall provide for the transfer of flow, through or around a section or sections of pipe that are to be repaired. The proposed bypassing system shall be acceptable in advance by the ENGINEER. The acceptance of the bypassing system in advance by the ENGINEER shall in no way relieve the CONTRACTOR of his responsibility and/or public liability. The flow bypassing shall be done in accordance with Section 02750 – Wastewater Flow Control.

Note: If the repair can be made in a few hours, bypass pumping may not be required. The placement carriage shall be equipped with a bypass section to allow flow once liner is pressed into place.

3.14 LINE OBSTRUCTIONS

A. It shall be the responsibility of the CONTRACTOR to clear the line of obstruction. If survey reveals an obstruction that cannot be removed by conventional cleaning equipment, the CONTRACTOR shall make a point repair excavation in accordance with Section 02757 – Point Repair of Sanitary Sewers, to uncover and remove or repair the obstruction. Such excavation shall be accepted in writing by the ENGINEER prior to the commencement of the work.

3.15 LINER INSTALLATION

A. Prior to liner installation, all active severe leaks which may affect the success of the liner installation shall be stopped using chemical grout. The CONTRACTOR shall impregnate the liner with the 100 percent solids

epoxy. Drop cloths, tarpaulins, and etc. shall be used to prevent epoxy material from contacting the adjacent ground. Place the liner on the placement carriage and maneuver carriage and liner into position with the use of a video camera. Force the liner against the inside wall of the damaged host pipe allowing epoxy resin to permeate into any cracks in the host pipe. Allow lines to cure for approximately 2 hours in accordance with the manufacturer's recommendations. Heat may be introduced to speed up curing time. Retract the placement carriage and remove from pipe.

B. After the sectional liner has been cured in place, the CONTRACTOR shall reconnect the service connections. Cutting of the liner pipe shall be done from the interior of the pipeline using a robotic cutter. Where holes are cut through the liner, they shall be neat and smooth in order to prevent blockage at the service connections. Cut-in-service connections shall be opened to a minimum of 95 percent of the flow capacity of the building sewer. Cuts shall be wire-brushed to remove jagged edges. All coupons shall be recovered at the downstream manhole and removed. All reinstated service lateral connections (between the liner and the existing pipe) shall be grouted. The CONTRACTOR should not reactivate any line sections until accepted by the ENGINEER.

3.16 ACCEPTANCE

A. The finished liner shall be continuous over the entire length of the installation. The liner shall be free from visual defects, damage, deflection, holes, delamination, uncured resin, and the like. There shall be no visible infiltration through the liner or from behind the liner.

3.17 CLEANUP

A. After the liner installation has been completed and accepted, the CONTRACTOR shall clean up the entire project area and return the ground cover to grade. All excess material and debris not incorporated into the permanent installation shall be disposed of by the CONTRACTOR.

3.18 WARRANTY

A. The liner shall be certified by the manufacturer for specified material properties for a particular job. The manufacturer warrants the liner to be free from defects in raw materials for one year from the date of acceptance. During the warranty period, any defects which affect the integrity or strength of the pipe shall be repaired at the CONTRACTOR's expense in a manner mutually agreed by the OWNER and the CONTRACTOR.

END OF SECTION

SECTION 02765

CURED-IN-PLACE PIPE LINER

PART 1 - GENERAL

1.01 WORK INCLUDED

A. It is the intent of this specification to provide for the reconstruction of pipelines and conduits by the installation of a resin-impregnated flexible tube which is formed to the original conduit by use of a hydrostatic head. The resin is cured using hot water under hydrostatic pressure within the tube. The Cured-In-Place Pipe (CIPP) will be continuous and tight fitting.

B. The work specified in this Section includes all labor, materials, accessories, equipment and tools necessary to install and test cured-in-place pipe lining in main lines and in service laterals.

1.02 GENERAL

A. The finished pipe in place shall be fabricated from materials which when cured will be chemically resistant to withstand internal exposure to domestic sewage.

B. This specification references ASTM F1216 (Rehabilitation of pipelines by the inversion and curing of a resin-impregnated tube). ASTM F1743 (Rehabilitation of pipelines by pulled-in-place installation of a cured-in-place thermosetting resin pipe), and ASTM D790 (Test methods for flexural properties of unreinforced plastics) which are made a part hereof by such reference and shall be the latest edition and revision thereof. In case of conflicting requirements between this specification and these referenced documents, this specification will govern.

1.03 SUBMITTALS

A. The CONTRACTOR shall submit manufacturer’s Certificate of Compliance certifying compliance with the applicable specifications and standards.

B. The CONTRACTOR shall submit certified copies of test reports of factory tests required by the applicable standards and this Section.

C. The CONTRACTOR shall submit Manufacturer’s installation instructions and procedures and insertion runs.

D. The CONTRACTOR shall submit procedures and materials for service reinstatement including time and duration of sewer service unavailability.

E. The CONTRACTOR shall submit liner sizing and wall thickness calculation data.

1.04 DELIVERY, STORAGE, AND HANDLING

A. The CONTRACTOR shall be responsible for delivery, storage, and handling of products.

B. Products shall be kept safe from damage. Damaged products shall be removed from the job site promptly. Damaged products shall be replaced with undamaged products.

1.05 PRODUCT AND INSTALLER ACCEPTABILITY

A. Since sewer products are intended to have a 50 year design life, and in order to minimize the OWNER's risk, only proven products with substantial successful long term track records will be approved.

B. Products seeking approval must meet all of the following criteria to be deemed commercially acceptable:

1. For a product to be considered commercially proven, a minimum of 1,000,000 linear feet or 4,000 manhole-to-manhole line sections of successful wastewater collection system installations in the U.S must be documented to the satisfaction of the OWNER to assure commercial viability. In addition, at least 250,000 linear feet of the product shall have been in successful service within the State of Florida for a minimum of five years.

2. For an installer to be considered as commercially proven, the installer must satisfy all insurance, financial, and bonding requirements of the OWNER, and must have had at least 5 (five) years active experience in the commercial installation of the product. In addition, the installer must have successfully installed at least 250,000 feet of the product in wastewater collection systems in Florida. Acceptable documentation of these minimum installations must be submitted to the OWNER.

3. Sewer rehabilitation products submitted for approval must provide third party test results supporting the long term performance and structural strength of the product and such data shall be satisfactory to the OWNER. Test samples shall be prepared so as to simulate installation methods and trauma of the product. No product will be approved without independent third party testing verification.

4. Documentation for products and installers must be satisfactory to the OWNER and must be submitted with the bid.

PART 2 - PRODUCTS

2.01 MATERIALS FOR MAIN LINES

A. The sewn tube shall consist of one or more layers of absorbent non-woven felt fabric and meet the requirements of ASTM F1216 or ASTM F1743, Section 5. The tube shall be constructed to withstand installation pressures, have sufficient strength to bridge missing pipe, and stretch to fit irregular pipe sections.

B. The wetout tube shall have a uniform thickness that when compressed at installation pressures will meet or exceed the Design thickness.

C. The tube shall be sewn to a size that when installed will tightly fit the internal circumference and length of the original pipe. Allowance should be made for circumferential stretching during inversion. Overlapped layers of felt in longitudinal seams that cause lumps in the final product shall not be utilized.

D. The outside layer of the tube (before wetout) shall be coated with an impermeable, flexible membrane that will contain the resin and facilitate monitoring of resin saturation during the resin impregnation (wetout) procedure.

E. The tube shall be homogeneous across the entire wall thickness containing no intermediate or encapsulated elastomeric layers. No material shall be included in the tube that may cause delamination in the cured CIPP. No dry or unsaturated layers shall be evident.

F. The wall color of the interior pipe surface of CIPP after installation shall be a light reflective color so that a clear detailed examination with closed circuit television inspection equipment may be made.

G. Seams in the tube shall be stronger than the unseamed felt.

H. The outside of the tube shall be marked for distance at regular intervals along its entire length, not to exceed 5 ft. Such markings shall include the Manufacturers name or identifying symbol. The tubes must be manufactured in the USA.

I. The resin system shall be a corrosion resistant polyester, vinyl ester, or epoxy and catalyst system that when properly cured within the tube

composite meets the requirements of ASTM F1216 and ASTM F1743, the physical properties herein, and those which are to be utilized in the Design of the CIPP for this project. The resin shall produce CIPP which will comply with the structural and chemical resistance requirements of this specification.

J. The finished pipe liner in place shall be chemically resistant to and shall withstand internal exposure to domestic wastewater having a pH range of 5 to 11 and temperature of 150°F.

2.02 STRUCTURAL REQUIREMNTS

A. The CIPP shall be designed as per ASTM F1216, Appendix X1. The CIPP design shall assume no bonding to the original pipe wall.

B. The CONTRACTOR must have performed long-term testing for flexural creep of the CIPP pipe material installed by his company. Such testing results are to be used to determine the Long-term, time dependent flexural modulus to be utilized in the product design. This is a performance test of the materials (tube and resin) and general workmanship of the installation and curing. A percentage of the instantaneous flexural modulus value (as measured by ASTM D-790 testing) will be used in design calculations for external buckling. The percentage, or the long-term creep retention value utilized, will be verified by this testing. Values in excess of 50% will not be applied unless substantiated by qualified third party test data. The materials utilized for the contracted project shall be of a quality equal to or better than the materials used in the long-term test with respect to the initial flexural modulus used in design.

C. The layers of the cured CIPP shall be uniformly bonded. It shall not be possible to separate any two layers with a probe or point of a knife blade so that the layers separate cleanly or the probe or knife blade moves freely between the layers. If separation of the layers occur during testing of field samples, new samples will be cut from the work. Any reoccurrence may cause rejection of the work.

D. Cured pipe shall conform to the following initial minimum structural properties:

PROPERTY	TEST METHOD	RESULTS
Flexural Stress	ASTM D-790 (short term)	4,500 psi
Modulus of Elasticity	ASTM D-790	250,000 psi

E. The required structural CIPP wall thickness shall be based at a minimum, on the physical properties described above and in accordance with the design equations in the appendix of ASTM F1216 , and the following design parameters:

Design Safety Factor	2.0
Retention Factor for Long-Term Flexural Modulus to be used in Design (as determined by Long-Term tests described in paragraph 2.02 B)	50%
*Ovality	5%
Groundwater Depth = Pipe Depth (above invert)*	ft.
Soil Depth (above crown)	ft.
Soil Modulus	700 psi
Soil Density	120 pcf
Live Load	Two H-20 passing trucks
Design Condition	Fully deteriorated
*Denotes information which can be provided here or in inspection video tapes or project construction plans. Multiple line segments may require a table of values.	

F. The lining manufacturer shall submit to the OWNER for review complete design calculations for the liner, signed and sealed by a Professional ENGINEER registered in the State of Florida and certified by the manufacturer as to the compliance of his material to the values used in the calculations. A safety factor of 2 shall be applied in the design calculation. The host pipe shall be considered fully deteriorated. The liner shall be designed to withstand a live load equivalent to two H-20 passing trucks plus all pertinent dead loads, hydrostatic pressure and grout pressure (if any). For design purposes, the water table shall b considered at grade elevation. The liner shall be designed in accordance with ASTM F1216. The buckling analysis shall account for the combination of dead load, live load, hydrostatic pressure and grout pressure (if any). The liner side support shall be considered as if provided by soil pressure against the liner. The existing pipe shall not be considered as providing any structural support. Modulus of soil reaction shall be 700, corresponding to a moderate degree of compaction bedding and a fine-grained sole as shown in AWWA Manual M45, Fiberglass Pipe Design.

G. Because of the nature of the calculations and constants utilized, the minimum liner thicknesses shall be 5 percent greater than the amount specified.

H. As part of the design calculation submittal, the liner manufacturer shall submit a tabulation of time versus temperature. This tabulation shall show the lengths of time that exposed portions of the liner will endure without self-initiated cure or other deterioration beginning. This tabulation shall be a five degree Fahrenheit increments ranging from 70 degrees F to 100 degrees F. This manufacturer shall also submit his analysis of the progressive effects of such “pre-cure” on the insertion and cured properties of the liner. This information shall be submitted in a timely fashion prior to the preconstruction conference so that the OWNER may set procedures for dealing with such an instance caused by construction delays. The minimum liner thickness is for material with characteristics as shown.

I. Liner shall neither be accepted nor installed until design calculations are acceptable to the OWNER. Liner shall be as manufactured by Insituform Technologies, Inc., 702 Spirit 40 Avenue, Chesterfield, MO 63005, Phone No. 800-325-1159, or approved equal.

2.03 MATERIALS FOR SERVICE LATERALS

A. Chemical Resistance – The CIPP shall meet the chemical resistance requirements of ASTM F1216, Appendix X2. CIPP samples for testing shall be of tube and resin system similar to that proposed for actual construction. It is required that CIPP samples with and without plastic coating meet these chemical testing requirements.

B. Hydraulic Capacity – Overall, the hydraulic profile shall be maintained as large as possible. The CIPP shall have a minimum of the full flow capacity of the original pipe before rehabilitation. Calculated capacities may be derived using a commonly accepted roughness coefficient for the existing pipe material taking into consideration its age and condition.

C. CIPP Field Samples – When requested by the OWNER, the CONTRACTOR shall submit test results from field installations in the USA of the same resin system and tube materials as proposed for the actual installation. These test results must verify that the CIPP physical properties specified in Section 2.02 D have been achieved in previous field applications.

2.04 MATERIALS FOR SERVICE LATERALS

A. Intent: It is the intent of this portion of this specification to provide for the reconstruction of lateral sanitary sewer pipelines with the installation of resin impregnated, flexible felt tubes. They shall be installed into the existing service using a pull rope or a push rod. Curing shall be

accomplished with hot water or other methods approved by the OWNER, the curing method shall be suitable for the selected resin, such that the resin produces a hard, impermeable pipe wall. The cured-in-place pipe (CIPP) should extend throughout the service lateral in a jointless, continuous, tight-fitting, watertight pipe-within-a-pipe.

B. Structural Requirements: The structural performance of the finished pipe must be adequate to accommodate all anticipated loads throughout its design life. No CIPP reconstruction technology will be allowed that requires bonding to the existing pipe for any part of its structural strength. Since the pipe strength is related to the uniformity and density of the pipe wall, only resin vacuum impregnation will be allowed. Resin impregnation without vacuum entraps air and creates voids which weaken the pipe wall. If reinforcing materials (fiberglass, etc.) are used, the reinforcing material must be fully encapsulated within the resin to assure that the reinforcement is not exposed, either to the inside of the pipe or at the interface of the CIPP and the existing pipe.

C. Structural Design Methods: design methods are to be derived from traditionally accepted pipe formulae for various loading parameters and modes of failure. All equations will be modified to include ovality as a design parameter. The design method shall be submitted to the OWNER for review. Design calculations shall be signed and sealed by a Professional ENGINEER registered in the State of Florida.

D. Continuous Structure: The lateral CIPP must bridge breaks and missing sections of the existing pipe, substantially reducing or eliminating infiltration or exfiltration. The new joint less pipe-within-a-pipe must fit tightly against the old pipe wall and consolidate all disconnected sections into a single continuous conduit.

E. Useful Life: The lateral CIPP must have a minimum design life of fifty (50) years. The minimum design life may be documented by submitting life estimates by national and/or international authorities or specifying agencies. Otherwise, long-term testing and long-term in-service results (minimum ten (10) years) may be used, with the results extrapolated to fifty (50) years.

F. Materials: All constituent materials will be suitable for service in the environment intended. The final product will not deteriorate, corrode or lose structural strength that will reduce the projected product life.

G. Physical Strength: The design for the lateral CIPP wall thickness will be based on the following strengths as shown herein, unless otherwise submitted and approved by the OWNER.

PROPERTY	TEST METHOD	RESULTS
Flexural Stress	Modified ASTM D-790	4,500 psi
Modulus of Elasticity	Modified ASTM D-790	250,000 – 500,000 psi

H. Service lateral liner shall be neither accepted nor installed until design calculations are acceptable to the OWNER. Liner shall be as manufactured by Insituform of North America, Inc., or approved equal.

PART 3 - EXECUTION

3.01 GENERAL

A. All activities shall be performed in accordance with the manufacturer's recommendations and regulations established by OSHA. Particular attention shall be drawn to those safety requirements involving working with scaffolding and entering confined spaces.

B. The Contractor shall provide traffic control in accordance with the requirements of Section 01570 – Traffic Regulations and Maintenance of Traffic

C. It is the Contractors responsibility to notify in writing any property OWNER having a sewer service connection on the sewer being relined that such work is being performed. Notification shall be done 48 hours prior to performing relining work. The Contractor shall be solely responsible for any damage to private service lines or backups caused by relining operations.

D. The Contractor shall defend, indemnify, and hold harmless the OWNER and employees, the Engineer, and the OWNERs consultants from and against any and all claims, suits, actions, damaged loss, liability, or costs of any nature or description (including, without limitation, reasonable attorney's fees) arising from, or in any way attributable to or connected with the Work performed by the Contractor.

3.02 PREPARATION

A. The Contractor shall clean and inspect the existing sewer in conformance with Section 02751 – Preparatory Cleaning and Root Removal.

B. The Contractor shall perform point repairs as directed by the OWNER, for the sewer section scheduled for relining. If during pre-television inspection, the Contractor identifies sections requiring point repairs but not identified on the Plans, he shall request OWNER's approval prior to performing those point repairs.

C. The Contractor shall provide for the diversion of wastewater entering or passing through the pipe in conformance with Section 02600 – Wastewater Flow Control.

D. Conditions that may prevent proper installation shall be noted and brought to the attention of the OWNER, and as directed by the OWNER corrected by the Contractor.

E. All service connections shall be noted and brought to the attention of the OWNER.

F. The Contractor shall notify the local fire department and utility company to obtain approval and a water meter, if required, before using fire hydrants.

G. The Contractor shall designate a location where the reconstruction tube shall be vacuum impregnated prior to installation. The Contractor shall allow the OWNER to inspect the materials and "wet out" procedure. A catalyst system compatible with the resin and reconstruction tube shall be used. Sufficient excess resin will be provided to ensure a mechanical bond with the host pipe after curing.

3.03 LINER INSTALLLATION FOR MAIN LINES

A. The Contractor shall install the pipe line in accordance with the manufacturer's specifications and as approved by the OWNER.

B. The wet out reconstruction tube shall be inserted through an existing manhole or other approved access by means of an inversion process and the application of a hydrostatic head sufficient to fully extend it to the next designated manhole or termination point. The reconstruction tube shall be inserted into the vertical inversion standpipe with the impermeable plastic membrane side out. At the lower end of the inversion standpipe, the reconstruction tube shall be turned inside out and attached to the standpipe so that a leak-proof seal is created. The inversion head will be adjusted to be of sufficient height to cause the impregnated tube to invert from manhole to manhole and hold the tube tight to the pipe wall, produce dimples at service lateral connections, and flared ends at the manholes. The use of a lubricant is recommended. Care shall be taken during the elevated curing temperature so as not to overstress the felt fiber. Care shall be taken to facilitate any resin spillage cleanup in the work area.

C. After inversion is completed, the Contractor shall supply suitable heat and water recirculation equipment. The equipment shall be capable of delivering hot water throughout the section by means of pre-strung hose to uniformly raise the water temperature above the temperature required to

affect a cure of the resin. This temperature shall be determined by the resin/catalyst system employed, as required by the manufacturer.

D. The heat source shall be fitted with suitable monitors to gauge the temperature of the incoming and outgoing water supply. Another such gauge shall be placed between the impregnated reconstruction tube and the pipe invert at the remote manhole to determine the temperatures during the cure period as recommended by the resin manufacturer.

E. Initial cure shall be deemed to be completed when inspection of the exposed portions of cured pipe appears to be hard and competent and the remote temperature sensor indicates that the temperature is of a magnitude to realize an exotherm. The cure period shall be of a duration recommended by the resin manufacturer, as modified for the cured-in-place inversion process, during which time the recirculation of water and cycling of the heat exchange to maintain the temperature continues.

F. The Contractor shall cool the hardened pipe to a temperature below 100°F before relieving the static head in the inversion standpipe. Cool-down may be accomplished by the introduction of cold water into the inversion standpipe to replace water being drained from a small hole made in the downstream end. Care shall be taken in the release of the static head so that a vacuum will not be developed that could damage the newly installed pipe. The discharge water temperature shall not exceed the level allowed by state or local standards.

G. The finished pipe shall be continuous over the entire length of an inversion run and be as free as commercially practical from visual defects, such as foreign inclusions, dry spots, pinholes, and delamination. It shall also meet the leakage requirements or pressure test specified below.

H. If the liner fails to make a tight seal due to a broken or misaligned pipe, at the manhole wall, or any other reason the Contractor shall apply a seal at that point. The seal shall be of a resin mixture compatible with the pipe.

3.04 SEALING PIPE IN MANHOLE

A. If the installed pipe fails to make a tight seal in the manhole, the Contractor shall apply a sealant at that point by pressure injection or other means to ensure a watertight seal. The sealant shall be of a resin mixture compatible with that used in the inversion process. The repair shall be rechecked after 48 hours to ensure that the seal is holding. If the seal does not hold, the Contractor shall continue to work until a seal is made and there are no leaks. The Contractor shall seal the pipe in the manhole at no additional cost to the OWNER.

3.05 REINSTATEMENT OF SERVICE LATERALS

A. After the pipe has been cured-in-place, the Contractor shall reinstate the existing service connections. This shall be done from the interior of the pipe without excavation of the pavement areas and in the case of no man-entry pipes, from the interior of the pipe by means of a 360° television camera and cutting device that reestablishes at least 95 and no more than 100% of the flow capacity of the service connection. The Contractor shall brush smooth all internal cuts to facilitate service lateral rehabilitation.

B. Only personnel experienced in the operation of cutting devices used for reinstatement of service laterals shall be allowed to operate such equipment.

C. The OWNER reserves the right to require reinstatement of service connections by excavation when a remote cut damages the pipe.

3.06 LINER INSTALLATION FOR SERVICE LATERALS

A. Site Disruption: The lateral CIPP usually require an access point to be established at the reconstruction termination point remote form the mainline pipe. The authorization for the access point a required location and excavation shall be obtained and performed by the OWNER of the system. The OWNER may install a clean-out, if required. The clean-out will be constructed of a polyvinyl chloride fitting or its equivalent with a riser pipe of equal diameter to the service pipe. The riser will be extended to the existing grade elevation and capped.

B. Internal Mainline Connection: The lateral CIPP shall be installed to affect a bond with the mainline invert-and-cure pipe to substantially reduce or eliminate the infiltration into the mainline pipe. The mainline pipe opening shall be prepared to accept the lateral CIPP. The lateral CIPP will protrude into the mainline pipe and form a seal with inside surface of the mainline invert-and-cure pipe surface. The bonding area of the lateral CIPP and the mainline invert-and-cure pipe shall be maximized to obtain the best possible bond. The protrusion shall not inhibit the closed circuit television post video inspection of the mainline or service lateral pipes.

C. Flow requirements: The lateral CIPP will provide at least 100 percent of the flow capacity of the host pipe before reconstruction. In lieu of actual measurements, calculated capacities may be derived using commonly accepted equations and values of the Manning flow coefficients (designated “n” coefficients). The original pipe material and condition at the time of reconstruction will determine the Manning coefficient used in the host pipe. A Manning coefficient of 0.009 for a jointless, relatively

smooth-wall cured-in-place pipe will be used for the lateral CIPP flow calculation.

D. Inspection: The materials and processes must be reasonably available for pre-installation, installation and post-installation inspections. Areas which require inspection include, but are not limited to, the following:

1. Product materials should exhibit sufficient transparency to visually verify the quality of resin impregnation.

2. Temperature sensing devices, such as thermocouples, shall be located between the existing pipe and the lateral CIPP to ensure the quality of the cure of the wall laminate.

E. Time of construction: Construction schedules will be submitted and approved by OWNER. At no time shall any service lateral remain inoperative for more than an eight hour period. Any service that will be out of service for more than eight hours will be temporarily by-passed into a mainline sanitary sewer. This will be done at the CONTRACTOR's expense.

3.07 INSPECTION

A. After the completion of the lining process and reinstatement of appropriate service connections, the installation shall be television inspected in accordance with Section 02752 – Television Survey. All service entrances shall be accounted for. No infiltration shall be apparent. The finished pipe shall be continuous over the length of the installation and be free of dry spots, lifts, and delaminations. If the pipe is not acceptable to the OWNER, remedies shall be accomplished at the Contractor's expense and to the OWNER's satisfaction.

3.08 TESTING

A. After the installation procedures have been performed and prior to reinstatement of service connections, the Contractor shall perform a hydrostatic test on the sewer line to determine if it is watertight. The test shall be performed using the existing hydrostatic head provided by the inversion standpipe. The test time shall be 5 minutes during which time no makeup water shall be added to the standpipe. If at the end of the test period no significant water loss is observed in the standpipe, the water tightness of the cured-in-place pipe shall be considered satisfactory.

B. For installation, two liner samples shall be required: A section of cured pipe cut from the installation at an intermediate or terminal manhole and

which has been inserted through a like diameter pipe held in place by a suitable heat sink (such as sandbags); and a sample fabricated from material taken from the tube and the resin/catalyst system used and cured in a clamped ‘plate’ mold placed in the downtube. Each sample shall be large enough to provide a minimum of three specimens.

C. The initial tangent flexural modulus of elasticity and flexural stress shall be measured in accordance with ASTM D-790 and shall meet the requirements of this section.

D. Pipe failing to meet these requirements is subject to rejection and replacement at the Contractor’s expense.

E. Upon acceptance of the installation work and testing, the Contractor shall reinstate service laterals in the project area affected by his operations.

F. After the work is complete, the Contractor shall provide the OWNER with a videotape showing the after installation, including a full circumferential view of the reinstated service lateral connections.

3.09 CLEANUP

A. After the installation work has been completed and all testing acceptable, the Contractor shall clean up the entire Project area. All excess material and debris not incorporated into the permanent installation shall be disposed of by the Contractor. The work area shall be left in a condition equal to or better than prior condition. Disturbed grassed areas shall be seeded or sod placed as directed by the OWNER at no additional cost to the OWNER. Refer to Section 02924 – Site Restoration.

3.10 WARRANTY

A. All liner installation will be warranted to be free from defects in materials and workmanship for a period of five (5) years from the date of rehabilitation. Should a defect occur during this five (5) year period that is attributable to the liner installation or materials, then this defect shall be repaired at no additional cost to the OWNER.

END OF SECTION

SECTION 02770

CURED-IN-PLACE T-LINER

PART 1- GENERAL

1.05 SCOPE

C. The work specified in this Section consists of providing for the reconstruction of a particular mainline section and the adjacent lateral sewer pipe without excavation while providing a one piece leak free connection at the interface of the mainline and lateral pipelines.

1.06 GENERAL

D. The reconstruction will be accomplished using a non-woven fabric tube of particular length and a thermoset resin with physical and chemical properties appropriate for the application. The lateral tube within a translucent inversion bladder is vacuum impregnated with the resin then placed inside a protective carrying device. The mainline liner that is physically attached to the lateral tube is affixed around a rigid "T" launching device. The "T" launching device and protective carrying device are winched into the existing sewer. When the "T" launching device is properly positioned at the lateral connection, the mainline liner is inflated and the resin saturated tube is inverted up through the lateral pipe, using air or water pressure, by bladder and launching/carrying devices are removed. The process shall meet ASTM F2561-06 and shall be manufactured by Performance Liner®, T-Liner™ or approved equal.

1.07 SUBMITTALS

E. The CONTRACTOR shall submit shop drawings, samples of materials, and other information to the ENGINEER for review in accordance with Section 01300, "Submittals".

1.08 QUALIFICATIONS

F. The Qualifications of the CONTRACTOR shall be submitted. These Qualifications shall include detailed descriptions of the following:

1. Name, business address and telephone number of the CONTRACTOR.

2. Name(s) of all supervisory personnel to be directly involved with this project.

3. The CONTRACTOR shall sign and date the information provided and certify that to the extent of his knowledge, the information is

true and accurate, and that the supervisory personnel will be directly involved with and used on this project. Substitutions of personnel and/or methods will not be allowed without written authorization of the ENGINEER.

4. Specialty technicians shall be certified by the equipment manufacturer and/or its authorized representative. Certifications shall be submitted to the ENGINEER.

5. The CONTRACTOR shall provide his references of previous project lists going back two years including his customers' names, addresses, and telephone numbers.

6. To be acceptable, a minimum of 400 T-Liner installations must be documented.

7. To be acceptable, the installer must have had a minimum of two (2) years active experience in the commercial installation of the product.

PART 2- PRODUCTS

2.01 GENERAL

A. The finished liner shall be fabricated from material as specified in this section which when cured will be resistant to the corrosive effects of the raw sewage and hydrogen sulfide.

2.02 LINER SIZING

A. The liner shall be fabricated to a size that when installed will neatly fit the internal circumference of the conduit to be repaired as specified by the ENGINEER.

2.03 LINER MATERIAL

A. The liner shall be one piece and will consist of a lateral portion and the mainline portion with one or more layers of flexible needled felt or an equivalent non-woven material. The liner will be continuous in length and the wall thickness shall be uniform. No overlapping sections shall be allowed in the circumference or the length of the lateral liner. The tube will be capable of conforming to offset joints, bells and disfigured pipe sections. The mainline liner will be flat with one end overlapping the second end and sized accordingly to create a circular lining equal to the diameter of the mainline pipe. The resin will be polyester or vinyl ester with proper catalysts as designed for the specific application. The cured-in-placed pipe shall provide a smooth bore interior with a co-efficient factor of N-.010%. Each installation shall have a design report documenting the

design criteria for a fully deteriorated pipe section, relative to the hydrostatic pressures, depth of soil cover, and type of soil.

B. The composite of the materials above will, upon installation inside the host pipe, exceed the minimum test standards specified by the American Society for Testing Methods.

Minimum Test Standards for CIPP

FLEXURAL STRENGTH (ASTM D-790)	4,500 PSI
FLEXURAL MODULUS (ASTM D-790)	250,000 PSI

2.04 LINER DESIGN

A. The lining manufacturer shall submit to the ENGINEER for review complete design calculations for the liner, signed and sealed by a Professional Engineer registered in the State of Florida and certified by the manufacturer as to the compliance of his materials to the values used in the calculations. A safety factor of 2 shall be applied in the design calculation. The unlined host pipe shall be considered fully deteriorated and if the pipe has a mainline liner already installed the lined pipe shall be considered partially deteriorated The liner shall be designed to withstand a live load equivalent to two H-20 passing trucks plus all pertinent dead loads, hydrostatic pressure and grout pressure (if any). The liner side support shall be considered as if provided by soil pressure against the liner. The existing pipe shall not be considered as providing any structural support. Modulus of soil reaction shall be 700, corresponding to a moderate degree of compaction of bedding and a fine-grained soil as shown in AWWA Manual M45, Fiberglass Pipe Design.

B. Liner shall be neither accepted nor installed until design calculations are acceptable to the ENGINEER.

PART 3- EXECUTION

3.01 CLEANING SEWER LINES

A. Prior to any lining of a pipe so designated, it shall be the responsibility of the CONTRACTOR to remove internal deposits from the pipeline in accordance with Section 02730-Preparatory Cleaning and Root Removal. Both mainline and lateral line shall be cleaned.

3.02 TELEVISION SURVEY

A. Television survey shall be performed in accordance with Section 02752-Television Survey, including Preconstruction and Post Construction Surveys. Both main line and lateral line shall be televised.

B. The interior of the pipeline shall be carefully surveyed to determine the locations and extent of any structural failures. The location of any conditions which may prevent proper installation of lining materials into the pipelines shall be noted so that these conditions can be corrected. A video tape and suitable log shall be kept and turned over to the ENGINEER.

C. For the sewer with T-liner installed, a variance for post-TV and tapes shall be allowed as follows:

1. The post-TV shall commence at the upstream manhole (downstream for reverse setups) and shall proceed at a maximum speed of 30 feet per minute until the repair is reached. No panning of defects or laterals needs to be done. Upon reaching the T-liner, the CONTRACTOR shall stop and carefully pan the beginning and the end of the liner to show that the repair has been successfully completed. The rest of the line shall be televised without stopping until the downstream manhole has been reached.

3.03 FLOW BYPASSING

A. The CONTRACTOR, when required, shall provide for the transfer of flow, through or around section or sections of pipe that are to be repaired. The proposed bypassing system shall be acceptable in advance by the ENGINEER. The acceptance of the bypassing system in advance by the ENGINEER shall in no way relieve the CONTRACTOR of his responsibility and/or public liability. The flow bypassing shall be done in accordance with Section 02750-Wastewater Flow Control.

Note: If the repair can be made in a few hours, bypass pumping may not be required. The placement carriage shall be equipped with a bypass section to allow flow once liner is pressed into place.

3.04 LINE OBSTRUCTIONS

A. It shall be the responsibility of the CONTRACTOR to clear the line of obstruction. If survey reveals an obstruction that cannot be removed by conventional cleaning equipment, the CONTRACTOR shall make a point repair excavation in accordance with Section 02757-Point Repair of Sanitary Sewers to uncover and remove or repair the obstruction. Such excavation shall be accepted in writing by the ENGINEER prior to the commencement of the work.

3.05 LINER INSTALLATION

A. The tube is inspected for tears and frayed sections. The tube, in good condition, will be vacuum impregnated with the thermostat resin. The resin will be introduced into the tube creating a slug of resin at the

beginning of the tube. A calibration roller will assist the resin slug to move throughout the tube. All air in the tube shall be removed by vacuum allowing the resin to thoroughly impregnate the tube. All resin shall be contained to ensure no public property or persons are exposed to the liquid resin. The mainline liner will be saturated upon a wet-out platform. The resin impregnated sample (wick), shall be retained by the installer to provide verification of the curing process taking place in the host pipe.

B. The saturated tube along with the inversion bladder will be inserted into the carrying device. The mainline liner is affixed on the “T” launching device. Both the launching and carrying device is pulled into the pipe using a cable winch. The pull is complete when the open port of the “T” launching device is aligned with the interface of the service connection and mainline pipe. The resin saturated lateral tube is completely protected during the pull. No resin shall be lost by contact with manhole walls or the pipe during the pull. The resin saturated mainline liner is supported upon the rigid “T” launcher that is elevated above the pipe invert by means of rotating skid system. The mainline liner should not be contaminated or diluted by exposure to dirt, debris, or water during the pull.

C. The installer shall document the placement of the “T” Liner by internal video inspection with the camera being inserted from the lateral pipe down to the mainline pipe.

D. The mainline liner is expanded against the mainline pipe and lateral tube is inverted out of the “T” launcher/carrying device by controlled air or water pressure. The installer shall be capable of viewing the lateral liner contacting the lateral pipe from the beginning to the end of the repair. The mainline liner and the lateral tube are held tightly in place against the wall of the host pipe by controlled pressure until the cure is complete.

E. When the curing process is complete, the pressure will be released. The inversion bladder and launching device shall be removed from the host pipe with the winch. No barriers, coatings, or any material other than the cured tube/resin composite, specifically designed for desirable physical and chemical resistance properties, should ever be left in the host pipe. Any materials used in the installation other than the cured tube/resin composite are to be removed from the pipe by the installer.

3.06 ACCEPTANCE AND TESTING

A. The finished liner shall be continuous over the length of the installation. The liner shall be free from visual defects, damage, deflection, holes, delamination, uncured resin, and the like. There shall be no visible infiltration through the liner or from behind the liner.

B. Verification of a non-leaking lateral liner and service connection shall require an air test in accordance with the following specifications. Testing shall be performed at the OWNER's discretion but at a frequency not to exceed one test for every ten T-liners installed. The cost for the test shall be included in the T-liner installation cost, and no separate payment shall be made.

1. A camera shall be inserted into the lateral pipe via a clean-out upstream of the upper most portion of the cured in-place lateral liner. The camera is then moved through the lateral pipe until it becomes positioned at the lateral/main connection. The camera is utilized to assist in positioning and placing a pair of plugs in the mainline on either side of the lateral opening. A pair of test plugs with a minimum of a ten-inch clear separation shall be centered on the lateral opening and spanning the brim of the lined connection.

2. Next, an air test plug shall be introduced into the lateral pipe by use of the clean-out opening. The test plug will be placed not more than five inches inside of the cured in-place lateral liner at its upper most portion. The test plug shall be inflated and sealed against the upper most portion of the cured in-place lateral liner.

3. The pair of plugs within the mainline are then inflated and sealed across the service connection.

4. Air-pressure not less than 4 PSI shall be introduced through the test plug. The void area between the three plugs shall be pressurized at 4 PSI, held for 3 minutes and during this time the pressure shall not drop below 3.5 PSI.

5. If an installed cured in-place lateral liner fails the specified air test, the corrective measures shall be taken.

    a. The cured in-place lateral liner shall be re-inspected by use of a closed circuit television camera in attempt to identify the defect.

    b. Any repairs made shall consist of materials that are structural and meet or exceed the same criteria as the cured in-placed lateral liner is required to meet in a domestic sewer collection system. Such materials shall have a minimum life expectancy of 50 years in accordance with ASTM F-1216-93 Appendix X1 Design Considerations and Appendix X2 Chemical-Resistance Test.

    c. Once the defect has been corrected, the renewed lateral pipe shall be retested in accordance with the air procedure as described above.

d. Any corrective measures shall be performed at the CONTRACTOR's expense.

6. If any of the air tests fail, the OWNER at its option may require the CONTRACTOR to test an addition lateral at no additional charge to the OWNER. If a second air test shall fail, the OWNER at its option may require the CONTRACTOR to test additional or all of the installed cured in-place lateral linings at no additional charge to the OWNER.

3.07 CLEANUP

A. After the liner installation has been completed and accepted, the CONTRACTOR shall clean up the entire project area and return the ground cover to grade. All excess material and debris not incorporated into the permanent installation shall be disposed of by the CONTRACTOR.

3.08 WARRANTY

A. The liner shall be certified by the manufacturer for specified material properties for a particular job. The manufacturer warrants the liner to be free from defects in raw materials for one year from the date of acceptance. During the warranty period, any defects which affect the integrity or strength of the pipe shall be repaired at the CONTRACTOR's expense in a manner mutually agreed by the OWNER and the CONTRACTOR.

END OF SECTION