

# AUGUSTA COUNTY SERVICE AUTHORITY

18 Government Center Lane  
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## ITB #1752 Addendum #1 and Acknowledgement

Date: June 13, 2017  
To: Prospective Bidders  
From: Bryan Rieckmann, Augusta County Service Authority  
Re: **ITB #1752 - Mt. Sidney Sewer Collection System Trenchless Rehabilitation**

**Please acknowledge these changes and questions:**

### Questions:

- 1) Will all of the submittals be required with the bid?  
**Yes, all submittals will be required for the Bidders' specified rehab methods (i.e. if you are bidding CIPP you do not also have to provide the submittals required for Fold and Form and vice versa).**
- 2) Do Bidders have the right to enter private property?  
**Yes, all Bidders have the right to enter private property within the scope of this bid through ACSA easements. The Bidder shall give the Owner notice of his/ her intent to enter private property at least 24 hours before doing so.**
- 3) Will right of entry agreements be given to the ALB?  
**Yes.**
- 4) What is the water source? Is there a charge for water? Is a meter required?  
**See page 18, Section 3.1 (I).**
- 5) Can the requirement for continuous temperature monitoring on page 18 Section G be removed?  
**No, this requirement will remain.**
- 6) Is the low pressure air test going to be required?  
**Yes, the low pressure air test will be required to identify any pinhole leaks that could have occurred during installation but were missed with the CCTV inspection.**

### Changes

- 1) **See the following attachment for Fold and Form Specifications.**
- 2) **Schedule of Events: Bids are due by June 30, 2017 at 2:00PM EST.**

**\*\*\*Please print this page, sign and date it, acknowledging that you have received the changes to the specifications and include it with your submittal with your bid documents in order for your bid to be considered.\*\*\***

I acknowledge receipt of this Document and the Addendum Changes:

\_\_\_\_\_  
Bidder's Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Printed Name

**ATTACHMENT A**  
**FOLD AND FORM TECHNICAL SPECIFICATIONS**

**Part 1: General**

- A) These technical specifications include the minimum requirements for the rehabilitation of sanitary sewer pipelines by the installation of fold and form PVC liner within the existing, deteriorated pipe as shown on the maps included as part of this solicitation.
- B) The rehabilitation of pipelines shall be done by the installation of a continuous PVC pipe which, when installed, shall be continuous and tight-fitting throughout the entire length of the original pipe. The fold and form PVC liner shall extend the full length of the original pipe and provide a structurally sound, joint-less and water-tight new pipe within the original pipe. The Bidder is responsible for proper, accurate and complete installation of the fold and form PVC liner using the system selected by the Bidder.
- C) Neither the fold and form PVC liner system, nor its installation, shall cause adverse effects to any of the OWNER's processes or facilities. 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 Bidder 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 Bidder shall cleanup, restore existing surface conditions and structures, and repair any of the "fold and form" PVC liner system determined to be defective. The Bidder 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.

**Section 1.1: Description of Work and Product Delivery**

- A) These specifications cover all work necessary to furnish and install the fold and form PVC liner. The Bidder shall provide all materials, labor, equipment, and services necessary for traffic control, bypass pumping and/or diversion of sewage flows, cleaning and television inspection of sewers to be lined, liner installation, reconnection of service connections, all quality controls, provide samples for performance of required material tests, final television inspection, testing of lined pipe system and warranty work, all as specified herein.
- B) The product furnished shall be a complete fold and form PVC liner system including all materials, applicable equipment and installation procedures. The fold and form PVC system manufacturer may submit a minimum of 14 calendar days in advance of the bid date, required information to the OWNER to obtain pre-approval status. Those fold and form PVC systems that have been pre-approved will not be required to furnish information as required in the submittal section of these specifications unless specifically requested to do so by the OWNER or if any of the fold and form PVC system components have changed from those preapproved by the OWNER. All other fold and form PVC systems or multi-component products will be required to meet the submittal requirements as contained herein if they are not pre-approved.
- C) The fold and form PVC liner shall be continuous and joint-less 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.
- D) The fold and form PVC liner shall fit sufficiently tight within the existing pipe so as to not leak at the manholes, at the service connections or through the wall of the installed pipe. If leakage occurs through the wall of the pipe the liner shall be repaired or removed as recommended by the fold and form PVC manufacturer at no additional cost to the OWNER. Final approval of the liner installation will be based on a leak tight pipe as determined by the testing specified below.
- E) The fold and form PVC liner shall be designed for a life of 50 years or greater.
- F) The fold and form PVC liner shall be designed to resist all external loads independent of the host pipe as a fully structural standalone pipe-within-a-pipe. It shall be assumed in all cases that the host pipe has fully deteriorated. The installed fold and form PVC liner shall meet or exceed all specified physical properties, fitting tightly within the existing pipe all within the tolerances specified. The installed fold and form PVC liner shall withstand all applicable surcharge loads (soil overburden, live loads, etc.) and external hydrostatic (groundwater) pressure, if present, for each specific installation location.
- G) The installed fold and form PVC liner shall have a long term (50 year) corrosion resistance to the typical chemicals found in domestic, industrial, and commercial sewage.
- H) All existing and confirmed active service connections and any other service laterals to be reinstated as directed by the OWNER shall be re-opened robotically or by hand in the case of man-entry size piping, to their original shape and to 90% of their original capacity. All over-cut service connections will be properly repaired to meet the requirements of these specifications at no additional cost to the OWNER.
- I) Testing and warranty inspections shall be executed by the Bidder. Any defects found shall be repaired or replaced by the Bidder.
- J) The Bidder shall furnish all samples for product testing at the request of the OWNER. The Bidder shall deliver the samples to an approved laboratory and pay for all material and product testing performed under this contract.
- K) The Bidder shall restore any disturbed land and roadways to ACSA and V-DOT standards at no additional cost to the OWNER. No trash shall ever be stored at the site and the Bidder shall consult with OWNER about acceptable locations to store materials, equipment, and vehicles overnight and on weekends.

## **Section 1.2: 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) D-638 Standard Test Method for Tensile Properties of Plastics
  - 2) D-790 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
  - 3) D-792 Standard Test Methods for Density and Specific Gravity of Plastics by displacement
  - 4) D-1784 Specification for Rigid Poly Vinyl Chloride (PVC) Compounds and Chlorinated Poly Vinyl Chloride (CPVC) Compounds
  - 5) D-2122 Dimensions of Thermoplastic Pipe and Fittings
  - 6) D-2412 Test Method for Determination of External Loading Characteristics of Pipe by Parallel-Plate Loading
  - 7) D-2444 Standard Test Method for Determination of the Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight)
  - 8) D-2657 Standard Practice for Heat Fusion Joining of Polyolefin, Pipe and Fittings
  - 9) D-2990 Standard Test Methods for Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics
  - 10) D-3350 Standard Specification for Polyethylene Plastic Pipe and Fittings Materials
  - 11) F-1504 Standard Specification for Folded Poly (Vinyl Chloride) (PVC) Pipe for Existing Sewer and Conduit Rehabilitation
  - 12) F-1533 Standard Specification for Deformed Polyethylene (PE) FP
  - 13) F-1606 Standard Practice for Rehabilitation of Existing Sewers and Conduits with Deformed Polyethylene (PE) FP
  - 14) F-1867 Standard Practice for Installation of Folded/Formed Poly (Vinyl Chloride) (PVC) Pipe Type A for Existing Sewer and Conduit Rehabilitation
  - 15) F-1871 Standard Specification for Folded/Formed Poly (Vinyl Chloride) Pipe Type A for Existing Sewer and Conduit Rehabilitation
  - 16) F-1947 Standard Practice for Installation of Folded Poly (Vinyl Chloride) (PVC) Pipe into Existing Sewers and Conduits

## **Section 1.3: Performance Work Statement Submittal**

The Bidder shall submit, to the OWNER, a Performance Work Statement (PWS) along with his/her unit price bid, which clearly defines the fold and form PVC liner product delivery in conformance with the requirements of this solicitation. Unless otherwise directed by the OWNER, the PWS shall at a minimum contain the following:

- A) Clearly indicate that the fold and form PVC liner will conform to the project requirements as outlined in the Description of Work and as delineated in these specifications.
- B) A detailed installation schedule shall be prepared, submitted and conform to the requirements of this solicitation. The plan shall describe all preparation work, cleaning operations, pre-CCTV inspections, by-pass pumping, traffic control, installation procedure, method of curing, service reconnection, quality control, testing to be performed, final CCTV inspection, warranties furnished and all else necessary and appropriate for a complete fold and form PVC liner installation. A detailed installation schedule shall be prepared, submitted and conform to the requirements of this solicitation.
- C) Bidder's description of the proposed fold and form PVC lining technology, including a detailed plan for identifying all active service connections, maintaining mainline service during installation.
- D) A description of the fold and form PVC liner 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.

- E) A statement of the Bidder's experience. The Bidder shall have a minimum of three (3) years of continuous experience installing the proposed fold and form PVC liner in deteriorated pipe of a similar size, length and configuration as contained in this solicitation. The Bidder must have successfully installed a minimum of 100,000 linear feet of liner and completed at least 5 jobs in which over 5,000 linear feet have been installed. The Bidder must submit documentation proving that he/she has successfully installed a minimum of 100,000 linear feet and 5 separate jobs in which at least 5,000 linear feet of liner were installed. The Bidder must also provide contact information of at least three references that have had similar work done by the Bidder using Attachment E. The Bidder and all employees must be certified by the proposed fold and form PVC liner manufacturer as qualified to perform work using their product. The Bidder shall submit official documentation from the fold and form PVC liner manufacturer to the OWNER that states that the Bidder is qualified. The lead personnel including the superintendent, the foreman and the lead crew personnel for the CCTV inspection, the fold and form PVC liner installation, liner curing and the robotic service reconnections each must have a minimum of three (3) years of total experience with the fold and form PVC liner technology proposed for this project and must have demonstrated competency and experience to perform the scope of work contained in this solicitation. The name and experience of each lead individual performing work on this project shall be submitted with the PWS. Personnel replaced by the Bidder, on this project, shall have similar, verifiable experience as the personnel originally submitted for the project.
- F) 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 fold and form PVC liner. It will be acceptable for the Bidder 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. All calculations shall include data that conforms to the requirements of these specifications or has been pre-approved by the OWNER.
- G) Proposed manufacturers' technology data shall be submitted for all fold and form PVC liner products and all associated technologies to be furnished.
- H) Submittals shall include information on the PVC liner 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 Bidder shall outline the mitigation procedure to be implemented in the event of key equipment failure during the installation process.
- I) Certify at the time of the bid, that the locations included in the solicitation were visited, inspected and evaluated by the Bidder or Bidder's Representative, prior to submitting a bid.
- J) A detailed description of the Bidder's proposed procedures for removal of any existing blockages in the pipeline that may be encountered during the cleaning process.

#### **Section 1.4: Product Submittals**

- A) Manufacturer of the PVC liner system
- B) Material Cell Classification
- C) Physical properties of the pipe: stiffness, flexural modulus, flexural strength, internal and external pipe dimensions
- D) Manufacturer's conformance to product specific ASTM standards
- E) Manufacturers' shipping, storage and handling recommendations for all components of the fold and form PVC System and Bidder documentation that those recommendations are being followed
- F) All MSDS sheets for all materials to be furnished for the project

#### **Section 1.5: Safety**

- A) The Bidder 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 Bidder shall erect such signs and other devices as necessary for the safety of the work site.
- B) The Bidder shall perform all of the Work in accordance with applicable OSHA standards. Emphasis shall be placed upon the requirements for entering confined spaces and with the equipment being utilized for pipe renewal.
- C) The Bidder shall be responsible for all necessary traffic control when working in V-DOT roadways. It shall be the sole responsibility of the Bidder to obtain and to set up any necessary traffic control measures. The cost of traffic control shall be included in the unit price bid.

#### **Section 1.6: Quality Control Plan**

- A) A detailed quality control plan (QCP) shall be submitted to the OWNER that fully represents and conforms to the requirements of these specifications. At a minimum the QCP shall include the following:
  - a. A detailed discussion of the proposed quality controls to be performed by the Bidder.

- b. Defined responsibilities, of the Bidder's personnel, for assuring that all quality requirements, for this contract, are met. These shall be assigned, by the Bidder, to specific personnel.
- c. Proposed procedures for quality control, product sampling and testing shall be defined and submitted as part of the plan.
- d. Proposed methods for product performance controls, including method of and frequency of product sampling and testing. .
- e. A scheduled performance and product test result review between the Bidder and the OWNER at a regularly scheduled job meeting.
- f. Inspection forms and guidelines for quality control inspections shall be prepared in accordance with the standards specified in this solicitation and stated by the manufacturer and submitted with the QCP.

#### **Section 1.7: Fold and Form PVC Liner Repair/Replacement**

- A) The Bidder shall take every precaution to prevent any defects from occurring in the liner. However, the Bidder shall outline specific repair or replacement procedures for potential defects that may occur in the installed fold and form PVC liner. Repair/replacement procedures shall be as recommended by the fold and form PVC liner system manufacturer and shall be submitted as part of the PWS.
- B) Defects in the installed fold and form PVC liner that will not affect the operation and long term life of the product shall be identified and defined.
- C) Repairable defects that may occur in the installed fold and form PVC liner shall be specifically defined by the Bidder based on manufacturer's recommendations, including a detailed step-by-step repair procedure, resulting in a finished product meeting the requirements of these specifications.
- D) Un-repairable defects that may occur to the fold and form PVC liner shall be clearly defined by the Bidder based on the manufacturer's recommendations, including a recommended procedure for the removal and replacement of the fold and form PVC liner.

#### **Section 1.8: As-Built Information**

- A) As-Built fold and form PVC liner information shall include actual liner thickness, actual length, and date installed for each segment of fold and form PVC liner. This as-built information shall be submitted to the OWNER in the form of a table. In addition to the as-built information, pre & post inspection CCTV recordings shall be submitted digitally to the OWNER, by the Bidder within 2 weeks of final acceptance of said work or as specified by the OWNER.
- B) As-Built information shall be kept on the project site at all times, shall include all necessary information as outlined in the PWS or as agreed to by the OWNER and the Bidder at the start of the project and shall be updated as the work is being completed, and shall be clearly legible.

#### **Section 1.9: Warranty**

- A) The materials used for the project shall be certified by the manufacturer for the specified purpose. The Bidder shall warrant the liner material and installation for a period of one (1) year. During the Bidder warranty period, any defect which may materially affect the integrity, strength, function and/or operation of the pipe, shall be repaired at the Bidder's expense in accordance with procedures included in Section 1.7 Fold and Form PVC Liner Repair/Replacement and as recommended by the manufacturer.
- B) On any work completed by the Bidder that is defective and/or has been repaired, the Bidder shall warrant this work for (1) year in addition to the warranty required by the contract.
- C) After a pipe section has been lined and for a period of time up to one (1) year following completion of the project, the OWNER may inspect all or portions of the lined system. The specific locations will be selected at random by the OWNER and will include all sizes of fold and form PVC liner from this project. If it is found that any of the fold and form PVC liner has developed abnormalities since the time of "Post Construction Television Inspection," the abnormalities shall be repaired and/or replaced as defined in Section 1.7 Fold and Form PVC Liner Repair/Replacement and as recommended by the manufacturer. If, after inspection of a portion of the lined system under the contract, problems are found, the OWNER may perform a CCTV inspection on all the fold and form PVC liner installed on the contract. All verified defects shall be repaired and/or replaced by the Bidder and shall be performed in accordance with Section 1.7 Fold and Form PVC liner Repair/Replacement and per the original specifications, all at no additional cost to the OWNER.

**Part 2: Products**

**Section 2.1: Materials**

- A) The fold and form PVC liner System must meet the chemical resistance requirements of this specification.
- 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 fold and form PVC liner system manufacturer to avoid damage. Damage includes, but is not limited to, gouging, abrasion, flattening, cutting, puncturing, or ultra-violet (UV) degradation. On site storage locations, shall be approved by the OWNER. All damaged materials shall be promptly removed from the project site at the Bidder's expense and disposed of in accordance with all current applicable agency regulations.

**Section 2.2: Structural Requirements**

- A) The physical properties and characteristics of the finished liner can vary considerably, depending on the degree of cure executed. It shall be the responsibility of the Bidder to control these variables and to provide a fold and form PVC liner system which meets or exceeds the minimum properties specified herein:
  - a. The fold and form PVC liner shall be designed as per ASTM F1216 Appendixes. The fold and form PVC liner design shall assume no bonding to the original pipe wall.
  - b. The design engineer shall set the long term (50 year extrapolated) Creep Retention Factor at 50% of the initial design flexural modulus as determined by ASTM D-790 test method. This value shall be used unless the Bidder submits long term test data (ASTM D2990) to substantiate a higher retention factor.
  - c. The fold and form PVC liner shall, at a minimum, meet or exceed the structural properties, as listed below.

**Section 2.3: Minimum Physical Properties**

Property	Test Method	PVC per ASTM F1216	Cured Composite per Design
Flexural Modulus of Elasticity	ASTM D-790	280,000 psi	Bidder Value
Flexural Strength	ASTM D-790	5,000 psi	Bidder Value

- A) The required structural fold and form PVC liner wall thickness shall be based, as a minimum, on the physical properties of the cured composite and per the design of the Professional Engineer (see section 1.3.F) and in accordance with the Design Equations contained in the appendix of the ASTM standards, and the following 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
Soil Depth (above crown)	As specified in the bid documents and verified by the Bidder
Live Load	Highway, railroad, or airport as applicable
Soil Load (assumed)	120 lb/ft <sup>3</sup>
Minimum Service Life	50 years

- B) The Bidder shall submit, prior to installation of the lining materials, certification of compliance with these specifications and/or the requirements of the pre-approved fold and form PVC liner system. Certified material test results shall be included that confirm that all materials conform to these specification and/or the pre-approved system. Materials not complying with these requirements will be rejected.

### **Part 3: Installation**

#### **Section 3.1: Construction Requirements**

- A) The Bidder shall clean the interior of the existing host pipe prior to installation of the fold and form PVC liner. All debris and obstructions, that will affect the installation and the final fold and form PVC liner product delivery to the OWNER, shall be removed and disposed of.
- B) The fold and form PVC liner shall be constructed of materials and methods, that when installed, shall provide a jointless and continuous structurally sound fold and form PVC liner able to withstand all imposed static, and dynamic loads on a long-term basis without structural support assistance from the host pipe.
- C) The Bidder 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 Bidder shall furnish a detailed traffic control plan and all labor and equipment necessary. The plan shall be in conformance with all V-DOT requirements.
- D) Cleaning of Pipe Lines - The Bidder shall remove all internal debris from the pipe line that will interfere with the installation and the final product delivery of the fold and form PVC liner as required in these specifications. Solid debris and deposits shall be removed from the system and disposed of properly by the Bidder. Moving material from manhole section to manhole section shall not be allowed. As applicable the Bidder shall either plug or install a flow bypass pumping system to properly clean the pipe lines. Precaution shall be taken, by the Bidder in the use of cleaning equipment to avoid damage to the existing pipe. The repair of any damage, caused by the cleaning equipment, shall be the responsibility of the Bidder. Unless otherwise specified by the OWNER, the Bidder shall dispose of all debris at no charge to the OWNER.
- E) By-passing Existing Sewage Flows - The Bidder shall provide bypass pumping up to 300gpm for the flow of existing mainline and service connection effluent around the section or sections of pipe designated for fold and form PVC liner installation. With most small diameter pipelines, particularly on terminal sewers, plugging will be adequate but must be monitored on a regular basis to prevent backup of sewage into adjacent homes. Service connection effluent may be plugged only after proper notification by the OWNER to the affected residence and may not remain plugged overnight. Installation of the liner shall not begin until the Bidder has installed the required plugs or a sewage by-pass system and all pumping facilities have been installed and tested under full operating conditions including the bypass of mainline and side sewer flows. Once the lining process has begun, existing sewage flows shall be maintained, until the liner is fully cured, cooled down, fully televised, the fold and form PVC liner ends finished, laterals reinstated and the pipe is accepted by the OWNER. The Bidder shall coordinate sewer bypass and flow interruptions with the OWNER at least 14 days in advance. The pump and bypass lines shall be of adequate capacity and size to handle peak flows. The Bidder shall submit a detail of the bypass plan and design to the OWNER before proceeding with any fold and form PVC liner installation. If the bypass pumping rate is to exceed 300gpm, then the OWNER shall provide the Bidder with the necessary pump and piping to handle the pump around. It shall still be the responsibility of the Bidder to setup, operate, and maintain the pump for the duration of the installation. Once the line is operational the Bidder shall return the pump and piping to the OWNER.
- F) The Bidder 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 Bidder shall provide the OWNER a copy of the pre-cleaning and post-cleaning video and suitable log, and/or in digital format for review prior to installation of the fold and form PVC liner and for later reference by the OWNER.
- G) Line Obstructions - It shall be the responsibility of the Bidder to clear the line of obstructions that will interfere with the installation and long-term performance of the fold and form PVC liner. 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 fold and form PVC liner, the Bidder shall notify the OWNER. The Bidder can propose a single lump sum price to fix the obstruction(s) in the pipe to the OWNER that is in addition to the unit price quoted in this bid. However, the OWNER may choose to fix the point repair in-house instead so fold and form PVC liner can be installed.
- H) The Bidder shall be responsible for confirming the locations of all branch service connections prior to installing and curing the fold and form PVC liner. At OWNER discretion, each connection may be dye tested to determine whether or not the connection is live or abandoned. In the event the status of a service connection cannot be adequately defined, the OWNER will make the final decision, prior to installation and curing of the liner, as to the status. Typically only service connections deemed "active" shall be reopened by the Bidder.
- I) The Bidder shall be allowed use of water from an OWNER-approved fire hydrant in the project vicinity at no cost. Use of an approved double check backflow assembly shall be required. Bidder shall provide his own approved assembly. The Bidder must have the double check assembly inspected by the OWNER and record all water use by the means of a hydrant meter provided by the OWNER. The Bidder shall pay a deposit for the meter, which will be returned once the job is completed and the meter is returned. The Bidder shall only use hydrants as specified by the OWNER.

### **Section 3.2: Installation of Liner**

- A) Prior to mobilizing, a comprehensive construction sequencing plan shall be submitted to the OWNER detailing the following:
  - a. A proposed schedule including sequencing
  - b. Identification of all proposed access routes
  - c. Identification of set-up locations for lining installation
  - d. Lining procedures
  - e. Bypass Pumping Plan
  - f. Traffic Control Plan
- B) The fold and form PVC liner shall be installed and cured in the host pipe per the manufacturer's specifications as described and submitted in the PWS.
- C) Fold and form PVC liner installation shall be in accordance with the applicable ASTM standards.
- D) The PVC liner 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 tube 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. Liner and/or host pipe interface temperature shall be monitored and logged during curing of the liner.
- F) Curing shall be accomplished by utilizing the appropriate medium in accordance with the manufacturer's recommended cure schedule. The curing source or input 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 Bidder.
- G) For heat cured liners, if any temperature sensor or multiple sensors do not reach the temperature as specified by the manufacturer to achieve proper curing or cooling, the Bidder can make necessary adjustments to comply with the manufacturer's recommendations. The system computer should have an output report that specifically identifies each installed sensor station in the length of pipe, indicates the maximum temperature achieved and the sustained temperature time. Each sensor should record both the maximum temperature and the minimum cool down temperature and comply with the manufacturer's recommendations.

### **Section 3.3: Cool Down**

- A) The Bidder shall cool the fold and form PVC liner in accordance with the approved fold and form PVC liner manufacturer's recommendations as described and outlined in the PWS.
- B) Temperatures and curing data shall be monitored and recorded, by the Bidder, throughout the installation process to ensure that each phase of the process is achieved as approved in accordance with the fold and form PVC liner System manufacturer's recommendations. The curing data shall also be made available to the OWNER.

### **Section 3.4: Finish**

- A) The installed fold and form PVC liner 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 de-lamination. The fold and form PVC liner shall be impervious and free of any leakage from the pipe to the surrounding ground or from the ground to inside the lined pipe.
- B) Any defect, which will or could affect the structural integrity or strength of the linings, shall be repaired at the Bidder's expense, in accordance with the procedures submitted under section 1.7 Fold and Form PVC Liner Repair/Replacement.
- C) The beginning and end of the fold and form PVC liner shall be sealed to the existing host pipe. The sealing material shall be compatible with the pipe end and shall provide a watertight seal. A hydrophilic gasket shall be installed at the end of each line as it enters the manhole as well to ensure no future leakage.
- D) If any of the service connections leak water between the host pipe and the installed liner, the connection mainline interface shall be sealed to provide a water tight connection.
- E) If the wall of the fold and form PVC liner leaks, it shall be repaired or removed and replaced by the Bidder at no additional cost with a watertight pipe as recommended by the manufacture of the fold and form PVC liner system.
- F) Compensation shall be at the actual length of fold and form pipe installed. The length shall be measured from center of manhole to center of manhole. The unit price per linear foot installed shall include all materials, labor, equipment and supplies necessary for the complete fold and form PVC liner installation. Compensation for service connection sealing, shall be at the unit price bid therefore in the Proposal.



**Section 3.5: Manhole Connections and Reconnection of Existing Services**

- A) A seal, consisting of a resin mixture or hydrophilic seal compatible with the installed fold and form PVC liner shall be applied at manhole/wall interface in accordance with the fold and form PVC liner system manufacturer’s recommendations.
- B) Prior to reinstating any lateral connections, the fold and form PVC liner shall be low pressure tested to ensure no pinhole leaks that could be missed by a CCTV inspection exist. The method for the low pressure test is as follows:
  - a. The fold and form PVC liner shall be plugged at both the upstream and downstream manhole with pneumatic plugs that shall be able to maintain the test pressure without external bracing. One plug shall have three air hose connections, one for plug inflation, one for a pressure gauge (supplied by Bidder with .01 psi increments), and one for introducing air into the sealed line.
  - b. The fold and form PVC liner section shall be pressurized to 4 psi and held above 3.5 psi for not less than two minutes for stabilization prior to testing. Air shall be added to maintain a minimum of 3.5 psi. Stabilization is complete when the line holds 3.5 psi for at least 2 minutes.
  - c. After stabilization has been completed, record the pressure (must be above 3.5 psi) and begin timing for the low pressure test. The pressure must not drop 0.5 psi or more in the time given in the following table.

Sewer Pipe Diameter (in)	Minimum Test Time (Minutes)
6-8	4
10	5
12	6
15+	7.5

- d. If the line does not pass the pressure test, then the leak must be identified by CCTV inspection, repaired or replaced in accordance with section 1.7: Fold and Form PVC liner Repair and Replacement.
- C) Existing services shall be internally or externally reconnected.
- D) Reconnections of existing services shall be made after the fold and form PVC liner has been installed, fully cured, cooled down and pressure tested for leaks. It is the Bidder’s responsibility to make sure that all active service connections are reconnected.
- E) External reconnections are to be made with a tee fitting in accordance with fold and form PVC liner system manufacturer’s recommendations. Saddle connections shall be seated and sealed to the new fold and form PVC liner using grout or resin compatible with the fold and form PVC liner.
- F) A CCTV camera and remote cutting tool shall be used for internal reconnections. The machined opening shall be at least 90 percent of the service connection opening 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 liner 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.
- G) In the event that service reinstatements result in openings that are greater than 100 percent of the service connection opening, the Bidder shall install a fold and form PVC liner type repair, sufficiently in size to completely cover the over-cut service connection. No additional compensation will be paid for the repair of over-cut service connections.
- H) 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.
- I) Compensation shall be at the actual number of services re-connected using either internal or external means as contained in the Proposal. The unit price bid per service line re-connected shall include all materials, labor, equipment and supplies necessary to complete the work as required in these specifications.

**Section 3.6: Testing Installed Fold and Form PVC liner**

- A) The physical properties of the installed fold and form PVC liner shall be verified through field sampling and laboratory testing. All materials for testing shall be furnished by the Bidder. All materials testing shall be performed at the Bidder’s expense, by an independent third party laboratory as recommended by the fold and form PVC liner manufacturer. All tests shall be in accordance with applicable ASTM test methods to confirm compliance with the requirements specified in the solicitation.

- B) The Bidder shall provide samples for testing from the actual installed fold and form PVC liner. Samples shall be provided, at a minimum from one location per 1,000 linear feet of fold and form PVC liner installed or as required by the OWNER. The sample shall be cut from a section of cured fold and form PVC liner 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. All curing, cutting and identification of samples will be witnessed by the OWNER and transmitted by the Bidder to the testing laboratory. The Bidder shall label each sample with the Gravity Main and Manhole ID as noted on the maps in the scope of work. The opening produced from the sample shall be repaired in accordance with manufacturer's recommended procedures.
- C) The laboratory results shall identify the test sample location as referenced by the Gravity Main and Manhole ID. Final payment for the project shall be withheld pending receipt and approval of the test results. If properties tested do not meet the minimum physical and thickness requirements, the fold and form PVC liner shall be repaired or replaced by the Bidder unless the actual physical properties and the thickness of the sample tested meet the design requirements as given in the specification.
- D) Chemical resistance - The fold and form PVC liner system installed shall meet the chemical resistance requirements of ASTM D5813. Fold and form PVC liner samples tested shall be of actual construction. It is required that fold and form PVC liner samples without plastic coating meet these chemical testing requirements. A certification shall be submitted, by the Bidder, from the manufacturer, verifying that the chemical resistance of the fold and form PVC liner meets the specification.
- E) Hydraulic Capacity - Overall, the hydraulic capacity shall be maintained as large as possible. The installed fold and form PVC liner 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 liner installation, the Bidder 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.
- F) The installed fold and form PVC liner thickness shall be measured for each line section installed. If the fold and form PVC liner thickness does not meet the submitted and approved design by the Bidder then the liner 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 solicitation. The liner thickness shall have tolerance of minus 5% plus 10%. In man-entry size piping the Bidder shall remove a minimum of one sample or one sample every line section of installed fold and form PVC liner, not meeting the specified design thickness, to be used to check the liner thickness. The samples shall be taken by core drilling 2-inch diameter test plugs at random locations selected by the OWNER. As an alternative the Bidder may use industry proven, non-destructive methods for confirming the thickness of the installed fold and form PVC liner.

### **Section 3.7: Final Acceptance**

- A) All fold and form PVC liner sample testing and repairs to the installed fold and form PVC liner as applicable, shall be completed, before final acceptance, meeting the requirements of these specifications and documented in written form.
- B) The Bidder shall perform a detailed closed-circuit television inspection in accordance with ASTM and NASSCO standards, in the presence of the OWNER after installation of the fold and form PVC liner and reconnection of the side sewers. A radial view (pan and tilt) TV camera shall be used. The finished liner shall be continuous over the entire length of the installation and shall be free of significant visual defects, damage, deflection, holes, leaks and other defects. Unedited digital documentation of the inspection shall be provided to the OWNER within ten (10) working days of the liner installation. The data shall note the inspection date, location of all reconnected lateral services, debris, as well as any other defects in the liner, including, but not limited to, gouges, cracks, bumps, or bulges. If post installation inspection documentation is not submitted within ten (10) working days of the liner installation, the OWNER may, at its discretion, suspend any further installation of fold and form PVC liner 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 Bidder shall thoroughly clean the newly installed liner 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 Bidder shall institute additional testing including, but not limited to air testing, localized testing and any other testing that will verify that the leakage rate of the installed fold and form PVC liner does not exceed acceptable tolerances specified in Section 3.5 of this solicitation.

**ATTACHMENT B**  
**SUBMITTAL SUMMARY**  
**Fold and Form Submittals**

*Performance Work Statement*

- PVC Liner Manufacturer & Info
- PVC Liner 50 yr Design Life
- Chemical Resistance
- Structurally Sound
- Installation Plan/Schedule (Detailed Below)
- Active Service Identification Plan
- Bidder Experience
- References
- Manufacturer Certification to Install
- Worker Experience Profiles
- PE Design Calculations
- PVC Liner Manufacturer Technology Data
- Equipment Requirements
- Recommended Manufacturer Repair Methods
- Site Visit
- Procedure for Removal of Blockage

*Installation Plan*

- Prep Work
- Cleaning
- Pre-TV Inspection
- Bypass Pumping
- Traffic Control
- Installation Procedure
- Cure Method
- Service Reconnection
- Quality Control
- Final CCTV Inspection
- Warranty Information

*Product Submittals*

- Material Cell
- Manufacturer Conformance
- PVC Liner Characteristics
- PVC Liner Storage Info and Bidder Compliance
- MSDS Sheets
- Manufacturer Recommended Cure Method

*Quality Control Plan*

- List of QC methods
- Worker Responsibilities
- Product Sampling/Testing Methods
- Product Performance Control Methods
- QC Inspection Forms from Manufacturer

*Materials*

- Bidder Design Value for Min. Physical Properties
- Material Test Results Conforming to Design Specs
- Chemical Resistance Certification from Manufacturer