RFP 2000003120

ATTACHMENT B – TECHNICAL SPECIFICATIONS

COUNTY OF FAIRFAX, VIRGINIA

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SECTION 01025 – MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.1 BASIS FOR MEASUREMENT AND PAYMENT

Measurement and Payment will be made for only those items included in the Schedule of Unit Prices and any written modifications issued by the County Purchasing Agent for the Project.

A. All measurement for payment will be for completed work performed according, ng to Contract Specifications, Construction Details and the Schedule of Unit Prices. The Engineer or Owner shall measure all work according to the methods outlined below.

B. Payment for any item is full compensation for furnishing all labor, materials and equipment required to provide a complete and operable item of the work. Any work and material paid for under one item, will not be paid for under another item.

C. Where units differ between the items listed below and the Schedule of Unit Prices, the Schedule of Unit Prices governs.

D. Work and products not installed in accordance with the requirements of the Contract Documents will be rejected or placed on a punch list for correction. If proper supporting documentation is not submitted during the invoice process, the County will reject or place the invoice on punch list for correction. The County may choose to not issue new work or delay current work until punch list items are corrected. It is expected that all punch list items will be corrected within 30 days or less of notification.

1.2 ANNUAL WORK (IF APPLICABLE TO THIS CONTRACT)

A. There is no guarantee for the amount of work issued under an annual contract.

PART 2 CONTRACT ITEMS

2.1 SPECIALIZED MOBILIZATION (ITEM 1)

A. *Measurement:* The Owner may utilize additional funds for this 5-year contract on an as needed basis to cover additional costs of emergency work and large scale planned work mobilization which is generally off road. The Owner in its sole discretion will determine when additional costs will be paid in the form of a lump sum payment or a percentage thereof under this Item. Specialized mobilization and/or emergency work costs are only granted upon authorization from the Owner and does not include standard sewer or manhole rehabilitation work reasonably authorized as part of this contract.

B. *Payment*: The cost of this item will be determined for each occurrence when unforeseeable costs deemed by the Owner result from specialized mobilization and/or emergency work. When requested by the Owner, the Contractor will be required to submit a schedule of values with supporting documentation to the County for all mobilization and/or emergency costs. Costs for items contained within other contract items, demobilization, final site restoration and cleanup must not be included in the lump sum payment of this item. Upon approval by the Owner

payment for mobilization/emergency cost will be paid according to the documented value of materials delivered and work completed in the field. Any items requiring installation and removal at the completion of work will be paid for at a rate of 70 % for installation and 30 % when removed.

This item includes all materials and operations necessary to assemble, set up the project, breakdown the project including, but not limited to, the following:

1. Initial movement of personnel to the site.
2. Construction and removal of storage and parking areas.
3. Field Office facility setup and removal
4. Providing sanitary and other facilities required by the specifications and/or state, Federal, local or safety regulations.
5. Moving on and off site all tools and other items required to complete the work.
6. All other work initial expenses, payment of bonds, insurance premiums, and operations which must be performed before the beginning of work.
7. All temporary utilities required for the construction activities.
8. All costs related to safety and security.

2.2 CIPP REHABILITATION OF GRAVITY SEWER (HEAT CURED) (ITEMS NO. 2 – 8)

A. *Measurement:* Shall be based upon the actual linear footage (LF) for each diameter of gravity sewer host pipe, where the CIPP installed is measured from manhole to manhole. The pay length must match the as-built length of the sewer line as shown in the County Geographic Information System. Any discrepancy will be resolved with precise measurements in the field by the contractor with formal confirmation by the County.

B. *Payment*: Payment shall be made at the contract unit price per linear foot (LF) for each diameter of gravity sewer host pipe. The unit price includes all labor, incidentals, materials, equipment, resident notification/coordination, necessary permits, flow control/bypass pumping flows 2 MGD and less , regular line cleaning, pre-liner, CCTV inspection to identify an obstruction and to verify the need for heavy cleaning, obstruction removal, traffic control for a two lane road 45 MPH and below, liner testing, pre and post CIPP lining CCTV inspection, reports, mobilization/demobilization, **all QA/QC including sample testing and web based curing temperature monitoring,** and all other work not included under other items necessary to complete the work as specified.

2.3 CIPP REHABILITATION OF GRAVITY SEWER (UV CURED) (ITEMS NO. 9 – 15)

A. *Measurement:* Shall be based upon the actual linear footage (LF) for each diameter of gravity sewer host pipe, where the CIPP installed is measured from manhole to manhole. The pay length must match the as-built length of the sewer line as shown in the County Geographic Information System. Any discrepancy will be resolved with precise measurements in the field by the contractor with formal confirmation by the County.

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B. *Payment*: Payment shall be made at the contract unit price per linear foot (LF) for each diameter of gravity sewer host pipe. The unit price includes all labor, incidentals, materials, equipment, resident notification/coordination, necessary permits, flow control/bypass pumping flows 2 MGD and less , regular line cleaning, pre-liner, CCTV inspection to identify an obstruction and to verify the need for heavy cleaning, obstruction removal, traffic control for a two lane road 45 MPH and below, liner testing, Pre and post CIPP lining CCTV inspection, reports, mobilization/demobilization, **all QA/QC including sample testing and web based curing temperature monitoring**, and all other work not included under other items necessary to complete the work as specified.

2.4 END SEAL FOR CIPP REHABILITATION OF GRAVITY SEWER (ITEMS NO. 16 – 20)

A. *Measurement:* Shall be based upon the count for each (EA) seal installed at the liner to manhole interface for the purpose of the elimination of infiltration and inflow.

B. *Payment*: Payment shall be made for each seal installed in connection with new liner installation. A quantity of two (2) seals will be paid for each sewer line rehabilitated.

2.5 HEAVY SEWER CLEANING OF GRAVITY SEWER PIPE (ITEMS NO. 21 – 22)

A. *Measurement:* Heavy sewer cleaning for pipelines is defined as cleaning performed in sewer pipes in excess of three (3) sewer cleaning passes, and outside of regular cleaning required to perform sewer rehabilitation. This line item shall only be utilized under written authorization from the County. Measurement shall be based upon the linear feet of sewer cleaned for each sewer using equipment and procedures specified for heavy cleaning.

B. *Payment*: Shall be made at the contract unit price per linear foot for each diameter of gravity sewer cleaned. The unit price includes all labor, traffic control for a two-lane road 45 MPH, and below materials, equipment, mobilization and demobilization, incidentals and debris removal and disposal. Payment shall be made to the Contractor based CCTV inspection reports.

2.6 HEAVY SEWER CLEANING OF GRAVITY SEWER MANHOLE (ITEM NO. 23)

A. *Measurement:* Heavy sewer cleaning for manholes is defined as cleaning performed when debris exceeds 33% of the manhole volume as calculated from invert to manhole rim and outside of regular cleaning required to perform sewer rehabilitation. This line item shall only be utilized under written authorization from the County. Measurement shall be based upon the vertical feet of four and five-foot diameter sewer manhole cleaned.

B. *Payment*: Shall be made at the contract unit price per vertical foot for each diameter of manhole cleaned. The unit price includes all labor, traffic control for a two-lane road 45 MPH and below, materials, equipment, mobilization and demobilization, incidentals and debris removal and disposal. Payment shall be made to the Contractor based CCTV inspection reports.

SECTION 01025 – MEASUREMENT AND PAYMENT

2.7 EXTREME SEWER CLEANING OF GRAVITY SEWER OR WET WELL AT PUMP STATION (ITEM NO. 24)

A. *Measurement:* Shall be based upon the actual crew hours (HR) spent cleaning extreme sediments and debris from pipelines and wet wells using equipment and procedures specified for heavy cleaning and deemed necessary by the County in its sole discretion to clean extreme amounts of sediment and debris from the sewer system.

B. *Payment*: Shall be made for each hour the entire crew spends cleaning the sewer utility. Items 21, 22 and 23 above may not be used for any one structure or pipeline in conjunction with this item. Attempt will be made to clean and pay for cleaning under items 21, 22 and 23 prior to requesting approval to clean and make payment under this item. Payment under item 24 will include hours spent attempting heavy cleaning as approved by the County. Pre and Post CCTV inspection will be provided to confirm the work. The unit price includes all labor, incidentals, materials, equipment, mobilization and demobilization, incidentals, debris removal and disposal, notification/coordination, necessary permits, flow control/bypass pumping flows 2 MGD and less , cleaning, CCTV inspection to identify an obstruction and to verify the need for extreme heavy cleaning, obstruction removal, traffic control for a two lane road 45 MPH and below, liner testing, reports, and all other work not included under other items necessary to complete the work as specified.

2.8 MECHANICAL LINER REHABILITATION OF GRAVITY SEWER (ITEMS NO. 25 – 31)

A. *Measurement:* Shall be based upon the actual linear footage (LF) for each diameter of gravity sewer host pipe, where the mechanical liner installed is measured from manhole to manhole. The pay length must match the as-built length of the sewer line as shown in the County Geographic Information System. Any discrepancy will be resolved with precise measurements in the field by the contractor with formal confirmation by the County.

B. *Payment*: Payment shall be made at the contract unit price per linear foot (LF) for each diameter of gravity sewer host pipe. The unit price includes all labor, incidentals, materials, equipment, resident notification/coordination, necessary permits, flow control/bypass pumping flows 2 MGD and less , regular line cleaning, CCTV inspection to identify an obstruction and to verify the need for heavy cleaning, obstruction removal, traffic control for a two lane road 45 MPH and below, liner testing, pre and post installation CCTV inspection, reports, mobilization/demobilization, QA/QC, and all other work not included under other items necessary to complete the work as specified.

2.9 EMERGENCY ROBTIC REINSTATEMENT OF SERVICE CONNECTIONS (ITEM NO 32)

A. *Measurement:* Measurement shall be based on the actual number of lateral taps on which the work is completed, including inspection and confirmation that tap is 100% open on sewer lines which have been previously rehabilitated by others. The Contractor shall ensure that all taps have been robotically trimmed and reinstated between the upstream and downstream manholes. Emergency response time will be 2 hours to confirm the work has been scheduled and 24 hours to complete it when the property owner is not experiencing a sewer backup. When the property owner is experiencing a sewer back-up, the reinstatement must be completed within three hours of being notified to reinstate the sewer service connection. A confirmation report consisting of

pre and post NASSCO compliant CCTV inspection will be transmitted to the County upon completion of the work.

B. *Payment:* Payment shall be made at the contract unit price for each (EA) lateral tap confirmed to be 100% robotically trimmed/reinstated as shown on the post CCTV video on existing lined sewer mains up to and including 15-inch diameter lines. The unit cost shall include all diameters of lateral taps inspected and confirmed open. This item includes but is not limited to all mobilization and demobilization, labor, equipment, materials, tools, flow control/bypass pumping flows 2 MGD and less , traffic control for a two lane road 45 MPH and below, mobilization and demobilization, pre and post closed circuit television (CCTV) to monitor and confirm cutting operations, debris removal, site restoration, incidentals, resident notification/coordination and all other work not included under other items necessary to complete the work as specified.

2.10 ROBTIC REINSTATEMENT OF SERVICE CONNECTIONS AFTER INSTALLATION OF CIPP OR OTHER REHABILATAION METHOD (ITEM NO 33)

A. *Measurement:* Measurement shall be based on the actual number of lateral taps on which the work is completed, including inspection and confirmation that tap is 100% open on sewer lines which have been rehabilitated under this contract. The Contractor shall ensure that all taps have been robotically trimmed and reinstated between the upstream and downstream manholes. A confirmation report consisting of pre and post NASSCO compliant CCTV inspection will be transmitted to the County with Draft Invoice for acceptance. Inspection will be included as part of the inspection of the newly installed CIPP or other rehabilitation process used.

B. *Payment:* Payment shall be made at the contract unit price for each (EA) lateral tap confirmed to be 100% robotically trimmed/reinstated as shown on the post CCTV video on existing lined sewer mains up to and including 15-inch diameter lines. The unit cost shall include all diameters of lateral taps inspected and confirmed open. This item includes but is not limited to all mobilization and demobilization, labor, equipment, materials, tools, flow control/bypass pumping flows 2 MGD and less , traffic control for a two lane road 45 MPH and below, mobilization and demobilization, pre and post closed circuit television (CCTV) to monitor and confirm cutting operations, debris removal, site restoration, incidentals, resident notification/coordination and all other work not included under other items necessary to complete the work as specified.

2.11 4-INCH SEWER MAIN/LATERAL INTERFACE TAP REPAIR AND SEAL (ITEM NO 34)

A. *Measurement:* Measurement shall be based on the actual number of non-grout lateral taps repaired and sealed to eliminate infiltration and inflow at the tap. Full wrap lateral seals are preferred. The Contractor shall ensure that all taps have been sealed between the upstream and downstream manholes.

B. *Payment:* Payment shall be made at the contract unit price for each (EA) lateral tap repaired and sealed on existing sewer mains up to and including 15-inch diameter lines. The unit price includes all labor, incidentals, materials, equipment, resident notification/coordination, necessary permits, flow control/bypass pumping flows 2 MGD and less , regular line cleaning, CCTV inspection to identify an obstruction and to verify the need for heavy cleaning, obstruction removal, traffic control for a two lane road 45 MPH and below, leak testing, Pre and post CCTV

inspection, reports, mobilization/demobilization, QA/QC, and all other work not included under other items necessary to complete the work as specified.

2.12 6-INCH SEWER MAIN/LATERAL INTERFACE TAP REPAIR AND SEAL (ITEM NO 35)

A. *Measurement:* Measurement shall be based on the actual number of non-grout lateral taps repaired and sealed to eliminate infiltration and inflow at the tap. Full wrap lateral seals are preferred. The Contractor shall ensure that all taps have been sealed between the upstream and downstream manholes.

B. *Payment:* Payment shall be made at the contract unit price for each (EA) lateral tap repaired and sealed on existing sewer mains up to and including 15-inch diameter lines. The unit price includes all labor, incidentals, materials, equipment, resident notification/coordination, necessary permits, flow control/bypass pumping flows 2 MGD and less , regular line cleaning, CCTV inspection to identify an obstruction and to verify the need for heavy cleaning, obstruction removal, traffic control for a two lane road 45 MPH and below, leak testing, Pre and post CCTV inspection, reports, mobilization/demobilization, QA/QC, and all other work not included under other items necessary to complete the work as specified.

2.13 8 INCH SEWER MAIN/LATERAL INTERFACE TAP REPAIR AND SEAL (ITEM NO 36)

A. *Measurement:* Measurement shall be based on the actual number of non-grout lateral taps repaired and sealed to eliminate infiltration and inflow at the tap. Full wrap lateral seals are preferred. The Contractor shall ensure that all taps have been sealed between the upstream and downstream manholes.

B. *Payment:* Payment shall be made at the contract unit price for each (EA) lateral tap repaired and sealed on existing sewer mains up to and including 15-inch diameter lines. The unit price includes all labor, incidentals, materials, equipment, resident notification/coordination, necessary permits, flow control/bypass pumping flows 2 MGD and less , regular line cleaning, CCTV inspection to identify an obstruction and to verify the need for heavy cleaning, obstruction removal, traffic control for a two lane road 45 MPH and below, leak testing, Pre and post CCTV inspection, reports, mobilization/demobilization, QA/QC, and all other work not included under other items necessary to complete the work as specified.

2.14 TRIM PROTRUDING SERVICE CONNECTIONS > ½ INCH (ITEM NO. 37)

A. *Measurement:* Measurement shall be based on the actual number of lateral taps **that have protrusions greater than 1/2/inch** robotically trimmed for each range of gravity sewer diameters where deemed necessary to prepare a gravity sewer for CIPP lining.

B. *Payment:* Payment shall be made at the contract unit price for each (EA) lateral tap trimmed for each range of gravity sewer diameters in Attachment C – Cost Proposal. The unit cost shall include all diameters of lateral taps trimmed. This item includes but is not limited to all mobilization and demobilization, labor, materials, tools, flow control/bypass pumping flows 2 MGD and less , traffic control for a two lane road 45 MPH and below, mobilization and demobilization, closed circuit television (CCTV) to monitor cutting operation, protruding tap

removal, debris removal, site restoration, incidentals, resident notification/coordination and all other work not included under other items necessary to complete the work as specified.

2.15 4, 6 AND 8-INCH SEWER MAIN/LATERAL INTERFACE TAP GROUT REPAIR AND SEAL (ITEM NO 38)

A. *Measurement:* Measurement shall be based on the actual number of taps repaired and sealed for the elimination of infiltration and inflow at the tap. Unit of measure is by Each (EA) tap completed. Acrylamide, Urethane and Acrylate gels are preferred. The Contractor shall ensure that all taps have been sealed between the upstream and downstream manholes. The Contractor shall provide field documentation to confirm the number of gallons used to eliminate infiltration and inflow at each tap.

B. *Payment:* Payment shall be made at the contract unit price per each tap repaired and sealed on existing sewer mains up to and including 15-inch diameter lines. The unit price includes up to two gallons of chemical gel grout, all labor, incidentals, materials, equipment, resident notification/coordination, necessary permits, flow control/bypass pumping flows 2 MGD and less , regular line cleaning, CCTV inspection to identify an obstruction and to verify the need for heavy cleaning, obstruction removal, traffic control for a two lane road 45 MPH and below, leak testing, Pre and post CCTV inspection, reports, mobilization/demobilization, QA/QC, and all other work not included under other items necessary to complete the work as specified.

2.16 8, 10, 12, 14, 15, 16, AND 18-INCH PIPE JOINT CHEMICAL GROUT REPAIR AND SEAL (ITEMS NO 39 – 45)

A. *Measurement:* Measurement shall be based on the actual number of joints repaired and sealed for the elimination of infiltration and inflow at the joints. Unit of measure is by Each (EA) joint completed. Acrylamide, Urethane and Acrylate gels are preferred. The Contractor shall ensure that all joints have been sealed between the upstream and downstream manholes. The Contractor shall provide field documentation to confirm the number of gallons used to eliminate infiltration and inflow at each joint.

B. *Payment:* Payment shall be made at the contract unit price per each joint repaired and sealed on existing sewer mains for the diameter of pipe being repaired. The unit price includes up to two gallons of chemical gel grout on 8 inch pipe joints, three gallons of grout on 10-12 inch pipe joints, four gallons on 14 to 16 inch pipe joints and five gallons on 18 inch pipe joints, all labor, incidentals, materials, equipment, resident notification/coordination, necessary permits, flow control/bypass pumping flows 2 MGD and less , regular line cleaning, CCTV inspection to identify an obstruction and to verify the need for heavy cleaning, obstruction removal, traffic control for a two lane road 45 MPH and below, leak testing, Pre and post CCTV inspection, reports, mobilization/demobilization, QA/QC, and all other work not included under other items necessary to complete the work as specified.

2.17 GALLONS OF GROUT USED FOR REPAIR AND SEAL (ITEM NO 46)

A. *Measurement:* When approved by the County, measurement shall be based on the actual number of gallons used in excess of the established quantities given in items 36-43 to eliminate infiltration and inflow at joints, sewer service connection taps and defects. This item may also

be used for the actual number of gallons used to eliminate infiltration and inflow, repair and seal pipe defects outside items 36-43. Unit of measure is by Each (EA) gallon used. Acrylamide, Urethane and Acrylate gels are preferred. The Contractor shall ensure that all defects and leaks have been sealed between the upstream and downstream manholes. The Contractor shall provide field documentation to confirm the number of gallons used to eliminate infiltration and inflow at each defect.

B. *Payment:* Payment shall be made at the contract unit price for each gallon used to repair and seal existing sewer mains up to 15-inch diameter. The unit price includes chemical gel grout, all labor, incidentals, materials, equipment, resident notification/coordination, necessary permits, flow control/bypass pumping flows 2 MGD and less , regular line cleaning, CCTV inspection to identify an obstruction and to verify the need for heavy cleaning, obstruction removal, traffic control for a two lane road 45 MPH and below, leak testing, Pre and post CCTV inspection, reports, mobilization/demobilization, QA/QC, public notifications and all other work not included under other items necessary to complete the work as specified.

2.18 CURED IN PLACE OR ALTERNATE INTERNAL POINT REPAIR (ITEMS NO. 47 – 53)

A. *Measurement:* Shall be made on the basis of completion of the Work in accordance with the Contract Documents and this section.

B. *Payment:* Shall be made at the contract unit price per linear foot (LF) for rehabilitating sanitary sewer pipelines, using the sectional cured in place pipe or alternate internal point repair method. Measurement of quantities will be made by the Contractor in the presence of the Owner. The unit price includes all labor, by-pass pumping (up to 2 MGD), cost of potable water, debris collection and disposal, dewatering, erosion and sediment control, excavation pits, ingress and egress procedures, materials, permits, regular line cleaning, pre-television and post-television inspection, re-instatement of service connections, removal and replacement of manhole frames and covers as necessary, removal of protruding service connections, resident/business owner notification, root removal, sediment and root removal, sealing liner at service connections, sealing the liner in the manholes, site restoration, site cleanup, testing, traffic control and other work, not included under other items, necessary to complete the rehabilitation per the Contract Documents.

2.19 BYPASS PUMPING (ABOVE 2.0 – 5.0 MGD) (ITEM NO. 54)

A. *Measurement*: Bypass pumping shall be measured based on the daily rate (DAY) established in the unit price. Bypass pumping shall be an incidental cost for CIPP lining with average daily flows 2 MGD and less and shall not be measured for payment. This item shall be reviewed as part of the bypass plan for each installation.

B. *Payment*: Payment shall be made at the contract unit price per day (DAY) required for bypass pumping for flows greater than 2 MGD up to 5.0 MGD. The unit price includes all labor, incidentals, materials, equipment, mobilization/demobilization, and all other work not included under other items, necessary to complete the work as specified. Bypass pumping 2 MGD and less is considered incidental to the various work items.

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2.20 BYPASS PUMPING (ABOVE 5.0 MGD – 10 MGD) (ITEM NO. 55)

A. *Measurement*: Bypass pumping shall be measured based on the daily rate (DAY) established in the unit price for bypass flow greater than 5 MGD. This item shall be reviewed as part of the bypass plan for each installation.

B. *Payment*: Payment shall be made at the contract unit price per day (DAY) required for bypass pumping for flows between 5 MGD and 10 MGD. The unit price includes all labor, incidentals, materials, equipment, mobilization/demobilization, and all other work not included under other items, necessary to complete the work as specified.

2.21 LATERAL CLEANOUT BY VACUUM EXCAVATION (ITEM NO. 56-58)

A. *Measurement:* Measurement shall be based on the actual number of service connection cleanouts installed by vacuum excavation and successfully passing leakage tests for 4" 6" and 8" sewer laterals. Cleanouts will be used to provide access points for bypass pumping when the County has deemed it necessary to maintain the sewer service for critical sewer customers who cannot be interrupted during repair or rehabilitation operations. Cleanouts are to be installed when directed by County when isolation of sewer flows must be accomplished at the sewer lateral in order to complete the work.

B. *Payment:* Payment shall be made at the contract unit price per each (EA) service connection cleanout installed for each range of gravity sewer diameters in Attachment C – Cost Proposal. The unit cost shall include vacuum excavation, backfill, pipe, fittings, connection to services, testing bypass pumping to isolate sewer service from customer for the duration of the work, plugging the service tap at the mainline sewer pipe and all incidentals required to isolate the sewer service flows from the customer. This item includes but is not limited to all mobilization and demobilization, labor, materials, tools, flow control/bypass pumping flows 2 MGD and less, traffic control for a two lane road 45 MPH and below, mobilization and demobilization, closed circuit television (CCTV) as needed, debris removal, temporary and final site restoration, incidentals and all other work not included under other items necessary to complete the work as specified.

2.22 CEMENTITIOUS MANHOLE REHABILITATION, CALCIUM ALUMINATE (ITEMS NO. 59 – 62)

A. *Measurement*: Measurement of each rehabilitated manhole shall be for the actual number of manholes rehabilitated and by the vertical foot (VF) from the invert to the top of the frame, rounded to the nearest foot, for each diameter of manhole.

B. *Payment:* Payment shall be made at the contract unit prices per vertical foot (VF) for actual quantities measured and accepted for each diameter manhole. Cementitious manhole rehabilitation using calcium aluminate based mortar includes invert to rim rehabilitation. The unit price includes all labor, incidentals, materials, equipment, resident notification/coordination, necessary permits, bypass pumping flows 2 MGD and less , manhole regular cleaning, traffic control for a two lane road 45 MPH and below, bench repair, water plugs, wall preparation and surface smoothing, incidentals, post rehab camera inspection, mobilization/demobilization, reports, QA/QC, and all other work not included under other items, necessary to complete the work as specified.

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2.23 POLYMER MANHOLE REHABILITATION (ITEMS NO. 63-66)

A. *Measurement*: Measurement of each rehabilitated manhole shall be by the vertical foot (VF) from the invert to the top of the frame, rounded to the nearest foot, for each diameter manhole.

B. *Payment:* Payment shall be made at the Contract unit prices per vertical foot (VF) for actual quantities measured and accepted for each diameter manhole. Manhole rehabilitation using epoxy or polyurethane liner includes invert to rim rehabilitation. The unit price shall include all acceptable methods of plastic liner installation. The unit price includes all labor, incidentals, materials, equipment, resident notification/coordination, necessary permits, bypass pumping flows 2 MGD and less , manhole regular cleaning, traffic control for a two lane road 45 MPH and below, bench repair, water plugs, wall preparation and surface smoothing, incidentals, post rehab camera inspection, mobilization/demobilization, reports, QA/QC, and all other work not included under other items, necessary to complete the work as specified.

2.24 MANHOLE FRAME AND COVER REPLACEMENT (ITEM NO. 67)

A. *Measurement*: Measurement shall be by each (EA) manhole frame and cover removed and replaced.

B. *Payment:* Payment shall made at the contract unit prices for each manhole frame and cover. Payment includes removal of existing frame and cover, replacing frame and cover, and disposal of old frame and cover, backfill and compaction, and restoring pavement markings, reestablish lawns and grasses as required.

C. *Restoration Requirements:*

1. For manholes located in paved areas and where pavement is removed, pavement replacement and restoration of the site including all pavement markings will be completed in accordance with the Virginia Department of Transportation Land Use Permit, Open-Cut Pavement Restoration Requirements and all other VDOT requirements. Compensation for pavement replacement and repair, including restoration of all pavement markings will be paid at the unit rates listed in Attachment C - Cost Proposal under the associated paving items.

2. For manholes located in non-paved areas the costs for all restoration shall be incidental and included in the unit rate.

2.25 MANHOLE INSERT UNDER FRAME AND COVER, RAIN POT (ITEM NO. 68)

A. *Measurement*: Measurement shall be by each (EA) manhole insert, rain pot installed new or replaced.

B. *Payment:* Payment shall be at the unit price in Attachment C – Cost Proposal. Payment includes all work, materials, labor and equipment required to install manhole insert, rain pot complete and disposal of old rain pot as required.

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2.26 ADJUST MANHOLE TOP TO GRADE USING PRE-CAST GRADE RINGS OR BRICK (ITEMS NO. 69-70)

A. *Measurement*: Shall be made on the basis of completion of the Work in accordance with the Contract Documents and this section.

1. Measurement of quantities will be made by the Contractor in the presence of the Owner. Measurement for payment to complete the manhole transition between top of precast cone section to the bottom of the frame and cover will be measured by the vertical feet (VF) of grade rings constructed to complete the transition (Chimney) of the manhole. If existing manhole is not pre-cast, measurement will be based on the number of vertical feet (VF) of brick courses used to bring manhole frame and cover to final grade, excluding the frame and cover itself in accordance with the Contract Documents. Measurement will be rounded to the closest tenth of a foot.

2. Manhole construction shall be completed in accordance with Fairfax County Public Facilities Manual.

B. *Payment:* Payment shall consist of all costs to furnish and install complete the manhole adjustment to final grade, for each size manhole as identified in Attachment C – Cost Proposal . The unit price includes all labor, incidentals, materials, equipment, resident notification/coordination, necessary permits, backfill, clearing, dewatering, excavation, backfill, grading, grubbing, landscaping, post-installation level 1 NASSCO compliant inspection, traffic control for a two lane road 45 MPH and below, protection of existing utilities, removal and disposal and disposal of existing manhole structure (where required), temporary site restoration, reports, QA/QC, and all other work not included under other items, necessary to complete the work as specified.

Borrow material to replace unsuitable spoils excavated during the work, erosion and sediment control, tree protection, restoration of roadway right-of-way areas including all asphalt paving, sidewalk, curb and gutter, seed, and sod will be paid for separately as described under those items of this specification. Any items not described within Attachment C – Cost Proposal are considered incidental and will not be paid for separately.

2.27 MANHOLE INTERNAL CHIMNEY SEAL FOR MANHOLE REHABILITATION (ITEM NO. 71)

A. *Measurement:* Measurement of quantities will be made by the Contractor in the presence of the Owner. Measurement to be will by the vertical feet (VF) of internal chimney seal installed overtop the manhole transition (Chimney) to eliminate infiltration and inflow. Measurement will be rounded to the closest tenth of a foot.

B. *Payment*: Payment includes all equipment, material and labor for the installation of an internal chimney seal. Payment shall be made for the actual number of vertical feet (VF) installed and left in place in connection with manhole rehabilitation.

2.28 MANHOLE EXTERNAL CHIMNEY SEAL FOR MANHOLE REHABILITATION (ITEM NO. 72)

A. *Measurement:* Measurement of quantities will be made by the Contractor in the presence of the Owner. Measurement to be will by the vertical feet (VF) of external chimney seal installed

overtop the manhole transition (Chimney) to eliminate infiltration and inflow. Measurement will be rounded to the closest tenth of a foot.

B. *Payment*: Payment includes all equipment, material and labor for the installation of an external chimney seal. Payment shall be made for the actual number of vertical feet (VF) installed and left in place in connection with manhole rehabilitation.

2.29 MANHOLE CHEMICAL GROUT LEAK REPAIR FOR MANHOLE REHABILITATION (ITEM NO. 73)

A. *Measurement:* The Contractor shall provide field documentation to confirm the number of gallons used to eliminate infiltration and inflow at each manhole slated for rehabilitation using a chemical grout. Measurement of quantities will be made by the Contractor in the presence of the Owner. Measurement for each gallon (GAL) will be rounded to the closest gallon.

B. *Payment*: Payment includes all equipment, material and labor for the installation of each gallon used to eliminate leaks within the manhole in connection with manhole rehabilitation.

2.30 MANHOLE EXPANSION BAND JOINT SEAL FOR MANHOLE REHABILITATION (ITEMS NO. 74-75)

A. *Measurement:* Measurement of quantities will be made by the Contractor in the presence of the Owner. Measurement will be made for each (EA) compression seal installed in precast manholes overtop leaking riser and cone section joints to eliminate infiltration and inflow.

B. *Payment*: Payment includes all equipment, material and labor for the installation of each expansion band joint seal. Payment shall be made for the actual number installed and left in place in connection with manhole rehabilitation.

2.31 FOUR- OR FIVE-FOOT DIAMETER MANHOLE BENCH AND CHANNEL REPLACEMENT (ITEMS NO. 76-77)

A. *Measurement*: Shall be made on the basis of completion of the Work in accordance with the Contract Documents and this section.

1. Measurement of quantities will be made by the Contractor in the presence of the Owner. Measurement will be made for each (EA) channel and bench removed and replaced with a newly constructed channel and bench within the existing manhole.

2. All work shall be completed in accordance with Fairfax County Public Facilities Manual.

B. *Payment:* Payment shall consist of all costs to remove existing channel and bench, furnish and install complete a new channel and bench in an existing sanitary sewer manhole, for each size manhole as identified in Attachment C – Cost Proposal . The unit price includes all labor, construction as shown in the County typical plates (Standard Details), bypass pumping/flow control (up to 2 MGD), manhole connections or drop connections, post-installation video inspection of manhole, removal and disposal, and traffic control for a two lane roads 45 MPH and below. Traffic control for a four-lane road with posted speed limit greater than 45 miles per hour, item 86 and Bypass pumping greater than 2 MGD, items 53 and 54 will be paid for separately when needed and directed by the County.

SECTION 01025 – MEASUREMENT AND PAYMENT

2.32 FOUR- OR FIVE-FOOT DIAMETER MANHOLE BENCH AND CHANNEL REPAIR (ITEMS NO. 78-79)

A. *Measurement*: Shall be made on the basis of completion of the Work in accordance with the Contract Documents and this section.

1. Measurement of quantities will be made by the Contractor in the presence of the Owner. Measurement will be made for each (EA) channel and bench repaired to produce a structurally sound channel and bench within the existing manhole. Repair assumes no bench demolition or removal. Cleaning and rebuilding benches only.

2. All work shall be completed in accordance with Fairfax County Public Facilities Manual.

B. *Payment:* Payment shall consist of all costs to remove clean/power wash corroded brick, mortar, and/or concrete within the channel and bench, furnish and install the required new replacement materials to complete repair within an existing sanitary sewer manhole, for each size manhole as identified in Attachment C – Cost Proposal. The unit price includes all labor, construction as shown in the County typical plates (Standard Details), bypass pumping/flow control (up to 2 MGD), manhole connections or drop connections, post-installation video inspection of manhole, removal and disposal, and traffic control for a two lane roads under 45 MPH and below. Traffic control for a four-lane road with posted speed limit greater than 45 miles per hour, item 86 and Bypass pumping greater than 2 MGD, items 53 and 54 will be paid for separately when needed and directed by the County.

2.33 MANHOLE STEPS (ITEM NO. 80)

A. *Measurement*: Measurement shall be by each (EA) manhole step provided.

B. *Payment:* Payment shall be at the unit price in Attachment C – Cost Proposal. Payment includes all work, materials, labor and equipment required to remove, and install new manhole steps, within an existing manhole and disposal of old steps as required.

2.34 TEMPORARY 6-FOOT HIGH CHAIN LINK FENCING (ITEM NO. 81)

A. *Measurement*: Shall be based on the measured liner feet (LF) of temporary six-foot chain-link fence approved for use by the County. Chain link fence to be constructed with a minimum height of 6 feet to prevent public entry. The fence must be capable of safely securing all construction equipment and supplies within a designated storage or work area. The contractor will stake or mark in the field the proposed location for the fence in advance of the work for approval by the County. Work shall be completed in accordance with the Contract Documents and this section.

1. Measurement of quantities will be made by the Contractor in the presence of the Owner. Measurement for payment for fence will be based upon the actual length of fence installed in accordance with the Contract Documents.

2. Measurement of the temporary 6-foot high fence will be made at locations where installed and approved for use by the County.

3. Installation shall be completed in accordance with Fairfax County Public Facilities Manual.

SECTION 01025 – MEASUREMENT AND PAYMENT

B. *Payment:* Payment shall consist of all costs to furnish, install, maintain, and remove temporary 6-foot high fencing. Payment will be made at a rate of 70% to install and the balance of 30% will be paid upon removal with completion of site restoration.

2.35 MILL AND OVERLAY PAVEMENT REPAIR (ITEM NO. 82)

A. *Measurement:* Measurement of quantities will be made by the Contractor in the presence of the Owner. Measurement to be will by the square yard (SY) of 1 ½ inches thick, Mill and Overlay installed in accordance with the Virginia Department of Transportation Land Use Permit, Open-Cut Pavement Restoration Requirements and all other VDOT requirements. Measurement will be rounded to the closest tenth of a foot.

B. *Payment*: Payment includes all equipment, material and labor for the installation of mill and overlay complete, including site restoration and reestablishment of pavement markings. Payment shall be made for the actual number of square yards (SY) installed and left in place, in connection with manhole rehabilitation.

2.36 ASPHALT CONCRETE BASE PAVEMENT REPAIR – REINSTATEMENT (ITEM NO. 83)

A. *Measurement:* Measurement of quantities will be made by the Contractor in the presence of the Owner. Measurement to be will by the square yard (SY) of 6-inch minimum asphalt base pavement materials, type BM-25.0A installed in accordance with the Virginia Department of Transportation Land Use Permit, Open-Cut Pavement Restoration Requirements and all other VDOT requirements. Measurement will be rounded to the closest tenth of a foot as follows:

(Length X Width) ÷ 9 = ___ square yards

B. *Payment*: Payment includes all equipment, material and labor for the installation of asphalt base pavement material complete, including site restoration. Payment shall be made for the actual number of square yards (SY) installed and left in place, in connection with manhole rehabilitation.

2.37 ASPHALT CONCRETE SURFACE MATERIAL REPAIR – REINSTAEMENT (ITEM NO. 84)

A. *Measurement:* Measurement of quantities will be made by the Contractor in the presence of the Owner. Measurement to be will by the square yard (SY) of asphalt concrete surface material, type SM-9.5A for ADT < 10,000 or SM-9.5D for ADT > 10,000, installed in accordance with the Virginia Department of Transportation Land Use Permit, Open-Cut Pavement Restoration Requirements and all other VDOT requirements. Measurement will be rounded to the closest tenth of a foot as follows:

(Length X Width) ÷ 9 = ___ square yards

Note: ADT = Average Daily Traffic (Vehicles)

B. *Payment*: Payment includes all equipment, material and labor for the installation of asphalt concrete surface material complete, including site restoration and reestablishment of pavement markings. Payment shall be made for the actual number of square yards (SY) installed and left in place, in connection with manhole rehabilitation.

SECTION 01025 – MEASUREMENT AND PAYMENT

2.38 AGGREGATE BASE MATERIAL TYPE 1 (ITEM NO. 85)

A. *Measurement:* Measurement of quantities will be made by the Contractor in the presence of the Owner. Measurement to be will by the cubic yard (CY) of base material, type I, size 21A or 21B, installed in accordance with the Virginia Department of Transportation Land Use Permit, Open-Cut Pavement Restoration Requirements and all other VDOT requirements. Measurement will be rounded to the closest tenth of a foot as follows:

(Length X Width X Depth) ÷ 27 = ___ cubic yards

B. *Payment*: Payment includes all equipment, material and labor for the installation of aggregate base material, type I, size 21A or 21B, complete. Payment shall be made for the actual number of cubic yards (CY) installed and left in place, in connection with manhole rehabilitation.

2.39 SELECT BACKFILL MATERIAL TYPE 1 (ITEM NO. 86)

A. *Measurement:* Measurement of quantities will be made by the Contractor in the presence of the Owner. Measurement to be will by the cubic yard (CY) of select backfill material, select material type I with Minimum CBR-30, installed in accordance with the Virginia Department of Transportation Land Use Permit, Open-Cut Pavement Restoration Requirements and all other VDOT requirements. Measurement will be rounded to the closest tenth of a foot as follows:

(Length X Trench Width X Depth) ÷ 27 = ___ cubic yards

B. *Payment*: Payment includes all equipment, material and labor for the installation of select backfill material, type I, Min. CBR-30 material complete. Payment shall be made for the actual number of cubic yards (CY) installed and left in place, in connection with manhole rehabilitation.

2.40 MAINTENANCE OF TRAFFIC ABOVE 45 MPH (ITEM NO. 87)

A. *Measurement:* Traffic control for a road with posted speed limit greater than 45 miles per hour shall be measured on a daily rate (DAY).

B. *Payment*: Traffic Control shall be made at the contract unit price in Attachment C – Cost Proposal per day (DAY). The unit price shall include all items required to complete the operation including but not limited to signs, cones, barrels, arrow boards, crash attenuators, flaggers, shadow vehicles, mobilization/demobilization, cleanup, and other items required to complete the operation, which is not included in other contract items. Refer to the latest version of the VDOT Virginia Work Area Protection Manual for traffic control requirements.

END OF SECTION

SECTION 01300 – SUBMITTALS

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for submittals from the CONTRACTOR.

1.2 RELATED DOCUMENTS

A. Drawings and all provisions of the Contract, including individual Specification Sections contained within.

1.3 SUBMITTAL PROCEDURES

A. Submit Shop Drawings to OWNER/ ENGINEER for review and approval in accordance with the CONTRACTOR's accepted schedule of Shop Drawings and Sample submittals and as specified herein.

B. Determine and verify before submitting each Shop Drawing or Sample:

1. Field measurements, quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto.

2. Materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work.

3. Information relative to CONTRACTOR's sole responsibilities with respect to means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.

C. CONTRACTOR shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples, and with the requirements of Work and Contract Documents.

1. Each submittal will bear a stamp, or specific written indication, that CONTRACTOR has satisfied CONTRACTOR's obligations under the Contact Documents with respect to CONTRACTOR's review and approval of that submittal.

2. At the time of each submission, CONTRACTOR shall give OWNER/ ENGINEER specific written notice of such variations, if any, that the Shop Drawing or Sample submitted may have from the requirements of the Contract Documents, such notice to be in a written communication separate from the submittal; and, in addition, shall cause a specific notation to be made on each Shop Drawing and Sample submitted to OWNER/ ENGINEER for review and approval of each such variation.

D. OWNER/ ENGINEER will review and approve Shop Drawings and Samples in accordance with the CONTRACTOR's schedule of Shop Drawings and Sample submittals accepted by OWNER/ ENGINEER.

1. OWNER/ ENGINEER's review and approval will be only to determine if items covered by submittals will, after installation or incorporation in Work, conform to information given in

the Contract Documents, and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. OWNER/ ENGINEER's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents), or to safety precautions or programs incident thereto.

3. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

4. CONTRACTOR shall make corrections required by OWNER/ ENGINEER, and shall return the required number of corrected copies, as specified herein, of Shop Drawings and submit as required new Samples for review and approval.

5. CONTRACTOR shall direct specific attention in writing to revisions other than corrections called for by OWNER/ ENGINEER on previous submittals.

E. OWNER/ ENGINEER's review and approval of Shop Drawings or Samples shall not relieve CONTRACTOR from responsibility for variation from requirements of the Contract Documents, unless CONTRACTOR has in writing called OWNER/ ENGINEER's attention to each such variation at the time of submission, and OWNER/ ENGINEER has given written approval of each such variation by specific written notation thereof incorporated in, or accompanying, the Shop Drawing or Sample approval; nor will approval by OWNER/ ENGINEER relieve CONTRACTOR from any such responsibility.

F. Where a Shop Drawing or Sample is required by Contract Documents or schedule of Shop Drawings and Sample submissions accepted by OWNER/ ENGINEER, related Work performed prior to OWNER/ ENGINEER's review and approval of pertinent submittal will be at the sole expense and responsibility of CONTRACTOR.

G. Hazardous Communication Program: Coordinate the exchange of material safety data sheets or other hazardous communication information required to be made available to, or exchanged between, other employees at the site in accordance with Laws or Regulations.

H. The OWNER/ ENGINEER will review each submittal a maximum of two times at no cost to CONTRACTOR. Beginning with the second resubmittal, OWNER will back charge the CONTRACTOR for OWNER/ ENGINEER’s time and materials to provide resubmittal reviews. Back charge rates will be determined as per the rates between the ENGINEER and the OWNER in effect at the time.

1.4 FORMAT AND QUANTITY OF SUBMITTALS

A. Transmittal Form:

1. Transmit each submittal, except sample installations and sample panels, to the office of the approving authority. Transmit submittals with a transmittal form approved by the OWNER/ ENGINEER and use as a standard for the project. Transmittal form shall identify CONTRACTOR, indicate date of submittal, and include information prescribed by the transmitted form and required in the paragraph entitled "Identification of Submittals."

SECTION 01300 – SUBMITTALS

Process transmittal forms to record actions regarding sample panels and sample installations.

2. In order to indicate that the submittals have been Reviewed and Approved by CONTRACTOR as to conformance to Contract Documents, CONTRACTOR shall have made and shall use labels and/ or a rubber stamp which shall materially conform to the following sample:

Submittal No.:			
Contract No.:		Project No.:	
CONTRACTOR:			

REVIEWED AND APPROVED for Conformance with the Contract Documents By:	(Signature)	(Date)

References:	
Drawing Sheet No's.:	
Specification Section No.:	
Specification Paragraph No.:	

3. Utilize a ten-character submittal identification numbering system in the following manner:

   a. The first character shall be:

      (1) D (for Shop/ Working Drawing and other Product Data).
      (2) S (for Samples).
      (3) M (for Operating/ Maintenance Manual).

   b. The next five digits shall be the applicable Specification Section Number.

   c. The next three digits shall be numbers 001-999 to sequentially number each different submittal submitted under each specific Section number.

   d. The last character shall be letter, A-Z, indicating an initial submission or resubmission of the same drawing, i.e.:

      (1) A (indicating the initial submission).
      (2) B (indicating the second submission or first resubmission).
      (3) C (indicating the third submission or second resubmission).
      (4) And so on.

   e. A typical submittal number would be D-02953-008-B which would indicate the following:

      (1) D - Shop Drawing type submittal.
      (2) 02953 - Specification Section 02953 for Sewer Main Rehabilitation by Mechanical Liner.
      (3) 008 - The eighth different submittal under this specification section number.

(4) B - The second submission (first resubmission) of this particular submittal package.

f. For equipment submittals, each submittal and corresponding submittal number shall address a single item or type of equipment.

4. OWNER/ ENGINEER's review:

a. Submittals reviewed by OWNER/ ENGINEER will be returned to CONTRACTOR with OWNER/ ENGINEER's comments, if any.

b. The OWNER/ ENGINEER reserves the right to require written confirmation from CONTRACTOR that comments placed on submittals stamped "APPROVED AS NOTED" will actually be followed.

c. The OWNER/ ENGINEER will make every reasonable effort to process and return each submittal within 30 calendar days after its receipt in OWNER/ ENGINEER's office. The need for resubmissions or delay in obtaining OWNER/ ENGINEER's review or approval of submittals will not entitle CONTRACTOR to an extension of time for Contract completion.

B. Identification of Submittals:

1. Assign each submittal a sequential number as described above.

2. Clearly identify products and materials submitted with appropriate equipment name and equipment tag number (if any) and installation location as it appears in the Contract Documents.

3. Accompany each submittal with a letter of transmittal showing information required for identification and checking.

4. On at least the first page of each submittal, and elsewhere as required for positive identification, show the submittal number in which the item was included.

5. Submittal log:

a. Maintain an accurate submittal log, showing current status of submittals.

b. Make the submittal log available for review upon request.

C. Submittal Content:

1. Each submittal shall address information from a single specification Section.

2. When a specification Section addresses multiple items of equipment, provide a unique submittal for each distinctly different type of equipment. When this is required or directed by the OWNER/ ENGINEER, provide and identify submittals per paragraph number.

3. Do not combine unrelated equipment or equipment from different specification sections in the same submittal.

D. Format for Shop Drawings:

1. For shop drawings presented on sheets larger than 8 1/ 2-inches by 11 inches, include on each drawing the drawing title, number, date, and revision numbers and dates, in addition to the information required in the paragraph entitled "Identification of Submittals."

2. For shop drawings presented on sheets 8 1/ 2-inches by 11 inches or less, conform to the format and quantity requirements for product data, and present as a part of the bound volume for the submittals required by the Section.

3. Dimension drawings, except diagrams and schematic drawings; prepare dimensioned drawings to scale. Identify materials and products for work shown.

4. Shop drawings shall be not less than 8 1/ 2 by 11 inches or more than 30 by 42 inches.

5. Submit detailed drawings and descriptions of proposed deviations from details or component arrangement indicated on the drawings.

6. Provide finished drawings for approval indicating proposed installation of Work, and materials and equipment being furnished.

7. Copies of plans will not be accepted for submission as drawings, nor will catalog numbers alone of materials or equipment.

8. Data shown on working drawings shall be sufficiently complete with respect to dimensions, design criteria, material of construction, and other details to enable review.

E. Format and Quantity for Product Data:

1. Description:

a. Product Data submittals: Those submittals that contain information regarding a specific product to be provided or furnished by the CONTRACTOR under this contract.

2. Present product data submittals for each Section as a complete, bound volume. Include a table of contents listing page and catalog item numbers for product data.

3. Indicate, by prominent notation, each product which is being submitted; indicate the Section and paragraph numbers to which it pertains.

4. Supplement product data with material prepared for the project to satisfy submittal requirements for which product data does not exist. Note that the material is developed specifically for the project.

5. Catalog data shall be explicit with regard to details of products being furnished and complete enough to enable OWNER to determine that products submitted conform to requirements of specifications.

6. For submittals with more than one style, size, capacity, etc. of a product on a sheet, clearly indicate exactly which product type is being submitted for approval. Failure to do this is cause for rejection.

7. Catalog data shall bear name of manufacturer of product.

F. Format - Electronic Version

1. CD ROM format.

2. Windows compatible.

3. Text in most current version of Microsoft Word (*.doc) or Adobe Acrobat (*.pdf) format, with searchable text.

4. Drawings in Adobe Acrobat (*.pdf) format.

5. Images or photographs in Adobe Acrobat, image files (*.jpg or *.gif format), or other OWNER-approved format.

   a. Photographs or images shall be minimum 150 dpi resolution to provide sufficient clarity.

G. Unless otherwise directed in writing, CONTRACTOR shall submit the following number of copies of each submittal:

1. Product Data, Shop Drawings, and Working Drawings: 5 copies for the following distribution, however if the CONTRACTOR wants more copies to provide to his sub-contractors and vendor the CONTRACTOR may submit additional copies:

   a. OWNER/ ENGINEER's review:

      (1) Hard copies: 3 copies. 1 copy for circulation and review, 1 copy for file, and 1 copy for the field representative.
      (2) Electronic copies: 1 copy.

   b. OWNER's records:

      (1) Hard copies: 1 copy.
      (2) Electronic copies: 2 copies.

   c. Returned to CONTRACTOR:

      (1) Hard copies: 5 copies.

         (a) 1 copy for Record Documents file.
         (b) 1 copy for CONTRACTOR's records.
         (c) 3 copies for circulation to sub-CONTRACTORs and suppliers.

1.5 MANUFACTURER'S CERTIFICATIONS

A. When specified, submit manufacturers' certifications to OWNER/ ENGINEER for review, in quantities specified for shop drawings.

B. Indicate material and equipment conforms to or exceeds specified requirements. Submit supporting reference date, affidavits, and certifications as appropriate.

C. Certifications may be recent or previous test results on material or product but must be acceptable to OWNER/ ENGINEER.

D. Certification submittals shall be made in accordance with the following:

1. A certification submitted for a product, or component of a product, indicates test results proving that product, or component, meets the requirements of the standard specified in the Contract Documents.

2. An affidavit consisting of a sworn statement by an official of the company manufacturing the product indicating that information on certification is true and accurate shall accompany the certification.

3. A statement originating from CONTRACTOR, or his SUBCONTRACTORs, suppliers, or other agent which merely indicates that a particular item of equipment, product, or

component of a product, meets the requirements of Contract Documents shall not be considered a certification. A submittal made in this manner will not be approved and corresponding equipment, product, or component, shall not be finally accepted.

1.6 PROFESSIONAL OWNER/ ENGINEERING REQUIREMENTS

A. Submittals where specified shall be signed and sealed by a licensed Professional Engineer.

B. The Professional Engineer shall be registered in the appropriate design discipline and in the state where the project is being constructed.

END OF SECTION

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SECTION 02640 – TECHNICAL PROVISIONS FOR INSPECTION AND REHABILITATION

PART 1 GENERAL

1.1 SUMMARY

A. This section includes technical provisions for all sewer collection system inspection and rehabilitation work.

B. Related Work Specified in Other Sections Include, but is not limited to, the following:

1. Section 01025, Measurement and Payment
2. Section 01300, Submittals
3. Section 02650, Sanitary Sewer Line Cleaning
4. Section 02651, Sanitary Sewer Overflow Response
5. Section 02954, Sewer Main Rehabilitation by Lining
6. Section 02955, Cured In Place or Alternate Pipe Point Repair
7. Section 02956, Television Inspection
8. Section 02957, Sewer Manhole Rehabilitation
9. Section 02959, Sewer Sealing by Chemical Grout
10. Section 02960, Temporary Bypass Pumping Systems
11. Section 02972, Vacuum Excavation

1.2 OWNER

A. This contract will be administered and performed under the direction and inspection of the Owner. Questions pertaining to this contract, before and after award, should be directed to the Owner.

B. The Owner intends to issue work periodically in phases. Each phase will be issued in a package that contains a list of sewer segments and/or manholes to be rehabilitated and CCTV inspections from County records for each sewer segment listed.

C. The Owner will provide the Contractor with the scope and location of the work as follows:

1. A list of manholes and/or sewer segments slated for sewer Rehabilitation for each phase of work. In general, the list may contain but not limited to the following information:
    a. **Phase:** This identifies the year and phase the work was released to the Contractor to be completed, for example- FY20 Phase 1.
    b. **Shed/Coordinates:** This is the location by Sewer Shed and Coordinates of County Grid System, for Example: K/A3.
    c. **Grid and Manholes (Line Segment):** This is the GIS map identification of the asset. It provides location of which County Grid the asset is located on and the manholes numbers, for example, **101-3**-010-**101-3**-009 is Grid 101-3 and manholes 010 to 009.
    d. **Diameter of pipe:** According to available records.

e. **Length of sewer pipe:** According to available records.

f. **Number of customers (Taps):** Connected to each line according to available records.

g. **Depth of manholes:** When manhole is rehabilitated according to available records.

h. **Street names:** Name of street where work will take place.

i. **Costs**: Approximate costs for each sewer pipe or manhole rehabilitated.

1.3 PUBLIC AND COUNTY NOTICE

A. The Contractor shall have a full-time construction superintendent who shall have full authority to act for the Contractor. It is understood that the representative shall be acceptable to the County Project Manager and shall be one who can be continued in that capacity for the particular job involved, unless he/she ceases to be on the Contractor's payroll. Superintendent must be able to communicate in English by both speaking and writing. The Superintendent must have the ability to act on behalf of the contractor for the purposes of signing legal documents and directives from the County on site.

B. During this contract the Contractor will provide each of the field crews with a copy of a letter that states the County has hired their company to perform maintenance and repair work on the sewer system. The County will provide the wording to be used within this letter. The letter will be distributed as needed by the Contractor on 2-sided copies (1 side English, 1 side Spanish) on an as-needed basis to residents to confirm the County has given them permission to access the sewer system during the performance of their work.

C. Resident Notification Letters, 2-sided (1 side English, 1 side Spanish), shall be provided by the Contractor and approved by the County. The first notification letter shall be delivered 30 days prior to the start of sewer rehabilitation work. This letter will advise the pubic of expected sewer rehabilitation work within their neighborhood and explain that additional notices will be provided 2 days before the work is expected to start. In addition, the 30-day letter will provide detailed information on what each resident will see during the performance of the work. The 2-day notification letters shall be delivered by the Contractor, to each residence affected by the installation process, a minimum of two business days prior to commencing work. Three types of 2-day letters will be delivered. One letter will be provided to those customers who will experience a loss of service. One letter will be given to those customers who will have their parking spaces impacted. One letter will be given to customers within a 350-foot radius of the upstream and downstream manholes. This letter is for customers that will not lose service, but they may experience odors if they do not fill their drain traps to prevent vapors from lining work from entering their home. Therefore, this letter will advise them to fill all dry drain traps and provide notice of when the work will take place. The Resident Notification Letters shall be hand delivered or mailed to each affected resident prior to lining. Hand delivered Letters will be placed on the Front, Side and Garage doors of residents, but preferably delivered directly to the resident whenever possible. Residents shall be informed when wastewater and/or water service interruption will take place and the approximate duration as applicable. Each letter will contain contact information for the public as directed by the County. The Contractor will have an established Public Relations Program in place and will provide upon request documentation of the training of employees.

D. During the performance of sewer rehabilitation work the contractor shall display a folding sign at the site behind the face of curb in a location that does not obstruct pedestrian traffic. The sign shall be a minimum of 24 inches wide and 36 inches high in its dimensions. This sign shall allow local residences to see contact information for the contractor performing the work and the Fairfax Trouble Response center. The lettering for the sign will comply to the most current version of the Manual on Uniform Traffic Control Devices for street and highways with reflective letting for visibility at night.

E. The superintendent, crew chiefs and any other staff who interact with the public verbally or by written document shall exhibit good customer service skills. All communications are expected to be professional and courteous. Profanity, bad language and combative behaviors by the Contractors' staff will not be tolerated. Those persons found to be not in compliance with this requirement, as determined by the County, may be required to attend customer service training at no additional cost to the County or removed from any work site within the County. Any such directive given to the Contractor for training or removal shall be given in writing by the County.

F. For any work crew accessing or working on the sewer system submit a weekly work schedule via email to the Owner in Excel 1 week in advance of the work. The weekly work schedule shall be provided by the Contactor and approved by the County. Schedule to contain:

A. Company Name
B. Contact information for crew and superintendent
C. Dates and name for each day
D. Street names where work will take place
E. Manhole Numbers, County Grids and coordinates
F. Liner size and thickness
G. Liner length and number of sewer house connections (Taps) for each sewer segment lined and/or manholes to be rehabilitated
H. Comments/Description of work

When submitting the weekly schedule above, the Contractor shall also update and submit the previous week's schedule, to show what work was completed as planned. This information is needed to keep local records and County GIS Maps current.

G. Failure to comply with this requirement and/or provide public notification in accordance with the contract may result in the issuance of a work stoppage; see Special Provision 35 – **OWNER'S RIGHT TO STOP WORK OR TERMINATE CONTRACT.** With each weekly work schedule, submit design data and specifications data sheets listing all parameters used in the CIPP material design and thickness calculations based on most current version of ASTM F-1216 and/or manhole design data in accordance with the contract documents.

1.4 PERMITS

A. Complete the permit processes as needed. Permit costs shall be included in the unit prices for inspection and rehabilitation work.

SECTION 02640 – TECHNICAL PROVISIONS FOR INSPECTION AND REHABILITATION

1.5 SAFETY

A. General: The Contractor is responsible for completing work safely and responsible for conditions within the job site, including safety of all persons (including employees) and property within the job site. This requirement shall apply continuously and not be limited to normal working hours. Additionally, maintain suitable, safe access to the premises for staff and visitors.

B. Safety Protection: The Contractor shall comply with Federal, State, and local safety and fire codes and regulations. The Contractor shall give all notices and comply with all applicable laws, ordinances, rules, regulations, permits, resolutions and lawful orders of any public authority bearing on the safety of persons or their protection from damage, injury or loss. Where requirements conflict, the most stringent requirement shall apply.

C. Material Safety: Comply with the precautions and product use procedures of the Material Safety Data Sheets (MSDSs) and Installation Specifications provided by the manufacturers of all chemicals, resins, additives, and catalysts used for sewage collection system rehabilitation. Provide all MSDSs and manufacturers' installation specifications to the Owner.

D. Health and Safety and Confined Space Entry: The Contractor shall submit his health and safety and confined space entry plans to the Owner for approval prior to beginning any field work.

1.6 ACCIDENT REPORTS

A. The Contractor shall maintain an accurate record of and shall immediately report orally to the Engineer and Owner, any accidents resulting in death, traumatic injury, occupational disease, or damage of property, materials, supplies, and equipment related to work performed under this Contract. Additionally, provide a written preliminary accident report to the Engineer and Owner within 24 hours of occurrence and a complete written report within seven (7) calendar days.

1.7 PERSONAL PROTECTIVE EQUIPMENT (PPE)

A. The Contractor shall require all of his employees to wear all required PPE, including but not limited to, hard hats, safety shoes, vests, and eye protection.

B. PPE shall be required at the construction site from start to completion of work. Employees, Contractors, and visitors at the inspection site shall be required to wear the appropriate PPE at all times. Individuals not wearing PPE shall not be permitted to remain onsite. The Contractor shall be responsible for advising all individuals working onsite of this requirement.

C. All personnel at the construction site shall be required to wear a company identification card at all times.

1.8 STYRENE MONITORING AND SAFETY PROGRAM

A. Care must be taken to ensure that styrene levels are below USEPA standards for airborne, surface, and water contamination. The EPA has set the maximum contaminant level at 0.1 ppm for drinking water and other water sources that impact drinking water. For sanitary sewer flow to a sewage treatment plant, styrene contamination must be below 2.1 ppm so as to not interfere with the effectiveness of the plant.

B. Effluent from the curing process must be disposed of directly into the County's sanitary sewer system unless otherwise directed. Effluent from the curing process that is discharged into the County or other Publicly Owned Treatment Works (POTW) must comply with all mandated instructions of the utility owner. The Contractor must obtain written permission for any discharge within 1 mile of a County owned sewer treatment plant and when discharging into another sewer system not owned by the County.

C. The Contractor shall maintain and provide a Styrene Monitoring and Safety program for the duration of this Contract. The Contractor shall submit a Styrene Monitoring and Safety plan to the County for Information Only. The Contractor must certify the plan conforms to all legal requirements and it meets the recommended exposure limit of 50 ppm for Styrene exposure. Any updates to this plan as they occur or whenever a requested by the County. When submitting a written plan, the Contractor shall include, but not limited to the following items:
   a. Methods and equipment used to comply with the Occupational Safety and Health Administration (O.S.H.A.) recommended exposure limit of 50 ppm for Styrene.
   b. List of personnel on site trained to react if the required exposure limits are exceeded with a written response plan to bring the work site into compliance with OSHA regulations and the recommended exposure limit of 50 ppm. Include documentation on any certifications and training.
   c. Modifications to equipment and installation safety procedures to dissipate and/or remove Styrene impacts and other chemicals during the installation process. Include venting, exhaust systems, personal protective equipment, special fittings, any chemical additives to control offensive odors.
   d. Methods and procedures used to Monitor Styrene exposure limits on site and adjacent properties (if needed). Provide sampling methods, details of obtaining samples, chain of custody to protect sample integrity, examples of documentation, report forms, sample maps showing location of samples.
   e. Recommendations that will be given to the public in advance of the work and when they have been exposed to Styrene vapors. Include examples of all notifications.
   f. How the photoionization detector (PID) will be calibrated and maintained in good working order.
   g. Explain the process of submitting a complete report to the County for each Styrene odor complaint received and what information the report will provide. The report as a minimum must contain the address of the complaint, timelines, photoionization detector (PID) readings specific to Styrene, PID readings locations and time taken, follow-up corrective actions to resolve the complaint with confirmation that all issues were resolved.

D. When a complaint is received by the Contractor for Styrene odor, a written confirmation email will be sent to the County for each occurrence. The confirmation email will be sent to the County within 2 hours of first contact or knowledge of the complaint. The confirmation email will contain basic information to document the response and investigation are underway. Thereafter the Contractor shall submit a more detailed written report with the minimum information following the requirements of the Styrene Complaint Response Plan as within 5 working days.

E. The Styrene Complaint Response Plan requirements:

   a. Submit a plan for addressing and resolving public complaints caused by Styrene odors, the plan must include:
      i. The structure of the emergency response plan and how it will be made available 24 hours a day 7 days per week.
      ii. Emergency contact list of response personnel

iii. Step by Step procedures to investigate, act to remove Styrene odors, document the event and support impacted persons.
iv. Detailed procedures used to remove Styrene odors from sites, dwellings and business experiencing Styrene complaints.
v. Details on how the property occupants will be relocated at no cost to the County during removal of styrene vapors and what housing options will be made available.
vi. The process to determine when the occupants will be allowed to return to their properties and dwellings.
vii. The process of submitting a complete report to the County for each Styrene odor complaint received and what information the report will provide.

b. Submit a Complain Report that documents as a minimum must the following:
i. Submit within 5 working days of the event
ii. The address of the complaint
iii. Timelines
iv. Photoionization detector (PID) readings specific to Styrene
v. Follow-up corrective actions to resolve the complaint
vi. PID readings locations and time taken
vii. Confirmation that all issues were resolved

c. For the duration of this Contract the Contractor will maintain the Styrene Complaint Response plan, including all documentation, procedures, personnel and equipment in a fully functional state. Any updates to the plan must be submitted for information only to the County as they occur. At no time shall any change violate Federal, local regulations or established laws nor change the intent to protect the public during the performance of work under this contract.

F. Liability

a. The County does not assume any liability for the Styrene Monitoring and Safety Program. The Contractor is responsible for maintaining the program at all times, complying with all laws and regulations and providing indemnification in accordance with Article 58 of the General Conditions and Instructions to Bidders (Appendix A).

1.9 TRAFFIC MAINTENANCE AND PROTECTION - GENERAL REQUIREMENTS

A. Comply with the provisions of the Virginia Work Area Protection Manual located at http://www.virginiadot.org

B. Obtain Virginia Department of Transportation (VDOT) Land Use Permits for single use temporary traffic control, from the VDOT district administrator's designee in the area of the County where the work is to be performed.

1. Web-site for VDOT Land Use Permit Application: http://www.virginiadot.org/business/bu-landUsePermits.asp

C. VDOT Temporary Traffic Control Permits may include, but not be limited to:

1. Shoulder Work - Stationary Operations

2. Shoulder Work with Minor Encroachment - Stationary Operations

3. Four Lane Road - Stationary Right Lane Closure

4. Two Lane - Stationary Closure

5. Closure in Center of Intersection

D. Information on VDOT roads may be found at http://www.virginiaroads.org

E. Information on Manual on Uniform Traffic Control Devices (MUTCD) may be found at:

https://mutcd.fhwa.dot.gov/pdfs/2009r1r2/pdf_index.htm

F. Contractor shall always have a VDOT Intermediate Work Zone Traffic Control Training and Flagger Certified person on site.

G. Contractor assumes responsibility for conducting operations in a manner to ensure the safety and convenience of all travelers and adjoining property owners within the limits of and for the duration of the contract.

H. Abide by laws and regulations of governing authorities when using public roads. If the work requires that public roads be temporarily impeded or closed, approvals shall be obtained from governing authorities and permits paid for before starting any work.

I. Perform all work within the Fairfax County rights-of-way in strict accordance with Virginia Department of Transportation Maintenance of Traffic Policy and other applicable statutory requirements to protect the public safety.

J. Be responsible for providing clear and concise guidance of traffic through work zones. A work zone is defined as the immediate areas of actual work and all abutting areas which are used and interfere with the driving or walking public.

K. Remove temporary equipment and facilities when no longer required. Restore area to original or specified conditions. Every precaution shall be taken to ensure that all work does not interfere with the movement of pedestrian traffic.

L. The Contractor will submit forms, mapping and VDOT standard documents necessary for obtaining the Land Use Permit. The Contractor shall complete all required forms and obtain the necessary signatures.

M. Minimum traffic flow restrictions are as follows:

On local streets in residential areas, the Contractor may work the hours of 7:00 A.M. to 7:00 P.M. On major and minor arterials and collector streets where the work will reduce the traffic lanes during rush hours and on streets where rush hour restrictions apply, the Contractor shall not work between the hours of 7:00 A.M. to 9:30 A.M. and 3:30 P.M. to 6:30 P.M., unless specifically requested and approved in advance.

N. The Contractor shall pay all fees and provide all bonds necessary for obtaining the Land Use Permit.

O. The Contractor shall be responsible for maintaining "local" traffic at all times and for notifying the proper authorities regarding the closing of the roads. The Contractor will be responsible for obtaining all permits required for maintenance of traffic.

P. The Contractor shall not begin work until standard barricades and warning signs are in an acceptable position and the markers and signs conform to the Federal Highway Administration (FHWA) "Manual of Uniform Traffic Control Devices for Streets and Highways" and all applicable state and local requirements. The Contractor assumes all responsibilities and liabilities regarding

strict adherence to applicable sections for the maintenance of traffic and public safety as set forth in the FHWA "Manual of Uniform Traffic Control Devices for Streets and Highways", and other applicable regulations. All traffic control devices must be in place prior to starting work.

Q. The cost of all traffic control devices shall not be paid separately but shall be included in the Items listed in Attachment C - Cost Proposal.

R. The Contractor shall maintain local traffic at all times during all phases of this project in a manner causing the least amount of inconvenience to the abutting property Owners. Temporary driveways, temporary roadways, or run around as may be necessary to provide vehicular access to and from the abutting properties shall be constructed, maintained, and subsequently removed by the Contractor as directed by the Owner.

S. The portion of the pavement not affected by the work shall be kept clear of all material and equipment.

T. The Contractor shall hold harmless the Owner and all its representation from all suits, actions, of claims of any character brought on account of any injuries or damages sustained by any person or persons or property in the performance of this contract.

U. If at any time traffic has to be blocked (emergencies only), the Contractor shall notify the nearest fire, police departments and necessary utility departments.

V. The cost of maintenance of traffic within roadways where posted speed is 45.0 MPH or less shall be incidental to the contract and not measured for payment.

W. The cost of maintenance of traffic within roadways where posted speed is 50.0 MPH or more shall be paid as described under 01025 Measurement and Payment, Item 86 and as described herein.

1. When traffic control plans are required the Owner may elect to utilize Consultant Traffic Control Engineering firms to assist in the development of approved traffic control plans which meet all jurisdictional requirements. Under these conditions the Owner will pay for these services. The Contractor will coordinate with the Engineering firm to design traffic control plans at no additional cost to the Owner.

2. The Owner may direct the Contractor to obtain a Consultant Traffic Control Engineering firm to prepare Traffic Control Plans. The Contractor will obtain a good faith estimate from the Engineering Firm and submit the estimated proposed costs to the Owner. Upon approval of the proposed costs by the Owner, design of the Traffic Control Plans may commence. During design any increase in costs must be approved in advance by the Owner. Under these conditions the Owner will pay for approved services and costs of the Engineering firm preparing the Traffic Control Plans following the payment terms of this contract.

3. Should additional permit fees result from traffic controls under Item 86, the Contractor shall submit invoice with receipt of payment to the Owner for reimbursement.

4. Invoices submitted for design of traffic control plans or additional permit fees shall not include any additional markup or handling fees.

SECTION 02640 – TECHNICAL PROVISIONS FOR INSPECTION AND REHABILITATION

1.10 WATER USAGE FROM FIRE HYDRANTS

A. Obtain a Fairfax Water Fire Hydrant Use Permit from the Fairfax Water Customer Service Center. The Contractor is responsible for complying with all permit requirements.

B. The Contractor will be responsible for making arrangements to turn off water services if necessary, to complete any work on this contract following the requirements of the utility owner.

1.11 SANITARY SEWER OVERFLOW RESPONSE

A. In the event of a sanitary sewer overflow caused by the Contactors sewage collection system inspection or rehabilitation activities, the Contractor shall follow the procedures of Section 02651, Sanitary Sewer Overflow Response.

1.12 USE OF PREMISES

A. The Contractor shall not trespass upon or in any way disturb private property without first obtaining written permission from the property Owner and/or Owner or Prime Contractor as appropriate to do so. A copy of such written permission shall be furnished to the Owner prior to accessing the site.

B. It shall be the Contractor's responsibility to work equipment around poles, trees, or other obstructions and to do so at his own expense.

C. If the Contractor finds it necessary to obtain additional working area, it shall be the Contractor's responsibility for its acquisition.

D. The Contractor shall, at no additional expense, restore such property to the original condition in the sole and unfettered opinion of the Owner. The Contractor must take photographs and/or videos of existing properties prior to disturbance of each property and make a copy available to the Owner.

E. All items within the street right-of-way or sewer easement shall be removed, or removed and replaced, or restored as directed by the Owner.

F. The Contractor shall ensure all employees have a badge or visible identification during any time that they on the project site or within private property. This identification must be worn so that it is readily recognized and readable to the public.

1.13 PROTECTION OF TREES

A. The Contractor shall avoid any unnecessary damage to trees. Branches which overhang the project limits, and which interfere with the operation of equipment shall be tied back to avoid damage, if possible. Where injury to branches is unavoidable, the branches shall be sawed off neatly at the trunk or main branch, and the cut area shall be protected with approved pruning spray immediately. The Contractor at no additional expense shall remove any trees damaged beyond saving and make restitution to the Owner (public or private).

SECTION 02640 – TECHNICAL PROVISIONS FOR INSPECTION AND REHABILITATION

1.14 FENCING

A. Any fences, including hedge and shrubs, that need to be removed to facilitate the work shall be replaced, in kind or with repairs satisfactory to the Owner, at the Contractor's expense. Replacement of fences, hedges, and shrubs shall be considered incidental to the contract and not measured for payment.

1.15 EXISTING UTILITIES

A. The Contractor must take the necessary precautions for the protection of any utility encountered on the project or the restoration of any utility damaged during the work.

B. If an excavation is required, the Contractor shall notify, at least 48 hours before breaking ground, all public or private service corporations having wire, poles, pipes, conduit, manholes, or other structures that may be affected by this operation, including all structures which are affected and not shown on these plans. Owners of underground utilities, which are members of the state's one call service, can be notified at https://va811.com/. Non-member underground utility Owners must be called directly.

C. All maintenance, repair, and replacement of existing utilities shall be in accordance with the rules and regulations of the various utility companies having jurisdiction.

D. All existing storm sewers, driveway drains, surface drain pipes and other property, removed or damaged during construction shall be repaired and reconnected by the Contractor as directed by the Owner at no additional cost to the Owner.

1.16 REQUESTS TO LOCATE MISSING MANHOLES

A. For each release of work the Contractor shall take reasonable steps to locate in advance the sewer manholes which will be utilized in the completion of the work. These manholes will include those needed to maintain sewer flows, manholes slated for rehabilitation and those manholes needed for access points. Any manholes found missing by the Contractor must be reported to the County at least two weeks in advance of the work with a request to locate the manhole. The County will make attempt to locate the buried or missing manhole. The manholes will be raised to grade before the work is performed if possible or after the proposed work is complete in some cases. If the manholes cannot be found the County may delay or remove the work from the current release until such time as the manholes can be located. The County is not responsible for costs incurred for failure to confirm manholes are accessible prior to the start of any work or ordering of materials.

B. The Contractor may use of the Fairfax County ArcGIS online Map Service for Mobile devices. Upon request the County will provide information to the Contractor to download the mobile app. This app may be utilized to assist in efforts to locate manholes in the field by providing approximate locations on handheld devices in the field. The County assumes no responsibly for allowing the Contractor to use this app. The Contractor assumes all liability and risk for its use. The Contractor will not receive any compensation for any claims in connection with its use.

C. The Contractor may also use the Fairfax County Digital Map Viewer to view Sanitary Sewer Maps. This map can be found at: https://www.fairfaxcounty.gov/gisapps/DMV/Default.aspx

The Contractor assumes all liability and risk for its use. The Contractor will not receive any compensation for any claims in connection with its use.

D. Any costs for County services to locate missing manholes may be deducted from current payments when the missing manhole rim is found to be visible to the eye or less than 2 inches below the existing surface of the ground.

E. The Contractor may also use the Fairfax County Digital Map Viewer to view Sanitary Sewer Maps. This map can be found at: https://www.fairfaxcounty.gov/gisapps/DMV/Default.aspx

The Contractor assumes all liability and risk for its use. The Contractor will not receive any compensation for any claims in connection with its use.

1.17 NO PARKING SIGNS AND ENFORCEMENT

A. The Contractor may designate areas within the public right-of-way as no parking areas in accordance with jurisdictional requirements of Fairfax County.

Dual Notification: When no parking areas are utilized by the Contractor, notification must be given to the Fairfax County Police Department, Parking Enforcement Division by phone at 703-280-0636 and email them at FCPDParkingEnforcement@fairfaxcounty.gov , 72 hours or more in advance of the expected start of the work. Weekends and holidays are not included in this 72-hour period.

Phone Notification: Requires the Contractor to leave a voice mail message or talk to a parking enforcement official at the police department. The phone call must provide details such as any known site conditions that could impact traffic functions, the dates, times, locations being impacted by the Contractor's operations and any additional information as requested by the County Police.

Email Notification: Includes a list of the street locations, dates, times, project number for the construction and rehabilitation work, as well as emergency contact information. The 72-hour period starts when the County Parking Enforcement Division has received the proper phone call and email notification from the Contractor.

Signage Inspection: The Fairfax County Police Department, Parking Enforcement Division may require a field inspection of the signage to confirm proper installation and conformance to standards prior to the start of work. After inspection, Fairfax County Police Department, Parking Enforcement will notify the Contractor of the results and authorization to proceed if all conditions are met. The Contractor will confirm and coordinate the field inspection in advance of the work with the County Parking Enforcement.

Signage Requirements: The temporary No Parking signs are required to include the project number, Wastewater Collections 24-hour Trouble Response Center phone number (703-323-1211), and the Police Non-Emergency phone number (703-691-2131). Temporary no parking signs shall be a minimum 11-inch by 14-inch and posted at regular intervals (approximately every 50 to 75 feet). Signs shall conform to the Federal Highway Administration (FHWA) "Manual of Uniform Traffic Control Devices for Streets and Highways" and all applicable state and local requirements. The Contractor assumes all responsibilities and liabilities regarding strict adherence to applicable sections for the maintenance of traffic and public safety as set forth in the FHWA "Manual of Uniform Traffic Control Devices for Streets and Highways", and other

applicable regulations. Design of the Temporary no parking signs must be approved by the County prior to first use. Once approved the sign can be used until the County requests a change or update to the design.

No Parking Zone Requirements: Business and Residential property shall have free and clear access to their property. All properties impacted by the No Parking Zone shall be given written notification of no parking prior to erecting signs in accordance with requirements set forth in section 02640, 1.3 Public and County Notice. The Contractor shall maintain the signage and site conditions. The signs must always be legible and properly posted for the duration of the time frame provided to the Fairfax County Police Department, Parking Enforcement Division. Signs must be removed within 24 hours after the completion of work or as directed by the County. The establishment and use of no parking zones by the Contractor will be at no additional cost to the County.

B. Removal or relocation of vehicles parked in an approved Temporary No Parking area must be requested to Fairfax County Police Department by calling 703-691-2131.

1.18 WORKING HOURS

A. The Contractor must complete all work such that no homeowner is without sewer service, unless otherwise directed by the Owner. Local noise ordinances or agencies having control over roadway closures may control starting or stopping operations. Prior to starting operations, the Contractor shall advise the Owner of the restrictions imposed by the local agencies.

B. The Contractor shall be on site with all necessary equipment in good working order no later than 7:30 a.m. Prior to starting the lining process, the Contractor shall be responsible for arrangements of lodging and meals for any resident that cannot be in service by 8:00 p.m. The Contractor may accommodate requests by property owners to complete work during night-time hours as allowed by permits and local jurisdictional requirements. Such requests must be also be approved by County

C. The Contractor may be required to workdays, nights or weekends to achieve the lowest depth flows in the sewer pipes and not conflict with public events.

D. No work, unless required by an emergency and authorized by the County, will be performed on weekends and holidays.

1.19 DECREASE/INCREASE IN SERVICE AND STOP WORK DUE TO INCLEMENT WEATHER

A. The Owner, at its option, may increase or decrease any or all service requirements provided for under this contract. The Owner further reserves the right to suspend or stop the performance of any or all of the work of this contract due to inclement weather conditions.

1.20 PUNCH LIST ITEMS

A. The Contractor must correct any problems found within 60 business days of discovery. If a problem is not corrected within 60 business days, then the County will charge the Contractor a penalty of $100.00 per business day. The Contractor shall maintain an updated list of Punch List Items and submit it to the County once a week.

B. The Contractor shall be physically and financially able to keep all “Punch List Items” caught up in the phase they are working. All punch list items will be completed before the next phase of work can be started, with 90% of the current phase work approved for payment

1.21 PROPERTY DAMAGE

A. Any damage to the County’s infrastructure, private property, or other public property (homeowner/business backups, dead grass, ruts, damaged pavement, concrete, fences, etc.) will be immediately repaired or rehabilitated to the County’s satisfaction at no additional expense to the County or property owner(s) in question. The property owner(s) and/or the County will be notified of the problem and the repair method. The Contractor must expedite the insurance process and take responsibility of all applicable clean up, replacement of materials, and/or repair to residences. All repair work must be completed to the satisfaction of the County and the property owner(s).

B. Upon award of the contract, the Contractor must have a Landscape contractor and a Plumbing contractor to address any concerns by the property owners caused by the sewer rehabilitation work.

C. In the event of a backup, the Contractor shall:

1. Immediately investigate any and all reports of sewage backing up into any building or dwelling served by the sewer service area that is being rehabilitated. This includes but is not limited to those sewer sections being cleaned, televised, rehabilitated, bypassed or otherwise being impacted by the work performed.

2. Notify the Owner immediately of any damage to private or public property caused by activities related to this contract. For each back-up event contact Wastewater Collection Division at the 24-hour Trouble Response Center at 703-323-1211 and email the County’s Project Manager as instructed. Provide the following:

   a. Street address of property
   b. Time of incident
   c. Property Owner name and contact information
   d. Contractor contact handling the cleanup/repair name, phone and email.
   e. Actions to be taken
   f. Estimated duration of repair and cleanup

3. Have a certified laboratory available for performing bacteria testing for residents when all backups occur, or other fecal matter issues arise at no cost to the County or its residents.

4. Performed all clean-up work in accordance with the most current guides for Professional Water Damage Restoration (IICRC S500) and Professional Mold Remediation (IICRC S520), unless otherwise stated. The Contractor is to have one-person onsite that is certified in accordance with the guides for Professional Water Damage Restoration (IICRC S500) and Professional Mold Remediation (IICRC S520).

5. All cost for restoration and repair shall be the responsibility of the Contractor. No costs resulting from the contractor’s operations, cleanup and repair shall be paid by the Property Owner. Complete all repairs and/or clean the property immediately in a

timeframe that is acceptable to the Property Owner at no cost to the County or the Property Owner.

D. The Contractor shall submit a Written Summary of each sewage back up or property damage with details of: what caused it, content of the damage, what was done, contact information for the person addressing the damage with involved parties and a remedy to prevent a reoccurrence to the County's Project Manager within two (2) business days.

1.22 EMERGENCY RESPONSE

A. The Contractor shall provide direct contact information to the Owner of at least three emergency contacts available 24 hours per day, 365 days per year. The contact information will be used by the Owner staff and Trouble Response Center when contacting the evening/weekend/holiday emergency work crew supervisors to address emergencies resulting from the Contractor's actions or lack thereof during this project.

The Contractor shall be responsible for contacting the Owner within one-half hour after the first verbal and electronic notification. If the Contractor's crew has not responded to the site of the emergency within one hour of the first contact, verbal and electronic, the Owner will make all necessary repairs and bill the Contractor for all work performed. Any costs borne by the County as a result of emergency response may be deducted from current payments for work completed under this contract.

Costs related to the emergency response will be incidental to the contract and not measured for payment. Failure to respond to requests from the County for emergency situations may be considered a breach of contract and cause for termination for failure to perform.

Submit a contact list and update when changes are made or when requested with this information. For each contract provide the name of contact, job title, office address, office number, cell number and email.

1.23 RESTORATION

A. All roadway berms and drainage ditches disturbed by the work shall be restored, reshaped, and graded to drain.

B. Pavement restoration, if necessary, shall conform to the Owner's regulations, or the Owner's Specifications depending upon who has jurisdiction for the street. Trench backfill and compaction shall be in conformance with the local street restoration jurisdiction.

C. The remediation of sunken trenches caused by activities conducted in this contract shall be the Contractor's responsibility. Sunken areas shall be backfilled and compacted to meet adjoining grades; the surface shall be re-seeded or resurfaced with asphalt or concrete matching the existing surfacing.

D. The Contractor shall restore unpaved areas by seeding and mulching. No direct payment will be made for seeding and mulching.

E. Driveways shall be restored in accordance with Owner's regulations, or the Owner's Specifications depending upon who has jurisdiction for the driveway.

F. All disturbed areas shall be restored as nearly as possible to their original condition.

G. All restoration shall be completed in strict accordance with the appropriate items of the specifications as directed by the Owner.

H. The cost of all restoration of streets, drives, walks; sod, etc. shall be incidental to the contract and not measured for payment with the exception of adjusting a manhole frame and cover to grade in paved areas. For these adjustments to grade, the Contractor will be paid for paving restoration costs at the rates given in Attachment C - Cost Proposal and all other site restoration costs shall be incidental.

I. Restoration shall be kept current with the project work. Failure to keep restoration of these items completed reasonably close shall result in a stop work notice and delay of payment until such restoration is completed to the satisfaction of the Owner.

1.24 CLEANUP

A. The Contractor shall keep the work area in an uncluttered condition by the frequent removal of debris. The Contractor shall remove all debris and unused material and leave the area in a condition similar to the condition of the area before any work was performed.

1.25 PROJECT COORDINATION MEETINGS

A. As outlined in the RFP, the Contractor shall be responsible for providing project coordination support with the County and their other Contractor's for projects that require construction of access, point repairs or other areas where access may prove difficult.

B. When requested by the County, the Contractor shall be required to attend coordination meetings for these projects. The Contractor's CIPP lining superintendent and crew lead shall be required to attend these meetings. The Site Prep meeting could last up to 8 hours. The repair/replacement coordination meeting and the pre-rehabilitation meeting may last up to 2 hours. The Contractor and/or the County may request additional meetings to improve coordination or to resolve field issues at no additional cost to either parties, subject to the availability of County staff.

END OF SECTION

SECTION 02650 – SANITARY SEWER LINE CLEANING

PART 1 GENERAL

1.1 SUMMARY

A. The intent of sanitary sewer cleaning is to remove debris from the pipes, manholes, and on occasion, wet wells to prepare for closed circuit television (CCTV), or to prepare for rehabilitation of the sewer system. The Contractor shall furnish all labor, equipment, material and supplies and perform all operations necessary to properly clean the sanitary sewer lines, manholes and wet wells.

B. The Contractor shall provide regular cleaning of the sewer system to remove all debris prior to the rehabilitation of sewer pipelines and manholes. The costs for regular cleaning shall be included in the unit rates for each item listed within Attachment C - Cost Proposal categories of CIPP Lining Installation, Mechanical Liner Installation, Sewer Pipeline Repairs, Sewer Pipeline Repairs-Grout, Sewer Pipeline Repairs-Internal Point repair, Manhole Rehabilitation and Repair, see Attachment B.

C. Related Work Specified in Other Sections Include, but is not limited to, the following:

1. Section 01025, Measurement and Payment
2. Section 01300, Submittals
3. Section 02640, Technical Provisions for Inspection and Rehabilitation
4. Section 02954, Sewer Main Rehabilitation by Lining
5. Section, 02956, Television Inspection
6. Section 02960, Temporary Bypass Pumping Systems

1.2 DEFINITIONS:

A. Debris: Debris shall consist of dirt, rocks, bricks, gravel, sand, silt, grease, roots, and other materials that may accumulate in a sanitary sewer pipe.

B. Regular Cleaning:

1. Pipeline Regular Cleaning shall consist of a minimum of three passes using high velocity, hydrojetting, and vacuum cleaning equipment to prepare for CCTV or sewer rehabilitation. One pass using a root saw, for general sawing, with a camera following to the downstream manhole for light root removal.
2. Manhole Regular Cleaning shall consist removal of all construction and cleaning debris from the manhole and proper disposal in a certified waste disposal facility. Debris removed may require confined space entry and shall not exceed 33% of the manhole volume as calculated from invert to manhole rim.

C. Heavy Sewer Cleaning:

1. Pipeline Heavy Sewer Cleaning is required when attempt at regular cleaning has failed and when a full pipe blockage is encountered, or the pipe has been identified through CCTV inspection as being greater than 50% blocked. Heavy cleaning shall consist of several passes using mechanically powered equipment, vacuum cleaning equipment

and/or other equipment to remove heavy grease, roots and debris that was not successfully removed by regular cleaning.

2. Manhole Heavy Sewer Cleaning is required when debris exceeds 33% of the manhole volume as calculated from invert to manhole rim. Cleaning shall include removal of all construction and cleaning debris from the manhole and proper disposal in a certified waste disposal facility. Heavy Cleaning requires confined space entry to remove debris in excess of 33% of the manhole volume as calculated from invert to manhole rim.

D. Extreme Sewer Cleaning:

1. The Contractor shall submit their means and methods to perform Extreme Heavy Sewer Cleaning. Submit means and methods for Pipelines, Manholes and Wet Wells that may not be defined in this specification.

2. Pipeline: Extreme Heavy Cleaning is required when the County has reviewed the Contractors information and decided that heavy cleaning cannot be accomplished.

3. Manhole: Extreme Heavy Cleaning is required when the County has reviewed the Contractors information and decided that Heavy cleaning cannot be accomplished.

4. Wet Wells: Extreme Heavy Cleaning, all cleaning is consisted to be Extreme Heavy Cleaning.

5. All Extreme Heavy Cleaning shall be paid for using the actual crew hours (HR) spent to clean extreme amounts of sediment and debris from the sewer system and wet wells using equipment and procedures specified and deemed necessary by the County.

1.3 REFERENCED DOCUMENTS

A. All work must also conform to the latest edition of the following specifications

1. NASSCO Sewer Pipe Cleaning Specifications 2014 (2019 update):

   https://www.nassco.org/sites/default/files/SPECIFICATION%20GUIDELINE%20-%20SEWER%20CLEANING%2006Nov14_%202019Update.pdf

2. State Department of Transportation (MUTCD):

   https://www.virginiadot.org/business/virginia_mutcd_supplement.asp

1.4 PROJECT INFORMATION:

A. Prior to any Cured-In-Place-Pipe (CIPP) reconstruction or Manhole Rehabilitation process, it shall be the responsibility of the Contractor to clean debris out of the sewer system in accordance with the “Sewer Line Cleaning” section of the most recent publication of NASSCO’s Specification Guidelines (for) Wastewater Collection Systems Maintenance & Rehabilitation. In addition, prior to television inspection and video recording, the sewer shall be cleaned to such a condition that the video camera can adequately discern structural defects, misalignments, and points of infiltration. Prior to rehabilitation, all sand, rocks, gravel, mud, grease, and other debris that could interfere with or otherwise adversely impact the success of the rehabilitation shall be removed. Protruding laterals > ½ inch shall be cut prior to rehabilitation.

SECTION 02650 – SANITARY SEWER LINE CLEANING

B. The Contractor shall seek Owner approval for heavy and extreme sewer cleaning on small diameter pipes (i.e. 8-inch to 18-inch) and Manholes when regular cleaning cannot be accomplished to allow for the installation of the rehabilitation product.

C. The Contractor shall protect the sanitary sewer lines/manholes from damage as a result of the cleaning operation. This also includes protecting public/private site and access. Sanitary sewer lines/manholes or site damaged as a result of the Contractor's improper operations shall be promptly repaired by the Contractor at no cost to the Owner.

D. The Contractor shall immediately notify owner if any of the cleaning activities result in deterioration of the host pipe and possibly result in sewer collapse. Owner shall decide if the cleaning operation needs to continue or be stopped.

E. The Owner will provide the Contractor with the scope and location of the work as follows:

1. A list of manholes and/or sewer segments slated for sewer Rehabilitation for each phase of work. In general, the list may contain but not limited to the following information:

    a. **Phase:** This identifies the year and phase the work was released to the Contractor to be completed, for example- FY20 Phase 1.
    b. **Shed/Coordinates:** This is the location by Sewer Shed and Coordinates of County Grid System, for Example: K/A3.
    c. **Grid and Manholes (Line Segment):** This is the GIS map identification of the asset. It provides location of which County Grid the asset is located on and the manholes numbers, for example, **101-3**-010-**101-3**-009 is Grid 101-3 and manholes 010 to 009.
    d. **Diameter of pipe:** According to available records.
    e. **Length of sewer pipe:** According to available records.
    f. **Number of customers (Taps):** Connected to each line according to available records.
    g. **Depth of manholes:** When manhole is rehabilitated according to available records.
    h. **Street names:** Name of street where work will take place.
    i. **Costs**: Approximate costs for each sewer pipe or manhole rehabilitated.

2. Asset information such as:

    a. A PDF copy of the CCTV log generated from the pipeline or manhole inspection on record. CCTV logs may or may not be the most current on record and the data generated from these inspections must be confirmed in the field prior to rehabilitation. This information is being provide for planning purposed only and should not be utilized as a basis of ordering materials or services. Videos will not be provided.
    b. The Fairfax County Digital Map Viewer to view Sanitary Sewer Maps. This map can be found at: https://www.fairfaxcounty.gov/gisapps/DMV/Default.aspx
    c. The Fairfax County ArcGIS Online Sewer Map Service available for compatible devices, may be used to locate approximate location of manholes using a cell phone in the field.

d. The Contractor assumes all liability and risk for the use of the Fairfax County Digital Map Viewer, ArcGIS Online sewer map sewer map service and any asset information obtained from the County. The Contractor shall confirm all data, make field measurements and conduct investigations to determine all requirements for completion of the work. The Contractor will not receive any compensation for any claims in connection with asset information obtained from the County.

1.5 SUBMITTALS:

A. Pay requests shall include a listing of all sanitary sewer pipe and manholes or wet wells cleaned. A PACP standard format report (WinCan VX) shall be included to document the existing conditions and address any field issues identified during the cleaning that may impact the CIPP liner or manhole rehabilitation design and installation.

B. Submit proposed debris haul routes to the County for approval.

C. Submit dump tickets for record when dumping debris generated from sewer cleaning operations.

D. Submit means and methods to perform Regular Sewer Cleaning for Pipelines and Manholes.

E. Submit means and methods to perform Heavy Sewer Cleaning for Pipelines and Manholes.

F. Submit means and methods to perform Extreme Heavy Sewer Cleaning for Pipelines, Manholes and Wet Wells.

PART 2 PRODUCTS

2.1 EQUIPMENT

A. General

1. The Contractor shall insure backup equipment is available and can be delivered to the site within 24 hours.

B. Cleaning Equipment

1. The Contractor shall provide all equipment necessary for the proper hydraulic cleaning, rodding, bucketing, brushing, root cutting, grease cutting, tap cutting and flushing of the sanitary sewer lines for the pipe sizes encountered. All cleaning equipment shall be subject to the review and approval of the Owner.

2. The Contractor shall protect the sanitary sewer lines from damage due to the improper use of cleaning equipment. Sanitary sewer lines or manholes damaged as a result of the Contractor’s operations shall be promptly repaired by the Contractor at no cost to the Owner.

3. All equipment, devices and tools required for line work shall be owned (or leased) and operated by the Contractor.

4. High velocity, hydrojetting, sanitary sewer line cleaners shall have the following characteristics:

a. A minimum usable water capacity of 2000 gallons and a pump capable of delivering at least 60 gallons per minute (gpm) at 1500 pounds per square inch (psi).
b. Two or more high velocity nozzles capable of producing a scouring action from 10 to 45 degrees, in all size lines to be cleaned. A relief valve adjustable from 1 to 1500 psi minimum shall regulate pressure to the nozzles.
c. A minimum of 600 feet of high-pressure hose certified for the working pressure to be mounted on a hydraulically driven hose reel.
d. A high velocity gun for washing and scouring manhole walls and floor that will produce flows from a fine spray to a long-distance solid stream.

5. Vacuum cleaning equipment shall have the ability to vacuum debris from the line/manhole at a minimum airflow of 3,600 cubic feet per minute (cfm) through an 8-inch tube, to depths of at least 25 feet.

6. Heavy-duty power rodding machine shall be capable of rodding distances of up to 1,000 feet in one setup. The machine shall have the ability to spin the rod either clockwise or counterclockwise or push the rod straight out or pull back without rotating the machine. The machine shall also be capable of pulling pipe- size swabs or brushes back through the pipe.

7. Heavy-duty bucket machines for use on a dragline shall be capable of using buckets, brushes, scrapers and swabs.

8. Tap cutting (protruding laterals) devices shall have a cutter capable of cutting protruding laterals without damage to the utility. The cutter will be sharp to make a clean cut.

2.2 MATERIALS

A. Water required for cleaning operations is the responsibility of the Contractor. Obtain a Fairfax Water Fire Hydrant Use Permit and meter from the Fairfax Water Customer Service Center. The Contractor is responsible for complying with all permit requirements. Use of non-potable water is not allowed on the project unless approved by Owner.

PART 3 EXECUTION

3.1 GENERAL

A. Sanitary sewer lines shall be cleaned in the downstream direction only, except from the pump station influent to the first manhole upstream of the pump station.

B. The Contractor shall monitor the effluent from cleaning operations and abandon cleaning if excessive sand and gravel are encountered. Once the source has been located and potential drainage to the pipe mitigated, cleaning may resume.

C. If an obstruction is encountered preventing the equipment from traversing the entire pipe section, cleaning operations shall be paused, and the Contractor shall perform a television investigation in accordance with Section 02956, Television Inspection.

1. If an obstruction is found which requires immediate repair (e.g. collapsed pipe) the Contractor shall notify the Owner and abandon any further action for the pipe section.
2. If the obstruction does not require immediate action by the Owner (e.g. a protruding lateral), the Contractor shall perform a television inspection.
3. If the need to perform heavy cleaning is identified, the Contractor shall perform the heavy cleaning as specified below.

D. CCTV Inspection shall be in accordance with Section 02956, Cured In Place or Alternative Pipe Point Repair.

E. Existing flows shall not be interrupted for periods longer than one hour. The Contractor shall take necessary precautions to prevent sewage backup and shall be responsible if damage results there from. Sewage diverted during cleaning operations shall be returned to the sanitary system and not discharged into streams or storm drain system.

F. Cleaning shall be in accordance with the manufacturer's recommendations of each supplier that provides the rehabilitation and repair products for sewer system being rehabilitated. This includes all products used to rehabilitate sewer pipelines, and manholes.

G. Following sewer cleaning, all sewer pipelines shall undergo a CCTV inspection. Manholes will be inspected following a level I NASSCO inspection. When submitting an invoice for the completed rehabilitation work on sewer pipelines or manholes include the pre and post inspection as part of the payment request. The pre inspection will take place after cleaning, prior to rehabilitation work and the post inspection will take place upon completion of the work.

3.2 SAFETY, PERMITS AND TRAFFIC CONTROL

A. The sewer cleaning Contractor shall comply with the safety, permits and traffic control provisions of Section 02640, Technical Provisions for Inspection and Rehabilitation, and all contract requirements as set forth in this contract.

3.3 REGULAR CLEANING

A. Sanitary sewer lines accessible to cleaning equipment shall be cleaned using high- velocity, hydrojetting, and vacuum cleaning equipment. The equipment shall be capable of removing debris from the sewer lines and manholes. Debris being cleaned, must be prevented from passing downstream into next manhole downstream. Perform one pass with root sawing equipment with the camera following the saw to the downstream manhole to remove light roots and grease.

B. The Contractor shall provide a minimum of two (2) and maximum of three (3) passes through the entire length of the sanitary sewer line. The Contractor shall monitor the discharge during cleaning operations and continue cleaning until the discharge exhibits little or no debris.

C. The Contractor shall provide a list of cleaning equipment with detailed instructions on its use during the typical regular cleaning operations. The detailed instructions shall provide step by step instructions on proper use of the equipment, all safety measures, methods to remove lodged equipment if stuck in the sewer system, clean-up and deposal of debris removed from

the sewer system. During the time frame of this contract the Contractor shall submit any changes to regular cleaning operations equipment, means and method instructions to the owner.

3.4 HEAVY CLEANING

A. Heavy cleaning may be performed after regular cleaning, to remove heavy grease and roots or other blockages in the line and preventing CCTV inspection.

B. The Contractor shall perform and submit a pre-heavy cleaning television investigation video and/or sonar profile for each pipe or manhole section that is to be heavy cleaned.

C. The pre-heavy cleaning television investigation and/or sonar shall clearly document the need for heavy cleaning and does not have to be performed in accordance with PACP standards (as required by Section 02956, Television Inspection). Heavy cleaning recommendations will be reviewed and approved by the Owner prior to payment based on the television investigation video and/or sonar profile.

D. Sanitary sewer lines shall be heavy cleaned using high velocity, hydrojetting and mechanically powered equipment, and vacuum cleaning equipment and/or other equipment to remove heavy grease, roots and debris that was not successfully removed by regular cleaning. The equipment shall be capable of removing all debris from the sewer lines and manholes. Heavy cleaning operations shall be performed until the line segment is free of debris.

E. Sanitary Sewer Manholes shall be heavy cleaned by removal of all construction and cleaning debris from the manhole when unable to meet the requirements of regular cleaning. The Contractor will dispose of all removed debris in a certified waste disposal facility. Heavy Cleaning requires confined space entry to remove debris in excess of 33% of the manhole volume as calculated from invert to manhole rim.

F. A television inspection shall be performed on pipe sections and manholes after heavy cleaning has been performed in accordance with Section 02956, Television Inspection.

G. The Contractor shall provide a list of cleaning equipment with detailed instructions on its use during the typical heavy cleaning operations. The detailed instructions shall provide step by step instructions on proper use of the equipment, all safety measures, methods to remove lodged equipment if stuck in the sewer system, clean-up and deposal of debris removed from the sewer system. The Contractor shall include a definition of what constitutes the need for heavy cleaning, how it is different from regular cleaning and his process for obtaining approval for heavy cleaning in advance of the work. During the time frame of this contract the Contractor shall submit any changes to heavy cleaning operations equipment, methods and instructions to the owner.

3.5 EXTREME SEWER CLEANING OF GRAVITY SEWERS AND WET WELLS AT PUMP STATIONS

A. Extreme cleaning may be performed with approval of the County after regular and heavy sewer cleaning has not provided acceptable results to remove heavy grease and roots or other blockages and debris in the sewer system.

B. The Contractor shall obtain and submit a pre-cleaning television investigation video for section of the sewer system that extreme sewer cleaning is performed in advance of the work.

C. The pre-cleaning television investigation and/or sonar shall clearly document the need for extreme cleaning, and does not have to be performed in accordance with PACP standards (as required by Section 02956, Television Inspection). Extreme cleaning recommendations will be reviewed and approved by the Owner prior to work being performed and payment will be based on the television investigation video and/or sonar profile.

D. The sanitary sewer system shall be cleaned using methods acceptable to the owner. The equipment shall be capable of removing debris from the sewer pipelines, manholes and/or wet wells. Cleaning operations shall be performed until the sewer system is free of debris.

E. A television inspection shall be performed after cleaning has been performed in accordance with Section 02956, Television Inspection.

The Contractor shall provide a list of cleaning equipment with detailed instructions on its use during three (3) typical extreme cleaning operations. One for cleaning pipelines, one for cleaning manholes and one for cleaning of wet wells. The detailed instructions shall provide step by step instructions on proper use of the equipment, all safety measures, methods to remove lodged equipment if stuck in the sewer system, clean-up and deposal of debris removed from the sewer system. The Contractor shall include a definition of what constitutes the need for extreme cleaning, how it is different from regular and heavy cleaning. He will also include the Contractor's process for obtaining approval to perform extreme cleaning in advance of the work. During the time frame of this contract the Contractor shall submit any changes to extreme cleaning operations equipment, methods and instructions to the owner.

3.6 CLEANING PRECAUTIONS

A. During all cleaning and preparation operations, the Contractor shall protect the sanitary sewer lines and manholes from damage. During these operations, the Contractor shall also ensure no damage is caused to public or private property adjacent to or served by the sanitary sewer or its branches. The Contractor is responsible for removing his equipment from sewers. The Contractor will be held fully liable for any damages incurred that result from the performance of the work under this contract or negligence. The Contractor shall restore any damage caused to public and/or private property as a result of any work performed under this contract such as cleaning and preparation operations to pre-existing conditions at no additional cost to the Owner. Pipe collapses resulting from cleaning operations shall be reported to the Owner immediately. The Contractor shall repair such damage at no cost to the Owner or the public.

B. When hydraulically propelled cleaning tools are used, retarding the flow in the sewer line, the Contractor shall ensure the water pressure created does not damage or cause flooding of public or private property being served by the sewer.

C. It will be the responsibility of the Contractor, throughout the tenure of this contract, to provide and always maintain sufficient flow to pass any flash of storm flow of drainage ditches and prevent any backwater flooding due to obstruction caused by cleaning or CCTV equipment.

D. It shall be the Contractor's responsibility to remove materials and equipment that has been lodged in the sewer from cleaning, television inspection.

E. Access to fire hydrants for the purpose of fire protection shall always be maintained.

F. The Contractor shall use the manufacturer's recommended size tools for the various size pipes. Equipment recommended by the manufacturer to protect the manhole and pipe, such as pull-in slant jack rollers and roller and yoke assembly, roller manhole jacks, etc. shall be utilized.

G. The Contractor shall monitor material exiting the pipe as it is cleaned and abandon all cleaning operations should evidence of descaling of corroded pipes or structures be encountered. Sanitary sewer lines or structures displaying excessive scaling or corrosion of metal pipe discovered through television inspections or television investigations shall not be mechanically cleaned unless the cleaning will be immediately followed by rehabilitation of the pipelines, manholes or structures.

3.7 DEBRIS REMOVAL AND DISPOSAL

A. All debris and other solid or semisolid waste material resulting from the cleaning operation shall be removed at the downstream manhole of the section being cleaned. When hydraulic cleaning equipment is used, a suitable dam or weir shall be placed in the downstream manhole to trap all such materials. 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.

B. Under no circumstances shall debris and other solid or semisolid waste removed during these operations be dumped or spilled into streets, ditches, storm drains or other sanitary sewers. All debris and other solids or semisolids resulting from the cleaning operations shall be removed from the site and disposed of in a lawful manner in a certified waste disposal facility.

C. 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 agreement and in accordance with applicable laws and regulations. The Contractor shall immediately clean up any such spill or debris release.

D. The haul 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.

3.8 ACCEPTANCE OF CLEANING OPERATION

A. The Contractor shall submit a post-regular cleaning television video in PACP format for all lines cleaned. The Owner shall review the television videos and inspect the work prior to release for payment.

B. The Contractor shall submit a television investigation video and post-heavy cleaning television inspection for all lines cleaned as heavy cleaning for Owner's review prior to release for payment.

C. Cleaned line segments shall be reasonably free of debris prior to acceptance by the Owner.

D. Acceptance of sewer line cleaning where television inspection has occurred shall be made upon the successful completion of the television inspection and shall be to the satisfaction of the Owner. If the television inspection shows the cleaning to be unsatisfactory, the Contractor shall be inquired to re-clean and re-inspect the sewer line. Re-cleaning and re-inspection of the sanitary sewer line shall be at no additional cost to the Owner.

SECTION 02650 – SANITARY SEWER LINE CLEANING

PART 4 PAYMENT

4.1 Requirements as set forth in Section 01025, Measurement and Payment and stated herein

A. Regular Cleaning costs shall be included in the unit rates for each item listed within Attachment C - Cost Proposal for all items requiring cleaning as part of the inspection and rehabilitation process. Separate payment for Regular Cleaning will not be made at any time.

B. Heavy Cleaning payment will be in accordance with the Contract Documents at the unit rate provided in Attachment C - Cost Proposal and any written modifications issued by the County Purchasing Agent.

C. Extreme Heavy Cleaning payment will be in accordance with the Contract Documents at the unit rate provided in Attachment C - Cost Proposal and any written modifications issued by the County Purchasing Agent.

END OF SECTION

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SECTION 02651 – SANITARY SEWER OVERFLOW RESPONSE

PART 1 GENERAL

1.1 SUMMARY

A. This section includes provisions for responding to sanitary sewer overflows (SSOs) resulting from the Contractor's inspection and rehabilitation work.

B. Related Work Specified in Other Sections Include, but is not limited to, the following:

1. Section 02640, Technical Provisions for Inspection and Rehabilitation
2. Section 02650, Sanitary Sewer Line Cleaning
3. Section 02954, Sewer Main Rehabilitation by Lining
4. Section 02955, Cured In Place or Alternate Pipe Point Repair
5. Section 02956, Television Inspection
6. Section 02957, Sewer Manhole Rehabilitation
7. Section 02959, Sewer Sealing by Chemical Grout
8. Section 02960, Temporary Bypass Pumping Systems

1.2 CONTRACTOR RESPONSIBILITIES

A. The Contractor shall schedule and perform work in manner that does not cause or contribute to incidence of overflows, releases or spills of sewage from sanitary sewer system or bypass operation.

B. The Contractor shall be responsible for preventing and controlling overflows from the sanitary sewers that result from his activities. Provisions for preventing and controlling overflows shall include but not be limited to the following:

1. Monitoring surcharging in manholes upstream of the work area which could result in an SSO or backup into a structure connected to the main line sewer.
2. Avoiding placement of obstructions in the sewer system that restrict wastewater flow other than plugs associated with bypass pumping.
3. Maintaining equipment on-site or near the work site for containing SSOs, bypass pumping, and recovery of wastewater from an SSO.
4. Monitoring the weather and making provisions for un-obstructed wastewater flow during rain events that may cause wastewater flows to exceed the capacity of bypass pumping equipment.
5. Scheduling the work to avoid extended periods of wastewater flow restrictions.

C. The Contractor shall not be responsible for SSOs due to existing sewer conditions or maintenance issues such as grease blockages, roots, sewer obstructions, inadequate sewer capacity, or other existing conditions not related to his work that may result in an SSO. This assumes that the Contractor's activities do not exacerbate existing conditions.

SECTION 02651 – SANITARY SEWER OVERFLOW RESPONSE

D. The Fairfax Department of Public Works and Environmental Services, Wastewater Collection System has a Sanitary Sewer Overflow Response Plan that provides procedures for County personnel to investigate, report on, control, monitor, and clean up SSOs. The Contractor shall coordinate his activities with those of the County and provide access to the work site for all County personnel involved in an SSO response. The Contractor shall be familiar with the County's response plan.

E. All costs for responding to SSOs not part of the County's response plan, responsibilities and subsequent activities shall be incidental to the work and no separate payment shall be made for the Contractor's response activities. This shall include cleanup of wastewater spills resulting from the Contractor's activities.

1.3 SSO NOTIFICATION

A. When an SSO occurs, the Contractor shall notify the County Trouble Response Center at (703) 323-1211. The County will make all necessary notifications to County personnel related to the SSO.

B. The Contractor shall immediately report any spills to the Owner and provide DEQ with a 24 hour sewage spill report, submit 24 hour report to: https://www.deq.virginia.gov/Programs/PollutionResponsePreparedness/PollutionReportingForm.aspx

1. Provide County Project Manager and Asset Management Group with copy of documents sent to DEQ to report spills for 24-hour report and 5-day spill report below.

2. Follow up with additional DEQ 5-day spill report form as required by DEQ with email to the following:

   Mark Evans mark.evans@deq.virginia.gov

   Lacy, Alan (DEQ) Alan.Lacy@deq.virginia.gov

   Miller, Mark (Mark.Miller@deq.virginia.gov

3. The Contractor shall confirm reporting procedures with DEQ and keep reporting procedures up to date.

4. The Contractor will be responsible for payment for all fines and damages resulting from a sewage spill. The written report shall include, but not be limited to, the following:

   a. A description of the nature and location of the discharge
   b. The cause of the discharge,
   c. The date on which the discharge occurred,
   d. The length of time the discharge continued,
   e. The volume of the discharge,
   f. If the discharge is continuing, how long it is expected to continue.
   g. If the discharge is continuing, what the expected total volume of the discharge will be, any steps planned or taken to reduce, eliminate and prevent a recurrence of the present discharge or any future discharges not authorized by the permit.

C. No other notification of the SSO shall be necessary.

D. No surfaces or amounts of spill are exempt from this notification.

E. The Contractor shall not communicate with the public or news media about the SSO. Any questions from or comments by the public or new media that are related to the SSO shall be referred to the County representative.

F. If hazardous wastes or toxic wastes are spilled and become part of the SSO, the Contractor shall include information on the type of hazardous or toxic material that was spilled (such as product data, Material Safety Data sheets, etc.) and the estimated spill quantity.

1.4 SANITARY SEWER OVERFLOW RESPONSE

A. Controlling an SSO

1. The Contractor shall initiate emergency actions as necessary to eliminate the cause of the SSO which results from his activities.

B. Containment

1. The Contractor shall take necessary actions to prevent wastewater from an SSO from entering a storm sewer or drainage way. This may include but not be limited to using sandbags or other appropriate devices to act as a dam to prohibit wastewater from entering a drop inlet, curb inlet or other inlet to the storm drain or drainage way. Dams shall be placed in the storm drain or drainage way at the farthest point downstream that the SSO has reached, where practical.

C. Recovery and Cleanup

1. Recovery and cleanup are necessary for all SSOs caused by the Contractors activities. All liquids, solids, and materials shall be recovered and removed from the site. Every effort shall be made to recover as much of the SSO as possible.

2. Depending on the responsibilities and actions of the County's SSO response personnel, it may be necessary for the Contractor to recover and cleanup SSOs from storm drains and drainage ways. All necessary cleanup work shall be incidental to the project and no separate payment will be made.

3. The Contractor shall take the necessary actions to avoid contact by his personnel with spilled hazardous or toxic materials that may be spilled and become part of the SSO, and shall abide by the material handling, safety procedures and precautions of the material supplier.

The Contractor shall disinfect areas, or private or public facilities contaminated by the SSO, unless the County determines that this is their responsibility. The Contractor shall provide information to the County's SSO response personnel on the area and/or facilities affected by the SSO.

D. COMPLIANCE AND REGULATIONS

1. The Contractor shall immediately report and take actions to cleanup any SSO resulting from his work. It is the responsibility of the Contractor to comply with laws, regulations and instructions from any governmental agency having jurisdiction. Should an SSO occur the Contractor is required to followed instructions of the County if given, as it relates to

public notification and interaction with various Government offices until such time as all issues with the SSO have been resolved. This involvement can include posting signage, delivery of letters, contacting state and local agencies as required.

2. Should regulations for SSO reporting and clean-up change as a result of new legislation the Contractor will be required to adhere to all new requirements.

END OF SECTION

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SECTION 02953 – SEWER MAIN REHABILITATION BY MECHANICAL LINER

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Materials and procedures for machine spiral wound polyvinyl chloride (PVC) pipe liner using the SPR™ EX installation method or approved equal.

1.2 SUMMARY

A. Machine spiral wound PVC liner or approved equal is intended for use in the rehabilitation of sanitary and storm sewers without excavation. The lining process uses a continuous one-piece PVC profile strip, which is machine wound directly into the deteriorated pipeline from an existing access chamber or manhole.

B. The system consists of a single, one-part PVC profile strip with “T” shaped ribs on one side. The edges of the strip interlock as it is spirally wound to form a liner inside the host pipe.

C. A range of PVC profiles are available with different profile, rib and thickness configurations to match project design requirements.

D. The winding process is continuous until the complete length of the existing pipe between access points or manholes has been lined.

E. The liner is wound at a fixed diameter, leaving an annular space between the liner and host pipe wall. It is then radially expanded by mechanical means, without the applications of heat, until the liner contacts the inside wall of the existing pipe.

F. Related Work Specified in Other Sections Include, but is not limited to, the following:

1. Section 01025, Measurement and Payment
2. Section 01300, Submittals
3. Section 02640, Technical Provisions for Inspection and Rehabilitation
4. Section 02650, Sanitary Sewer Line Cleaning
5. Section 02954, Sewer Main Rehabilitation by Lining
6. Section, 02956, Television Inspection
7. Section 02960, Temporary Bypass Pumping Systems

1.3 REFERENCES

A. ASTM D 256: Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics

B. ASTM D 638: Standard Test Method for Tensile Properties of Plastics

C. ASTM D 790: Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical InsulatingMaterials

D. ASTM D 1784: Standard Specification for Rigid Poly Vinyl Chloride (PVC) Compounds and Chlorinated Poly Vinyl Chloride (CPVC) Compounds

E. ASTM F 1697-18: Standard Specification for Poly Vinyl Chloride (PVC) Profile Strip for Machine Spiral-Wound Liner Pipe Rehabilitation of Existing Sewers and Conduits

F. ASTM F 1741-18: Standard Practice for Installation of Machine Wound Poly Vinyl Chloride (PVC) Liner Pipe for Rehabilitation of Existing Sewers and Conduits

PART 2 MATERIALS

2.1 MATERIAL COMPOSITION

A. The extruded profile strip shall be made from unplasticised PVC compounds meeting the minimum requirements for cell classification 13354 or higher, as defined in ASTM D 1784.

B. PVC profile strip for machine spiral wound liner pipe rehabilitation of existing sewers shall comply with ASTM F 1697-18, except as modified herein.

2.2 MATERIAL AND EQUIPMENT ACCEPTANCE

A. At the time of manufacture, each lot of extruded profile strip shall be inspected for defects and tested for physical properties as specified. A “lot” is defined as a continuous extrusion run of a given profile designation on a spool.

B. PVC profile strip minimum dimensions and initial stiffness factors shall be in accordance with Table 1 below. In accordance with ASTM F 1697- 18, other profile configurations are permitted, provided similar details are provided as in Table 1.

TABLE 1

Profile Type	Minimum Width		Minimum Height		Minimum Waterway Wall		Minimum Initial Stiffness Factor (EI)	
	mm	(in.)	mm	(in.)	mm	(in.)	MPa-mm^3	(in^3 – lbf/in^2)
1	51.0	2.00	5.5	0.216	1.4	0.0551	21.2x10^3	188.0
2	80.0	3.14	8.0	0.314	1.4	0.0551	63.4x10^3	561.0
3	121.0	4.76	13.0	0.511	1.6	0.0630	242.7x10^3	2148.0
7	121.0	4.76	19.0	0.748	2.1	0.0830	450x10^3	3983.0

Note: Initial Stiffness Factors are derived from testing in accordance with ASTM D 790 as modified by ASTM F1697-18, using flat strips of profile

C. The following values of modulus of elasticity of PVC shall be used in design:
Short Term: 400,000psi (2,750 MPa)
Long Term: 116,000psi (800 MPa)

D. Design stiffness values for a specific PVC profile strip are available from the manufacturer.

E. Sealants and gaskets necessary for effective interlocking of the edges of PVC strip are pre-applied at the time of manufacture. They shall be suitable for use in a sewer environment.

2.3 MATERIAL TESTING

A. Before installation of the liner has commenced, a sample of profile from each production run shall be tested to confirm that the value of initial stiffness factor detailed in Table 1 exceeds specified minimum values.

2.4 MARKING

A. Each PVC profile strip shall be distinctly marked on its inside surface at intervals not to exceed 60 inches with a code number identifying the manufacturer, plant, date of manufacture and shift, and profile type. This information shall also appear on each reel.

PART 3 EXECUTION

3.1 INSTALLATION AND FIELD INSPECTION

A. Installation of machine spiral wound PVC liner pipe for rehabilitation of existing sewers shall comply with ASTM F 1741-18 except as modified herein.

B. The existing pipeline shall be cleaned of any obstructions, to a standard suitable for installation of the liner, and televised. All existing live service connections shall be precisely located longitudinally and radially and logged for subsequent reinstatement following installation of the liner.

C. Bypass pumping is not mandatory for installation of the spiral wound liner. The Contractor shall be responsible for deciding the need for flow diversion to allow successful liner installation.

D. During installation the winding machine shall perform the following operations simultaneously:

1. A continuous ribbed liner profile strip is supplied from a reel and fed down through the existing manhole to the winding machine positioned at the base of the manhole
2. Joint lubricating sealant shall be placed into the primary lock of the self-interlocking edges of the ribbed profile (Note: An elastomeric adhesive, which prevents the liner from expanding prematurely during winding, is applied to the secondary lock during manufacture of the ribbed profile)
3. High tensile wire shall be inserted (Note: The wire remains only temporarily as it is pulled out during the expansion stage)
4. The winding machine winds the PVC strip into a liner pipe by interlocking the edges
5. Winding continues until the full length of the deteriorated pipe between manholes has been lined
6. The liner is then radially expanded by mechanical means, without the application of heat, until the liner contacts the inside wall of the existing pipe

E. End seals between the liner pipe and the existing pipe shall be installed with a sealing material that is compatible with the liner pipe material.

F. The transition between the liner invert and the invert in the manhole base shall be rendered smooth to reinstate the sewer flow line.

3.2 SERVICE CONNECTIONS

A. The Contractor shall reinstate all live junctions immediately after installation of the liner. Service connections may be reinstated by excavation or internally.

B. The service connection openings shall conform to the shape and size of the inside diameter of the existing service connection. Service connection openings shall be reinstated to 95 -100% of their diameter and free from rough edges or protrusions.

3.3 PRE-INSTALLATION INSPECTION

A. A closed-circuit television (CCTV) inspection shall be carried prior to installation to establish the condition of the existing pipe, show pipe has can accept installation as specified and all live junctions have been located.

B. All CCTV work shall conform to the most current NASSCO PACP standards and the requirements given in Section 02956, Television Inspection.

3.4 POST AND PRE-INSTALLATION INSPECTION

A. A closed-circuit television (CCTV) inspection shall be carried out before after installation to establish that the lining has been installed as specified and all live junctions have been reinstated.

B. The finished lining shall be free of defects that would affect long term strength or hydraulic performance.

PART 4 PAYMENT

4.1 Requirements as set forth in Section 01025, Measurement and Payment.

END OF SECTION

SECTION 02954 – SEWER MAIN REHABILITATION BY LINING

PART 1 GENERAL

1.1 SUMMARY

A. This section includes the minimum requirements for the rehabilitation of sanitary sewer pipelines by the installation of Cured-In-Place Pipe (CIPP) within the existing, deteriorated pipe under this contract.

B. Related Work Specified in Other Sections Include, but is not limited to, the following:

1. Section 01025, Measurement and Payment
2. Section 02640, Technical Provisions for Inspection and Rehabilitation
3. Section 02650, Sanitary Sewer Line Cleaning
4. Section 02651, Sanitary Sewer Overflow Response
5. Section 02956, Television Inspection
6. Section 02959, Sewer Sealing by Chemical Grout
7. Section 02960, Temporary Bypass Pumping Systems

C. The rehabilitation of pipelines shall be done by the installation of a resin-impregnated flexible tube which, when cured, shall be continuous and tight-fitting throughout the entire length of the original pipe. The CIPP shall extend the full length of the original pipe and provide a structurally sound, jointless and water-tight new pipe-within-a-pipe. The Contractor is responsible for proper, accurate and complete installation of the CIPP using the system selected by the Contractor meeting the Owners requirements.

D. Neither the CIPP product, system, nor its installation, shall cause adverse effects to any of the Owner's processes or facilities. The pressures and temperatures used for the product installation shall not damage the system in any way, and the use of the product shall not result in the formation or production of any detrimental compounds or by-products at the wastewater treatment plant. The Contractor shall notify the Owner and identify any by-products produced as a result of the installation operations, test and monitor the levels, and comply with any and all local laws and waste discharge requirements. The Contractor shall cleanup, restore existing surface conditions and structures, and repair any of the CIPP system determined to be defective. The Contractor shall conduct installation operations and schedule cleanup in a manner to cause the least possible obstruction and inconvenience to traffic, pedestrians, businesses and property owners or tenants.

E. The prices submitted by the Contractor, shall include all costs of permits, testing, quality control, labor, equipment and materials for the various items necessary for furnishing and installing, complete in place, CIPP in accordance with these specifications. All items of work not specifically mentioned herein which are required, by the Contractor, to make the product perform as intended and deliver the final product as specified herein shall be included in the respective lump sum and unit prices.

F. The prices submitted by the Contractor shall include the costs of maintaining sewage flows up to and including 2.0 MGD in the unit price for all diameters of CIPP rehabilitation.

SECTION 02954 – SEWER MAIN REHABILITATION BY LINING

G. Additional bypass costs in excess of 2.0 MGD will be paid as follows:

1. Sewer lines 15 inch thru 18 inch – Payment will be made when approved by the Owner in advance of the work. Payment to be made under Items for Bypass Pumping 2.0 – 5.0 MGD or 5.0 MGD – 10 MGD. The Contractor shall provide flow meter data to support his request to use additional bypass.

2. Sewer lines less than 15 inch- No payment will be made for additional bypass.

1.2 DESCRIPTION OF WORK AND PRODUCT DELIVERY

A. The Contractor shall provide all materials, labor, equipment, and services necessary for traffic control, bypass pumping and/or diversion of flows, cleaning and television inspection of sewers to be rehabilitated, liner installation, reconnection of service connections, all quality controls, provide and process samples for performance of required material tests, Pre and final television inspection, testing of the rehabilitated pipe system, warranty work and other work, and as specified herein.

B. Requirements for inspection and cleaning sewer system follow:

1. Section 02650, Sanitary Sewer Line Cleaning

2. Section 02956, Television Inspection

3. The Contract Documents

C. The product furnished shall be a complete CIPP system including specific materials, applicable equipment and installation procedures. All CIPP systems or multi-component products will be required to meet the submittal requirements as contained herein.

D. The CIPP shall be continuous and jointless from manhole to manhole or access point to access point and shall be free of all defects that will affect the long-term life and operation of the pipe.

E. Prior to installation the Contractor shall CCTV and clean the sewer segment. Any visible leakage that would prevent proper installation of the CIPP in accordance with the manufacturer's instructions shall be eliminated. Such leaks will typically be characterized as providing a steady stream or flow of water that could cause washout of the resin or uneven heat distribution during the curing process. The type of infiltration to be eliminated, as defined by NASSCO includes Infiltration Runner (IR) and Infiltration Gusher (IG). The CIPP shall fit sufficiently tight within the existing pipe so as to not leak at the manholes, or through the wall of the installed pipe. If leakage occurs at the manholes, the Contractor shall seal these areas to stop all leakage using a material compatible with the CIPP at no additional cost to the Owner. If leakage occurs through the wall of the pipe, the CIPP shall be repaired or removed as recommended by the CIPP manufacturer. Each installation of CIPP to include End Seals on each end of the sewer segment being rehabilitated. Final approval of the CIPP will be based on a leak tight pipe and end seals, excluding leaks at reinstated service connections. Reinstated service connections found leaking during post video inspections will be documented and provided to the Owner for review. The Owner will determine what follow-up repairs will be utilized to elevate leaks at reinstated service connections.

F. The CIPP shall be designed for a life of 50 years or greater.

G. The installed CIPP shall have a long term (50 year) corrosion resistance to the typical chemicals found in domestic sewage and defined in the referenced and applicable ASTM standards.

H. All existing and confirmed active service connections and any other service laterals to be reinstated, shall be re-opened robotically, to their original shape, cutting and wire brushing an opening in the liner to 100 percent of the flow capacity of the lateral recovering all coupons and fragments of coupons resulting from cutting the liner removal of resin slugs from inside service connections. The edges of the re-opened service connections shall not impede sewer flows. All over-cut or under-cut service connections will be properly repaired to meet the requirements of these specifications.

I. All materials furnished, as part of this contract shall be marked with detailed product information, stored in a manner specified by the manufacturer and tested to the requirement of this contract.

J. Warranty inspections shall be executed by the Owner. Any defects found shall be repaired or replaced by the Contractor at no cost to the Owner within 30 calendar days or sooner if required to maintain reliable sewer service to the public.

K. The Contractor shall furnish, from the project installation, all samples for product testing. The Contractor shall be responsible for testing and maintaining the chain of custody, delivery of the samples to an Owner approved independent laboratory and paying for all material and product testing performed under this contract. Prior to testing the Contractor shall submit to the Owner for approval, the name and location of the independent testing laboratory with a certified statement from the laboratory indicating they are independent from and not associated with the Contractor in any way.

L. Random CIPP samples of cured liner will be obtained from 20% of the sewer segments rehabilitated as directed by the Owner.

1.3 REFERENCES

A. The following documents form a part of this specification to the extent stated herein and shall be the latest editions thereof. Where differences exist between codes and standards, the requirements of these specifications shall apply. All references to codes and standards shall be to the latest revised version.

1. ASTM - F1216 Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube
2. ASTM - F1743 Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Pull in and Inflate and Curing of a Resin-Impregnated Tube
3. ASTM - D543 Standard and Practice for Evaluating the Resistance of Plastics to Chemical Reagents
4. ASTM - D638 Standard Test Method for Tensile Properties of Plastics
5. ASTM - D790 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
6. ASTM - D792 Standard Test Methods for Density and Specific Gravity of Plastics by Displacement

7. ASTM - F2019 Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Pulled in Place Installation of Glass Reinforced Plastic (GRP) Cured-in-Place Thermosetting Resin Pipe (CIPP)
8. ASTM - D2122 Standard Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings
9. ASTM F2561 Standard Practice for Rehabilitation of a Sewer Service Lateral and Its Connection to the Main Using a One-Piece Main and Lateral Cured-in-Place Liner
10. ASTM - D2990 Standard Test Methods for Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics
11. ASTM - D3567 Standard Practice for Determining Dimensions of Fiberglass (Glass-Fiber-Reinforced Thermosetting Resin) Pipe and Fittings
12. ASTM - D3681 Standard Test Method for Chemical Resistance of "Fiberglass (Glass Fiber Reinforced Thermosetting Resin) Pipe in a Deflected Condition
13. ASTM - D5813 Standard Specification for Cured-in Place Thermosetting Resin Sewer Pipe

1.4 PERFORMANCE WORK STATEMENT (PWS) SUBMITTAL

A. The Contractor shall submit, to the Owner a Performance Work Statement (PWS) which clearly defines the CIPP product delivery in conformance with the requirements of these contract documents. Unless otherwise directed by the Owner, the PWS shall at a minimum contain the following:

1. Clearly indicate that the CIPP will conform to the project requirements as outlined in the Description of Work and as delineated in these specifications.
2. A detailed written installation plan describing all preparation work, cleaning operations, pre-CCTV inspections, bypass pumping, traffic control, installation procedure, method of curing, service reconnection, quality control, testing to be performed, final CCTV inspection, warrantees furnished and all else necessary and appropriate for a complete liner installation. A detailed installation schedule shall be prepared, submitted and conform to the requirements of this contract.
3. The Owner intends to issue work periodically in phases. Each phase will be issued in a package that contains a list of sewer segments to be rehabilitated and CCTV inspections from County records for each sewer segment listed. The Contractor shall prepare a PWS submittal for the first package of pipes issued by the Owner each year and when changes to the PWS have occurred.
4. Contractor's description of the proposed CIPP technology, including a detailed written plan for identifying all active service connections maintaining service, during mainline installation, to each home and business connected to the section of pipe being lined, including temporary service for commercial, industrial and apartment complexes.
5. A description of the CIPP materials to be furnished for the project. Materials shall be fully detailed in the submittals and conform to these specifications and/or shall conform to the pre-approved product submission.

6. Engineering design calculations, in accordance with the Appendix of ASTM F1216, for each length of liner to be installed including the thickness of each proposed CIPP. It will be acceptable for the Contractor to submit a design for the most severe line condition and apply that design to all of the line sections. These calculations shall be performed and certified by a qualified, Professional Engineer licensed in the state of Virginia. All calculations shall include data that conforms to the requirements of these specifications or has been pre-approved by the Owner.

7. Proposed manufacturers technology data shall be submitted for all CIPP products and all associated technologies to be furnished.

8. Submittals shall include information on the cured-in-place pipe intended for installation and all tools and equipment required for a complete installation. The PWS shall identify which tools and equipment will be redundant on the job site in the event of equipment breakdown. All equipment to be furnished for the project, including proposed back-up equipment, shall be clearly described. The Contractor shall outline the mitigation procedure to be implemented in the event of key equipment failure during the installation process.

9. A detailed description of the Contractor's proposed procedures for removal of any existing blockages in the pipeline that may be encountered during the cleaning process.

10. A written detailed public notification plan shall be prepared and submitted including detailed staged notification to residences affected by the CIPP installation. A copy of the public notification letters and procedures shall be submitted to the Owner for review and approval.

11. A written styrene monitoring and safety program shall be submitted by the Contractor which includes an odor control plan that will ensure that project specific odors will be minimized at the project site and surrounding area, keeping the public and Contractor employees safe on site, see Section 02640, Technical Provisions for Inspection and Rehabilitation, paragraph 1.8.

12. A written plan to repair or replace defective CIPP, see Section 02954, Sewer Main Rehabilitation by Lining, paragraph 1.8.

13. Compensation/costs for all work required to provide and maintain the PWS submittal shall be included in the unit prices of the various items contained within Attachment C - Cost Proposal.

1.5 PRODUCT SUBMITTALS

A. Fabric Tube – including the manufacturer and description of product components such as felts and reinforcing materials.

B. Flexible membrane (coating) material – including materials specific to the proposed curing method and recommended repair (patching) procedure if applicable.

C. Raw Resin Data - including the manufacturer and description of product components including the Spectroscopic Wavelength diagram for the resin being furnished

D. Manufacturers' shipping, storage and handling recommendations for all components of the CIPP system.

E. All Safety Data Sheets (SDSs) for all materials to be furnished for the project.

F. Tube wet-out & cure method including:

1. A complete description of the proposed wet-out procedure for the proposed technology.

2. The Manufacturer's recommended cure method for each diameter and thickness of liner to be installed. The PWS shall contain a detailed curing procedure outlining the curing medium, the method of application and how the curing temperatures will be monitored.

1.6 SAFETY

A. The Contractor shall conform to all work safety requirements of pertinent regulatory agencies and shall secure the site for the working conditions in compliance with the same. The Contractor shall erect such signs and other devices as are necessary for the safety of the work site.

B. The Contractor shall perform all of the Work in accordance with applicable OSHA and VDOT standards. Emphasis shall be placed upon the requirements for traffic safety, entering confined spaces and with the equipment being utilized for pipe renewal.

C. The Contractor shall submit a written Safety Plan to the Owner, prior to beginning any work, identifying all competent persons. The plan shall include a description of a daily safety program for the job site and all emergency procedures to be implemented in the event of a safety incident. All work shall be conducted in accordance with the Contractor's submitted Safety Plan and include the requirements of the Styrene Monitoring and Safety program per Section 02640, Technical Provisions for Inspection and Rehabilitation, paragraph 1.8.

D. Compensation/costs for all work required to provide and maintain the Safety Plan shall be included in the unit prices of the various items contained within Attachment C - Cost Proposal.

1.7 QUALITY CONTROL PLAN (QCP)

A. A detailed quality control plan (QCP) shall be submitted to the Owner at the onset of the Contract that fully represents and conforms to the requirements of these specifications. At a minimum the QCP shall include the following:

1. A detailed written plan and discussion of the proposed quality controls to be performed by the Contractor.

2. Defined responsibilities, of the Contractor's personnel, for assuring that all quality requirements for this contract are met. These shall be assigned, by the Contractor, to specific personnel.

3. Proposed procedures for quality control, product sampling and testing by the Contractor shall be defined and submitted as part of the plan.

4. Proposed methods for product performance controls, including method of and frequency of product sampling and testing both in raw material form and cured product form.

5. Scheduled performance and product test result reviews between the Contractor and the Owner at a regularly scheduled job meeting.

6. Inspection forms and guidelines for quality control inspections shall be prepared in accordance with the standards specified in this contract and submitted with the QCP.

7. Proposed third party laboratory address and certification per Section 1.2, paragraph J.

1.8 CIPP REPAIR/REPLACEMENT

A. Occasionally installations will result in the need to repair or replace a defective CIPP. The Contractor shall outline specific repair or replacement procedures for potential defects that may occur in the installed CIPP. Repair/replacement procedures shall be as recommended by the CIPP system manufacturer and shall be submitted as part of the PWS.

B. The Contractor shall submit a complete written plan prior to the start of work which explains how failures in CIPP samples, or the work will be resolved including details on additional testing in accordance with all ASTM requirements. The plan shall include all follow-up activities to test, remove, replace, or repair the defective CIPP in accordance with the Manufacturer's requirements. Provide written documentation to confirm and attest the manufactures, installers, and any party involved in the installation of CIPP agree the plan will adequately produce an acceptable final resolution to correct defects in the work. The final plan to resolve CIPP defects must meet all ASTM requirements. Explain or confirm how:

1. To identify and define defects in the installed CIPP that will not affect the operation and long-term life of the product.

2. For defects that may occur in the installed CIPP, how the Contractor will determine if the defect is repairable?

   a. If repairable, what detailed step-by-step repair procedures will be used for various conditions based on manufacturer's recommendations? Include a detailed step-by-step repair procedure, resulting in a finished product meeting the requirements of these contract specifications.

   b. If unrepairable, what detailed step-by-step repair procedures will be used based on manufacturer's recommendations? Include a detailed step-by-step repair procedure, include a recommended procedure for the removal and replacement of the CIPP.

3. The Contractor will not be reimbursed for any repair necessary due to their installation of the CIPP liner or failure of materials used.

1.9 PRE & POST-INSPECTION VIDEOS

A. Pre & post video inspections including CCTV logs, NASSCO compliant and compatible with WinCan shall be submitted to the Owner, by the Contractor, within ten (10) working days of installation of said work or as specified by the Owner.

B. All video inspections shall provide a clear picture of the pipe and any defects. Video distortions, issues with color, white balance, debris, fluids within the pipe that prevent a complete inspection will be rejected.

C. Compensation for all work required for the submittal and approval of these inspections shall be included in the various pipelining items contained in the Proposal.

SECTION 02954 – SEWER MAIN REHABILITATION BY LINING

1.10 WARRANTY

A. The materials used for the project shall be certified by the manufacturer for the specified purpose. The Contractor shall warrant the CIPP material and installation for a period of five (5) years. During the Contractor warranty period, any defect which may materially affect the integrity, strength, function and/or operation of the pipe, shall be repaired at the Contractor's expense in accordance with procedures included in CIPP Repair/Replacement defined here within and as recommended by the manufacturer.

B. On any work completed by the contractor that is defective and/or has been repaired, the Contractor shall warrant this work for (1) year in addition to the warrantee required by the contract.

C. After a pipe section has been rehabilitated and for a period of time up to five (5) years following completion of the project, the Owner may inspect all or portions of the rehabilitated system. The specific locations will be selected at random by the Owner's inspector and should include all sizes of CIPP from this project. If it is found that any of the CIPP has developed abnormalities since the time of "Post Construction Television Inspection," the abnormalities shall be repaired and/or replaced as defined in Section 1.8 CIPP Repair/Replacement and as recommended by the manufacturer. If, after inspection of a portion of the rehabilitated system under the contract, problems are found, the Owner may televise all the CIPP installed on the contract. All verified defects shall be repaired and/or replaced by the Contractor and shall be performed in accordance with Section 1.8 CIPP Repair/Replacement and per the original specifications, all at no additional cost to the Owner.

PART 2 PRODUCTS

2.1 MATERIALS

A. The CIPP System must meet the chemical resistance requirements of these contract documents.

B. All materials shipped to the project site shall be accompanied by test reports certifying that the material conforms to the ASTM standards listed herein. Materials shall be shipped, stored, and handled in a manner consistent with written recommendations of the CIPP system manufacturer to avoid damage. Damage includes, but is not limited to, gouging, abrasion, flattening, cutting, puncturing or ultra-violet (UV) degradation. Onsite storage locations shall be approved by the Owner. All damaged materials shall be promptly removed from the project site at the Contractor's expense and disposed of in accordance with all current applicable government regulations and this contract.

2.2 FABRIC TUBE

A. The fabric tube shall consist of one or more layers of absorbent non-woven felt fabric, felt/fiberglass, felt/carbon fiber, carbon fiber or fiberglass and meet the requirements of ASTM F 1216, ASTM F 1743, or ASTM F2019 and ASTM D5813. The fabric tube shall be capable of absorbing and carrying resins, constructed to withstand installation pressures and curing temperatures and have sufficient strength to bridge missing pipe segments and stretch to fit

irregular pipe sections. The Contractor shall submit certified information from the felt manufacturer on the nominal void volume in the felt fabric that will be filled with resin.

B. The wet-out fabric tube shall have a uniform thickness and excess resin distribution that when compressed at installation pressures will meet or exceed the design thickness after cure.

C. The fabric tube shall be manufactured to a size and length that when installed will tightly fit the internal circumference, meeting applicable ASTM standards or better, of the original pipe. Allowance shall be made for circumferential stretching during installation. The tube shall be properly sized to the diameter of the existing pipe and the length to be rehabilitated and be able to stretch to fit irregular pipe sections and negotiate bends. The Contractor shall determine the minimum tube length necessary to effectively span the designated run between manholes. The Contractor shall verify the lengths in the field prior to ordering and prior to impregnation of the tube with resin to ensure that the tube will have sufficient length to extend the entire length of the run. The Contractor shall also measure the inside diameter of the existing pipelines in the field prior to ordering liner so that the liner can be installed in a tight-fitted condition.

D. The outside and/or inside layer of the fabric tube (before inversion/pull-in, as applicable) shall be coated with an impermeable, flexible membrane that will contain the resin and facilitate, if applicable, vacuum impregnation and monitoring of the resin saturation during the resin impregnation (wet-out) procedure.

E. No material shall be included in the fabric tube that may cause delamination in the cured CIPP. No dry or unsaturated layers shall be acceptable upon visual inspection as evident by color contrast between the tube fabric and the activated resin containing a colorant.

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. The hue of the color shall be dark enough to distinguish a contrast between the fully resin saturated felt fabric and dry or resin lean areas.

G. Seams in the fabric tube, if applicable, shall meet the requirements of ASTM D5813.

H. The outside of the fabric tube shall be marked a maximum of every 5 feet with the name of the manufacturer or CIPP system, manufacturing lot and production footage.

I. The minimum length of the fabric tube shall be that deemed necessary by the installer to effectively span the distance from the starting manhole to the terminating manhole or access point, plus that amount required to run-in and run-out for the installation process.

J. The nominal fabric tube wall thickness shall be constructed, as a minimum, to the nearest 0.5 mm increment, rounded up from the design thickness for that section of installed CIPP. Wall thickness transitions, in 0.5 mm increments or greater as appropriate, may be fabricated into the fabric tube between installation entrance and exit access points. The quantity of resin used in the impregnation shall be sufficient to fill all of the felt voids for the nominal felt thickness.

2.3 RESIN

A. The resin shall be a corrosion resistant polyester or vinyl ester resin and catalyst system or epoxy and hardener system that, when properly cured within the tube composite, meets the requirements of ASTM F1216, ASTM F1743 or F2019 and ASTM D5813, the physical properties herein, and those which are to be utilized in the design of the CIPP for this project. The resin,

specified for the specific application defined in the contract documents, shall produce CIPP which will comply with or exceed the structural and chemical resistance requirements of this specification. Quick-cure or accelerated resin systems that cure in half the specified time or substantially quicker will not be allowed. Quick-cure resin systems include those formulated by substantially increasing the amount of catalysts from that amount is normally specified for standard installations by the Manufacturer. Resins, catalysts and resin/catalysts mixing ratios shall not be changed during this Contract unless specifically approved by the Owner in writing.

B. Contractor shall identify the wet-out facility where all CIPP will be manufactured. All CIPP shall be manufactured from this designated wet-out facility unless specifically approved otherwise by the Owner in writing.

C. If the Owner decides to inspect the manufacturing of the CIPP, the Contractor shall provide full access to witness the wet-out process and shall provide any and all information related to the manufacturing as requested including Quality Control measures without delay and without claims of confidentiality or product privacy.

D. Contractor shall also submit a Certificate of Authenticity from the resin manufacturer prior to manufacturing any CIPP for each shipment of resin sent to the wetout facility.

E. Copies of the shipment documents from the resin manufacturer shall be submitted to the Owner when requested showing dates of shipment, the originating location and the receiving location.

F. The cure schedules for the CIPP shall be submitted to the Owner for review. The curing process/schedules shall be approved by the resin manufacturer in writing. The cure schedules shall include specific information on stepping the temperature up to “cooking” temperatures, “cooking” temperatures and durations, and cool-down procedures – all to be approved in writing by the resin manufacturer.

G. The resin to tube ratio, by volume, shall be furnished as recommended by the manufacturer.

H. Steam-cure shall not be allowed unless approved by the Owner in writing.

2.4 STRUCTURAL REQUIREMENTS

A. The physical properties and characteristics of the finished CIPP will vary considerably, depending on the types and mixing proportions of the materials used and the degree of cure executed. It shall be the responsibility of the Contractor to control these variables and to provide a CIPP system which meets or exceeds the minimum properties specified herein.

B. The cured pipe material (CIPP) shall, at a minimum, meet or exceed the structural properties, as listed below.

MINIMUM PHYSICAL PROPERTIES			
Property	**Test Method**	**Cured Composite Per ASTM F1216**	**Cured Composite Per Design**
Flexural Modulus of Elasticity (Short-Term) Felt Tubes. Felt/Fiberglass, Fiberglass as recommended by the Manufacturer	ASTM D-790	250,000 psi	Contractor Value

SECTION 02954 – SEWER MAIN REHABILITATION BY LINING

MINIMUM PHYSICAL PROPERTIES: Continued			
Property	**Test Method**	**Cured Composite Per ASTM F1216**	**Cured Composite Per Design**
Long-term Flexural Modulus of Elasticity	ASTM D-790	50% of Initial	-
Flexural Strength (Short-Term) Felt Tubes. Felt/Fiberglass, Fiberglass as recommended by the Manufacturer	ASTM D-790	4,500 psi	Contractor Value
Long-term Flexural Strength	ASTM D-790	50% of Initial	-
Tensile Strength	ASTM D-638	2,500 PSI	-
Tensile Modulus	ASTM D-638	320,000 PSI	-

C. The required CIPP wall thickness shall be based, as a minimum, on the physical properties of the cured composite. Provide wall thickness calculations that are:

1. Sealed by a licensed professional Engineer in the Commonwealth of Virginia.
2. Designed in accordance with the Design Equations in the appendix of ASTM F1216.
3. Designed in accordance with WRc Sewerage Rehabilitation Manual, Type II Design, Section 5.3.2.iii for non-round pipe or circular pipes with greater than 10% ovality.
4. Designed following these design parameters:

Design Safety Factor	2.0
Creep Retention Factor	50%
Ovality	2% or as measured by field inspection
Constrained Soil Modulus	Per AASHTO LRFD Section 12 and AWWA Manual M45
Groundwater Depth	Use- Elevation over the pipe equivalent to surface grade
Soil Depth (above the crown)	Varies
Live Load	Highway
Soil Load (assumed)	120 lb./cu. ft.
Minimum Service Life	50 years

D. The design Engineer shall:

1. Design liner to withstand internal and/or external pressures in accordance with the applicable provision of ASTM.
2. Liner thickness calculations shall be performed based on a fully deteriorated pipe condition.

3. Assume no bonding to the original pipe wall in the CIPP design.
4. Set the long-term (50 year extrapolated) Creep Retention Factor at 50% of the initial design flexural modulus as determined by ASTM D790 test method. This value shall be used unless the Contractor submits long-term test data (ASTM D2990) to substantiate a higher retention factor.
5. Use Poisson's ratio of 0.3.
6. Use Enhancement factor of 7.
7. Use a design soil modulus of elasticity of 1,000 psi, soil weight of 120 pounds per cubic foot.
8. Include ASSHTO H-20 Live Load in design for CIPP in roadways.

E. If the Engineer's calculated minimum liner thickness is less than shown on the Minimum Liner Thickness table below, the liner shall be fabricated using the specified thickness within the table. Any installed CIPP which does not meet the required designed thickness or the minimum liner thickness table, whichever is greater, will not be accepted.

MINIMUM LINER THICKNESS		
Minimum Lining Thickness Following Installation Operations and Curing Felt Liner and Ambient Temperature, Hot Water Cured CIPP		
Host Pipe Diameter	**Depth**	**Minimum Liner Thickness**
8" diameter	Up to 17 feet	6 mm
8" diameter	Over 17 to 25 feet	8 mm
10" diameter	Up to 11 feet	6 mm
10" diameter	Over 11 to 18 feet	8 mm
10" diameter	Over 18 to 25 feet	9 mm
12" diameter	Up to 12 feet	8 mm
12" diameter	Over 12 to 18 feet	9 mm
12" diameter	Over 18 to 25 feet	11 mm
15" diameter	Up to 10 feet	8 mm
15" diameter	Over 10 to 14 feet	9 mm
15" diameter	Over 14 to 20 feet	11 mm
18" diameter	Up to 8 feet	Submit to Owner
18" diameter	Over 8 feet	Submit to Owner

F. The Contractor shall submit, prior to installation of the lining materials, certification of compliance with these specifications and/or the requirements of the pre-approved CIPP system. Certified material test results shall be included that confirm that all materials conform to these specifications and/or the pre-approved system. Materials not complying with these requirements will be rejected.

SECTION 02954 – SEWER MAIN REHABILITATION BY LINING

PART 3 EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. Preparation, cleaning, inspection, flow bypassing and public notification. The Contractor shall clean the interior of the existing host pipe prior to installation of the liner. All debris and obstructions that will affect the installation and the final CIPP product delivery to the Owner shall be removed and disposed of. The Contractor shall provide necessary public notification to all affected homeowners and businesses as part of the pre-construction requirements.

B. The liner shall be constructed of materials and methods that, when installed, shall provide a jointless and continuous structurally sound CIPP able to withstand all imposed static, and dynamic loads on a long-term basis.

C. The Contractor may, under the direction of the Owner, utilize any of the existing manholes in the project area as installation access points. If a street must be closed to traffic because of the location of the sewer, the Contractor shall furnish a written detailed traffic control plan and all labor and equipment necessary. The plan shall be in conformance with the requirements of the local agency having jurisdiction over traffic control. Costs for traffic controls and plans are incidental to the contract except when work takes place in roadways with posted speed limits of 50.0 MPH or more, see Section 02640, Technical Provisions for Inspection Rehabilitation, paragraph 1.9 and Section 01025, Measurement and Payment, paragraph 2.39.

D. Bypassing Existing Flows - The Contractor shall provide for the flow of existing mainline and service connection effluent around the section or sections of pipe designated for CIPP installation in accordance with Section 02960, Temporary Bypass Pumping Systems. The Contractor shall include in the unit price of lining, costs for bypassing of sewage flows up to and including 2.0 MGD. Flows above 2.0 MGD will be bypassed in accordance with Section 02960, Temporary Bypass Pumping Systems. The Contractor shall be reimbursed for costs at the unit price agreed upon for bypassing sewage flows above 2.0 MGD, see Section 01025, Measurement and Payment, paragraph 2.18 and 2.19.

E. Cleaning of Pipe Lines – Before ordering liner materials for the project, the Contractor shall remove all internal debris from the pipe line that will interfere with the installation and the final product delivery of the CIPP, as required in these specifications, and accurately measure and document the exact size of the existing pipeline to be rehabilitated. Cleaning shall conform to Section 02650, Sanitary Sewer Line Cleaning.

F. Contractor shall perform post-cleaning video inspections of the pipelines. Only PACP certified personnel trained in locating breaks, obstacles and service connections by closed circuit television shall perform the inspection. The Contractor shall provide the Owner with a copy of the post-cleaning video and inspection log in digital format when submitting draft invoices for payment and for later reference by the Owner.

G. Line Obstructions - It shall be the responsibility of the Contractor to clear the line of obstructions that will interfere with the installation and long-term performance of the CIPP. If pre-installation inspection reveals an obstruction, misalignment, broken or collapsed section or sag that was not identified as part of the original scope of work and will prohibit proper installation of the CIPP, the Contractor will provide video inspections to the Owner for review and recommendation. The Owner may direct the Contractor to not attempt installation. The Contractor will not be

compensated for work that is not completed, including making the determination that CIPP cannot be installed due to the existing condition of the pipe or manhole. The Owner may elect to resolve issues preventing the installation of CIPP and reissue the work to Contractor at a later date for completion. The Owner may also elect to replace or otherwise repair the pipe without follow-up installation of CIPP.

H. The Contractor shall be allowed use water through obtainment of a Fairfax Water Fire Hydrant Use Permit from the Fairfax Water Customer Service Center. Use of an approved double check backflow assembly shall be required. Contractor shall provide his own approved assembly. Contractor shall pay current market price for all water usage with no reimbursement from the Owner.

3.2 INSTALLATION OF LINER

A. The liner shall be installed using standard water curing or ultraviolet light (UV). Insert liner within one hour of final cleaning pass. The Owner intends to not use steam curing whenever possible. Steam curing will not be allowed without advance written permission from the Owner and only in extreme or emergency circumstances as determined by the Owner. All liners shall be cured in the host pipe per the manufacturer's specifications as described and submitted in the Performance Work Statement (PWS).

B. CIPP installation shall be in accordance with the applicable ASTM standards as modified in this section 3.2.

C. A pre-liner tube and end seals will be required for each installation CIPP. If significant groundwater infiltration is present in the existing sewer, such as heavy runners and gushers, defined by NASSCO as Infiltration Runner (IR) and Infiltration Gusher (IG), the Contractor shall perform chemical grouting compatible with the CIPP system on major leaks to control resin loss and contamination, maintain CIPP thickness, prevent physical property reduction and prevent inadequate curing of the liner resulting from water or other contamination of the resin during installation. The pre-liner tube shall be a reinforced plastic tube to fit the existing pipeline and shall be continuous from manhole (access) to manhole (access).

D. The wet-out tube shall be positioned in the pipeline using the method specified by the manufacturer. Care should be exercised not to damage the tube as a result of installation. The liner should be pulled-in or inverted through an existing manhole or approved access point and fully extend to the next designated manhole or termination point.

E. Prior to installation and as recommended by the manufacturer, remote temperature gauges or sensors shall be placed inside the host pipe to monitor the temperatures during the cure cycle. This system shall be installed at the pipe invert per the manufacturer's recommended procedures. The temperature sensors shall be placed at intervals as recommended by the sensor manufacturer. Additional sensors shall be placed where significant heat sinks are likely or anticipated. The sensors shall be monitored by a computer using a tamper proof database. Liner and/or host pipe interface temperature shall be monitored and logged during curing of the liner. Use ZIA systems, VeriCure, or similar web-based curing log documentation. Provide access to utilized website to the Owner and training at Owner's business location for the web-based curing documentation system being used, include up to 10 training manuals with two (2) electronic copies. Training shall detail how to interpret data collected and how data should be

used to interpret proper curing in accordance with the recommendations of the materials manufactures and the web-based curing data monitoring system instructions.

F. To monitor the temperature of the liner wall and to verify correct curing, temperature monitors can be placed between the host pipe and the liner in the bottom of the host pipe (invert) at manholes or access points and/or throughout its entire length (continuous) to monitor the temperature on the outside of the liner during the curing process. For continuous temperature monitoring, a fiber optic cable is installed in the pipe invert prior to the liner installation. The fiber optic cable is monitored by a computer that is capable of recording temperatures at the interface of the liner and the host pipe continuously in time and location throughout the entire pipeline being rehabilitated.

G. Curing shall be accomplished by utilizing the appropriate medium or ultraviolet light in accordance with the manufacturer's recommended cure procedure and/or schedule. The curing source or in and output temperatures shall be monitored and logged during the cure cycles, if applicable. The manufacturer's recommended cure method & schedule shall be used for each line segment installed, and the liner wall thickness and the existing ground conditions with regard to temperature, moisture level, and thermal conductivity of soil, per ASTM as applicable, shall be taken into account by the Contractor.

H. For water cured liners, if any temperature sensor, or continuous sensor location does not reach the temperature as specified by the manufacturer to achieve proper curing or cooling, the installer can make necessary adjustments to comply with the manufacturer's recommendations. For continuous temperature monitoring, the system computer should have an output report that specifically identifies stations along the length of pipe, indicates the maximum temperature achieved and the sustained temperature time at the stations. At each station along the length of the pipe, the computer should record both the maximum temperature and the minimum cool down temperature and comply with the manufacturer's recommendations.

I. For UV Cured Liners, all light train sensor readings, recorded by a tamper proof computer system, shall provide output documenting the cure along the entire length of the installed liner. The cure procedure shall be in accordance with the manufacturer's recommendation as included in the PWS submission by the contractor.

J. For UV Cured liners submit all light train sensor readings. Provide data base access to the Owner and training at Owner's business location for the system being used, include up to 10 training manuals with two (2) electronic copies. Training shall detail how to interpret data collected and how data should be used to interpret proper curing in accordance with the recommendations of the materials manufactures and the curing data system instructions.

3.3 COOL DOWN

A. The Contractor shall cool the CIPP in accordance with the approved CIPP manufacturer's recommendations as described and outlined in the PWS.

B. For water cure, CIPP shall be slowly cooled in accordance with the Manufacture's schedule to a temperature below 90 degrees Fahrenheit, or to a temperature recommended by the CIPP manufacturer, whichever temperate is lowest, prior to relieving the head in the inversion pipe.

C. For water cure, care shall be taken in the release of the static head so that a vacuum will not develop that could damage the newly installed liner.

D. Installations within 1 mile of any sewer treatment plant will require notification to the sewer treatment plant. Cure and cool down water shall be treated to remove styrene as directed by the treatment plant at no additional cost to the Owner.

E. Cure and cool down water shall be contained and shall not be allowed to leak on the ground surface or be discharged to the storm drain system.

F. Temperatures and curing data shall be monitored and recorded, by the Contractor, throughout the installation process to ensure that each phase of the process is achieved as approved in accordance with the CIPP System manufacturer's recommendations.

3.4 FINISH

A. The installed CIPP shall be continuous over the entire length of a sewer line section and be free from visual defects such as foreign inclusions, dry spots, pinholes, major wrinkles and delamination. The CIPP shall be impervious and free of any leakage through the CIPP wall.

B. Any defect which will or could affect the structural integrity or strength of the CIPP shall be repaired at the Contractor's expense in accordance with the procedures submitted under Section 1.8 CIPP Repair/Replacement.

C. The beginning and end of the CIPP shall be neatly cut 2 inches from the wall of the manhole after installation. For manholes slated for rehabilitation, cure CIPP to facilitate the application of manhole rehabilitation materials. Pipe ends shall be sealed to the existing host pipe. Any liner installed thru manhole channels may be cut within 2 inches above the top of the manhole bench and left in place when approved by the Owner or removed. The sealing material shall be compatible with the pipe end and shall provide a watertight seal.

D. If any service connections leak water between the host pipe and the installed CIPP, document leaks during post CCTV and provide to the Owner for review. The Owner will determine what follow-up repairs will be utilized to elevate leaks at service connections reinstatements.

E. If the wall of the CIPP leaks, it shall be repaired or removed and replaced with a watertight pipe as recommended by the manufacture of the CIPP system.

F. Compensation shall be at the unit price in Attachment C – Cost Proposal for the actual length of cured-in-place pipe installed within each sewer segment. Camera footage shall not be used to determine length of the sewer pipe being rehabilitated unless pre-approved by Owner. The payment length will be established by County GIS mapping, County as-built drawings and records. The payment length shall be from center of manhole to center of manhole with no deductions or additions for inside diameter of manholes. No payment will be made for CIPP installed within manhole channels. Any discrepancies between CIPP installed and that given in County records may be resolved with field measurements using a surveyor's clough or steel tape in the presence of the Owner. The unit price per linear foot installed shall include all materials, labor, equipment and supplies necessary for the complete CIPP installation.

G. Grouting to eliminate major leaks such as Infiltration Runner (IR) and/or Infiltration Gusher (IG) prior to lining that could prevent proper installation of the liner shall be paid at the unit prices in Attachment C – Cost Proposal. Compensation for pipe sealing at the manhole/wall interface after liner installation shall not be paid for as end seals are expected to not leak.

SECTION 02954 – SEWER MAIN REHABILITATION BY LINING

3.5 MANHOLE CONNECTIONS AND RECONNECTIONS OF EXISTING SERVICES

A. A hydrophilic seal compatible with the installed CIPP, shall be applied at manhole/wall interface in accordance with the CIPP System manufacturer's recommendations.

B. Existing services shall be internally or externally reconnected unless indicated otherwise directed by the Owner.

C. Reconnections of existing services shall be made after the CIPP has been installed, fully cured, and cooled down. It is the Contractor's responsibility to make sure that all active service connections are reconnected.

D. External reconnections are to be made with a tee fitting in accordance with CIPP System manufacturer's recommendations. Saddle connections shall be seated and sealed to the new CIPP using grout or resin compatible with the CIPP.

E. A CCTV camera and remote cutting tool shall be used for internal reconnections. The machined opening shall be at least 100 percent of the service connection opening area and the bottom of both openings must match. The opening shall not be more than 100 percent of the service connection opening. The edges of the opening shall not have pipe fragments or CIPP fragments which may obstruct flow or snag debris. In all cases the invert of the sewer connection shall be cut flush with the invert entering the mainline.

F. In the event that service reinstatements result in openings that are greater than 100 percent of the service connection opening, the Contractor shall install a CIPP type repair, sufficient in size to completely cover the over-cut service connection. No additional compensation will be paid for the repair of over-cut service connections.

G. Coupons of pipe material resulting from service tap cutting shall be collected at the next manhole downstream of the pipe rehabilitation operation prior to leaving the site. Coupons may not be allowed to pass through the system.

H. Compensation shall be at the actual number of services reconnected using means as contained in the Proposal. The unit price per service line reconnected shall be include all materials, labor, equipment and supplies necessary to complete the work as required in these specifications.

3.6 TESTING OF INSTALLED CIPP

A. The Owner will require 20% of the installed CIPP footage to be sampled at random locations selected by the Owner. The physical properties of the installed CIPP shall be verified through field sampling and laboratory testing in accordance with ASTM standards. All materials for testing shall be furnished by the Contractor to the third party testing laboratory for testing. All materials testing shall be performed at the Contractor's expense by the independent third-party laboratory recommended by the CIPP manufacturer and approved by the Owner. All tests shall meet requirements of applicable ASTM test methods to confirm compliance with the requirements specified in these contract documents. Should sample results fail, the Contractor will conduct additional sampling to determine the extent of defective product at the direction of the Owner and at no additional cost to the Owner.

B. The Contractor shall provide samples for testing to the third-party testing laboratory from the actual installed CIPP. Samples shall be provided from each section of CIPP installed slated for

sampling by the Owner. The Owner will randomly select one (1) of every five (5) lines scheduled for installation from the Contractor's weekly schedules. The sample shall be:

1. Cut from a section of cured CIPP that has been inverted or pulled through a like diameter pipe which has been held in place by a suitable heat sink, such as sandbags. Any opening produced from the sample shall be repaired in accordance with manufacturer's recommended procedures.

2. Identified, labeled in the field and delivered for testing- All curing, cutting and identification of samples will be provided by the Contractor and transmitted by the Contractor's representative as specified, to the testing laboratory.

C. The Contractor shall maintain the chain of custody for each sample. The laboratory results shall:

1. Be certified and submitted within the time frame stipulated by the Owner.

2. Identify the test sample location as referenced to the nearest manhole and station.

3. Be tested in accordance with all ASTM and specified standards.

4. Clearly mark or conclude pass or fail results.

D. Final payment for the project/phase of work may be withheld pending receipt and approval of the test results. If properties tested do not meet the minimum physical and thickness requirements, the CIPP shall be repaired or replaced by the Contractor unless the actual physical properties and the thickness of the sample tested meet the design requirements as required in the contract.

E. Chemical resistance - The CIPP system installed shall meet the chemical resistance requirements of ASTM F1216 and ASTM D5813. CIPP samples tested shall be of the fabric tube and the specific resin proposed for actual construction. It is required that CIPP samples without plastic coating meet these chemical testing requirements.

F. Hydraulic Capacity - Overall, the hydraulic capacity shall be maintained as large as possible. The installed CIPP shall, at a minimum, be equal to the full flow capacity of the original pipe before rehabilitation. In those cases where full capacity cannot be achieved after CIPP installation, the Contractor shall submit a request to waive this requirement together with the reasons for the waiver request. Calculated capacities may be derived using a commonly accepted roughness coefficient for the existing pipe material taking into consideration its age and condition.

G. The installed CIPP thickness shall be measured for each line section installed as per the ASTM requirements specified. If the CIPP thickness does not meet that specified in the contract and submitted as the approved design by the Contractor, then the CIPP shall be repaired or removed unless the tested physical properties and the thickness of the sample tested meet the design requirements as required in the contract. The CIPP thickness shall have tolerance of minus 5% - plus 10%. In worker-entry size piping, the Contractor shall remove a minimum of one sample every line section of installed CIPP to be used to check the CIPP thickness. The samples shall be taken by core drilling 2-inch diameter test plugs at random locations selected by the Owner. The openings produced from the samples shall be repaired in accordance with manufacturer's recommended procedures.

H. All costs to the Contractor associated with providing cured CIPP samples for testing, transport of samples and testing by an approved third-party lab shall be included in the unit price for

installation of the CIPP. Payment for all testing by a laboratory will be paid for by the Contractor directly to the laboratory.

I. The Contractor shall be physically and financially able to keep all testing current, including delivery of test results to the Owner for each phase of work underway. All testing will be completed before the next phase of work can be started, with 90% of the current phase work testing samples approved. The Owner may choose to not issue new work or delay current work until testing results are provided and accepted with all repair work approved. It is expected that all required testing will be submitted within 30 days or less of the installation date.

3.7 FINAL ACCEPTANCE

A. All CIPP sample testing and repairs to the installed CIPP, as applicable, shall be completed before final acceptance for each phase of work, meeting the requirements of these specifications and documented in written form.

B. The Contractor shall perform a detailed NASSCO closed-circuit television inspection, in accordance with ASTM standards, for the Owner after installation of the CIPP and reconnection of the side sewers. A radial view (pan and tilt) TV camera shall be used. The finished CIPP shall be continuous over the entire length of the installation and shall be free of significant visual defects, damage, deflection, holes, leaks in the liner wall and other defects. Leaks at reinstated service connections will be documented during post CCTV and provided to the Owner for review to determine the type of follow-up rehabilitation. The unedited NASSCO compliant digital documentation of the inspection shall be provided to the Owner within ten (10) working days of the CIPP installation. The data shall note the inspection date, location of all reconnected side sewers, debris, as well as any defects in the CIPP, including, but not limited to, gouges, cracks, bumps, or bulges. The Contractor shall stop at each reconnected sewer service (lateral) for at least 30 seconds and provide a 360-degree pan & tilt view of each reinstated service. The service CCTV inspection must confirm the service was properly re-opened robotically, to its original shape, with cutting and wire brushing to remove all rough edges, leaving an opening in the liner to 100 percent of its original flow. If post installation inspection documentation is not submitted within ten (10) working days of the CIPP installation, the Owner may at its discretion suspend any further installation of CIPP until the post-installation documentation is submitted. As a result of this suspension, no additional working days will be added to the contract, nor will any adjustment be made for increase in cost. Immediately prior to conducting the closed-circuit television inspection, the Contractor shall thoroughly clean the newly installed CIPP removing all debris and build-up that may have accumulated at no additional cost to the Owner.

C. Bypass pumping or plugging from the upstream manhole shall be utilized to minimize sewage from entering the line during the inspection. In the case of bellies in the line, the pipe shall be cleared of any standing water to provide continuous visibility during the inspection.

D. Where leakage is observed through the wall of the pipe, the contractor shall institute localized testing (such as a grout packer) or any other testing that will verify that the leakage rate of the installed CIPP does not exceed acceptable tolerances specified in the contract. As an alternative to leakage testing, the Contractor may choose effect repairs to the observed leaks.

SECTION 02954 – SEWER MAIN REHABILITATION BY LINING

3.8 SANITARY SEWER SPILLS, OVERFLOWS AND BACKUPS

A. The Contractor shall be responsible for spills, overflows and backups resulting from the work in connection with this contract. See specified requirements in sections:

1. 02640, Technical Provisions for Inspection and Rehabilitation
2. 02650, Sanitary Sewer Line Cleaning
3. 02651, Sanitary Sewer Overflow Response.

PART 4

4.1 Requirements as set forth in Section 01025, Measurement and Payment, and stated herein

A. When submitting a request for draft and final payment submit the following:

1. Information required per Special Provisions, Section 18-Reports and Invoicing
2. Documentation of materials used and installation mechanisms, such as wet-out, pre and post CCTV logs, cook sheets and other documents as stated herein.
3. Provide Pre and Post CCTV reports with each Invoice and with video inspection NASSCO compliant and compatible with WinCan.
4. Provide quality assurance reports per recommendations of Manufacture or supplier of products.
5. Clearly label and date each, report, pre and post CCTV to identify the correct location it represents.

B. Payment will be in accordance with the Contract Documents at the unit rate provided in Attachment C - Cost Proposal and any written modifications issued by the County Purchasing Agent.

END OF SECTION

SECTION 02955 – CURED IN PLACE PIPE OR ALTERNATE POINT REPAIR

PART 1 GENERAL

1.1 SUMMARY

A. The Work specified in this section includes all labor, materials, accessories, equipment and tools necessary to install and test sectional cured-in-place pipe (CIPP) lining or an alternate method of internal point repair. Excavation not to be used for installation of the product. One method will be utilized on this contract for all internal point repairs. The completed point repair shall be watertight and not impede normal flows of the sewer system.

B. Related Work Specified in Other Sections Include, but is not limited to, the following:

1. Section 01025, Measurement and Payment
2. Section 01300, Submittals
3. Section 02640, Technical Provisions for Inspection and Rehabilitation
4. Section 02650, Sanitary Sewer Line Cleaning
5. Section 02651, Sanitary Sewer Overflow Response
6. Section 02954, Sewer Rehabilitation by Lining
7. Section 02956, Television Inspection
8. Section 02957, Sewer Manhole Rehabilitation
9. Section 02960, Temporary Bypass Pumping Systems

1.2 DESCRIPTION OF WORK AND PRODUCT DELIVERY

A. Any point repair product and method must be approved by the Owner prior to use.

B. Pertinent information required prior to a point repair includes the main line size, material and approximate location, depth and length of defect.

C. The Contractor shall provide all materials, labor, equipment, and services necessary for traffic control, bypass pumping and/or diversion of flows, cleaning and television inspection of sewers to be rehabilitated, liner installation, reconnection of service connections, all quality controls, provide and process samples for performance of required material tests, pre and final television inspection, testing of the rehabilitated pipe system, warranty work and other work, and as specified herein.

D. All materials furnished, as part of this contract shall be marked with detailed product information, stored in a manner specified by the manufacturer and tested to the requirement of this contract.

E. Prior to installation the Contractor shall CCTV and clean the sewer segment. Any visible leakage that would prevent proper installation of the CIPP or alternate point repair product in accordance with the manufacturer's instructions, shall be eliminated. Such leaks will typically be characterized as providing a steady stream or flow of water that could cause washout of the resin or uneven heat distribution during the curing or impact the installation process. The type of infiltration to be eliminated, as defined by NASSCO includes Infiltration Runner (IR) and Infiltration Gusher (IG).

F. The rehabilitation of pipelines shall be done by the installation of a resin-impregnated flexible tube which, when cured, shall be continuous and tight-fitting throughout the entire length of the original pipe. An alternate method of internal point repair may be used as approved by the Owner. The internal point repair shall extend the full length of repair area and terminate at point where pipe is structurally sound to provide a jointless and water-tight new pipe-within-a-pipe. The Contractor is responsible for proper, accurate and complete installation of the internal point repair using the system selected by the Contractor meeting the Owners requirements.

G. Neither the internal point repair product, system, nor its installation, shall cause adverse effects to any of the Owner's processes or facilities. The pressures and temperatures used for the product installation shall not damage the system in any way, and the use of the product shall not result in the formation or production of any detrimental compounds or by-products at the wastewater treatment plant. The Contractor shall notify the Owner and identify any by-products produced as a result of the installation operations, test and monitor the levels, and comply with any and all local laws and waste discharge requirements. The Contractor shall cleanup, restore existing surface conditions and structures, and repair any of the internal point repair system determined to be defective. The Contractor shall conduct installation operations and schedule cleanup in a manner to cause the least possible obstruction and inconvenience to traffic, pedestrians, businesses and property owners or tenants.

H. The Contractor shall perform all required permanent landscape restoration of disturbed areas on private property and within locality and/or VDOT right-of-way upon completion of the point repair to the satisfaction of the Owner.

I. The prices submitted by the Contractor, shall include all costs of permits, testing, quality control, labor, equipment and materials for the various items necessary for furnishing and installing, complete in place, internal point repair in accordance with these specifications. All items of work not specifically mentioned herein which are required by the Contractor, to make the product perform as intended and deliver the final product as specified herein shall be included in the respective lump sum and unit prices.

1.3 SUBMITTALS

A. Submittals shall be made by the Contractor in accordance with the procedures set forth in Section 01300, Submittals, and as described below.

B. The product proposed for the rehabilitation of the sewers must have been in use for at least three years and/or have an established track record acceptable to the Owner.

C. After notification of a specific project, the Contractor shall submit the following information for review and approval.

1. Shop drawings and product data for the rehabilitation method, including a report outlining the process to be used in the rehabilitation of the sewer line. The report shall also include information specific to the job, such as coordination issues, access, timing, manufacturer's installation instructions and bypass pumping.

2. A report outlining the point repair process. The report shall also include information specific to the job, such as coordination issues, access, timing, and bypass pumping.

3. All measurements made by the Contractor to verify length and diameter of pipe prior to ordering of material.

4. Provide Pre- and Post-Installation TV Inspection as specified in Section 02956, Television Inspection and supporting installation documentation for approved product with invoice requesting payment.

5. The Contractor shall provide written warranties for all materials and products.

PART 2 PRODUCTS

2.1 APPROVED PRODUCT

A. Submit for approval by the Owner the internal point repairs being proposed. Include all required information stated herein to clearly provide manufactures recommendations and instructions, installations procedures, materials properties, testing and acceptance.

B. Only one method will be selected and approved by the Owner for the duration of this Contract.

PART 3 EXECUTION

3.1 GENERAL

A. The Contractor shall furnish and install a complete system as shown in the Contract Documents. Pipe Liner or alternate point repair shall be installed in accordance with the manufacturer's recommendations.

B. The Contractor 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 in accordance with Section 02960, Temporary Bypass Pumping Systems, and be acceptable in advance by the Owner. The acceptance of the bypassing system in advance by the Owner shall in no way relieve the Contractor of his responsibility and/or public liability.

C. Prior to any installation of product, it shall be the responsibility of the Contractor to remove internal deposits from the pipeline in accordance with Section 02650, Sanitary Sewer Line Cleaning.

D. Inspection of pipelines shall be performed by experienced NASSCO, PACP certified personnel trained in locating breaks, obstacles, and service connections by closed circuit television. The interior of the pipeline shall be carefully inspected to determine the locations and extent of any structural failures and defects. A video and suitable log shall be kept and turned over to the Owner. Television survey shall be performed in accordance with Section 02956, Television Inspection, including Preconstruction, Post Construction and Warranty Surveys.

E. Line Obstructions - It shall be the responsibility of the Contractor to clear the line of obstructions that will interfere with the installation and long-term performance of the product. If pre-installation inspection reveals an obstruction, misalignment, broken or collapsed section or sag that was not identified as part of the original scope of work and will prohibit proper installation of the product, the Contractor will provide video inspections to the Owner for review with a recommendation on

how to proceed with the work. The Owner may direct the Contractor to not attempt installation. The Owner may elect to resolve issues preventing the installation of internal point repair and reissue the work to Contractor at a later date for completion. The Owner may also elect to replace or otherwise repair the pipe without follow-up installation of the internal point repair.

All costs to provide video, recommendation and other associated costs are incidental to this contract. The Contractor will not be compensated for work that is not completed, including making the determination the point repair product cannot be installed due to the existing condition of the pipe or manhole. Payment will only be made for the work completed in accordance with the unit rates listed within Attachment C - Cost Proposal.

3.2 SANITARY SEWER SPILLS/BACKUP

A. The Contractor shall be responsible for spills, overflows and backups resulting from the work in connection with this contract. See specified requirements in sections:

1. 02640, Technical Provisions for Inspection and Rehabilitation
2. 02650, Sanitary Sewer Line Cleaning
3. 02651, Sanitary Sewer Overflow Response.

3.3 INSTALLATION

A. Prior to the installation of CIPP, all active leaks shall be stopped using chemical grout in accordance with Section 02959, Sewer Sealing by Chemical Grout. Impregnate the liner with the 100 percent solids epoxy; drop cloths, tarpaulins, 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 allowing 100 percent solids epoxy resin to permeate into any cracks in the host pipe. Heat may be introduced to speed up curing time. Curing shall be in accordance with manufacturer's recommendations. Retract the placement carriage and remove from pipe.

B. For alternate method of point repair follow manufacture's installation instructions and stop all active leaks using chemical grout in accordance with Section 02959, Sewer Sealing by Chemical Grout as approved by the Owner.

C. Service connections shall be reconnected as specified in Section 02954, Sewer Main Rehabilitation by Lining or as approved by the Owner.

3.4 ACCEPTANCE

A. For CIPP: 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.

B. For Alternate method of point repair: Follow manufacture's recommendations as approved by the Owner

SECTION 02955 – CURED IN PLACE PIPE OR ALTERNATE POINT REPAIR

3.5 CLEANUP

After the installation has been completed and accepted, the Contractor shall clean up the entire project area and return the ground pre-existing conditions or better. All excess material and debris not incorporated into the permanent installation shall be disposed of by the Contractor.

3.6 WARRANTY

During the warranty period, any defects which affect the integrity or strength of the pipe shall be repaired at the Contractor's expense. Prior to the repair of the defective work, the Contractor shall submit a Shop Drawing indicating the method of repair, for the Owner's approval. The Contractor shall obtain approval for the Owner for method of repair, which may require field or workshop demonstration.

PART 4

4.1 Requirements as set forth in Section 01025, Measurement and Payment and stated herein

A. When submitting a request for draft and final payment submit the following:

1. Information required per Special Provisions, Section 18-Reports and Invoicing.
2. Documentation of materials used and installation mechanisms as stated herein.
3. Provide Pre and Post CCTV Reports with each Invoice and video inspection NASSCO compliant and compatible with WinCan.
4. Provide quality assurance reports per recommendations of Manufacture or supplier of products.
5. Clearly label and date each, report, pre and post CCTV to identify the correct location it represents.

B. Payment will be in accordance with the Contract Documents at the unit rate provided in Attachment C - Cost Proposal and any written modifications issued by the County Purchasing Agent.

END OF SECTION

SECTION 02956 – TELEVISION INSPECTION

PART 1 GENERAL

1.1 SUMMARY

A. The Contractor shall furnish all labor, equipment, material and supplies and perform all operations necessary to conduct the internal pre and post closed-circuit television inspection (CCTV) of all pipelines rehabilitated under this contract. This work includes remote televising and recording of the sewer inspection.

The Contractor shall also furnish all labor, equipment, material and supplies and perform all operations necessary to conduct the pre and post NASSCO level I MACP manhole inspection for all manholes rehabilitated under this contract.

The Contractor shall include the cost of internal pre and post closed-circuit television inspections for pipelines and the inspection of manholes, NASSCO level I MACP as an incidental to the cost of all work. These costs shall be included in the unit prices for the various items listed within Attachment C - Cost Proposal. All project locations will be within the Owner's service area.

B. Related Work Specified in other sections include, but is not limited to, the following:

1. Section 01025, Measurement and Payment
2. Section 02640, Technical Provisions for Inspection and Rehabilitation
3. Section 02650, Sanitary Sewer Line Cleaning
4. Section 02651, Sanitary Sewer Overflow Response
5. Section 02954, Sewer Main Rehabilitation by Lining
6. Section 02959, Sewer Sealing by Chemical Grout
7. Section 02960, Temporary Bypass Pumping Systems

C. The Contractor will be held fully liable for any damages incurred that are caused by his or her negligence.

1.2 DEFINITIONS

A. NASSCO - National Association of Sewer Service Companies.

B. PACP - Pipeline Assessment Certification Program.

C. LACP – Lateral Assessment Certification Program.

D. MACP- Manhole Assessment Certification Program.

E. Television Inspection - is a video inspection performed by the Contractor of sanitary sewer system to assess the condition of the line, cleaning completed and document various types of rehabilitation complete. The inspection shall be compliant with PACP, MACP and LACP standards.

SECTION 02956 – TELEVISION INSPECTION

F. Television investigation - is a video observation of the sanitary sewer system or private lateral performed by the Contractor to identify an obstruction and/or to verify the need for heavy cleaning. Investigation is not required to be compliant with PACP, MACP and LACP standards.

G. Television Inspection Log - is information collected and recorded by each television operator for any Television Inspection effort submitted to the Owner. Television Inspection codes, Sewer Line Assessment Codes shall be in accordance with NASSCO PACP, MACP and LACP standards.

H. Manhole inspection - Manhole inspection compliant to NASSCO level I MACP.

1.3 COMPLIANCE AND ACCEPTANCE

A. The following defines each work item, the level of effort, and quality of work that will be necessary to meet the intent of this specification.

B. Television Inspection

1. CCTV inspections will be delivered entirely in electronic format to be compatible with WinCan XV format.

2. All CCTV work shall conform to the most current NASSCO PACP, MACP and LACP standards. The documentation of the work shall consist of NASSCO compliant CCTV Reports, NASSCO compliant database, logs, electronic reports, etc. noting defects and observations encountered during the inspection.

3. All Manhole inspections shall be NASSCO level I MACP before and after work is completed.

1.4 REFERENCED DOCUMENTS

A. All work must also conform to the latest edition of the following specifications (as required in advance by the Owner)

1. NASSCO PACP, MACP and LACP Standards

2. NASSCO Pipe Condition Assessment Specifications using CCTV 2014 (2019 update):

https://www.nassco.org/sites/default/files/SPECIFICATION%20GUIDELINE%20-%20CCTV%2015Dec2014.pdf

3. State Department of Transportation (MUTCD)

https://www.virginiadot.org/business/virginia_mutcd_supplement.asp

4. Other permits, as required.

B. Assumptions

1. It is reasonable and customary to assume the following, unless otherwise detailed in writing:

a. The Owner has provided the Parties (Contractor), in writing, with enough information to allow the Contractor to accurately and fully assess the entire scope of the project.

b. The Parties are knowledgeable, capable and legally authorized to contract for the services in question.

C. Notification

1. If observed defects are believed to be such that further operations may compromise the structural integrity and/or cause the pipe to become unusable, the Contractor must provide written communication by way of email and phone call to the Owner's designee of the observed condition(s) and reason to believe that continued operations may cause substantial damage. The Owner may direct the Contractor as to what services, precautions, and follow up actions are required. The Owner may direct the Contractor to not attempt the work. The Contractor will not be compensated for work that is not fully completed, including making the determination that issued work cannot be completed due to the existing condition of the sewer system. If the contract documents do not address this potential, then the Owner and Contractor will negotiate in good faith, the conditions under which the work may continue or cease to continue.

2. This exception may only be used to prevent asset damage and shall not be used to eliminate difficult or adverse areas that were previously documented in these documents or by prior written communication with the Owner.

1.5 SUBMITTALS

A. Contractor shall submit pre and post inspection in accordance with the contract documents. For each pipeline rehabilitated under this contract, provide Pre and Post CCTV inspection with appropriate documents when requesting payment for rehabilitation work. For each manhole provide a NASSCO Level I manhole inspection with appropriate documents when requesting payment for rehabilitation work. It is the intent of the County to have pre and post inspections and/or Pre and Post NASSCO Level I manhole inspections for all work performed to validate the need for rehabilitation, quality of work completed, and payments to improve said asset.

B. Inspection Equipment: Catalogue cuts and equipment specification information for proposed inspection equipment, including datalogger and software systems. All proposed equipment shall be approved by OWNER prior to being mobilized for WORK.

C. Sample Submittal: An example of a typical PACP/MACP/LACP Inspection deliverable will be submitted for approval by Contractor prior to mobilizing for WORK. The example deliverable will contain the following:

a. A sample Header form as a paper copy with highlighted fields that will be populated for the inspection work

b. A sample NASSCO Standard Exchange Database, per Owner-required version, in Microsoft Access file format (.mdb), as exported from the Contractor's data collection software.

c. A sample report printout from data collection software.

d. Example media files, including observation photos, videos, and reports; with all files consistently utilizing the required file naming conventions and folder structures.

e. The proposed viewing software to be used with the proprietary inspections database and related media.

f. NASSCO validation report in PDF format, demonstrating the sample is fully conforming to NASSCO standards and conventions. Validation reports can be obtained by submitting a sample database to NASSCO thru their web portal at https://www.nassco.org/certified-software.

g. Inspections database(s) that are fully cross-referenced to the videos, images, and reports.

h. Example reports will be presented in both hard copy and in PDF format, and all other sample data will be presented in digital format on an external hard drive.

PART 2 PRODUCTS

2.1 GENERAL

A. The working area shall be reserved for equipment, both operational and stored, and no equipment utilized within the sewer shall be allowed to be stored in the viewing area.

B. Modifications to the inspection vehicle requirements will be acceptable where off-road type equipment is necessary for sewer manhole access.

2.2 INSPECTION SOFTWARE

A. The Contractor shall use a datalogger and software system specifically designed for condition assessment and asset management that is NASSCO certified. At a minimum, software shall provide the following for the named Version in the contract documents:

1. Provide only PACP/MACP/LACP codes for conditions and asset/survey information. The Software shall ensure each entered code is validated against NASSCO requirements.

2. Provide all NASSCO required and optional fields for both survey headers and observations.

3. Import and export the standard NASSCO transfer files and consolidated information from multiple sources into one database.

4. Summarize observed defects and inspection results by location, type and severity and NASSCO rating systems.

2.3 TELEVISION INSPECTION AND COMPUTERIZED EQUIPMENT

A. The Contractor shall use a color pan and tilt camera specifically designed and constructed for sewer pipe inspection. Inspection for manholes to be NASSCO level I MACP. Each sewer to be televised shall be suitably isolated to control flow during the inspection. The Contractor shall provide a recording of the sewer inspection, locating each sewer service connection entering the sewer.

B. CCTV Equipment: Select and use CCTV equipment that will produce a color recording. The camera and video system components shall have the following properties:

1. Footage counters accurate to two-tenths of a foot that displays on the TV monitor the exact distance of the camera from the starting point of the recording.

2. Lighting system that allows the features and conditions of the pipe to be clearly seen. Lighting shall not cause shadows or loss of color within the field of view of the camera.

3. Capability to operate in 100 percent humidity condition while keeping camera lens clear of debris and buildup, allowing a clear inspection view.

4. Capability to produce a minimum 470 lines vertical resolution color video picture. Picture quality and definition shall be to the satisfaction of the County.

C. The inspection vehicle shall comprise totally separate viewing and working areas. Where practical the viewing shall be insulated against noise and extremes in temperature, include the provision for air conditioning, and shall be provided with means of controlling external and internal sources of light in a manner capable of ensuring that the monitor screen display is in accordance with the specification. Seating accommodation shall be provided to enable two people, in additions to the operator, to view clearly the onsite monitor, which shall display the inspection as it proceeds. Images shall be able to be printed directly from the system along with text annotations highlighting specific points in the image and the current control settings.

D. Lighting for the pan and tilt camera shall provide a clear picture of the entire periphery of the existing sewer.

E. The pan and tilt camera shall pause, pan, and visually inspect all service connections, pipe ends, and maintenance or structural defects. Stop at each service connection for at least 30 seconds and provide a 360-degree pan & tilt view. If a blockage cannot be removed within sewer and hampers the televising of the sewer in one direction, the Contractor shall attempt to complete the section by televising from the other manhole to complete the section, this reversal should immediately follow the initial direction. The Contractor must immediately report the obstruction to the Owner, see Section 02956, Television Inspection, Part 3 Execution, paragraph 3.6, A13 and Section 02954, Sewer Main Rehabilitation by Lining, Part 3 Execution, paragraph 3.1 G.

F. If the image quality is not adequate to allow proper inspection coding, the Contractor shall be required to repeat the survey at the Contractor's expense.

G. Pipe Inspection Camera: The pipe inspection camera and video components shall have the following additional properties:

1. Capability to produce a video recording using a pan-and-tilt, radial viewing, pipe inspection camera that pans ±275 degrees and rotates 360 degrees.

2. Camera height adjustment so that the camera lens is always centered at one-half the inside diameter in the pipe being televised. The camera lens may be centered higher only if necessary, to keep the camera out of the flow.

H. Recording: All recordings are to be in digital format.

1. Image Capture: Digitized picture images shall be stored and be exportable as JPEG formats.

2. Video Capture: Full time live video and audio files shall be captured for each pipe segment. The files shall be stored in industry standard Windows Media or MPEG-2 format on a USB 2.0 external hard drive and viewable on a personal computer that utilizes Microsoft Media Player, version 9.0 or later. Alternate digital formats will not be accepted unless approved by the Owner in advance of submittal. The video shall have a minimum resolution of 960 pixels (x) by 720 pixels (y) and an encoded frame rate of 60 Hz. System

shall perform an automatic disk image/file naming structure to allow saved video/data sections to be "burned" to digital format. It shall have the capability of "burning" a minimum of 120 minutes of recording. The video recording shall be free of electrical interference and shall produce a clear and stable image. The audio recording shall be sufficiently free of background and electrical noise as to produce an oral report that is clear and discernable. The digital recordings and inspection data shall be cross-referenced to allow instant access to any point of interest within the digital recording.

3. The Contractor shall perform all CCTV inspections in accordance with NASSCO's Assessment Certification Programs. CCTV inspections will be delivered entirely in electronic format. The entire survey shall be recorded in an approved electronic format submitted with electronic links between the data and the video. All television inspection reports shall be with-in +/- two (2) feet of the measured linear footage between manholes along the existing sewer centerline from the start of pipe to end of pipe. All Owner and PACP required header information must be fully and accurately entered on all CCTV reports. Work not following these specifications may be rejected for payment and the Contractor may be required to re do the work.

I. The Contractor shall provide a NASSCO certified operator on site at all times during the entire survey. If video is to be coded separately from the actual recording, both the onsite Operator and the individual performing the PACP coding shall be PACP certified. The Contractor shall provide proof of certification prior to commencement of work, prior to a change in personnel involved in data collection, and as requested by the Owner.

J. CCTV Reports, logs, electronic reports, and worksheets must include the following information and conform to the applicable guidelines:

1. CCTV Reports shall comply to NASSCO PACP, LACP and MACP inspection criteria and Certified Database. NASSCO compliant electronic reports, logs and worksheets must accompany all inspection work.

2. All Owner and NASSCO PACP required header information must be fully and accurately entered on all CCTV reports.

3. All inspection documents to be submitted in PDF format.

4. For any single inspection all data shall be recorded accurately. All inspection data on the inspection video shall be accurate and match specific information submitted on the inspection documents. The submitted inspection documents, videos and invoices must contain all required information such as street names, times, dates asset identifiers (manhole and pipe identification numbers), sizes, lengths, defect descriptions and other information which is consistent with the video submitted. Each inspection will document the inspection of one sewer Asset. Inspections listing more than one Asset will not be accepted. Inaccurate or incomplete inspection packages will be immediately rejected.

2.4 MANHOLE INSPECTION

A. All manhole inspections will require the Contractor to fill out the appropriate NASSCO MACP Header forms. The Contractor will be required to perform MACP Level I manhole inspections before and after the work is complete.

B. Contractor shall find the manhole in the field and seek assistance from the Owner if unable to locate them, see Section 02640, Technical Provisions for Inspection and Rehabilitation, paragraph 1.16.

C. No additional compensation will be given for locating manholes in the field.

D. Inspection software used by the manhole inspection equipment shall be MACP compliant and final reporting and database shall be in digital format. Provide inspection as follows:

1. MACP Level 1 w/ Photos and Videos can be accomplished utilizing equipment that can be lowered into the manhole from the ground surface. The Contractor will be required to:

   a. Take a minimum of 5 photos of the surrounding area from above the rim of the manhole frame.

   b. Take a minimum of 10 high quality photos above and below the rim and an internal video of the manhole from rim to invert.

   c. Take an internal video of the manhole from rim to invert.

   d. Note visual observations and defects on the MACP Level 1 form.

2. Manhole inspection shall be performed by a NASSCO/MACP certified operator and shall meet the coding and reporting standards and guidelines as set by MACP. All report annotations, manhole conditions and manhole defects shall be identified properly using MACP codes as defined by MACP, and condition scores ratings shall be calculated according to MACP.

PART 3 EXECUTION

3.1 GENERAL

A. A competent supervisor shall be present at all times during active inspection activities. The field supervisor shall be approved in writing by the Owner prior to commencement of work. Any change of supervision must also be approved in writing by the Owner prior to the change. Field Supervisor, or designee, is responsible for providing weekly reports of project activity to be submitted electronically to the Owner with all pertinent information pertaining to the project. Submit weekly schedules in accordance with Section 02640, Technical Provisions for Inspection and Rehabilitation.

B. The Contractor shall furnish and maintain, in good condition, all cleaning and televising equipment necessary for proper execution of the work.

C. Maintaining Flow: It will be the responsibility of the Contractor, throughout the tenure of this contract, to provide and maintain sufficient flow within the sewer system at all times and prevent any backwater flooding due to obstruction caused by cleaning or inspection equipment.

D. Retrieval of Materials and Equipment: It shall be the Contractor's responsibility to remove materials and equipment that has been lodged in the sewer from cleaning, television inspection, or point repairs.

E. Inspection work shall be completed with a minimum of inconvenience and disturbance to the residents and the employees of the adjacent dwellings, commercial and government facilities, and the traveling public.

F. Inspection operations shall be confined strictly within the limits of rights-of-way or easements unless written permission is obtained to occupy additional ground. Any obvious existing defects discovered prior to inspection shall be reported to the County including, but not limited to, manholes and pipes.

G. Upon completion of work, the Contractor shall clean up and restore the area of operations to a condition at least equal to original conditions. Damage to property including adjacent structures, signs, fences, trees, shrubs, lawns, sidewalks, utilities, storm drains, etc., will be the Contractor's responsibility, and restoration of same shall be made at Contractor's expense.

3.2 FLOW CONTROL/TEMPORARY BYPASS

A. During television inspection of a sewer line section the Contractor shall reduce the flow depth to an acceptable level by performing the television inspection during minimum flow hours, plugging, trucking, bypassing, or other acceptable flow control methods. Video inspection made while floating the camera is not acceptable unless approved by the Owner.

B. The Contractor shall notify the Owner if unable to reduce flow depth in the pipe to an acceptable level for television inspection.

1. Temporary bypass systems shall be provided in accordance with Section 02960, Temporary Bypass Pumping Systems, and the contract documents.

3.3 SANITARY SEWER SPILLS/BACKUP

A. The Contractor shall be responsible for spills, overflows and backups resulting from the work in connection with this contract. See specified requirements in sections:

1. 02640, Technical Provisions for Inspection and Rehabilitation
2. 02650, Sanitary Sewer Line Cleaning
3. 02651, Sanitary Sewer Overflow Response.

3.4 CLEANING

A. Cleaning shall be conducted to accomplish the work then it shall be done in accordance with Section 02650, Sanitary Sewer Line Cleaning.

3.5 MAINTENANCE OF TRAFFIC

A. The Contractor shall be responsible for maintaining traffic as specified in Section 02640, Technical Provisions for Inspection & Rehabilitation.

SECTION 02956 – TELEVISION INSPECTION

3.6 SEWER LINE INSPECTION

A. CCTV Inspection

1. Sewers shall be visually inspected by means of CCTV. The camera shall be placed at the center of the manhole 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. CCTV Camera Prime Position: The CCTV camera shall be positioned to reduce the risk of picture distortion. In circular sewers the CCTV camera lens shall be positioned centrally (i.e. in prime position) within the sewer. In non-circular sewers, picture orientation shall be taken at mid-height, unless otherwise agreed, and centered horizontally. In all instances the camera lens shall be positioned looking along the axis of the sewer when in prime position. A positioning tolerance of no more than 10% of the vertical sewer dimension shall be allowed when the camera is in prime position.

3. Camera and monitor image color shall be synchronized and calibrated per the manufacturer's recommendations at the beginning of each workday and anytime the picture becomes distorted, or whenever directed by the Owner.

4. The camera shall be moved through the line 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 advanced at a speed greater than 30 feet per minute. Manual winches, power winches, TV cable, and powered rewinds 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.

5. 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 twelve (12) feet away from the camera to allow a clear, unobstructed view. Jet nozzle shall be used in front of the camera while televising through a dip to draft out water. If, during the inspection operation, the television camera will not pass through the entire sewer section, the Contractor shall set up his equipment so that the inspection can be performed from the opposite manhole or structure. If a reverse setup is required for the inspection of the pipe segment, the Contractor will complete the setup at no additional cost to the Owner or County.

6. 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.

7. 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 inspected to ensure good communications between members of the crew.

8. Movement of the television camera shall be temporarily halted, pan and tilt for a minimum of ten (10) seconds at all points of interest including all obstructions, broken pipe, other suspected defects and point sources of infiltration and/or inflow until the severity and leakage rate from each source is quantified by using pan and tilt camera. All points of interest shall also be indicated via audio during inspection.

9. Service connections and the service laterals shall be inspected to the extent possible from inside the main sewer pipe segment that is being inspected.

10. Throughout the television inspection activities, the Owner reserves the right to require altering the speed at which the camera is moved through the sewer. However, at no point should an inspection exceed 30 feet per minute.

11. Should the quality of the picture fail to provide a clear view of the entire sewer, the Contractor shall make appropriate adjustments in his monitoring equipment or discontinue work until the Owner agrees an acceptable picture has been obtained.

12. Should any inspection equipment become stuck in the sewer, the Contractor will be responsible for its removal at no additional cost to the Owner.

13. If an obstruction prevents the camera from passing, and cannot be removed by regular or heavy sewer cleaning, the following procedures shall apply:

    a. Abandon the survey (using MSA code and comments indicating the reason) and complete a reverse inspection up to the point where the survey was abandoned.

    b. If a portion of the pipe longer than 10 feet cannot be inspected after attempting a reverse inspection, abandon the incomplete inspection and report the pipe segment to the Owner. Provide the owner with available video from abandoned inspection.

    c. When submitting abandoned inspection to the Owner also make a recommendation for extreme sewer cleaning if applicable and/or any recommendation on how to complete the inspection and rehabilitation. The Owner will provide the final decision on how the work will proceed.

    d. The Owner may direct the Contractor to not attempt follow-up cleaning and inspection. The Contractor will not be compensated for work that is was not completed, including making the determination that cleaning, inspection and installation of CIPP could not be accomplished due to the existing condition of the sewer system. The Owner may elect to resolve issues preventing the work from proceeding and reissue the work to Contractor at a later date for completion. The Owner may also elect to replace or otherwise repair the sewer without the use of this contract.

14. Conduct work so as not to cause damage to the sewer system, its connections, apparatus and/or adjacent properties. For any impacts resulting from the work follow Section 02651, Sanitary Sewer Overflow Response, Section 02640, Technical Provisions for Inspection and Rehabilitation, and the contract documents. Any damage caused during the operations shall be repaired to the complete satisfaction of the Owner at no additional cost to the Owner.

3.7 INSPECTION AND DELIVERABLES FOR PIPELINE AND MANHOLES

A. Written Inspection Reports: Provide PDF location records to clearly identify the location of each defect, or lateral connection, in relation to adjacent manholes, using a standard stationing system zeroed on the upstream manhole. Record all information requested using proper NASSCO/PACP/MACP/LACP defect codes. The reports shall include at least the minimum amount of information required by PACP/MACP/LACP, including required PACP/MACP/LACP

header information. Color still-shot images of all defects encountered shall be included with each pipe segment. Log sheets, graphs, and other appropriate reporting information shall be provided for other approved types of pipeline inspection equipment.

B. Electronic Inspection Reports (PACP/MACP Database Records)

1. Provide a NASSCO/PACP/MACP (version 7.0 or later) certified database listing all PACP/MACP/LACP required data fields for each pipe segment.

2. Provide one inspection record per mainline sewer segment and private service lateral. If the conditions of the pipe segment do not permit inspection of the entire asset from one direction, provide a second inspection record from the opposite end to the point the initial inspection was abandoned (reversals not required for private laterals).

3. Each inspection record shall contain the video file name associated with the inspection in the "tape/media number" PACP/MACP header field. Provide only the video file name and extension of this field. Do not provide file paths or drive letters.

C. Inspection Recordings:

1. Provide digital CCTV inspection recordings for all pipes. Manhole only inspections to be MACP Level 1 w/ Photos and Videos.

2. Recording shall be of a quality sufficient for the Owner to evaluate the condition of the sewer, locate the sewer service connections, and verify cleaning and joint testing. If the Owner determines that the quality is not sufficient, re-televise the sewer segment and provide a new recording and report at no additional compensation. Payment for televised inspection will not be made until the Owner approves the recordings and reports.

   a. Camera distortions, inadequate lighting, dirty lens, or blurred/hazy picture, disagreement between video/photos and inspection documents will be cause for rejection.

   b. Pipe stationing not shown on the video or in a font style or color that is unreadable will be cause for rejection.

3. TV inspection recordings shall not be edited.

4. Digital recordings: Electronic recording file must allow snap scrolling to allow easy and quick access of the entire recording.

5. Digital Recording File Management:

   a. Provide one electronic video file of each inspection. Multiple inspections per video file and multiple video files per inspection will be cause for rejection.

      (1) File name format for mainline videos:

         (a) [UpstreamStructureID]-[DownstreamStructureID]_[InspectionDirection]_[DATE] ;
         (b) Where Date is hhmmmmddyyyy (hour, minute, month, day, year)

      (2) The photo file name format shall be

         (a) [Up streamStructureID]-DownstreamStructureID] _ [InspectionDirection] _ [DATE] _ [videofootage] _[Sequence]
         (b) Where Date is hhmmmmddyyyy (hour, minute, month, day, year)

(c) Video footage is the footage of the snapshot
(d) Sequence is the # of picture

6. As a minimum requirement each inspection must contain this information:

- Contractor's Name and Contact Information
- Crew lead, field supervisor
- Owner's Name
- Project Name
- Contract Number
- Inspection Type
- Digital Video/photo Number
- Date Inspected
- Pipe Segment and/or Manhole Asset Identification Number on documents and videos/photos
- NASSCO Compliant inspection data on documents and videos/photos, including the video/photo header

7. Manhole only inspections to be MACP Level 1 w/ Photos and Videos. Accomplished utilizing equipment that can be lowered into the manhole from the ground surface. The Contractor will be required to:

1. Take a minimum of 5 photos pre and post of the surrounding area from above the rim of the manhole frame.
2. Take a minimum of 10 high quality photos above and below the rim invert pre and post.
3. Take an internal video of the manhole from rim to invert pre and post.
4. Note visual observations and defects on the MACP Level 1 form.

8. The Contractor shall submit deliverables listed within the contract to the Owner in electronic format, either by external hard drive, ShareFile upload or as agreed by Owner. Pre and Post inspections shall be submitted as part of each invoice, and upon request. Name and submit all inspection items as follows:

a. Parent folder to be named by invoice number, example FY20 010. Each sub-folder to be named by Pipe Segment/Manhole Asset Identification Number (Asset ID) and it will contain all inspection and installation data for one pipe segment. Up to ten (10) pipe segments can be submitted within each invoice. Within each subfolder name inspection items by Asset ID and type of item, for example:

(1) 079-1-102-079-1-103 Pre CCTV
(2) 079-1-102-079-1-103 Post CCTV
(3) 079-1-102-079-1-103 Pre-Video
(4) 079-1-102-079-1-103 Post-Video

b. Folders containing cumulative inspection data for the project shall be updated each month. Includes, inspection schedules, a cumulative PACP/MACP database as applicable, videos, photos and Inventory Tracking Log for every pipe in the scope.

Deliverable	Content	Media	Schedule
Inspection Logs	Inspection location, CCTV camera location within the sewer and each defect coded feature of the sewer	ShareFile Upload	Upon Completion of all inspection work.
Photographs	Captured still images from CCTV video recordings at points of significant inflow and infiltration or defects classified PACP coding 3 and above, as requested by the Owner. Images shall be cross-referenced to inspection logs by labeling directly on image. Photo will be taken every time an inspection is abandoned.	ShareFile Upload	Upon Completion of all inspection work.
Inspection Data	Visual and audio record of CCTV inspections (in MPEG-4 format), including inspection database (PACP compatible software in WinCan VX format)	ShareFile Upload	Upon Completion of all inspection work.
Red Lined Counter Maps	Field notes recording manholes not located, with request to locate manholes and manholes that could not be accessed (rusted shut), manholes found but not shown on drawings, etc.	ShareFile Upload	Weekly or two weeks in advance of the work.
Work Schedules	Scheduled work to be completed each week submitted one week in advance. Scheduled work from previous week that was not completed as planned, include explanation why work was not performed.	ShareFile Upload	Weekly

END OF SECTION

SECTION 02957 – SEWER MANHOLE REHABILITATION

PART 1 GENERAL

1.1 SCOPE OF WORK

A. These Specifications include the minimum requirements for the rehabilitation of manholes as directed by the OWNER using cementitious coatings, polymer coatings, repair and replacement of manhole frame and covers including brick and grade ring transitions, rain pots underneath rim setting, chimney seals and chemical grouting. Manhole rehabilitation types will include:

1. Manhole Structural Repair- repair, rebuild existing structure and restore manhole components. Grouting to stop leaks but no coatings.
2. Manhole Grouting only.
3. Manhole Cementous coating overtop of existing manhole.
4. Manhole Cementous and Polymer coating overtop of existing manhole.
5. Manhole Structural Repair and grouting to stop leaks with Manhole Cementous coating or Cementous and Polymer coating overtop of existing manhole.

Note: Manhole internal and external chimney seals and/or expansion band joint seals may be used in combination with rehabilitation types 1-5.

B. Related Work Specified in Other Sections Include, but is not limited to, the following:

1. Section 01025, Measurement and Payment
2. Section 01300, Submittals
3. Section 02640, Technical Provisions for Inspection and Rehabilitation
4. Section 02650, Sanitary Sewer Line Cleaning
5. Section 02651, Sanitary Sewer Overflow Response
6. Section 02956, Television Inspection
7. Section 02959, Sewer Sealing by Chemical Grout
8. Section 02960, Temporary Bypass Pumping Systems

C. The rehabilitation of manholes shall be accomplished by the application or installation of rehabilitation components either individually or together. These may include grouts, protective coatings, a variety of linings, inserts, seals and mechanical devices that, when installed, shall protect the manhole structure, seal it from Inflow & Infiltration (I & I), rebuild it structurally (if needed) and provide chemical resistance for the length of time specified. The Contractor is responsible for the accurate and complete installation, and warranty of each manhole Rehabilitation Component System (SYSTEM) specified by the Owner.

D. The SYSTEM for each manhole, shall at a minimum, include I&I control (through grout injection or approved equal), structural protection (through calcium aluminate cementitious products or approved equal) and/or corrosion protection (through polymer coating system or approved equal). The unit prices in Attachment C - Cost Proposal shall include all costs per to provide the minimum SYSTEM.

E. The manhole SYSTEM's installed shall cause no adverse effects to any of the Owner's processes or facilities either during or after application. The use of the product, by the Contractor, shall not result in the formation or production of any detrimental compounds or by-products at the wastewater treatment plant. The Contractor shall notify the Owner and identify any by-products produced as a result of the installation operations, test and monitor the levels, and comply with any and all local waste discharge requirements. The Contractor shall cleanup, restore existing surface conditions and structures, and repair any of the manhole SYSTEM's installed and determined to be defective. The Contractor shall conduct installation operations and schedule cleanup in a manner to cause the least possible obstruction and inconvenience to traffic, pedestrians, businesses, and property owners or tenants.

F. The prices submitted by the Contractor, shall include all costs of permits, labor, equipment and materials for the various items necessary for furnishing and applying, complete in place, manhole SYSTEM's, in accordance with these specifications. All items of work not specifically mentioned herein which are required to make the product perform as intended and deliver the final product as specified herein shall be included in the respective lump sum and unit prices in Attachment C- Cost Proposal. These Specifications include the minimum requirements for the rehabilitation of manholes defined herein as part of these contract documents.

1.2 DESCRIPTION OF WORK AND PRODUCT DELIVERY

A. The work on this contract requires the Contractor to furnish, install and test, a variety of products to rehabilitate manholes using various SYSTEM's. The Contractor shall deliver a finished product(s) including all materials, labor, equipment, and services necessary for traffic control, bypass pumping and/or diversion of sewage flows, cleaning equipment, product installation, all quality controls and samples for performance of required material tests, test results, final inspection and warranty work, all as specified in these contract documents. All costs to furnish, install and test all SYSTEM's shall be included in the unit rates in Attachment C- Cost Proposal.

B. The SYSTEM's furnished shall be complete integrated and compatible systems including all materials, manufacturer's recommended equipment and manufacturer's installation procedures. The SYSTEM manufacturer may submit to the Owner, all required product information during the SYSTEM approval process. The Owner will review the information and respond to the Contractor, who will be responsible for transmitting the result of the review to the manufacturer. All communications regarding the submitted SYSTEM will be accomplished through the Contractor. The review process shall not create any agreement or liability between the Owner and the manufacturer. Those SYSTEM's that have been pre-approved will not need to be re-submitted as required in the submittal section of these specifications unless any of the system components have changed from those pre-approved by the Owner. All other component products will be required to meet the submittal requirements as contained within the contract documents.

C. The SYSTEM's installed shall be free of all defects that will affect the design and service life and operation of the manhole.

D. The SYSTEM installed shall eliminate water leakage into the manhole and prevent water or vapors to leak out of the manhole through pin-holes or other defects. If leakage occurs either in or out of the manhole the Contractor shall seal these areas to stop all leakage using a material compatible with the SYSTEM applied and as specified by the manufacturer. If leakage occurs through any SYSTEM applied to the manhole, the SYSTEM shall be repaired or removed as

recommended by the manufacturer. All repair materials shall have the same estimated life expectancy than the SYSTEM installed. Final approval of the SYSTEM installation will be based on meeting the acceptance test requirements for each SYSTEM applied/installed.

E. The SYSTEM (applied to the intended structure) shall be designed against corrosion and typical chemicals found in domestic sewage, unless otherwise specified in the detailed section of the contract documents. The Contractor/manufacturer of the SYSTEM shall provide testing data that supports their SYSTEM's design and service life.

F. SYSTEM'S may be designed to rehabilitate the existing manhole against corrosion, I&I structural build-back, or a combination of the three.

1. A manhole is specified to be structurally replaced, being able to sustain all earth, hydrostatic and dynamic loading without support by the existing structure.
2. A manhole is specified to be structurally rebuilt, with build-back materials, or rehabilitated to sustain hydrostatic loading by groundwater.
3. A manhole is specified to receive a corrosion protective coating sufficiently thick to totally protect the existing host structure from further corrosion, deterioration and water vapor transmission.
4. A manhole is specified to receive a coating to renew mortar or other deteriorated components of a manhole but has no specified longevity or corrosion resistance requirement. The manufacture's third-party testing will be acceptable for application suitability.
5. A manhole is specified to receive patch repair materials for portions of the manhole. The manufacture's third-party testing will be acceptable for application suitability.

G. All manhole steps shall be replaced after coating or lining application.

H. Flow from existing active service connections entering the manhole shall be maintained or bypassed if the flow will affect proper SYSTEM application/installation.

I. All component materials furnished, as part of this contract shall be marked with detailed product information, stored in a manner specified by the manufacturer and tested to the requirements of this contract.

J. Testing shall be executed by the contractor in the presence of the owner. Warranty inspections shall be executed by the Owner or its representative. Any defects found shall be repaired or replaced by the Contractor.

K. The Contractor shall furnish, from the project installation, all samples for product testing. The Contractor shall be responsible for testing and maintaining the chain of custody, delivery of the samples to an Owner approved independent laboratory and paying for all material and product testing performed under this contract. Prior to testing the Contractor shall submit to the Owner for approval, the name and location of the independent testing laboratory with a certified statement from the laboratory indicating they are independent from and not associated with the Contractor in any way.

L. Compensation for all work required for testing and providing test results to the Owner shall be included in the rates given in Attachment C- Cost Proposal and in accordance with Section 01025, Measurement and Payment and the contract documents. No separate payment will be made.

SECTION 02957 – SEWER MANHOLE REHABILITATION

1.3 SCOPE OF WORK INCLUDED

A. A detailed description of each SYSTEM included in the contract, complete with estimated quantities.

1.4 PERFORMANCE WORK STATEMENT (PWS) SUBMITTAL

A. The Contractor shall submit, to the Owner, a Performance Work Statement (PWS) prior to the start of work, which clearly defines various manhole SYSTEM's proposed for delivery in conformance with the requirements of these contract documents.

B. For all manholes, structural defects and adjustments to grade shall be accomplished prior to the installation of a coating system as recommended by the Manufacturer. Two main classes of SYSTEM's to be used for Rehabilitation include structure Repair SYSTEM's and Coating SYSTEM's. They will be used in combination to rehabilitate manholes within the sewer system. The PWS shall at a minimum contain the following:

1. Clearly indicate that the SYSTEM will conform to the project requirements as outlined in the Description of Work, Scope of Work Included and as further delineated in these contract documents.

2. The manufacturer's description of the SYSTEM materials are to be furnished for the project. Material descriptions shall be sufficiently detailed in the submittals to verify conformance to these specifications and/or shall conform to the pre-approved SYSTEM submission.

3. The Contractor's experience for each type of rehabilitation component shall be as more specifically delineated in the detailed specifications. The name and experience of each lead individual performing work on this contract with certifications, for each component, shall be submitted with the PWS. If personnel are substituted after submittal of the PWS, the name and experience of the individual shall be submitted to the Owner for approval before starting any work.

4. Information on the SYSTEM and all tools and equipment required for a complete application/installation, shall be submitted. The PWS shall identify which tools and equipment will be redundant on the job site in the event of equipment breakdown. The Contractor shall outline the mitigation procedure to be implemented in the event of key equipment failure during the installation process.

5. A detailed description of the Contractor's proposed procedures for cleaning and preparing the manhole structure, prior to applying/installing the SYSTEM shall be submitted as part of the PWS. The Contractor will describe in detail what substrate testing will be performed by the contractor to verify acceptability of the SYSTEM material to be applied.

SECTION 02957 – SEWER MANHOLE REHABILITATION

1.5 SUBMITTALS

A. Product data submittals required for all rehabilitation SYSTEM's proposed for installation under this contract shall include:

1. SYSTEM material type and manufacturer to be used including catalog data sheets, ASTM references, material composition, manufacturers recommended specifications, component physical properties and chemical resistance. (PWS)

2. Manufacturer's detailed description of the recommended procedures for handling and storing materials including a proposed method for monitoring temperatures of the storage location, if applicable to the specific SYSTEM material. (PWS)

3. Manufacturers detailed description of the recommended material installation/application process including mixing, additives, set time, cure time (return to service) and all equipment required for quality product delivery. (PWS)

4. Technical data sheet describing each rehabilitation component to be applied/installed, stating the expected longevity of the component in a wastewater environment. Data shall be based on independent third-party tests. (PWS)

5. Manufacturer's detailed description of all required field-testing processes and procedures. (PWS)

6. Copies of independent testing performed on the rehabilitation component, indicating that the product meets the requirements as specified in these contract documents and the manufacturers design. (PWS)

7. Technical data sheet and project specific data for manhole repair materials to be used in conjunction with each rehabilitation component(s) including application cure time and surface preparation procedures. (PWS)

8. Certification that backup installation equipment is available on the job site or can be delivered to the job site by the morning of the next business day. (PWS)

9. Shipping information including: (Jobsite)

    a. Shipped item, including manufacturer, stock and lot number
    b. Date shipped including origination and delivery locations
    c. Shipping method and carrier
    d. All shipping, storage and safety requirements including MSDS documents.
    e. Date delivered to project site including name and signature of receiver

10. By-Pass Pumping Plan if applicable to the SYSTEM's being installed. (PWS)

11. Traffic Control plan, if applicable for the SYSTEM's being installed.

12. Certified statement, from the manufacturer, that the contractor/installer is an approved installer of the SYSTEM with certificates of completed training for each crew member involved in each rehabilitation component. This requirement shall comply with the specific SYSTEM requirements specified in the contract documents. (PWS)

13. For each manhole rehabilitation, a complete and accurate record of all SYSTEM's installed/applied shall be prepared by the Contractor. The record shall include identifying manhole number, location, quantities of rehabilitation components installed.

14. Submittal of all quality assurance documentation and test reports for SYSTEM's installed. (After Rehabilitation Completion)

15. The Contractor shall provide testing and test results for all products furnished and installed on this contract in accordance with All ASTM standards and referenced requirements as stated herein.

B. Manhole Rehabilitation SYSTEM's to furnish and install include:

1. Manhole Grouting and I/I control
2. Cementitious Coatings
3. Polymer Coatings
4. Manhole frame and cover replacement
5. Manhole rain pot insert under frame and cover
6. Manhole top adjustment to grade with grade rings or brick
7. Manhole steps, remove and replace
8. Manhole bench and channel replacement
9. Manhole bench and channel repair
10. Internal and external chimney seals
11. Expansion band joint seals

C. All work to be in conformance with the Fairfax County Public Facility Manual (PFM)

D. Compensation for all work required to furnish and install each SYSTEM shall be paid at the rates given in Attachment C - Cost Proposal and in accordance with Section 01025, Measurement and Payment, and the contract documents

1.6 QUALITY CONTROL PLAN (QCP)

A. A detailed quality control plan (QCP) shall be submitted to the Owner, prior to the start of work that fully represents and conforms to the quality control requirements of these specifications. The QCP shall be submitted prior to the initiation of the contract and resubmitted at each contract renewal. At a minimum the QCP shall include the following:

1. A detailed description of the proposed quality controls to be performed by the Contractor.
2. Defined responsibilities, of each of the Contractor's personnel, for assuring that all quality control requirements, for this contract, are met. These shall be assigned, by the Contractor, to his specific personnel.
3. Proposed procedures for quality control, product sampling and testing shall be defined.

4. Proposed methods for product performance controls, including method of and frequency of product sampling and testing both in raw material form and cured product form as applicable.
5. A scheduled review of Contractor performance and product test results. Meeting to be held with the Contractor and acceptable to the Owner, at a scheduled time and location as agreed.
6. Inspection forms and guidelines for quality control inspections shall be prepared in accordance with the standards specified in this contract and submitted with the QCP.
7. Proposed methods and procedures for SYSTEM repair or replacement, (as defined in Section 1.7) in the event of product defects or total failure.

1.7 SYSTEM REPAIR/REPLACEMENT

A. Due to mechanical damage or defects in application, SYSTEM's will occasionally need to be repaired or a portion of the installed product replaced. The Manufacturer shall outline specific repair or replacement procedures for potential issues that may occur during the application of any SYSTEM. Repair/replacement procedures shall be as recommended by the SYSTEM Manufacturer and shall be submitted as part of the PWS.

B. Issues, that may not affect the operation and long-term life of the product, shall be identified and defined by the Manufacturer.

C. Repairable issues that may occur in the SYSTEM shall be specifically based on Manufacturer's recommendations, including a detailed step-by-step repair procedure, resulting in a finished product meeting the estimated life cycle of the component and requirements of these contract specifications.

D. Un-repairable issues that may occur in the SYSTEM shall be clearly defined based on the Manufacturer's recommendations. The Contractor together with the manufacturer shall define the best recommended procedure for the total removal and replacement of the SYSTEM.

E. The Contractor shall receive no additional compensation for the repair or replacement of any SYSTEM's deemed non-conforming to the requirements of these contract documents and unacceptable by the Owner.

1.8 REFERENCES

A. ASTM and other applicable standard documents, that are listed in the detailed specifications, are made a part of these specifications by reference to the extent stated herein and shall be the latest edition thereof. Where there are differences between codes, standards and these specifications, these specifications shall govern.

1.9 DELIVERY, STORAGE AND HANDLING

A. Rehabilitation component materials are to be kept dry, protected from weather and stored under cover and in accordance with manufacturer's recommendations.

B. Polymer and Cementitious protective coating materials are to be stored at temperatures as recommended by the manufacturer and handled according to their material safety data sheets. Do not store near flame, heat or strong oxidants.

C. All Safety Data Sheets (SDSs) for all materials to be furnished for products used.

1.10 SAFETY

A. The Contractor shall conform to all work safety requirements of pertinent regulatory agencies and shall secure the site for working conditions in compliance with the same. The Contractor shall erect such signs and other devices as are necessary for the safety of the work site.

B. The Contractor shall perform all of the Work in accordance with applicable OSHA safety standards. Emphasis shall be placed upon the requirements for entering confined spaces and with the equipment being utilized for manhole rehabilitation components. Confined space, defined as any space having one or more of the following characteristics:

1. Limited openings for entry and exit.
2. Unfavorable natural ventilation.
3. Not designed for continuous worker occupancy.

C. The Contractor shall have on the job site at all times at a minimum the following safety equipment:

1. Gas monitor capable of testing and detecting for combustible gas, oxygen deficiency and hydrogen sulfide.
2. Confined space access and retrieval winch system.
3. Ventilating fans with large diameter ventilating hose.
4. Supplied air respirator, MSHA/NIOSH approved type.
5. Safety harness and life lines.
6. Other equipment as may be required for a specific project
7. All equipment to be available for use, in sufficient quantity, by the Contractor, Engineer and Owner for the duration of the project.

D. All entries into or work within confined spaces shall be conducted in accordance with the U.S. Department of Health and Human Services/National Institute for Occupational Safety and Health [DHHS (NIOSH)] Publication No. 87-113, A Guide to Safety in Confined Spaces.

E. The Contractor shall submit a proposed Safety Plan to the Owner, as part of the PWS and prior to beginning any work, identifying all competent persons, equipment and operating procedures. The plan shall include a description of a daily safety program and daily safety meeting for the job site and all emergency procedures to be implemented in the event of a safety incident. All work shall be conducted in accordance with the Contractor’s submitted Safety Plan.

SECTION 02957 – SEWER MANHOLE REHABILITATION

1.11 WARRANTY

A. The materials used for the project shall be certified by the manufacturer for the specified purpose. The manufacturer shall warrant any SYSTEM to be free from defects in raw materials for five (5) years after installation or from the date of acceptance by the Owner, or in accordance with the manufacturer recommendation, whichever is later. The Owner considers a warranty with a longer time frame to be more valuable when cost is in line with other products offering only a Five-year warranty. The Contractor shall warrant the installation of the rehabilitation component for the duration of the Warranty. During the warranty period if the rehabilitation component, fails, delaminates, peels or shows any defect, which may materially affect the integrity, strength, function and/or operation of the manhole structure, it shall be immediately repaired at the Contractor's expense in accordance with procedures included in Section 1.7 Rehabilitation Component Repair/Replacement.

B. After a manhole has been renewed and for the term of the warranty and final acceptance of the work, the Owner may inspect all or portions of the renewed manholes. The specific locations will be selected at random by the Owner and will include all types of structures rehabilitated under this contract.

C. If any of the rehabilitation components have developed defects since the time of Quality Assurance and Testing, the defects shall be repaired and/or the component shall be replaced as defined in Section 1.7 Rehabilitation Component System (SYSTEM) Repair/Replacement. Owner may inspect all manholes where SYSTEM's have been applied/installed under this contract.

D. All verified defects shall be repaired and/or replaced by the Contractor and shall be performed in accordance with Section 1.7 Rehabilitation Component System Repair/Replacement and per the original specifications, all at no additional cost to the Owner.

1.12 WARRANTY INSPECTIONS

A. Visual inspection to determine integrity of SYSTEM materials, water-tightness and workmanship will be conducted within 6 months of installation and again before the expiration of the guarantee period.

B. If possible, inspection should be performed in the spring during high groundwater and frequent rainfall events.

C. The Owner shall perform, at its own cost, warranty inspections with its own personnel or personnel independent of the installation contractor.

D. Ten (10) percent of manholes rehabilitated shall be inspected, at locations randomly selected, by the Owner.

E. No infiltration or inflow shall be visible in the renewed manhole.

F. If any SYSTEM fails the warranty inspection, the Owner shall inspect all SYSTEM's installed in the contract, together with Contractor.

G. The Contractor will correct any SYSTEM that fails the Warranty inspection as directed and to the satisfaction of the Owner.

SECTION 02957 – SEWER MANHOLE REHABILITATION

PART 2 PRODUCTS

2.1 REHABILITATION COMPONENT SYSTEM PRODUCTS

A. The SYSTEM'S defined herein include those identified as commercially accepted methods for manhole rehabilitation. Methods or products not defined herein must be pre-approved by the Owner before use on this project under these specifications.

B. All products shall conformance to the requirements of the Fairfax County Public Facility Manual (PFM), references ASTM and requirements herein.

C. Each manhole system shall include required structural repairs and adjustments to grade, and Chemical Grouts for I&I control. Repairs shall be completed prior to installation of Cementitious manhole restoration and Polymer (Epoxy, Polyurethane or Polyurea Coatings). The Owner will direct which manholes will receive repairs only and which ones will be repaired and coated with Cementitious or Cementitious/Polymer materials.

2.2 CHEMICAL GROUTS

A. REFERENCES

1. ASTM F2414-03 Standard Practice for Sealing Sewer Manholes Using Chemical Grouting

B. CHEMICALGROUT TYPES

1. The Contractor shall specifically define the type of chemical grout that will be furnished for the project. Depending on the specific application either Acrylic or Acrylate Based Grout or Urethane Based Grout shall be furnished. The type of grout to be used shall be in accordance with the manufacturer's recommendation for the specific application within the County.

2. Contractor shall deliver materials to job site in undamaged, unopened containers bearing manufacturer's original labels. Materials used as chemical grout shall be transported, stored, mixed and applied in manner prescribed by the manufacturer of the specified materials, as detailed in published data provided by manufacturer.

C. MATERIALS

1. Contractor shall provide a chemical sealant solution containing principal chemical sealant constituent, initiator (trigger) and catalyst specifically recommended for the purpose of sealing leaks in manholes. Chemical sealant constituent, initiator (trigger) and catalyst shall be compatible when mixed. Solution shall have ability to tolerate dilution and react in moving water. After final reaction, it shall be a stiff, impermeable, yet flexible gel. The grout proportions shall be such that dilute aqueous solutions, when properly catalyzed will form stiff gels. Materials provided shall gel in a predetermined time period when exposed to normal groundwater pH ranges and be capable of formula adjustments to compensate for changing conditions. Final reaction shall produce a continuous, irreversible, impermeable stiff Gel and shall not be rigid or brittle.

2. The grout shall exhibit the following properties:

   a. Controllable reaction times and shrinkage through the use of chemicals supplied by the same manufacturer. The minimum set time shall be established so that adequate grout travel is achieved.

   b. Resistance to chemicals, to most organic solvents, mild acids and alkali.

   c. The grout shall be non-toxic in its cured form.

   d. Sealing material shall not become rigid or brittle when subjected to a dry environment. The material shall be able to withstand freeze/thaw and moving load conditions as verified by third party testing.

3. The Contractor shall identify the type of grout and additives used on the contract and furnish references of successful use in similar applications. The Contractor shall select the choice of materials based on chemical and physical properties and expected performance for the requirements of the contract documents.

4. Grout conditions may be adjusted for catalyzing the reaction, inhibiting the reaction, lowering the freezing temperature the grout solution, adding fillers, providing strength or for inhibiting root growth according to the instructions of the grout manufacturer and in the specified quantities as recommended by the grout manufacturer.

D. MIXING & HANDLING

1. Mixing and handling of chemical grout, which may be toxic under certain conditions, shall be done in such a manner as to minimize any hazard to personnel and the public in accordance with the manufacturer's recommendations. It is the responsibility of the Contractor to provide appropriate protective measures to ensure that chemicals are handled only by trained and authorized personnel. All equipment used to install the grout shall be as recommended by the manufacturer and only personnel thoroughly familiar with all aspects of the grouting material and meeting the qualification requirements specified herein, shall perform the actual grouting operation.

2.3 CEMENTITIOUS MANHOLE RESTORATION

A. REFERENCES

1. ASTM F2551 Standard Practice for Installing a Protective Cementitious Liner System in Sanitary Sewer Manholes

2. ASTM C150 Standard Specification for Portland Cement Type I

3. ASTM C33-86 Standard Specification for Concrete Aggregates

4. ASTM C78 Standard Test Method for Flexural Strength of Concrete; Using Simple Beam with Third Point Loading

5. ASTM C109/C109M-05 Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)

6. ASTM C157/C157M-06 Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete

7. ASTM C267 Test Methods for Chemical Resistance of Mortars, Grouts and Monolithic Surfacings and Polymer Concretes
8. ASTM C293-02 Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Center-Point Loading)
9. ASTM C309 Specification for Liquid Membrane-Forming Compounds for Curing Concrete
10. ASTM C321-00(2005) Standard Test Method for Bond Strength of Chemical-Resistant Mortars
11. ASTM C348-02 Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars
12. ASTM C494-86 Standard Specification for Chemical Admixtures for Concrete
13. ASTM C496/C496M-04e1 Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens
14. ASTM C666/C666M-03 Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing
15. ASTM C882-05 Standard Test Method for Bond Strength of Epoxy-Resin Systems Used With Concrete by Slant Shear
16. ASTM- Referenced within the contract and/or considered appliable to products being offered, as normally being submitted as an industry standard. Any product submitted without proper ASTM references will be rejected for use.

B. GENERAL

1. For each manhole provide field assessment to determine proper SYSTEMS of rehabilitation for use. Prior to cementitious restoration complete structural repairs and adjust manhole to grade in accordance with all regulations, laws and jurisdictional requirements. All work to be completed in accordance with the Fairfax County Public Facility Manual (PFM) and referenced documents therein.
2. When Owner directed, the Contractor shall provide a cementitious restoration material designed for structural build-back, I&I abatement, corrosion resistance, and repairing inverts to design requirements. All materials applied to a structure shall be compatible, as specified by the manufacturer.

C. MANHOLE REPAIR MATERIALS

1. Infiltration Control – Cementitious Material
    a. All fast setting materials furnished shall be designed specifically for leak control, to be applied in dry powder form, with no prior mixing of water, directly to active leaks under hydrostatic pressure in manholes or related structures, in accordance with the manufacturer’s recommendations.
2. Infiltration Control - Oakum Water Plugs
    a. Rapid setting, oil free oakum and hydrophilic grout to seal active water leaks prior to applying other SYSTEM’s
    b. Oil-free oakum meeting Federal Specification HH-P-117
    c. Two-part urethane resin.

3. Invert Repair and Patching

   a. All material furnished, by the Contractor, shall be designed to fill large voids in manhole walls and to repair or reconstruct inverts where no hydrostatic pressure exists. Material shall consist of rapid setting cements, mono-crystalline quartz aggregates, and various accelerating agents. Material shall not contain chlorides or metallic particles and shall be applied in accordance with the manufacturer's recommendations.

   b. Repair and Patching Materials shall have its bond strength tested to substrate failure according to ASTM C952 and be compatible with all other material components applied to the manhole.

4. Manhole Adjustment to Grade- Brick, grade rings, motor, rain pot, frame and cover.

   a. New frame and cover will be provided by the Owner if replaced, allow 30 days for delivery and pickup at County properties as directed at no additional cost to the Owner.

   b. Follow requirements for Invert Repair and Patching

   c. All materials furnished to comply with ASTM standards and PFM

5. Grouting mix:

   a. For stopping severe infiltration, the Contractor shall provide a polymer solution that reacts freely with water to form a strong film, gel, or foam of polyurethane. See specification section 2.2 Grouts.

6. Cementitious Coating Restoration Materials for manhole walls, channels, corbels, chimneys and benches. The Contractor shall install cementitious restoration materials that shall be specifically designed for the rehabilitation of manholes and other related wastewater structures. Liner materials shall be cement based, poly-fiber reinforced, shrinkage compensated, and enhanced with chemical admixtures and siliceous aggregates. Liner materials shall be mixed with water per manufacturer's written specifications and applied using equipment specifically designed for, troweling, low-pressure spray or centrifugal spin casting application. All cementitious liners shall be troweled to densify and smooth out the surfaces.

2.4 POLYMER SYSTEMS (EPOXY, POLYURETHANE, POLYUREA COATINGS)

A. REFERENCES

1. ASTM D543 - Resistance of Plastics to Chemical Reagents.
2. ASTM D638 - Tensile Properties of Plastics.
3. ASTM D695 - Compressive Properties of Rigid Plastics.
4. ASTM D790 - Flexural Properties of Unreinforced and Reinforced Plastics.
5. ASTM D2240 - Standard Test Method for Rubber Property—Durometer Hardness
6. ASTM D4060 - Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abrader

7. ASTM D4414 - Standard Practice for Measurement of Wet Film Thickness of Organic Coatings by Notched Gages
8. ASTM D7234 - Pull-off Strength of Coatings Using a Portable Adhesion Tester.
9. SSPC SP-13/NACE No. 6 – Surface Preparation of Concrete
10. NACE SP0188 - For performing holiday detection
11. CIGMAT - Evaluation of Liner System for Wastewater Concrete and Clay Brick Facilities
12. ASTM G210 - Severe Wastewater Analysis Test

B. GENERAL

1. For each manhole provide field assessment to determine proper SYSTEM of rehabilitation for use. Prior to restoration complete other repairs as needed in accordance with all regulations, laws and jurisdictional requirements. All work to be completed in accordance with the Fairfax County Public Facility Manual (PFM) and referenced documents therein.
2. All materials applied to a structure shall be compatible, as specified by the manufacturer.

C. EXISTING SUBSTRATE PREPARATION

1. Standard Portland cement or new concrete (not quick setting high strength cement) must cure a minimum of 28 days prior to application of the coating product(s).
2. Remove existing coatings prior to application of the SYSTEM which may affect the performance and adhesion of the SYSTEM.
3. Thoroughly clean, removing all laitance and prepare existing products to effect a mechanical bond with the SYSTEM.
4. Manufacturer shall recommend specific methods for surface preparation.

D. REPAIR AND RESURFACING PRODUCTS

1. Repair products shall be used to fill voids, bug holes, and/or smooth transitions between components prior to the installation of the SYSTEM. Repair materials must be properly cured and must be compatible with the SYSTEM and shall be used and applied in accordance with the manufacturer’s recommended requirements.
2. Resurfacing products shall be used to fill large voids, lost mortar in masonry structures, smooth deteriorated surfaces and to rebuild severely deteriorated structures.
3. The following products may be accepted and approved as compatible repair and resurfacing products for use within the specifications:
    a. 100% solids, solvent-free polymer grout specifically formulated for epoxy polymer top coating compatibility.
    b. Factory blended, rapid setting, high early strength, fiber reinforced, non-shrink repair mortar that can be troweled or pneumatically spray applied maybe approved if specifically formulated to be suitable for polymer top coating with the specified

polymer product. The length of resurfacing material cure required before polymer top-coating, shall be as recommended by the manufacturer.

c. All repair and resurfacing materials should be properly cured and prepared for surface top-coat application.

E. SYSTEM APPLICATION

1. Polymer System manufacturer shall provide System application procedures and requirements.

2. Manufacturer recommended and approved application equipment.

3. Hard to reach areas, primer application and touch-up may be performed using hand tools.

2.5 MANHOLE STRUCTURAL REPAIR ONLY

A. All other manhole repair and rehabilitation products shall meet appropriate ASTM requirements and industry standards as approved by the Owner.

1. Submit all product material technical specifications, installation procedures and manufactures recommendations on warranty and measures for correcting defective work for approval by the Owner. Payment for all manhole work shall be at the rates listed in Attachment C - Cost Proposal and in accordance with Section 01025, Measurement and Payment. All other costs are considered as incidental and should be included in the unit rates given in Attachment C - Cost Proposal.

PART 3 EXECUTION

3.1 GENERAL

A. Maintain all flow in the manhole throughout duration of project.

B. Schedule, plan and report work following Section 02640, Technical Provisions for Inspection and Rehabilitation.

1. Submit a weekly schedule for proposed work and work completed the prior week.

2. Provide public and County/Owner notification in advance of the work.

C. Contractor Experience

1. Submit to Owner current documentation, from the SYSTEM product manufacturer, certifying that the Contractor's training, the Contractor's personnel and equipment comply completely with their product Quality Assurance requirements.

2. For a manhole coating or lining product to be considered for this project, a minimum of 1000 vertical feet of documented manhole rehabilitation must have been completed by the Contractor in the previous three (3) year period.

3. For all SYSTEM products, to be considered for this project, a minimum of a three (3) year successful installation history must be documented.

4. In all cases a minimum of five (5) recent verifiable references of the Contractor's work is required, indicating the successful application of the SYSTEM products of the same material type as specified herein or to be furnished by the Contractor and applied in a similar project environment as included in these contract specifications.

D. MANHOLE PREPARATION

1. Bypass Pump sewage, in the manhole, as required following Section 02960, Temporary Bypass Pumping Systems.
2. Clean interior surfaces of manhole of debris, dirt, oil, grease, remains of old coating materials, and any other extraneous materials following Section 02650, Sanitary Sewer Line Cleaning.
3. Pressure wash manhole walls to remove loose mortar, concrete and debris. Pressure washing levels, used for cleaning, shall be as recommended by the manufacturer.
4. Repair irregularities in manhole using materials, compatible with proposed resurfacing material, as recommended by the manufacturer.
5. Repair leakage in manhole using materials, compatible with proposed resurfacing material, specified in these contract specifications.
6. Trim and grout incoming laterals and pipes as required and/or specified.
7. Remove debris from manhole and incoming sewer connections.
    a. Handle cleaning water to prevent water and residue from causing damage.
    b. Do not discharge debris downstream through the sanitary sewer system.
    c. Filter solids-laden water through a de-silting device.
    d. Properly dispose of debris and residue from cleaning and other construction operations in a manner satisfactory to Owner and authority having jurisdiction over area where work site is located.

3.2 CHEMICAL GROUT

A. GENERAL

1. Grouting should only be performed on a structurally sound manhole unless the grout is used to prevent water from entering the manhole during application of a lining or coating system. All structural repairs, adjustments to the frame and cover and installation of grade rings, brick or other materials shall be completed prior to beginning the grouting operation. Normal grouting operations shall be performed at the temperatures as recommended by the manufacturer.

B. CHEMICAL GROUTING APPLICATION

1. Grouting applications may include sealing a manhole from infiltration/Inflow prior to application of a coating or lining or other structural rehabilitation component or using the grout for sealing the entire manhole structure. If the entire manhole is to be sealed,

grouting shall include corbel, wall, pipe seals, bench and invert as recommended by the manufacturer of the grouting material.

C. DRILLING AND GROUT INJECTION

1. Drilling grout injection holes in the manhole in strategic locations to re-direct flow coming through cracks and other defects in the wall, or to seal the entire exterior surface of the manhole, shall be in accordance with the recommendations of the grout manufacturer.

2. Grout shall be injected through the drilled holes using the recommended probe and applying pressures that will effectively inject the grout but, not cause damage to the manhole structure or the surrounding area.

3. Grout typically, shall be injected through the lowest holes first, working the grout higher until the manhole is externally sealed with grout. Additional holes may be required to verify that the grout has encompassed the entire outside of the manhole.

4. The injection holes shall be cleaned and patched as recommended by the manufacturer.

D. TESTING AND ACCEPTANCE

1. Visual inspection – all leakage into the manhole must be eliminated.

2. All ASTM testing and standards meet product requirements.

3. All Manhole inspections shall be NASSCO level I MACP compliant. Perform inspection before (Pre) and after work (Final) is completed following Section 02956, Television Inspection. Final inspection to meet contract requirements for acceptance.

3.3 CEMENTITIOUS RESTORATION

A. GENERAL

1. Before starting any patch, work or liner application install a perforated device, catch bucket, or other straining device to prevent construction debris from entering down-stream pipes.

2. Provide all materials, labor, equipment, etc. required to perform the work as recommended by the manufacturer and as required by the contract documents.

3. Inspect each manhole to determine methods of stopping leaks and applying patch repairs.

4. Promptly inform Owner of errors or discrepancies between the contract documents and the field conditions found. When possible, the Contractor will provide video inspections and/or photos to the Owner for review with a recommendation on how to proceed with the work. The Owner may direct the Contractor to not attempt installation. The Owner may also elect to resolve issues preventing the work from proceeding and reissue the work to Contractor at a later date for completion. The Owner may also elect to replace or otherwise perform the work themselves without any involvement or payment to the Contractor.

   All costs to provide videos/photos, recommendations and other associated costs are incidental to this contract. The Contractor will not be compensated for work that is not

completed, including making the determination the work cannot be installed due to the existing condition of the pipe or manhole. Payment will only be made for the work completed in accordance with the unit rates listed in Attachment C - Cost Proposal.

5. Install all products in accordance with manufacturer's instructions regarding surface preparation, product application and curing.

6. Confirm that all material to be used, for the rehabilitation of the manhole are compatible with each other. Do not use any materials that have not been verified for compatibility.

B. SEALING ACTIVE LEAKS

1. The work consists of hand applying a dry quick-setting cementitious mix designed to instantly stop running water or seepage in all types of concrete and masonry structures. The applicator shall apply material in accordance with manufacturer's recommendations in accordance with the following minimum specifications.

   a. The area to be repaired must be clean and free of all debris per the guidelines set forth elsewhere in these specifications.

   b. Once cleaned, prepare crack or hole by chipping out loose material to a minimum depth recommended.

   c. As recommended by the manufacturer, place a generous amount of the dry quick-setting cementitious material to the active leak, with a smooth fast motion, maintaining external pressure for 30 seconds, repeat until leak is stopped.

   d. Proper application should not require any special mixing of product or special curing requirements after application.

   e. Use of Oil-free Oakum Water Plugs.

      (1) Saturate oakum with resin following approved submittals.
      (2) Use additives as required.
      (3) Place and cure following manufacturer's recommendations.

C. INVERT REPAIR

1. The work consists of hand mixing and applying a rapid setting, high early strength, non-shrink patching material to fill all large voids and repair manhole channels prior to spray lining of the manhole. For invert repairs, flow must be temporarily restricted by inflatable or mechanical plugs prior to cleaning.

   a. The area to be repaired must be cleaned and free of all debris.

   b. Mix water shall be clean potable water and require no additives or admixtures for use with cementitious patching materials.

   c. Cementitious material shall be mixed in a mortar tub or 5-gallon pail with water per manufacturer's specifications. Material should be mixed in small quantities, to avoid setting prior to placement in voids or channels.

   d. Once mixed to proper consistency, the materials shall be applied to the invert or void areas by hand or trowel. In invert applications, care should be taken to not apply excessive material in the channel, which could restrict flow. Once applied, materials should be smoothed either by hand or trowel in order to facilitate flow.

   e. Flows in channels shall be re-established when material has cured enough to withstand the flow as determined by the manufacturer.

SECTION 02957 – SEWER MANHOLE REHABILITATION

D. APPLICATION OF CEMENTITIOUS MANHOLE LINER

1. The work consists of troweling, spray applying and/or centrifugally spin-casting a cementitious based liner to the inside of the existing manhole. The necessary equipment and application methods to apply the cementitious based liner materials shall be only as recommended and approved by the material manufacturer.

2. Material shall be mixed with water in accordance with manufacturer's specifications. Once mixed to proper consistency, the materials shall be pumped via a rotor-stator style progressive cavity pump through a material plaster hose for delivery to the appropriate and / or selected application device. The equipment shall be as recommended by the manufacturer, matched for the material being applied.

3. If a chimney seal is required in conjunction with the lining technology, the Contractor should contact the chimney seal manufacturer to determine the proper preparation required for effectively installing the chimney seal after the coating has been applied and cured.

E. SPRAY APPLICATION OF THE CEMENTITIOUS MATERIAL.

1. All material shall be applied and finished, by the Contractor, using equipment specified by the manufacturer.

   a. Material hose shall be coupled to a low-velocity spray application nozzle. Pumping of the material shall commence and the mortar shall be atomized by the introduction of air at the nozzle, creating a low-velocity spray pattern for material application.
   b. Spraying shall be performed by starting at the manhole invert and progressing up the wall to the corbel and chimney areas.
   c. Material shall be applied to a specified uniform minimum thickness as required by the manufacturer and as necessary for proper curing and application. Material shall be applied to the bench area in such a manner as to provide for proper drainage.
   d. Material shall be troweled smooth to compact material into voids. A brush or broom finish may be applied when a top coating is desired.

F. SPIN CASTING APPLICATION OF THE CEMENTITIOUS MATERIAL

1. All material shall be applied and finished by the Contractor using equipment specified by the manufacturer.

   a. Material hose shall be coupled to a high-speed rotating applicator device. The rotating casting applicator shall then be positioned within the center of the manhole at either the top of the manhole chimney or the lowest point elevation corresponding to the junction of the manhole bench and walls.
   b. The high-speed rotating applicator shall then be initialized and pumping of the material shall commence. As the mortar begins to be centrifugally cast evenly around the interior of the manhole, the rotating applicator head shall be raised and / or lowered at a controlled retrieval speed conducive to providing a uniform material thickness on the manhole walls.

c. Controlled multiple passes are then made until the specified minimum finished thickness is attained. If the procedure is interrupted for any reason, simply stop the retrieval of the applicator head until flows are recommenced.

d. Material thickness may be verified at any point with a depth gauge and shall be no less than a uniform ½-inch. If additional material is required at any level, the rotating applicator head shall be placed at that level and application shall recommence until that area is thickened.

e. Material shall be applied only when manhole is in a saturated surface dry (SSD) state, with no visible water dripping or running over the manhole walls.

f. The low-velocity spray nozzle and the centrifugal spin casting head may be used in conjunction to facilitate uniform application of the mortar material to irregularities in the contour of the manhole walls and bench areas.

g. Troweling of materials shall begin immediately following the spray application. Initial troweling shall be in an upward motion, to compress the material into voids and solidify manhole wall. A brush or broom finish may be applied if top coating is desired.

h. Curing will take place once the manhole cover has been replaced. It is important that the manhole cover is replaced no more than 10-20 minutes after troweling is complete to avoid moisture loss in the material due to sunlight and winds.

i. Material shall not be applied during freezing weather conditions. Material shall not be placed when the ambient temperature is 37 degrees Fahrenheit and falling or when the temperature is anticipated to fall below 32 degrees Fahrenheit for 24 hours.

G. TESTING AND ACCEPTANCE

1. Visual inspection – verify no infiltration, cracks, or loose material.

2. All ASTM testing and standards meet product requirements.

3. All Manhole inspections shall be NASSCO level I MACP compliant. Perform inspection before (Pre) and after work (Final) is completed following Section 02956, Television Inspection. Final inspection to meet contract requirements for acceptance.

3.4 POLYMER LINERS (EPOXY, POLYURETHANE, POLYUREA COATINGS)

A. GENERAL

1. Contractor shall comply with local, state and federal regulatory and other applicable agencies with regard to environment, health and safety during work.

2. Any active flows shall be dammed, plugged or diverted as required to ensure all liquids are maintained below or away from the surfaces to be coated.

3. Temperature of the surface to be coated should be maintained between 40 deg F and 120 deg F or as recommended manufacturer.

4. Specified surfaces should be shielded to avoid exposure of direct sunlight or other intense heat source. Where varying surface temperatures do exist, coating application shall be

scheduled when the temperature is falling and not rising or as recommended by the manufacturer.

5. Prior to commencing surface preparation, Contractor shall inspect all surfaces specified to receive the coating. Notify Owner, in writing, of any noticeable disparity in the site, structure or surfaces which may interfere with the work, use of materials or procedures as specified herein. When possible, the Contractor will provide video inspections and/or photos to document discovered interference and submit to the Owner for review with a recommendation on how to proceed with the work. The Owner may direct the Contractor to not attempt installation. The Owner may also elect to resolve issues preventing the work from proceeding and reissue the work to Contractor at a later date for completion. The Owner may also elect to replace or otherwise perform the work themselves without any involvement or payment to the Contractor.

   All costs to provide videos/photos, recommendations and other associated costs are incidental to this contract. The Contractor will not be compensated for work that is not completed, including making the determination the work cannot be installed due to the existing condition of the pipe or manhole. Payment will only be made for the work completed in accordance with the unit rates listed in Attachment C - Cost Proposal.

B. SURFACE PREPARATION

1. Oils, grease, incompatible existing coatings, waxes, form release, curing compounds, efflorescence, sealers, salts, or other contaminants which may affect the performance and adhesion of the coating to the substrate shall be entirely removed.

2. Concrete and/or mortar damaged by corrosion, chemical attack or other means of degradation shall be removed so that only sound substrate remains.

3. Choice of surface preparation method(s) should be based upon the condition of the structure and concrete or masonry surface, potential contaminants present, access to perform work, and required cleanliness and profile of the prepared surface to receive the specified polymer coating product, as recommended by the manufacturer.

4. Surface preparation methods or combination of methods that may be used include high pressure water cleaning, high pressure water jetting, abrasive blasting, shot blasting, grinding, scarifying, detergent water cleaning, hot water blasting and others as described in NACE No. 6/SSPC SP-13. Whichever method(s) are used, they shall be performed in a manner that provides a uniform, sound clean neutralized surface with sufficient profile to promote an acceptable bond with the specified polymer coating.

5. Infiltration shall be stopped by using a material which is compatible with the repair products and is suitable for top-coating with the epoxy coating product. The manufacturer shall verify the product compatibility, in writing, to the Owner.

6. Manhole Chimney Joint and Casting: The area between the manhole and the manhole ring and the manhole casting shall be a termination point of the specified epoxy coating product.

C. APPLICATION OF REPAIR AND RESURFACING PRODUCTS

1. Areas where reinforcing bars have been exposed shall be repaired in accordance with the manufacturer’s recommendations.

2. Areas where rebar has been exposed and is corroded shall be first prepared as required for the repair work. The exposed rebar shall then be abrasive blasted and coated with the polymer coating product specified as recommended by the manufacturer.

3. Repair products shall be used to fill voids, bug holes, and other surface defects which may affect the performance or adhesion of the epoxy coating product.

4. Resurfacing products shall be used to repair, smooth or rebuild surfaces with rough profiles to provide a concrete or masonry substrate suitable for the polymer coating product to be applied. These products shall be installed to minimum thickness as recommended within the manufacturer's published guidelines. Should structural rebuild be necessary, these products shall be installed to a thickness as specified in the contract documents. Structural rebuild should be specified in advance whenever feasible and paid for at a separate unit price in Attachment C – Cost Proposal.

   a. Repair and resurfacing products shall be handled, mixed, installed and cured in accordance with manufacturer recommendations.

   b. All repaired or resurfaced surfaces shall be inspected for cleanliness and suitability to receive the coating product(s). Additional surface preparation may be required prior to coating application.

   c. If a chimney seal is required in conjunction with the lining technology, the Contractor should contact the chimney seal manufacturer to determine the proper preparation required for effectively installing the chimney seal after the coating has been applied and cured.

D. APPLICATION OF POLYMER COATING PRODUCT

1. Application procedures shall conform to the recommendations of the epoxy coating product manufacturer, including environmental controls, product handling, mixing, application equipment and methods.

2. Spray equipment shall be specifically designed to accurately ratio, apply the polymer coating product, shall be in proper working order and shall be as recommended by the product manufacturer.

3. Contractors qualified in accordance with these specifications shall perform all aspects of polymer coating product installation.

4. Prepared surfaces shall be coated by spray application of the coating product(s) described herein to a minimum as recommended by the manufacturer to meet the requirements of these contract documents.

5. NOTE: Coating thickness recommendations are available through the polymer coating product manufacturer based upon project assessment. Contact the manufacturer of the polymer coating for project specific recommendations and provide to Owner.

6. Subsequent top coating or additional coats of the polymer coating product shall occur within the product's recoat time. Additional surface preparation procedures will be required if this recoat time is exceeded. The polymer manufacturer's re-coat time for the specific application, based on temperature and project conditions, shall be strictly followed by the applicator.

7. The polymer coating product shall mechanically bond with adjoining construction materials throughout the manhole structure to effectively seal and protect concrete or masonry substrates from infiltration and attack by corrosive elements. Procedures and materials necessary to effect this bond shall be as recommended by the polymer coating product manufacturer. No hollow spots will be accepted.

8. Contractor must submit manufacturers recommended method for terminating a coating or lining in a manhole.

9. If required sewage flow shall be stopped, bypassed or diverted for application of the polymer coating product to the invert and interface with pipe materials.

E. TESTING AND ACCEPTANCE

1. Visual Inspection - Installed liner system shall be completely free of pinholes and hollow spots/voids and other defects that will reduce the life expectancy of the applied system.

2. Film thickness Measurements – (either wet or dry) Liner thickness shall be the minimum value as specified by product manufacturer and Owner requirements.

3. Holiday Detection Test (Spark Testing), to identify pinholes, thin material and any defects that will affect the life of the installed system.

4. Adhesion Testing – To verify that the system has consistently mechanically bonded to the host structure.

5. Additional Tests to meet product manufacturer recommendations and/or ASTM requirements.

F. The manhole frame and cover shall be manufactured and installed to the dimensions shown on the contract documents.

1. All materials furnished to comply with ASTM standards and PFM.

G. Measurement shall be by each manhole frame and cover removed and replaced.

1. Materials for new frame and cover will be provided by the Owner if replaced, allow 30 days for delivery and pickup at County properties as directed at no additional cost to the Owner.

H. Payment shall be at the unit price in Attachment C - Cost Proposal.

1. Payment includes removal of existing frame and cover, replacing frame and cover, and disposal of old frame and cover as required.

3.5 REPLACE FRAME AND COVER

A. The manhole frame and cover shall be manufactured and installed to the dimensions shown on the contract documents.

1. All materials furnished to comply with ASTM standards and PFM.

B. Measurement shall be by each manhole frame and cover removed and replaced.

1. Materials for new frame and cover will be provided by the Owner if replaced, allow 30 days for delivery and pickup at County properties as directed at no additional cost to the Owner.

C. Payment shall be at the unit price in Attachment C - Cost Proposal.

1. Payment includes removal of existing frame and cover, replacing frame and cover, and disposal of old frame and cover as required.

2. If existing frame and cover is reused no payment will be made.

3.6 MANHOLE STEPS

A. Manhole steps shall be driven into pre-cast or drilled holes. Steps shall be installed no more than 16 inches apart vertically on the interior of the manhole wall at a point 4” below the base flange of the manhole casting.

1. All materials furnished to comply with ASTM standards and PFM.

B. Measurement shall be for each manhole step provided.

C. Payment shall be at the price in Attachment C - Cost Proposal.

1. Payment includes the removal and replacement of manhole steps per each in Attachment C - Cost Proposal.

3.7 QUALITY ASSURANCE AND TESTING

A. GENERAL

1. The Contractor shall test the installed SYSTEM’s as specified by these contract documents. 10% of the installed SYSTEM’s shall be tested using a testing procedure as further delineated below. If more than 5% of the tested SYSTEM’s fail the test than an additional 10% of the manholes are selected for further testing. This process continues until the SYSTEM’s tested meet the requirements of these contract documents, to the satisfaction of the Owner.

B. CHAIN OF CUSTODY

1. The Contractor shall furnish, from the project installation, all samples for product testing. The Contractor shall produce test samples from the work and transmit samples to a third-party testing laboratory recommended by the manufacturer and approved by the Owner. The Contractor will maintain the chain of custody of all samples that are transmitted and tested to verify SYSTEM compliance with these contract documents.

2. Prior to testing the Contractor shall submit to the Owner for approval, the name and location of the independent testing laboratory with a certified statement from the laboratory indicating they are independent from and not associated with the Contractor in any way.

SECTION 02957 – SEWER MANHOLE REHABILITATION

C. TEST REQUIREMENTS

1. Visual Inspection

   a. All manholes shall be visually inspected. Any leakage into the manhole in areas where SYSTEM's were installed by the Contractor shall be identified.

   b. The Contractor shall provide samples for testing the actual installed SYSTEM. Samples shall be provided, at a minimum from one location per every ten (10) SYSTEM's installed.

2. Cementitious Material Property Testing

   a. Where specified one 2 X 2 inch sample cube shall be taken for every 50 bags of material used. Samples shall be sprayed from nozzle, and sent, by the Contractor, to an independent test laboratory for compression strength testing as described in ASTM C-109.

3. Vacuum Testing

   a. Where specified if the entire manhole including invert and pipe penetrations is rehabilitated to as new condition then a Vacuum Test may be performed according ASTM F1244. If vacuum test fails then the contractor shall spray entire manhole with a soap solution and retest to determine where air is entering the manhole. Contractor shall determine if failure was due to improper rehabilitation or poor pipe condition or improperly seated plugs. If Contractor determines that the failure is due to improper rehabilitation, then the Contractor shall repair manhole according to manufacturer recommendations and retest until a successful vacuum test is achieved. If the Contractor and county jointly determine that the failure was due to poor condition of the pipes, or annular space between the pipe and its liner, or the inability to seat the plugs properly and that there are no visible defects in the applied product then the owner may deem the manhole rehabilitation as passed and acceptable.

4. Film Thickness Measurements

   a. Where applicable and specified during application a wet film thickness gauge, meeting ASTM D4414 - Standard Practice for Measurement of Wet Film Thickness of Organic Coatings by Notched Gages, shall be used. Measurements shall be taken, in the presents of the Owner's representative, documented and attested to by Contractor for submission to Owner.

5. Holiday Detection Test

   a. Where specified Holiday Detection shall be performed for all coating systems installed in corrosive environments.

   b. After the epoxy coating product have set in accordance with manufacturer instructions, all surfaces shall be inspected for holidays with high-voltage holiday detection equipment. Reference NACE RPO 188-99 for performing holiday detection.

   c. All detected holidays shall be marked and repaired by abrading the coating surface with grit disk paper or other hand tooling method. After abrading and cleaning, additional coating can be hand applied to the repair area.

d. All touch-up/repair procedures shall follow the coating manufacturer's recommendations.
e. Documentation on areas tested, results and repairs made shall be provided to the Owner, in writing, by Contractor.

6. Adhesion Testing

a. A minimum of 10% of the manholes coated shall be tested for adhesion/bond of the coating to the substrate. Testing shall be conducted in accordance with ASTM D4541, ASTM D7234, or NACE SP018. Owner's representative shall select the manholes to be tested.
b. A minimum of three (3) - 50 mm dollies shall be affixed to the coated surface at the cone area, mid-section and at the bottom of the structure or in areas suspect from non-destructive evaluation and testing. The adhesive used to attach the dollies to the coating shall be rapid setting with tensile strengths in excess of the coating product and permitted to cure in accordance with manufacturer recommendations. The coating and dollies shall be adequately prepared to receive the adhesive.
c. Failure of the dolly adhesive shall be deemed a non-test and require retesting. Prior to performing the pull test, the coating shall be scored to the substrate by mechanical means without disturbing the dolly or bond within the test area.
d. Two of the three adhesion pulls shall exceed 300 psi or concrete failure with more than 50% of the subsurface adhered to the coating.
e. Should a structure fail to achieve two successful pulls as described above, additional testing shall be performed at the discretion of the Owner. Any areas detected to have inadequate bond strength shall be evaluated by the Owner.
f. Further bond tests may be performed in that area to determine the extent of potentially deficient bonded area and repairs shall be made by Contractor.

7. All testing shall meet all ASTM testing and standards. Conduct testing in accordance with the contract specifications and the submitted PWS.

3.8 MANHOLE STRUCTURAL REPAIR ONLY-EXECUTION

A. All other manhole repair and rehabilitation products to be installed in accordance with the manufacture's recommendations meeting applicable ASTM, industry standards and the requirements of this contract. All products to be approved by the Owner in advance of the work.

3.9 SANITARY SEWER SPILLS/BACKUP

A. The Contractor shall be responsible for spills, overflows and backups resulting from the work in connection with this contract. See specified requirements in sections:

1. 02640, Technical Provisions for Inspection and Rehabilitation
2. 02650, Sanitary Sewer Line Cleaning
3. 02651, Sanitary Sewer Overflow Response

SECTION 02957 – SEWER MANHOLE REHABILITATION

PART 4

4.1 Requirements as set forth in Section 01025, Measurement and Payment and stated herein

A. When submitting a request for draft and final payment submit the following:

1. Information required per Special Provisions, Section 18-Reports and Invoicing.
2. Documentation of grout materials used and installation mechanisms as stated herein.
3. Provide Pre and Post CCTV reports with each Invoice and with video inspection NASSCO compliant and compatible with WinCan.
4. Provide quality assurance reports per recommendations of Manufacture or supplier of grouting products.
5. Clearly label and date each, report, pre and post CCTV to identify the correct location it represents.

B. Payment will be in accordance with the Contract Documents at the unit rate provided in Attachment C - Cost Proposal and any written modifications issued by the County Purchasing Agent.

END OF SECTION

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SECTION 02959 – SEWER SEALING BY CHEMICAL GROUT

PART 1 GENERAL

1.1 SCOPE OF WORK

A. The Owner will designate and assign work to the Contractor for sewer requiring rehabilitation. In general terms it is expected that grouting rehabilitation should relate to rehabilitation work as follows:

1. CIPP- Rehabilitate using CIPP for pipe or manhole.
2. Chemical Grout- Rehabilitate pipeline or manhole using only grout to seal leaks.
3. Chemical Grout- Seal leaks prior to CIPP installation in pipelines.
4. Chemical Grout- Seal leaks at service connections (Laterals) resulting from CIPP
5. Chemical Grout- Seal leaks in connection with internal point repairs.
6. Chemical Grout- Seal leaks in connection with manhole rehabilitation.
7. Chemical Grout- Seal leaks as directed by Owner

B. Contractor shall provide all labor, materials, tools, equipment and incidentals as shown, specified, and required for testing sewer pipe joints by applying a positive air pressure to the joints, monitoring and recording the pressure in the void. The intent of joint & connection testing is to identify those sewer joints, lateral connections and laterals that are not watertight and that can be successfully sealed by packer injection grouting. This document can be utilized for the following applications:

1. Test all joints in a mainline segment
2. Test all service lateral connections from the sewer main at the tap interface between the main line sewer and sewer lateral.
3. Test all lateral connections where they connect to the manhole.
4. Test all other defects the Contractor deems acceptable for testing.

C. Provide all labor, materials, tools, equipment, and incidentals as shown, specified, and required to grout pipeline joints, service lateral connection at manhole walls, manholes, lateral connections to the mains and other defects the Contractor deems acceptable for use of the packer injection method.

1. Packer injection grouting is used to reduce the infiltration within the pipeline, seal annular space between liners and host pipes at lateral connections, seal pipe joints that have failed the joint test criteria, provide external pipe support, but not a structural rehabilitation, by stabilizing soils outside the pipe and prevent further loss of pipe bedding into the pipe.
2. Packer injection grouting shall be accomplished by pressure injection of chemical grout into the soils encompassing the exterior of pipe joint. Chemical grouts shall be designed to be injected into the soil surrounding the pipe, which stabilizes the soil and forms a permanent impermeable seal called a grout/soil ring, and into the annular space between liners and host pipes. Adequate volumes of grout must be injected to form an effective seal. Adequate amounts of grout are based generally upon pipe size and field conditions.

SECTION 02959 – SEWER SEALING BY CHEMICAL GROUT

This application will be through structurally sound joints and lateral connections through penetrations from within the pipe by using the packer method in tandem with a closed-circuit television (CCTV) inspection system.

D. Related Work Specified in Other Sections Include, but is not limited to, the following:

1. Section 01025, Measurement and Payment
2. Section 01300 Submittals
3. Section 02640, Technical Provisions for Inspection and Rehabilitation
4. Section 02650, Sanitary Sewer Line Cleaning
5. Section 02651, Sanitary Sewer Overflow Response
6. Section 02954, Sewer Main Rehabilitation by Lining
7. Section 02956, Television Inspection
8. Section 02960, Temporary Bypass Pumping Systems

1.2 REQUIREMENTS

A. Contract requires work in active or bypassed sewers. Contractor shall follow all federal, state and local requirements for safety in confined spaces and uniform traffic controls.

B. Additional safety considerations including safely handling, mixing, and transporting of chemical grouts should be provided by the grout manufacturer/supplier, and should include safe operating practices and procedures, appropriate personal protective equipment (PPE) for the various grouting operations, and proper storage, transportation, mixing, and disposal of grouts, additives, and their associated containers.

C. Provide public notice to residences and businesses when the performing work. Submit a work schedule and schedule of completed work each week. Provide traffic control and follow all safety regulations. Maintain a neat, clean orderly site. Adhere to scheduled working hours, protect property and persons. Restore and leave each project site in a condition equal to or better than its original condition. See Section 02640, Technical Provisions for Inspection and Rehabilitation, and the contract documents for additional information.

1.3 QUALITY ASSURANCE

A. Require completion of grout handling, mixing and application training certification from the grout manufacturer/supplier for personnel working with chemical grouts and additives.

B. Commercially Proven Products:

1. Minimum 12,000 mainline joints and 1,000 lateral-mainline interfaces successfully grouted and documented in the United States.

C. The Owner may inspect and test grout at factory, before delivery to site, while in storage, or prior to use.

D. Internally CCTV inspect host pipe prior to grouting, during grouting and post grouting.

SECTION 02959 – SEWER SEALING BY CHEMICAL GROUT

1.4 SUBMITTALS

A. The Contractor shall provide a minimum 48-hour advance written notice of proposed testing schedules and testing procedures for review and concurrence of the Owner.

B. Equipment operating procedures and systems.

C. Catalog data showing manufacturer's clarifications and updates, ASTM references, material composition, specifications, and physical and chemical properties of grout.

D. Calculations of expected volumes of annular space between packer and pipe wall, to be used in calculating required gel times.

E. Manufacturer's recommended procedures for handling, storing, mixing and injecting grout.

F. Method of Construction.

G. Access manholes and site locations.

H. Work dimensions.

I. Size of working area.

J. Impacted portions of existing sewer.

K. Site access points.

L. Bypass pumping plan: Following Section 02960, Temporary Bypass Pumping Systems.

M. Chemical Grout information:

1. Description of chemical grout materials to be used.
2. Description of proposed additives to be used.
3. Manufacturers recommended procedures for storing, mixing, testing and handling of chemical grouts.
4. MSDS sheets for all materials to be used.

N. Identify the manufactures & models of the packers to be utilized on the project.

O. Upon completion of each pipe segment, submit to the Owner a report showing the following data for each joint and/or lateral connection tested, grouted or attempted to be grouted as required by PACP.

1. Identification of the sewer pipe section tested by assigned sewer ID (if available) and length.
2. Type of pipe material, diameter & depth of pipe to the surface at manholes.
3. Length of pipe sections between joints.
4. Test pressure used and duration of test.
5. Pass/fail results for each joint/connection tested.
6. Location stationing of each joint/connection tested, and location of any joints/connections not tested with an explanation for not testing.
7. Volume of grout material used on each joint or connection.

8. Gel set time used (cup test results from tanks)
9. Grout mix record of the batches mixed including amount of grout and catalyst, additives, temperature of the grout solution in tanks.
10. Operator conducting testing and sealing shall be noted on the reports.
11. Video recordings
    a. Video recording shall include testing and sealing operations for each joint/lateral (including inflation and deflation over the joint/lateral) displaying the final air test of joints or laterals.
    b. Additional final recording, if specified, shall include inspection of the pipe or lateral after all grouting work is complete.

1.5 REFERENCE STANDARDS TO BE USED

A. National Association of Sewer Service Companies (NASSCO) prepared Pipeline/Lateral Assessment and Certification Program (PACP/LACP/MACP), TV inspection form and sewer condition codes

B. ASTM F2304 Standard Practice for Rehabilitation of Sewers using Chemical Grouting (latest revision)

C. ASTM F2454 Standard Practice for Sealing Lateral Connections and lines from the Mainline Sewer Systems by Lateral Packer Method, Using Chemical Grouting (latest revision)

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect, store, and handle grout or other material during transportation and delivery, while stored on-site, and during installation following manufacturer's recommendations.

B. Grout Material found defective or damaged due to manufacture or shipment:

1. Remove from Contract site and replace, following Owner's direction, at no cost to the Owner.

PART 2 PRODUCTS

2.1 TESTING EQUIPMENT & GROUTING EQUIPMENT

A. The basic equipment used for mainline pipe joints and for laterals connected to the mainline shall consist of a remotely operated color television camera capable of pan and tilt, joint testing device (referred to hereafter as a packer), and test monitoring equipment. The equipment shall be constructed in such a way as to provide means for introducing air under pressure into the void area created by the expanded ends of the packer against the host pipe and a means for continuously measuring, viewing and recording the actual static pressure of the test medium and grout within the void area only. The packer shall be of a size less than the diameter of the host pipe, with the cables at either end used to pull it through the line and may be constructed in such a manner as to allow a restricted amount of sewage to flow at all times. Packer shall be

expanded by air pressure. Packers shall be of low void space construction with void volume given by the packer manufacturer.

B. The device for testing lateral connections shall consist of inflatable mainline end elements and a lateral grouting plug that creates a void area extending beyond the main connection. Whenever possible, use a lateral grouting plug sized to match the diameter of the lateral being grouted with an effective sealing length of at least 4 feet. Where the lateral is capped, utilize alternate lateral grouting plug or equipment sized appropriately for the capped lateral. In cases were the lateral transitions from 6” to 4” in diameter, use a 4” lateral grouting plug. However, it is possible that due to physical restrictions the lateral plug may not launch and thus the service may not be able to be grouted.

C. Void pressure data shall be transmitted from the void area to the monitoring equipment or video picture of a pressure gauge mounted on the packer and connected to the void area. All test monitoring equipment shall be above ground in a location suitable for simultaneous and continuous observation of the televising monitor and test monitoring equipment.

D. Grouting equipment shall consist of the packer, appropriate pumping and hosing systems capable of supplying an uninterrupted flow of sealing materials to completely fill the voids. Grout pumping system shall be sized to deliver a mixed volume of grout at a minimum of 3 gpm and 30 gallons of uninterrupted flow within 10 minutes.

E. Volume of mixed grout pumped must be capable of being measured and recorded for each grouted joint/connection. Generally, the equipment shall be capable of performing the specified operations in sewers where flows do not exceed 25 percent of pipe diameter unless permitted by the Owner.

F. Connection and lateral service sealing shall be accomplished using the lateral grouting plugs and push packers specified above. Provide back-up bladders for each packer on-site at all times during grouting procedures.

G. Equipment for cleaning lateral blockages shall be readily available while any lateral grouting work is being performed.

2.2 GROUTS – GENERAL

A. All grout materials must have the following characteristics:

1. While being injected, the grout must be able to react /perform in the presence of water (groundwater).
2. The ability to increase grout mix viscosity, density and gel strength by increased concentration of constituents or the use of approved additives.
3. The cured grout must withstand submergence in water without degradation.
4. The resultant grout formation must be homogeneous and prevent the passage of water (infiltration) through the pipe joint.
5. The grout must not be biodegradable.
6. The cured grout should be chemically stable and resistant to organics found in sewage.

7. Residual grout shall be easily removable from the sewer line to prevent blockage of the sewage flow.

B. Handle, mix, and store grout in accordance with the manufacturer's recommendations. The materials shall be delivered to the site in unopened original manufacturer's containers.

2.3 CHEMICAL GROUTS

A. Water based chemical grouts shall have the following characteristics:

1. A minimum of 10% acrylamide base material by weight in the total grout mix. A higher concentration of acrylamide base material is recommended to increase strength or offset dilution during injection.
2. The ability to tolerate some dilution and react in moving water during injection.
3. A viscosity of approximately 2 centipoises, which can be increased with approved additives.
4. A controllable reaction time from 10 seconds to 1 hour.
5. A reaction (curing) that produces a homogenous, chemically stable, non-biodegradable, firm, flexible gel.
6. The ability to increase mix viscosity, density and gel strength by increased concentrations of the mix constituents or by the use of approved additives.
7. Approved Manufacturers:
    a. Avanti AV-100
    b. Avanti AV-118
    c. or equal.

B. Acrylate base grout shall have the following characteristics:

1. A minimum of 10% acrylate base material by weight in the total grout mix.
2. The ability to tolerate some dilution and react in moving water during injection.
3. A viscosity of approximately 1-3 centipoise, which can be increased with approved additives.
4. A controllable reaction time from 10 seconds to 1 hour.
5. A reaction (curing) that produces a homogenous, chemically stable, non-biodegradable, firm, flexible gel.
6. The ability to increase mix viscosity, density and gel strength by the use of approved additives.
7. Approved Manufacturers:
    a. DeNeef AC-400
    b. DeNeef Gelacryl SR
    c. Avanti AV-160
    d. or equal.

SECTION 02959 – SEWER SEALING BY CHEMICAL GROUT

2.4 ADDITIVES

A. At the Contractor's discretion and according to field conditions, additives may be selected and used within the manufacturers recommended quantities.

B. Strengthening Agents

1. For joint grouting, a latex or "diatomaceous earth" additive may be added to increase compressive and tensile strength. The quantity of strengthening agent additive shall be as recommended by the manufacturer and approved by the Owner. Product Manufacturer:

a. Avanti AV-257 Icoset
b. DeNeef Reinforcing Agent
c. or equal.

C. Dye - A manufacturer approved water soluble dye without trace metals may be added to the grout tank(s) for visual confirmation.

D. Gel Time Modifier - A gel time extending agent may be used in accordance with the manufacturer's recommendations to extend gel time as necessary.

E. Freeze/Thaw - In those lines where the grouting material may be exposed to a freeze-thaw cycle, ethylene glycol or other Owner approved additive shall be used to prevent chemical grout cracking once set.

F. When using non soluble additives the grout tanks must have mechanical mixing devices to keep the additives in suspension and maintain a uniform solution of grout and additive.

PART 3 EXECUTION

3.1 CONTROL TESTS

A. Packer Tests - Demonstrate the acceptable performance of air test.

1. To ensure the accuracy, integrity and performance capabilities of the testing equipment, a demonstration test will be performed in an above-ground 8" nominal diameter test cylinder suitable to contain the full length of the packer and sustain the void test pressure. The test cylinder shall be equipped with a void release valve to exercise a controlled release of pressurized air from the void area to test the packer under both sound and leaking conditions. The test cylinder shall also be equipped with a local pressure gauge (0-25 psi) within the void space.

a. With the void release valve sealed, inflate the packer and air test void at 7-10 psi. The observed void pressure at the test cylinder pressure gauge must be within ±1.0 psi of the reading in the control center/studio void pressure gauge and follow both up and down pressure changes (allowing time for pressure equalization).
b. If above test is passed, crack the release valve to simulate a very small leak. The cylinder shall be equipped with a void release valve to exercise a controlled release of the test media with the associated pressure drop to be equally displayed ±1.0 psi of the cylinder gauge and test monitoring equipment.

2. After entering each pipeline segment with the test equipment, but prior to the commencement of joint testing, position the packer on a section of sound sewer pipe between pipe joints, and perform a test as specified. The equipment shall hold a 7-10 psi test pressure for a period of 15 seconds with a pressure drop of less than 1 psi. In the event of a failed test, repair any defective equipment and re-test to verify proper operation of all equipment at no additional compensation. Should it be found that the surface or porosity conditions of the barrel of the sewer pipe cannot meet the joint test requirements, then the performance testing shall be waived or modified as determined by the Owner.

3. If air testing cannot be performed successfully, repair or otherwise modify air test equipment and repeat the tests. This test may be required at any other time during the performance of joint testing work if the Owner suspects the testing equipment is not functioning properly.

B. Pump Tests - At the beginning of the contract, prior to application of grout, perform a pump test to determine if proper ratios are being pumped from the grout component tanks at the proper rates and to measure pump rates. Use separate containers to capture the discharges from each of the grout component hoses, to simulate the actual volumes of each component through the interconnect hoses, hose reel and length of grout hose and confirm accuracy of grout pump totalizer. Take corrective action if ratios or rates are not within manufacturer's recommended standards.

C. Grout Tests - Perform and record a grout gel test in the presence of the Owner by recording the grout tank solution temperature, catalyst tank solution temperature, ambient air temperature in truck, and gel time of the sample whenever the following conditions occur:

1. At the beginning of each day, the material in the hoses shall be recycled to the tanks and a sample shall be taken.

2. When new batches of grout are mixed.

3. Whenever the temperature in the tanks or ambient temperature have changed by more than +/- 10°F from the previous gel test.

3.2 PIPE PREPARATION

A. Prior to the application of the chemical grouting materials, the Contractor shall thoroughly clean the sewer designated to receive the chemical grouting following Section 02650, Sanitary Sewer Line Cleaning. Cleaning shall constitute removal of all loose debris & solids which inhibit proper seating of the packer. If protruding taps are present, they shall be trimmed and paid for at the price contained in Attachment C - Cost Proposal.

B. Line Obstructions and defects - It shall be the responsibility of the Contractor to clear the line of obstructions that will interfere with the installation and long-term performance of the grout. If pre-installation inspection reveals an obstruction, misalignment, broken or collapsed section, dropped joints or other defects that were not identified as part of the original scope of work and will prohibit grouting (test and seal), the Contractor will provide video inspections to the Owner for review and recommendation. The Owner may direct the Contractor to not attempt grouting. The Contractor will not be compensated for work that is not completed, including making the determination that grouting cannot be installed due to the existing condition of the pipe or

manhole. The Owner may elect to resolve issues preventing the installation of grout and reissue the work to Contractor at a later date for completion. The Owner may also elect to replace or otherwise repair the pipe without follow-up grouting.

3.3 ROOTS AND LOOSE DEBRIS IN LATERAL CONNECTIONS

A. Remove all roots and loose debris from laterals connected to manholes where laterals connect to the manhole wall in preparation for testing and grout sealing.

B. During mainline sewer cleaning or joint testing, document all lateral connections containing roots, mineral deposits or obstructive conditions that are either (a) greater than fine roots or (b) of a nature to prevent testing and sealing of connection. For each such connection, submit a screen shot image clearly showing the extent of roots or obstructive condition to the Owner. Submit images in electronic format, labeled and organized in a manner to easily retrieve the image for the lateral connection in question. The list of lateral connections with roots shall include upstream and downstream manhole numbers and stationing.

The Owner will review the list of lateral connections containing roots and obstructions. Then direct the Contractor as to which laterals are:

1. To be cleaned and grouted.
2. To be grouted without cleaning – in which case such lateral connection would be excluded from warranty testing.
3. Removed from the scope of work – in which case no payment for such lateral will be made.
4. Costs for Cleaning lateral connections will be included in the unit rates within the Attachment C - Cost Proposal.

3.4 GROUT PREPARATION

A. Follow the manufacturer's recommendations for the mixing and safety procedures.

B. Adjust gel time as necessary to compensate for changes in temperature in grout component tanks or hoses. The addition of dilution water to extend gel times is not acceptable unless resulting base grout tank only material exceeds 20% by weight for solution grouts.

C. During the grouting process, the Grouting Technician shall monitor the grout component tanks to make sure that proper ratios are being pumped. If unequal levels are noted in the tanks, repeat the pump test as described above and correct any defective equipment.

D. Gel times shall be calculated using the following formula unless Contractor experience and/or field conditions dictate otherwise. Any alterations of the gel time formula shall be recommended by the manufacturer and approved by the Owner.

$$Gel\ Time = \left(\frac{Volume\ of\ Pipe / Packer\ Void\ Space\ (gal)}{Pumping\ Rate\ (gpm)} \right) \left(\frac{60\,\text{sec}}{1\,\text{min}} \right) + 20\,\text{sec}(+/-5\,\text{sec})$$

E. Packer/Pipe void shall be defined as the volume between the inflated packer and the inside pipe wall when the packer is inflated per manufacturer recommendations. For example: an 8" pipe with a packer void space of 0.3 gallons and a 3 gpm pumping rate would provide.

$$Gel\ Time = \left(\frac{.3(gal)}{3(gpm)}\right)\left(\frac{60\text{sec}}{1\text{min}}\right) + (20\text{sec}) = 26\text{sec}(+/-5\text{sec})$$

3.5 TESTING AND GROUTING DEFECTS

A. Testing and grouting will not be required on pipe exhibiting the following conditions or characteristics:

1. Longitudinally cracked, fractured or broken pipe.
2. Sections of the pipe with structural defects between joints.
3. Any section of pipe or joints that are in such poor structural condition that in the judgment of Contractor, significant structural damage of the pipe would occur as a result of the pressure test.

B. When testing and sealing leaks the Contractor shall exercise judgement to not impose loads or pressures that would damage the existing sewer.

C. Grout all circumferential cracks and fractures or other defects as needed for leak control and as needed to perform work under this contract. Do not test or grout any other pipe defects that will result in damage to the existing sewer. Promptly repair any sewer damage resulting from the Contractor's operations at no additional compensation.

3.6 LATERAL CONNECTION TESTING PROCEDURE

A. Lateral connection joint testing pressure shall be equal to 0.5 psi per vertical foot of pipe depth plus 2 psi; however, test pressure shall not exceed 10 psi without approval of the Owner.

B. Air testing lateral connections shall be accomplished by isolating the area to be tested with the lateral connection packer and by applying positive pressure into the isolated void area. A pan and tilt camera shall be used to position the lateral packer for laterals directly connected to the mainline sewer. The lateral bladder shall be inverted from the mainline assembly into the lateral pipe and inflated. The mainline elements shall then be inflated to isolate the lateral connection and the portion of the lateral to be tested. A sensing unit shall monitor the pressure of the packer void and will accurately transmit a continuous readout of the void pressure to the control panel at the grouting truck or to a pressure gauge on the packer recorded by the CCTV camera.

C. The test procedure will consist of applying a controlled air pressure into each isolated void area. Air shall then be slowly introduced into the void area until a pressure equal to or greater than the required test pressure, but in no cases greater than 2 psi above the required test pressure, is observed on the pressure monitoring equipment. Once the designated pressure in the isolated void is displayed on the meter of the control panel, the application of air pressure will be stopped, and a 15 second waiting period will commence. The void pressure will be observed during this period. If the void pressure drop is greater than 2.0 psi within 15 seconds, the lateral shall be considered to have failed the air test and shall be grouted and retested.

D. After completing the air test for each individual lateral specified herein, deflate the lateral packer, with the void pressure meter continuing to display void pressure. If the void pressure does not drop to 0.0 +/- 0.5 psi, the equipment shall be adjusted to provide a zero void pressure reading at the monitor.

3.7 GROUTING GENERAL

A. Grout all joint, lateral connections and defects that failed the pressure test by the injection method. This shall be accomplished by forcing grout through a system of pumps and hoses into and through the joints of the sewer from the packer within the sewer pipe. Remove excess grout from pipe and laterals. Excess grout shall be defined as a thickness of grout that given its location, size and geometry, could cause a blockage or impede sewer flows. Flush or push forward to the next downstream manhole, remove from the sewer system, and properly dispose of excess grout.

3.8 PIPE JOINT SEALING BY PACKER INJECTION OR GROUTING FOR MAINLINE SEWERS

A. Position the mainline packer over the joint or defect to be sealed by means of a CCTV camera in the line. Position the push/pull packer over the joint or defect to be sealed by a means of visual observation, marked push rod, or where a cleanout is available, through a CCTV camera in the lateral. For push packers, start work at the most distant point to be grouted. Take an accurate measurement of the location of the defect to be sealed using a portion of the packer as a point of reference for positioning the injection area of packer over the defect. Pneumatically expand the packer sleeves such that they seal against the inside periphery of the pipe to form a void area at the joint now completely isolated from the remainder of the pipeline.

B. Pump grout materials, in stages if needed, into this isolated area to refusal until and the void or surrounding soil has been filled or solidified with the goal of applying 0.25 to 0.5 gallons of grout per inch-diameter per pipe joint. Refusal is when the packer void pressure during grout pumping instantaneously rises or “spikes” by 4 to 5 psi or more above the normal void pressure experienced during grout pumping operation. Refusal may also be revealed when pumping void pressure exceeds the holding pressure of the packer end elements as evidenced by “blow-by” past the packer sealing end elements. Refusal shall mean, when the joint will not accept any more grout because it has flowed throughout the void, through any joint failure and into the surrounding soil; gelled or filled the available void space; and formed a cohesive seal stopping further grout flow, then the joint will have then been sealed. Record the amount of grout pumped on the sealing log. If sealing is not achieved refer to para.3.9.D.

C. Upon completion of the injection, deflate the packer to break away from the ring of gel formed by the packer void. The packer should then be re-inflated and the joint retested at a pressure equal to the initial test pressure. If the joint fails this air test, repeat the grouting procedure at no additional cost to the Owner, except for the additional grout used. Repeat this sequence of air testing, grouting and subsequent air testing until either the joint is sealed, or it is determined that the grout consumption is too high (see section 3.9.D). The final determination to stop subsequent attempts to seal a joint will be made jointly between the Owner and the Contractor. Should the void pressure meter not read zero ±0.5 psi, clean the equipment of residual grout or make the necessary equipment repairs/adjustments to produce accurate void pressure readings.

D. If mainline joints require more than 0.5 gallon of grout per inch-diameter per pipe joint, modify grouting procedure to perform stage grouting by pumping additional grout in up to 4 gallon increments, waiting 1 gel set cycle time or 1 full minute, whichever is greater between stages. Maximum number of stages shall not exceed two stages of 4 gallons each unless approved by the Owner.

3.9 LATERAL CONNECTION SEALING FROM THE MAINLINE BY PACKER INJECTION GROUTING

A. Lateral connection sealing begins if the lateral connection does not pass the air test, shows evidence of leakage, has been successfully cleaned to remove roots, or where Contractor has been directed. The lateral packer shall remain in position during the pressure test, thus maintaining the isolated void. Pressure inject grout through the lateral packer into the annular space between the lateral grouting plug and the lateral pipe.

B. When pumping grout, operate the pumps until the mixed grout has flowed through any joint failure, through any annular space, and into the surrounding soil; gelled or filled the available void space; formed a cohesive seal stopping further grout flow; and minimum of 8 psi back pressure is achieved while pumping. As grout pumping continues the void pressure will slowly rise to a range of about 2 to 4 psi, continue pumping until a point where there is a sudden increase in the void pressure. This increase from 2 to 4 psi to over 8 to 10 psi takes place in a matter of a few seconds. If the grout pumped exceeds 1 gallon per foot of lateral bladder plus 3 gallons, it will be suspected that there are significant voids on the outside of the pipe or that the packer is not properly sealed. Check that the packer is sealed properly. If it is, modify grouting procedure to stage grouting by pumping additional grout equivalent to1 gallon plus 0.25 gallon per foot of lateral bladder, waiting 1 full minute, and retesting. The maximum number of stages shall not exceed two stages unless authorized by the Owner.

C. Upon completion of the lateral connection sealing procedure, deflate the lateral bladder, re-inflate and air test the lateral connection a second time to confirm the sealing of the connection in accordance with the air testing procedure. If the lateral connection fails this air test, repeat the grouting procedure at no additional cost to the Owner, except for the additional grout used. Air tests after grouting laterals containing roots is not required.

D. Confirm lateral flows after sealing each lateral connection. If a grout blockage exists, the Contractor shall immediately clear the lateral at no additional cost to the Owner.

E. After grouting lateral connections (with the appropriate size lateral bladder), a thin residual grout film may be present inside the lateral wall. The amount of residual grout film present is dependent on the lateral bladder used, geometry of the lateral and positioning of the packer. This thin layer of cured grout is normal and will eventually peel off the sidewall of the pipe. The residual chemical grout film is not “sandwiched” between two structures and will eventually peel off the sidewall of the pipe. This residual chemical grout film is not considered excess grout. The Contractor shall remove residual grout and such removal will not be paid for. The costs for removal of residual grout shall be included in the unit prices for Grout, contained within Attachment C - Cost Proposal.

SECTION 02959 – SEWER SEALING BY CHEMICAL GROUT

3.10 JOINT SEALING VERIFICATION

A. Record grouting of joints in conjunction with the testing of joints. Record the void pressure drop continuously on video and in writing immediately before sealing, and immediately after grouting. After the packer is deflated and moved, record on video the visual inspection of the joint.

B. Use of standardized test and seal data sheets and PACP data codes is required.

3.11 DISPOSAL

A. Collect and properly dispose of cleaning materials used in the cleaning of the grouting equipment.

3.12 POST-CONSTRUCTION INSPECTION

A. After grouting is complete, perform post-cleaning video inspections of the pipelines. Only PACP certified personnel trained in locating breaks, obstacles and service connections by closed circuit television shall perform the inspection. The Contractor shall provide the Owner with a copy of the post-cleaning video and inspection log in digital format when submitting draft invoices for payment and for later reference by the Owner.

3.13 QUALITY CONTROL

A. Conduct warranty CCTV inspection of mainline sewers at no additional cost, on all of the pipe sections which contain joint, lateral or defect grouting. This work shall be completed during conditions of high ground water and shall commence a minimum of 11 months after installation and be completed a maximum of 18 months after installation. Any joints, lateral connections or defects which were originally sealed and are observed to be leaking shall be re-sealed at no cost to the Owner.

B. All warranty inspections in the last year of this contract must be completed and accepted or repaired within 6 months of the expiration date of the contract.

PART 4

4.1 Requirements as set forth in Section 01025, Measurement and Payment and stated herein

A. When submitting a request for draft and final payment submit the following:

1. Information required per Special Provisions, Section 18-Reports and Invoicing.
2. Documentation of grout materials used and installation mechanisms as stated herein.
3. Provide Pre and Post CCTV reports with each Invoice and with video inspection NASSCO compliant and compatible with WinCan.
4. Provide quality assurance reports per recommendations of Manufacture or supplier of grouting products.
5. Clearly label and date each, report, pre and post CCTV to identify the correct location it represents.

B. Payment will be in accordance with the Contract Documents at the unit rate provided in Attachment C - Cost Proposal and any written modifications issued by the County Purchasing Agent.

END OF SECTION

SECTION 02960 – TEMPORARY BYPASS PUMPING SYSTEMS

PART 1 GENERAL

1.1 DESCRIPTION

A. This section includes requirements for implementing a temporary pumping system for the purpose of diverting existing sewage flow around work area for duration of the project when necessary to complete the sewer repairs and rehabilitation.

B. The design, installation, and operation of the temporary pumping system shall be the Contractor's responsibility. The Contractor shall employ the services of a vendor or staff member who can demonstrate to the Owner that he specializes in the design and operation of temporary bypass pumping systems.

C. Scope: The Contractor shall furnish, construct, maintain and operate bulkheads, plugs, hoses, piping, and pumps to bypass sewage flow while maintenance or construction operations are in progress. The flow shall be diverted by pumping around the construction location to a downstream manhole. Bypass pumping shall prevent backup or overflow onto streets, yards and unpaved areas or into buildings, adjacent ditches, storm sewers, and waterways, without diverting sewage outside of the sewer system. The Contractor shall provide adequate redundancy for the bypass system as specified here within.

D. No overflow, overland flow, or discharge from a sanitary sewer will be permitted. Pipe will not be allowed to be submerged in bodies of water or streams in part or in whole.

E. The Contractor shall provide three (3) levels of bypass capability as follows:

1. 2 MDG and less- This level of bypass is where the average daily flow is 2 MGD or less for use when bypassing sewer pipes with diameters of 15 inches and less. The Contractor may use higher capacity bypass systems for his convenience at his expense. Bypass pumping at this level is incidental to the contract. Include the all costs for maintaining sewage flows up to and including 2.0 MGD within the unit rates of Attachment C - Cost Proposal. Submit Contractor's typical bypass plan to the Owner for bypass systems of 2.0 MGD and less.

2. Above 2.0-5.0 MGD- This level of bypass is where the average daily flow is expected to be above 2.0 to 5.0 MGD for bypassing sewer with pipe diameters of 15 inches and greater. Approval by the Owner for the use of this bypass system will on a case by case basis. The Contractor shall provide flow meter data or other documentation acceptable to the Owner when requesting the use of this bypass system. Costs for this bypass system will be provided as a daily rate in a separate pay item within Attachment C - Cost Proposal.

3. Above 5.0-10.0 MGD- This level of bypass is where the average daily flow is expected to be above 5.0 to 10.0 MGD for bypassing sewer with pipe diameters of 15 inches and greater. Approval by the Owner for the use of this bypass system will on a case by case basis. The Contractor shall provide flow meter data or other documentation acceptable to the Owner when requesting the use of this bypass system. Costs for this bypass system will be provided as a daily rate in a separate pay item within Attachment C - Cost Proposal.

SECTION 02960 – TEMPORARY BYPASS PUMPING SYSTEMS

F. Compensation for Temporary Bypass Systems costs will be as follows:

1. Bypass systems greater than 2 MGD for sewer lines 15 inch thru 18 inch – Payment will be made when approved by the Owner in advance of the work. Payment to be made under Items for Bypass Pumping above 2.0 – 5.0 MGD or above 5.0 MGD – 10 MGD.

2. Bypass systems for sewer pipe diameters less than 15 inches – Costs are incidental to the contract and are considered as being included within the unit rates within Attachment C - Cost Proposal. No separate payment or compensation will be made for bypassing used on sewer lines with pipe diameters less than 15 inches.

3. Traffic controls shall be paid for as outlined in Section 02640, Technical Provisions for Inspection and Rehabilitation and Section 01025, Measurement and Payment.

4. For Bypass systems greater than 2 MGD

   a. The Contractor shall conduct operations to preserve all improvements at the site in a safe manor. Any damage done by the Contractor outside the established limits of the work will be repaired at the Contractor's expense.

   b. Restoration costs for backfill materials and pavement restoration resulting from the installation of bypass piping below the existing roadway may be paid for under those items contained within Attachment C - Cost Proposal. Pay limits shall be in accordance with VDOT Specifications and Owner requirements. Any roadway damage resulting from Contractor's negligence and failure to properly protect roadway will not be paid for.

   c. Manholes that have been dismantled to accommodate bypass piping will be restored to their previous condition. Costs to restore the manholes will be at the unit rates provided in Attachment C - Cost Proposal.

   d. Temporary 6-foot-high fencing when used shall be at the unit rate in Attachment C - Cost Proposal.

   e. Prior to the start of work the Contractor shall submit to the Owner proposed costs for sediment controls and site restoration expected to result from bypass installation. Include costs for silt fence, construction entrances, various sediment control devices, and restoration of curb and gutter, sidewalks, seed, sod, plantings, signage and street markings with supported documentation acceptable to the Owner. Items already listed in Attachment C - Cost Proposal shall not be included.

      Rental rates for bypass road ramps for conveyance of flows over paved surfaces such as driveways, will be considered for payment when the Owner agrees their use is required. No other separate part of the bypass system will be considered for payment outside of the items listed and within Attachment C - Cost Proposal.

      Upon agreement by the Owner, the Contractor may be compensated for these additional items under Specialized Mobilization Item 1. No other compensation will be considered.

G. The by-passing pump system must continuously run 24 hours per day, 7 days per week for the duration of the required bypass operation. The system will not intermittently run based on flow or level sensors.

SECTION 02960 – TEMPORARY BYPASS PUMPING SYSTEMS

H. Related Work Specified in Other Sections Include, but is not limited to, the following:

1. Section 01025, Measurement and Payment
2. Section 01300, Submittals
3. Section 02640, Technical Provisions for Inspection and Rehabilitation
4. Section 02650, Sanitary Sewer Line Cleaning
5. Section 02651, Sanitary Sewer Overflow Response
6. Section 02954, Sewer Main Rehabilitation by Lining
7. Section 02955, Cured In Place or Alternative Pipe Point Repair
8. Section 02956, Television Inspection
9. Section 02957, Sewer Manhole Rehabilitation
10. Section 02959, Sewer Sealing by Chemical Grout

1.2 QUALITY ASSURANCE

A. The bypass system shall meet the requirements of all codes and regulatory agencies having jurisdiction and as specified herein. The Contractor shall be responsible for damage due to sewer backup or overflow onto streets, yards and unpaved areas or into buildings, adjacent ditches, storm sewers, and waterways. Violations from sewage spills shall be the sole responsibility of the Contractor.

B. Perform leakage and pressure tests on discharge piping using clean water, before operation. Discharge piping system previously used to discharge sewer shall be flushed prior to test and discharged into the existing sewer and shall not impeded normal function of the sewer system. Notify the Owner 48 hours prior to testing with clean water free from sewage.

C. Maintain and inspect temporary pumping system every two hours. A responsible operator shall be on site when pumps are operating.

D. Keep and maintain spare parts for pumps and piping on site, as required for sustained operation.

E. Maintain fuel supply, adequate hoisting equipment and accessories on site for each pump.

F. Protect bypass system from vandalism, pedestrians, roadway traffic and weather conditions that may impact performance.

1.3 SUBMITTALS

A. Provide three (3) bypass pumping plan submittals for bypass systems that are 2 MDG and less, above 2.0-5.0 MGD and above 5.0-10.0 MGD. Submit per Section 01300, Submittals and in accordance with the following:

1. The Contractor shall submit a detailed bypass pumping plan (BPP) for approval by the Owner a minimum of 30 days prior to startup of the bypass system. Work shall not commence until the plan has been approved by the Owner. The Owners acceptance does not constitute validation of the design or function of the bypass system for the Contractor

or his subcontractors. The Contractor is solely responsible for providing the bypass system design, setup, maintenance, safety and function. The acceptance of the bypassing system in advance by the Owner shall in no way relieve the Contractor of his responsibility and/or public liability. The Contractor shall submit a written description and drawings showing the methods and equipment to be used for a sewage bypass pumping system at each pump station or manhole. The BPP shall include the following at a minimum:

a. Indicate number, size, material, location and method of installation of suction and discharge piping
b. Size of pipeline or conveyance system to be bypassed, site access point, and expected flow.
c. Staging areas for pumps, piping and related items.
d. Size and location of manhole or access points for suction and discharge hose or piping. Provide detailed explanation of any structural adjustments to the manholes to accommodate piping and methods utilized to restore the manholes to the pre-existing condition.
e. Road crossing details, including any road cuts, temporary paving, and hose ramp details.
f. Sections showing suction and discharge pipe depth, embedment, select fill and special backfill, if buried.
g. No parking, detour, and traffic management plan relative to bypass system locations.
h. Temporary pipe supports and anchoring required.
i. Thrust and restraint block sizes and locations.
j. Sewer plugging method, location and type of plugs.
k. Bypass pump sizes, capacity, number of each size to be on site and power requirements.
l. The bypass system shall undergo maintenance as necessary for full operation. For all maintenance, provide a checklist of maintenance schedules and activities. This checklist will include items to be checked/replaced, the duration of the event, and the interval at which the event shall occur. The checklist shall include the following at a minimum:
    (1) Float systems and switches
    (2) Valves and fittings
    (3) Voltage tests
    (4) Impeller clearance
    (5) Seals, gaskets, and O-rings
    (6) Pump performance, rated versus observed
    (7) Fluid levels
    (8) Temperature
m. Backup pump, power and piping equipment.

n. Calculations of static lift, friction losses, and flow velocity. Pump curves showing pump operating range.

(1) High level in suction manhole shall not cause backup into any service lateral connection.

(2) Calculation shall show the available net positive suction head (NPSH) is greater than the required NPSH

(3) Flow velocity shall be maintained between 2.5 feet per second (fps) and 8 fps.

o. Design plans and computation for access to bypass pumping locations indicated on drawings.

p. Calculations for selection of bypass pumping pipe size.

q. Method of noise control for each pump and/or generator.

r. Method to comply with the Noise Ordinance, Chapter 108.1 of the Code of the County of Fairfax, including any documentation for Noise Variance requests which have been approved.

s. Method of protecting discharge manholes or structures from erosion and damage.

t. Method of repair used to rebuild manhole structures which have been dismantled for the purpose of installing bypass suction or discharge piping.

u. Schedule for installation and maintenance of bypass pumping lines.

v. Procedures to monitor upstream mains for backup impacts.

w. Procedures for setup and breakdown of pumping operations, including flushing and disinfecting prior to shutdown and dismantling.

x. Plan to monitor weather and schedule work to ensure the submitted system is sufficient to protect against backups or flooding during the actual performance of work in the field

y. Emergency plan detailing procedures to be followed in event of pump failures, sewer overflows, service backups, and sewage spillage.

(1) Maintain copy of emergency plan on site for duration of project and on site.

z. Configuration of an alarm detection and notification system including bypass components to be monitored, alarm settings, and groups with associated project team members established for reporting purposes.

aa. Sample of customer notification of bypass pumping and sewer service disruption.

bb. The bypass plan shop drawing shall be signed and sealed by a licensed professional engineer in the Commonwealth of Virginia. The shop drawings shall be affixed with the following certification statement:

(1) “By this submittal, we hereby represent that we have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and pertinent data including field conditions, and have checked and coordinated each item with all Contract requirements as it pertains to the sewer bypass system on this project. We certify the Pump and Bypass lines are of adequate capacity and size to handle flow without causing a sanitary sewer overflow. The bypass system will not adversely affect the service connections upstream of the sewer being cleaned and/or televised.”

SECTION 02960 – TEMPORARY BYPASS PUMPING SYSTEMS

1.4 SANITARY SEWER SPILLS, OVERFLOWS AND BACKUPS

A. The Contractor shall be responsible for spills, overflows and backups resulting from the work in connection with this contract. See specified requirements in sections:

1. 02640, Technical Provisions for Inspection and Rehabilitation
2. 02650, Sanitary Sewer Line Cleaning
3. 02651, Sanitary Sewer Overflow Response.

1.5 DELIVERY AND STORAGE

A. Transport, deliver, handle, and store pipe, fittings, pumps, ancillary equipment and materials to prevent damage and following manufacturer's recommendations.

1. Inspect all material and equipment for proper operation before initiating work.

B. Material found to be defective or damaged due to manufacturer or shipment.

1. When the Owner deems repairable: Repair as recommended by manufacturer.
2. When the Owner deems not repairable: Replace as directed by the Owner before initiating work.
3. Repair or replacement of defective or damaged material and equipment will be at no cost to Commission.

PART 2 PRODUCTS

2.1 MATERIALS FOR 2.0 MGD AND LESS BYPASS SYSTEM

A. Provide materials that meet or exceed the requirements of the approved bypass pumping plan and these contract documents.

2.2 MATERIALS FOR ABOVE 2.0-5.0 MGD AND ABOVE 5.0-10.0 MGD BYPASS SYSTEMS

A. Discharge and Suction Pipes: Approved by the Owner.

1. Discharge piping:
   a. Determined according to flow calculations and system operating calculations.
   b. Shall be HDPE or approved equal.
2. Suction piping:
   a. Determined according to pump size, flow calculations, and manhole depth following manufacturer's specifications and recommendations.
   b. Shall be HDPE or approved equal.

SECTION 02960 – TEMPORARY BYPASS PUMPING SYSTEMS

B. High-Density Polyethylene (HDPE).

1. All polyethylene (HDPE) pipes shall meet the requirements of ASTM F714. Dimension Ratio (DR) rating of the pipe shall be sufficient to withstand the pressure and leakage test outlined below.
2. HDPE Pipe shall be furnished in standard laying lengths not exceeding 50 feet.
3. Homogenous throughout, free of visible cracks, discoloration, pitting, varying wall thickness, holes, foreign material, blisters, or other deleterious faults.
    a. Defective areas of pipe: Cut out and joint fused as stated herein.
4. Assembled and joined at site using couplings, flanges or butt-fusion method to provide leak proof joint. Follow manufacturer's instructions. Heat fused joints shall follow ASTM D 2657.
    a. Threaded or solvent joints and connections are not permitted.
5. Fusing: By personnel certified as fusion technicians by manufacturer of HDPE pipe and/or fusing equipment.
6. Butt-fused joint: True alignment and uniform roll-back beads resulting from use of proper temperature and pressure.
    a. Allow adequate cooling time before removal of pressure.
    b. Watertight and have tensile strength equal to that of pipe.
    c. Acceptance by Owner before insertion.
7. Design piping, joints, and accessories to withstand at least twice the maximum system pressure or 50 psi, whichever is greater.
8. When subject to traffic loading, protect system, using traffic ramps or covers.
    a. Install system and maintain H-20 loading requirements while in use or as directed by the Owner.
    b. Road crossings shall be designed to convey the design flow while maintaining clear traffic flow along the existing roadways.

C. Valves and Fittings: Determined according to flow calculations, pump sizes previously determined, and system operating pressures.

D. Air Release Valves: The blow-off side of the air release valve shall be routed back to the manhole where the suction lines come from.

E. Plugs: Selected and installed according to size of line to be plugged, pipe and manhole configurations, and based on specific site.

1. It is expected that all Plugs shall be new. “New” means never been used before on any previous application. (First time use.) Any request for permission to use Plugs which are not new on bypass of 2 MGD or less, and at the risk of the Contractor must be submitted to the Owner with supporting documentation that the plug will function without failure. Bypass systems over 2 MGD to have new plugs. Any plug which has failed will be removed the job site and replaced in kind or better.
2. Additional plugs: Available in the event a plug fails. Plugs will be inspected before use for defects which may lead to failure.

3. Each plug shall have air hose and pressure gauge mounted at the surface for easy monitoring of the air pressure in the plug.

F. For bypass systems over 2 MGD, aluminum "irrigation type" piping, low or medium PE pipe, PVC pipe, or flexible hoses shall not be permitted.

G. For bypass of 2 MGD and less submit piping to Owner for approval.

2.3 EQUIPMENT FOR 2.0 MGD AND LESS BYPASS SYSTEM

A. Provide materials that meet or exceed the requirements of the approved bypass pumping plan and these contract documents.

2.4 EQUIPMENT FOR ABOVE 2.0-5.0 MGD AND ABOVE 5.0-10.0 MGD BYPASS SYSTEMS

A. Pumps.

1. Provide pumps of the fully automatic, self-priming type, submersible hydraulic or submersible electric, in good working order. Pumps shall not require the use of foot-valves or vacuum pumps in the priming system. All pumps used must be constructed to allow dry running for extended periods of time to accommodate the cyclical nature of sewer flows.
2. Provide pumps with a working pressure gauge on the discharge.
3. Provide Stop/Start and electronic level based controls for each pump. Provide a cellular auto-dialer set to notify key personnel if pump speed increases past a set- point as defined by the Owner to maintain operating levels and flow in the sewers.
4. Provide level sensors able to accurately and dependably detect changes in water level in increments of 0.01 feet.
5. Provide pumps with an electronic level control system to start and stop additional pumps and to adjust pump speeds in response to water level changes.
6. Provide critically silenced pumps. Pumps defined as critically silenced shall include, but not be limited to, a critical grade silenced muffler, isolated engine vibration, acoustical sound deadening material in the enclosure, and silenced priming exhaust. Additional methods of silencing pump operation may be provided as necessary to achieve critical silence.
7. Provide stand-by pumps of adequate capacity, installed within the bypass system and isolated by valving. The pump shall be identical (make, model and manufacture) to the largest primary bypass pump.
8. Constructed to allow dry running for long periods of time to accommodate cyclical nature of effluent flows.
9. Critically silenced Dry Prime Pumps shall have sound attenuating enclosures which will limit noise to no more than 68dB at 30 feet away from the pump.
10. Pumps shall be able to be primed to 28 feet of suction lift from dry.
11. Re-priming shall be automatic.

2.5 MANUFACTURERS FOR 2.0 AND LESS BYPASS SYSTEM

A. Acceptable manufacturers shall be as submitted and approved, that meet or exceed the requirements of the approved bypass pumping plan and these contract documents.

SECTION 02960 – TEMPORARY BYPASS PUMPING SYSTEMS

2.6 MANUFACTURERS FOR ABOVE 2.0-5.0 MGD AND ABOVE 5.0-10.0 MGD BYPASS SYSTEMS

A. Acceptable manufacturers are listed below.

1. Xylem
2. Sunbelt Rentals
3. Rain for Rent
4. Or Approved Equal

PART 3 EXECUTION

3.1 MONITORING

A. The Contractor shall provide on-site person to manually oversee all bypass pumping operations 24 hours per day, 7 days per week when the bypass pumping system is in operation.

B. The 24-hour monitoring person shall be properly trained, experienced, and mechanically qualified such that they can quickly and effectively address any potential emergency and non-emergency situations associated with the pumps and bypass pumping system that must remain in operation for an extended period.

C. The Contractor shall provide an Emergency contact list to the County to include at least 3 contacts. The email and phone numbers will be provided for each contact person to ensure notification to the Contractor can be accomplished 24 hours a day 7 days a week. These contacts shall include officers of the company, field management and persons on site who can respond to resolve bypass pumping issues resulting from public complaints and other deficiencies in the work, see 02640, Part 1 General, paragraph 1.22 Emergency Response.

3.2 PROTECTION OF PUBLIC AND PRIVATE PROPERTY

Precautions shall be taken to ensure flow control and bypass pumping operations shall not cause flooding or damage to public or private properties. In the event flooding or damage occurs, Contractor shall make provisions to correct such damage at no additional cost to Owner or public. Contractor shall be solely responsible for reporting associated cleanup and repair, claims, damages to public or private property, overflows from the sewer system and violations resulting in fines as a result of the flow control or bypass pumping operation.

3.3 PREPARATION

A. Determining location of bypass pipelines.

1. The bypass piping shall be located above ground. Above-ground piping shall be located as approved by the Owner.
2. Buried piping, where required, shall have minimal disturbance to existing utilities.
   a. The Contractor shall field locate existing utilities in proposed bypass area prior to excavation
   b. Costs associated with relocation of utilities and obtaining approvals at no cost to the Owner.
3. Obtain approvals for placement within public or private property.
4. Obtain Owner’s approval of location.

B. The Contractor shall sequence the bypass operation to minimize its duration. All submittals shall be approved, and materials delivered related to the bypass prior to initiating the bypass operation.

3.4 FLOW CONTROL

A. Flows shall be plugged, trucked, or otherwise handled to prevent flows from interfering with the work to be performed on a given portion of the sanitary sewer system.

B. Flow control shall include the operation of public and private pump stations to control flows in the system as well as performing work during nighttime conditions to control flow in the system.

C. The Contractor shall contact the Owner and private pump station operators to coordinate with the operation of the pumping stations discharging to the gravity sewer as required to perform the work. The Contractor shall not operate municipal or private pumping stations.

3.5 PRECAUTIONS

A. When flow in a sewer line is plugged, blocked, or bypassed by the Contractor, the Contractor shall take precautions to protect the public health and to protect the sanitary sewer lines from damage resulting from sewer surcharging. Further, the Contractor shall take precautions to ensure sewer flow control operations do not cause flooding or damage to public or private property being served by the sewers involved and shall be responsible for any damage resulting from the flow control operations.

B. When flow in a sewer line is plugged or blocked by the Contractor, the Contractor shall monitor the conditions upstream of the plug and shall be prepared to immediately start bypass pumping, if needed. Any liquid or solid matter that is bypass pumped from the sewage collection system shall be discharged to another sewer manhole or appropriate watertight vehicle or container only. No such liquid or solid matter shall be allowed to be discharged, stored, or deposited on the ground, swale, road, stormwater drainage system, or open environment. The Contractor shall protect all pumps, conduit, and other equipment used for bypass from traffic.

C. Should any liquid or solid matter from the sewer collection system be spilled, discharged, leaked or otherwise deposited to the open environment as a result of the Contractor’s flow control operations, the Contractor shall immediately clean and disinfect the affected area, notify the Authority's operating personnel and appropriate regulatory agencies, and perform required cleanup operations at no additional cost to the Owner.

D. If a manhole contains mechanical or electrical hardware or equipment, do not proceed with work at the manhole and notify the Owner. Manholes Containing Mechanical or Electrical Equipment shall not be bypassed unless approved by the Owner.

E. Upon completion of bypass pumping operations, and after the receipt of written permission from Owner, remove piping, restore property to pre-construction condition and restore pavement.

END OF SECTION

SECTION 02972 – VACUUM EXCAVATION

PART 1 GENERAL

1.1 SUMMARY

A. The County recognizes that during the performance of work under this contract that certain customers will occasionally not be able to be without sewer service during sewer rehabilitation work impacting their property. These critical customers are large grocery stores, industrial businesses, residents with special needs and others. It is expected that the first effort by the Contractor to resolve service interruption issues should include contact with the property owner to discuss doing the work after hours or making other accommodations. Should it not be possible for the Contractor to address the service interruption issues with the customer, a vacuum cleanout may be installed as part of a sewer bypass system to keep the customer in service until the work can be completed. This will assist the Contractor in completing work, which otherwise would not be possible to complete without maintaining service.

B. When approved by the Owner, the Contractor shall furnish all labor, equipment, material and supplies and perform all operations necessary to perform work associated with lateral cleanout by vacuum excavation and provide means to bypass sewer from the vacuum excavated cleanout into the local sewer system. The work includes vacuum excavation, backfill, pipe, fittings, connection to services, testing bypass pumping to isolate sewer service from customer for the duration of the work, plugging the service tap at the mainline sewer pipe, bypassing flows from the customer's lateral into the sewer system during the work, plumbing permit and all incidentals required to isolate the sewer service flows from the customer. It is the intent of this specification to provide a cost-effective installation of a sewer lateral clean out without conventional excavation for use during bypass operations to maintain flows of the customers sewer lateral into the local sewer system.

C. Related Work Specified in other sections include, but is not limited to, the following:

1. Section 01025, Measurement and Payment
2. Section 02640, Technical Provisions for Inspection and Rehabilitation for Inspection
3. Section 02650, Sanitary Sewer Line Cleaning
4. Section 02651, Sanitary Sewer Overflow Response
5. Section 02954, Sewer Main Rehabilitation by Lining
6. Section 02959, Sewer Sealing by Chemical Grout
7. Section 02960, Temporary Bypass Pumping Systems

D. The Contractor will be held fully liable for any damages incurred that are caused by his or her negligence.

1.2 SUBMITTALS

A. Contractor shall submit submittals for work in accordance with Section 01300, Submittals and the Contract Documents as applicable.

SECTION 02972 – VACUUM EXCAVATION

PART 2 PRODUCTS

2.1 GENERAL

A. The molded PVC saddle product and vacuum excavation process consists of locating a sewer lateral pipe by the most effective means available to the installer. The most common method utilized and associated with vacuum excavation consists of inserting a video camera with an internal sonde into the lateral service line from the mainline pipe. Locating the lateral pipe is accomplished using a locating receiver. The located lateral pipe shall be marked by driving a steel pin in the soil when possible and marking the surface with marking paint and a marking flag.

B. Borehole approximately twenty-inches (20”) in diameter shall be created by vacuum excavation. A saddle is affixed to one end of a PVC riser pipe utilizing a solvent weld. A mastic adhesive/sealant is applied to the underside of the saddle. The pipe and saddle are inserted down into the hole with the saddle end first, to snap fit onto the exterior of the lateral pipe. The saddle is pressed down onto the lateral pipe whereby the saddle expands under the downward force until the bottom-most portion of the saddle has surrounded more than fifty percent (50%) of the pipe diameter.

C. Once the saddle has surrounded more than half of the pipe and passes the spring line of the pipe, the saddle retracts thus pulling downward until the saddle has snapped as it encompasses a majority of the pipe. Next, the annular space between the borehole and the riser pipe is filled with sand or pea-gravel to within six-inches (6") of the surface grade and an approved cleanout cap is installed. A hydrostatic water test is performed, and the crown of the lateral pipe is cut open. The surface is then restored to its original condition.

D. The installed sewer cleanout and bypass piping shall allow suction of sewer flows from the customers lateral to the bypass pumps and then discharge the collected sewer flow to the local sewer system.

2.2 MATERIAL

A. The material shall be a one-piece, molded PVC saddle and shall be compatible with the riser pipe. Solvent welding the riser pipe into the saddle boss. The saddle shall conform to the lateral pipe by a snap fit where the lateral pipe is either four (4”) or six (6”) in diameter. The riser pipe shall be installed in accordance with the most current version of the Virginia uniform statewide building code (USBC). The resin will be a one-part marine grade adhesive/sealant designed for the specific designed for the application of a VAC-A-TEE saddle, or approved equal, adhered to the lateral pipe by a chemical bond. The process shall be VAC-A-TEE® by LMK Enterprises, Inc. or approved equal.

SECTION 02972 – VACUUM EXCAVATION

PART 3 EXECUTION

3.1 GENERAL

A. The Owner may direct, at the request of the Contractor, the installation of a vacuum excavated cleanout. These cleanouts would be used in conjunction with a bypass system to keep critical customers in service during rehabilitation work where conventional bypass systems would prevent normal use of sewer service during the work by a business or resident within the County. The installation of a vacuum excavated cleanout will be directed as a last resort after all other options have been exhausted to keep said customer in service. The Owner and Contractor must exhaust all options before proceeding with the work. During the performance of work under this contract the Contractor will identify and report to the Owner any customer that must remain in service for his work to proceed. The Contractor will provide the Owner with the name of resident or business, address, phone number, and reasons they cannot be without service.

B. The Owner will contact the customer to confirm the continuous need for service. Generally, the Contractor's representative will be a part of this process to provide input on planning and services required including the availability of sub-contractors as needed. The Contractor will be required to provide all follow up notifications and coordination of the work with the customer and the Owner. The Contractor will assist in the acquisition of waivers, permissions, Right of Entry, and other written documents to allow the work to proceed as directed by the Owner. The final paperwork shall clearly specify the following:

1. Date the work will be done.
2. Duration of the work.
3. Permission to proceed with agreed conditions of the work.
4. Accommodations in place which allow the Owner to use the property without interruption while the work is underway.
5. Exact details of how the site will be restored including how the vacuum cleanout will be left in place or abandoned. This will include a joint inspection with the Owner, Contractor and customer upon completion of the work to sign off on a final acceptance.
6. A list of emergency contacts the customer may use if problems occur on site.

C. The installed vacuum cleanout will be utilized as an access point to pick up sewer flows from the customer who cannot be without service. Flows will be picked up at the vacuum excavated cleanout and then will be pumped, discharges into the local sewer system or tanker trucks.

D. The site shall be left clean and the property restored to conditions equal to site conditions prior to the installation.

E. In grass areas, the sod shall be neatly cut and removed. In pavement areas, the pavement shall be straight-line marked, cut and removed. Costs for site restoration will be paid under those items and contained within Attachment C - Cost Proposal.

F. The vacuum excavated borehole shall be approximately twenty inches (20") in diameter and all spoils shall be deposited in a vacuum truck.

G. A riser pipe of an appropriate length shall be solvent welded to the saddle.

SECTION 02972 – VACUUM EXCAVATION

H. The adhesive/sealant shall be applied to the underside of the saddle at no less than a ¼" thick layer.

I. The saddle and riser pipe shall be carefully inserted into the bore hole, setting the saddle onto the pipe, applying a downward force causing the saddle to expand and snap onto the lateral pipe.

J. Immediately after the saddle has been affixed to the lateral pipe, the riser pipe should be secured by backfilling the bore hole with sand or pea-gravel to within 6-inches of the original grade.

K. Deviations: Should soil conditions reveal running sand or similar conditions that would prohibit the installation, the installation shall be terminated, and the borehole filled with flowable grout. The surface area shall be restored to its original condition.

3.2 TESTING AND CUTTING

A. Prior to set-up of suction lines, bypass pumps and discharge lines, an exfiltration test shall be performed by filling the riser pipe with a 6-foot column of water. The test shall be performed no less than 12-hours from the time of affixing the saddle to the pipe. The column of water shall be held for five minutes. The water level shall be measured from the top of the riser pipe. Zero leakage is allowed.

B. A diamond core saw shall be introduced into the riser pipe, the crown of the pipe is cut, and the coupon is removed.

C. An approved cap or cover is installed at ground level or below ground level.

3.3 FINAL ACCEPTANCE

A. Upon completion, the installer will deliver a videotape of the completed work to the Owner. The Owners will review the documentation and the site to determine that the scope of work is complete, and the work is satisfactory. Work must be accepted by the Owner and the customer who accepted the installation of the vacuum cleanout prior to payment.

PART 4

4.1 Requirements as set forth in Section 01025, Measurement and Payment and stated herein

A. Payment will be in accordance with the Contract Documents at the unit rate provided in Attachment C - Cost Proposal and any written modifications issued by the County Purchasing Agent.

END OF SECTION