

ADDENDUM No. 1

PROJECT: **2019 Storm CIPP**
 Project # 19PW09

OWNER: City of Roseburg
 900 SE Douglas Ave.
 Roseburg, Oregon 97470

ENGINEER: City of Roseburg
 900 SE Douglas Ave.
 Roseburg, Oregon 97470



The original Contract Documents, Specifications and Plans issued for bid on April 17, 2019, are hereby amended and supplemented by this **Addendum No. 1 dated May 9, 2019**. All bids shall be based upon inclusion of this Addendum No. 1.

CONTRACT/BID DOCUMENTS

1.0 ADVERTISEMENT FOR BID:

Project number shall be changed from 19PW06 to 19PW09.

2.0 BIDDING REQUIREMENTS AND CONTRACT DOCUMENTS

2.1 Bid Form:

Delete existing bid form and replace with revised attached Bid Form. Quantity adjustments were made to bid items #5, 6 and 13.

3.0 SPECIAL PROVISIONS

3.1 SECTION 170.02 – Permits, Licenses, and Taxes: Add the following bullet,

- City of Roseburg will coordinate with and purchase any required access permit from the railroad.

3.2 SECTION 180.50(h) – Contract Time: Delete and replace with the following,

The Contractor shall complete all Work to be done under the Contract, within one hundred fifty (150) calendar days.

3.3 SECTION 412.41 – Installation: Add the following bullets to 412.41.(c).1–Water

- f. Provide temporary downstream dams and filtration measures in the pipeline to catch excess resin and construction debris. Waste water and steam condensate shall not be permitted to be discharged City storm system. Waste materials shall be properly discharged at an approved waste water treatment facility.
- g. Do not allow the temperature of the water discharged from processing liners to exceed the level allowed by State or local requirements.

3.4 SECTION 413 – Glass Reinforced Plastic (GRP) Cured-in-Place Pipe (CIPP)

Delete existing Section 413 and replace with attached Section 413

4.0 CONSTRUCTION DRAWINGS:

4.1 Hickory St & Riverridge Ave: Add the following General Note

- 4. City staff will clear brush and blackberries from Outfall to Sta 1+30. Contractor shall be responsible for necessary equipment access and surface restoration.

5.0 GENERAL:

5.1 Video Footage: Existing video footage of storm pipes is available upon request. Please contact Ryan Herinckx, rherinckx@cityofroseburg.org for instructions to City FTP site.

BID FORM

**City of Roseburg
900 SE Douglas Avenue
Roseburg, Oregon 97470**

The undersigned bidder has carefully examined the Contract Documents for the construction of the
**2019 STORM CIPP
PROJECT No. 19PW09**

referred to in the Invitation to Bid dated April 17, 2019, inviting bids on such Project and also the site of the Project. Bidder will provide all necessary labor, equipment, tools, apparatus and other means of construction, do all the work and furnish all the materials called for by said Contract Documents in the manner prescribed therein to provide a complete Project.

The undersigned bidder understands that the quantities of work as shown herein are approximate only, unless noted otherwise, and are subject to increase or decrease. The bidder offers to perform the work, at the unit price stated in the following schedule, whether the quantities are increased or decreased.

| Bid Schedule | | | | | |
|------------------------|-----------------------------|------|--------------------|-----------|------------|
| Item No. | Description | Unit | Estimated Quantity | Unit Cost | Total Cost |
| 1 | Mobilization | LS | 100% | | |
| 2 | Temporary Traffic Control | LS | 100% | | |
| 3 | CIPP Liner 24-Inch | LF | 569 | | |
| 4 | CIPP Liner 30-Inch | LF | 70 | | |
| 5 | CIPP Liner 42-Inch | LF | 980 | | |
| 6 | CIPP Liner 48-inch | LF | 1784 | | |
| 7 | 6" Service Line Connection | EA | 2 | | |
| 8 | 8" Service Line Connection | EA | 3 | | |
| 9 | 12" Service Line Connection | EA | 7 | | |
| 10 | 18" Service Line Connection | EA | 1 | | |
| 11 | Asphalt Trench Resurfacing | SY | 180 | | |
| 12 | Concrete Trench Resurfacing | SF | 90 | | |
| 13 | Post-Installation Video | LF | 3403 | | |
| Bid Item Total: | | | | \$ | |

Abbreviations:

LS – Lump Sum
LF – Lineal Feet

EA – Each
SY – Square Yard

SF – Square Feet
TONS – Tons

The undersigned also declares and agrees as follows:

1. That the only persons or parties interested in this bid are those named herein, that the bid is in all respects fair and without fraud, and that it is made without any connection or collusion with any person making another bid on this Contract.
2. That the bidder, and any subcontractor upon which the bidder is relying, have carefully examined and had an opportunity to comment on, the Contract Documents for the construction of the proposed improvements including a full set of the plans and specifications, including all addenda thereto; that bidder has personally inspected the contemplated construction area or areas; that bidder is satisfied as to the adequacy and completeness of the plans and specifications, the feasibility of the work described therein, quantities of materials, items of equipment and conditions of work involved, including the fact that the description of work and materials as included herein are approximate only; and that this bid is made according to the provisions and under the terms of the Specifications which are hereto attached and hereby made a part of this bid.
3. All of the Specifications and Plans which are listed herein have been examined by the undersigned bidder and the terms and conditions thereof are hereby accepted.
4. It is understood that the Plans may be supplemented by additional Drawings and Specifications in explanation and elaboration of the Plans and it is agreed that such Supplemental Drawings, when not in conflict with those referred to in Paragraph 3 above, will have the same force and effect as if completed and attached hereto, and that when received, will be considered a part of the Contract Documents.
5. It is understood that all work will be performed under the price schedule outlined herein and that all services, materials, labor and equipment and all work necessary to complete the Project in accordance with the Plans and Specifications shall be furnished for the prices named in the bid. If there is a change in the scope of work or work which cannot be properly classified under the price schedule then bidder agrees to do this work as "extra work". The undersigned bidder agrees to do any extra work and furnish materials, and to accept as full compensation therefore at such prices as may be agreed upon in writing by the City and the Contractor before extra work begins. Each party binds itself to agree to reasonable prices.
6. It is understood the work to be performed must meet the highest standards prevalent in the industry or business most closely related to the work to be performed. It is further understood that failure to meet such standards may result in consequences including, but not limited to, a reduction or withholding of payment; a requirement that bidder perform, at bidder's own expense, additional work required to meet such standards; or termination of the contract, with damages being sought.
7. The bidder agrees that if this bid is accepted, the bidder will, within ten (10) calendar days after the notification of acceptance, execute the Construction Contract with the City in the form of Contract specified, and will, at the time of execution of the Contract, deliver to the City the Performance Bond, Payment Bond and Public Works Bond Filing Certification form as required herein, and will furnish all the materials necessary to complete the Project in the manner, in the time and according to methods as specified in the Specifications and required by the City.
8. The cash, certified check, cashier's check, irrevocable letter of credit or Bid Bond shall be payable to the City to the extent of 10% of the amount of the bid in case this bid is accepted by the City and the undersigned shall fail or refuse to execute the Contract and furnish a Payment Bond, a Performance Bond or the Public Works Bond Filing Certification form as required by the Specifications within the time limit named therein after notification that said bid is accepted,

all in accordance with the provisions of this bid and the Plans and Specifications which are a part hereof.

9. All items for the Contract for which forms are provided herein have been completed in full by the showing of prices for each and every item thereof, and for the showing of other information indicated by the Bid Form.
10. Bidder agrees to begin work within ten (10) calendar days after the execution of the Contract proposed herein and receipt of the City's notification to begin work and to complete work in all respects within **one hundred fifty (150)** calendar days after "Notice to Proceed" has been issued by the City.
11. In the event the bidder is awarded the Contract and fails to complete the Project within the time limit or extended time agreed upon, as more specifically set forth in the General Conditions, liquidated damages shall be paid to or withheld by the City pursuant to Paragraph 4 of the Construction Contract (Time of Performance - Liquidated Damages) at the rate of **five hundred Dollars (\$500.00)** per day, until the Project has been completed as provided in the General Conditions.
12. The undersigned bidder hereby states, as part of this bid, that the applicable provisions of Oregon's Prevailing Wage Law (ORS 279C.800 to 279C.870) and the Federal Prevailing Wage Law (Davis-Bacon Act, 40 U.S.C. 3141-3148), shall be complied with. When the Project is subject to both the State and Federal Prevailing Wage Laws and rates, workers in each trade will be paid the higher of the two rates.
13. The undersigned bidder and bidder's subcontractors shall comply with ORS 656.017, which requires them to provide Workers' Compensation coverage for all their subject workers.
14. The undersigned bidder hereby states, as part of this bid, that bidder shall comply with ORS 279C.505(2) which requires bidder to have an employee drug testing program in place.
15. The undersigned bidder and bidders' subcontractors shall comply with ORS 279C.570 and 279C.580, which require timely progress payments for public improvement projects and provide interest penalties for late payment.
16. The undersigned bidder hereby states, as part of this bid, bidder and bidder's subcontractors shall comply with the provisions of Exhibit "A" - "Standard City Contract Provisions".
17. If the bidder is awarded the Contract for this work, the name and address of the Surety who will provide the Payment Bond, Performance Bond and Public Works Bond (if required) will be:_____.
18. The name and address of the bidder who is submitting this bid is:_____, which is the address to which all communications pertinent to this bid and the Contract shall be sent. The bidder's email address is:_____.
19. The names of the principal officers of the corporation submitting this bid or of the partnership, or of all parties interested in this bid as principals are as follows:
_____.

20. The undersigned bidder acknowledges that Addenda No. _____ through _____ have been delivered to bidder and have been examined as part of the Contract Documents.
21. In the prosecution of this work, the bidder proposes to use the subcontractors listed on the First-Tier Subcontractor Disclosure Form presented within two working hours of the bid submission deadline as set forth in the Invitation to Bid. Any bidder not using subcontractors subject to the above referenced Disclosure Form shall indicate "NONE" on the Disclosure Form and sign and submit the form as required.
22. Declaration of Residency: I "am" or "am not" (circle one) a "resident bidder"* as defined by ORS 279A.120, a contractor that has paid unemployment taxes or income taxes in Oregon during the 12 calendar months immediately preceding submission of the bid, has a business address in this state and has stated in the bid whether the bidder is a "resident bidder" pursuant to ORS 279A.120.
23. The bidder's Construction Contractors Board License Number or Landscape Contractors Board License Number is: _____.
24. Bidder's Tax Identification Number: _____ Email: _____.
25. Public Works Bond: If the bid is accepted, prior to beginning work on the project, the bidder will file with the Construction Contractors Board, a Public Works Bond in the amount of \$30,000 with a corporate surety authorized to do business in the State of Oregon; and before permitting a subcontractor to begin work on the project, the bidder will verify that the subcontractor has also filed the aforementioned bond. If the bidder, as a certified disadvantaged, minority, women or emerging small business enterprise, elects not to file the Public Works Bond, bidder will file written verification of such certification with _____ the Construction Contractors Board and provide the Board and the City of Roseburg with notice of such election.

If sole Proprietor or Partnership:

In witness hereto, the undersigned as set his/her hand this _____ day of _____, 2019.

Printed name of bidder: _____

Signature of bidder: _____

Title: _____

If Corporation:

In witness whereof, the undersigned corporation has caused this instrument to be executed and its seal affixed by its duly authorized officers this ____ day of _____, 2019.

Name of Corporation: _____

Printed name of person signing: _____

Signature: _____

Title: _____

Attest: _____

Secretary

SECTION 00413 – GLASS REINFORCED PLASTIC (GRP) CURED-IN-PLACE PIPE (CIPP)

Description

00413.00 Scope: - This work consists of rehabilitating existing pipes by furnishing and installing pipe liners by cured-in-place (CIPP) lining methods as shown.

Contractor shall provide and install a resin impregnated glass reinforced material tube with styrene blocking inner and outer foils and a wearing surface of inner pure resin layer in all sewers identified for cured-in-place-pipe (CIPP) lining in accordance with American Society for Testing and Materials (ASTM) F2019 for the pulled-in-place and UV-cured installation method.

The existing pipe is a spiral wound aluminized steel pipe with a severely deteriorated invert that is currently exposed to the potential intrusion of exterior groundwater which has not been verified. The Contractor is responsible for insuring the CIPP product can be properly installed under conditions that may not be entirely dry if after diverting all upstream flows, groundwater is still present in the host pipe.

00413.01 Submittals: - This section replaces Section 00410.03 of the Standard Specifications, submit the following,

1. Catalog data and manufacturer's technical data showing complete information on material composition, physical properties, depth of installation and dimensions of system components of the tube and resin system. Include manufacturer's recommendation for handling, storage, insertion, curing, trimming, finishing and repair of damaged liner.
2. Certification showing the Contractor is currently certified or licensed by the appropriate licensor to perform CIPP installation. Certification shall be given to Owner before any materials are delivered to the job site.
3. Certification from the manufacture that the materials meet the requirements of these specifications and intended use. Certification of test results confirming than the liner and resin meet the minimum chemical resistance requirement according to ASTM F2019.
4. Flow diversion plan for the mainline. This will include a specific plan for each individual manhole section which identifies location of bypass pipe, method of discharging against the curblin where shown on the plans, crossing street inter- section, pumping capacity and location of equipment within the street.
5. A letter identifying the cleaning methods Contractor plans to employ to remove sediment, debris, grease, scale, encrustation, mineral deposits and roots through- out the gravity pipe to be lined and in the structures to be repaired. The letter shall include a detailed explanation of the cleaning process and a schedule of activities.

6. Structural calculation for each CIPP liner size with recommended thicknesses based upon minimum physical properties in Table 1 of ASTM F2019. Values greater than this for flexural strength and flexural modulus may be used at the discretion of the Contractor. Verification of final thickness and physical properties will be determined in accordance with 00413.71. Consequences for failure to reach the submittal strength are outlined in 00413.91.
7. CCTV Inspection reports as specified in subsection 00413.40.
8. Manufacturer's recommended installation procedures.
9. Manufacturer's or Assembler's certification that the liner materials and system are in compliance with the specifications, codes, and standards referenced herein.
10. Testing for chemical resistance shall be performed on a previously prepared sample of the finished product, equivalent to that proposed for this project. A certified affidavit, signed by an officer of the company, shall be provided stating that the resin the tests apply to and the resin submitted for this project are the same.
11. CIPP samples in accordance with 00412.71.
12. CIPP liner terminations.
13. Material safety data sheets for all hazardous chemicals used or expected to be on-site.

00413.02 Design Parameters: - Contractor shall furnish CIPP tubing that meets the following design criteria.

Follow the design considerations of ASTM F 2019, Appendix X1 and these specifications. All material properties used in design calculations shall be long-term (time-corrected) values.

| <u>Condition</u> | <u>Parameter</u> |
|----------------------------|---|
| Service Life | Greater than 50 year |
| Pipe Condition | Fully deteriorated |
| <u>Load Conditions</u> | |
| Soil | 120-pounds/cubic foot |
| Traffic | H2O-Highway Groundwater |
| Elevation | At surface (Depth per plan) |
| Design Thickness..... | Cured-in-place fiberglass lining shall comply with ASTM F 2019-11 of the intent thereof as determined by the Engineer, minimum finished liner thickness as defined by design calculation. |
| Pipe Ovality..... | Per Contractor's review of CCTV Inspection (assumed 2%) |

| | |
|-------------------------------|-----------------------------|
| Modulus of Soil Reaction... | 1000 psi |
| Enhancement Factor..... | 7 |
| Long-term Flexural Strength.. | 70% of initial (ASTMD 790) |
| Modulus of Elasticity | 70% of initial (ASTM D 790) |
| Maximum Deflection | 5% |
| Minimum Factor of Safety... | 2.0 |
| Resin Migration Allowance... | 10% maximum |
| Allowable Deformity..... | 3% |

Design the CIPP wall thickness to withstand all imposed loads, including live loads and if applicable, hydrostatic pressure. Include considerations for ring bending, deflection, combined loading buckling and ovality in the design of the CIPP.

00413.03 References - This section incorporates by reference the latest revisions of the following documents. They are part of this section insofar as specified and modified herein. In case of conflict between the requirements of this Section and the listed documents, the requirements of this Section shall prevail.

| Reference | Title |
|------------------|---|
| ASTM D543 | Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents |
| ASTM D790 | Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials |
| ASTM D903 | Standard Test Method for Peel or Stripping Strength of Adhesive Bonds |
| ASTM D1600 | Standard Terminology for Abbreviated Terms Relating to Plastics |
| ASTM F1216 | Standard Practice for Rehabilitation of Existing Pipelines and Conduits by Inversion and Curing of a Resin-Impregnated Tube |
| ASTM F2019 | Standard Practice for Rehabilitation of Existing Pipelines and Conduits by Pulled-in-Place Installation of Glass Reinforced Plastic (GRP) Cured-in-Place Thermosetting Resin Pipe (CIPP). |

00413.06 Licensing and Certification

1. The Contractor or subcontractor installing the CIPP shall have a current certification or license agreement with the product Manufacturer or Assembler.
2. Individuals installing the CIPP shall be certified by the product Manufacturer or Assembler.

3. Lining installation shall be in accordance with the requirements of the product Manufacturer or Assembler and as directed by their Technical Representative. This includes the correction of defective work.

Materials

00413.10 Tube: - Contractor shall furnish CIPP tubing that meets the following requirements:

- (a) The tube material shall meet the requirements of ASTM F2019.
- (b) The CIPP shall be continuous in length and the wall thickness shall be uniform. No overlapping sections shall be allowed in the length of the liner. Tubing: The tubing material shall be free from tears, holes, cuts, foreign materials and other surface defects.
- (c) The CIPP shall be capable of conforming to offset joints, bells and disfigured pipe sections. It shall be able to stretch to fit irregular pipe sections and negotiate bends.
- (d) Seams in the CIPP shall be stronger than the non-seamed material.
- (e) The CIPP shall be marked at regular intervals along its entire length, not to exceed 5 feet. Markings shall include Manufacturer's or Assembler's name or identifying symbol.
- (f) The CIPP liner shall be manufactured with materials from a consistent supplier. All materials of similar type shall be from a single source for the entire project.
- (g) The CIPP shall be fabricated to a size that, when installed, will tightly fit the internal circumference and length of the original pipe.
 - a. Allowance shall be made for circumferential stretching during the installation process.
 - b. The hydraulic capacity of the CIPP shall be greater than or equal to the hydraulic capacity of the original host pipe, based on hydraulic calculations with standard engineering roughness coefficients.
- (h) The liner thickness shall be designed based on the engineering formulas listed in ASTM F1216 for **fully deteriorated** pipes, assuming groundwater at the surface, HS-20 live loading, 120 pounds per cubic foot dry soil density, and depth of cover as determined by the adjacent upstream or downstream manhole, whichever is deeper. The thickness shall be sufficient to prevent groundwater from entering the pipe, while maintaining the maximum cross-sectional pipe area possible.

00413.11 Resin:

UV Light Cured Fiberglass pipe liner shall meet the requirements of ASTM F2019 and compatible with the host pipe material and other rehabilitation products that the resin may contact.

- (a) Resin shall form no excessive bubbling or wrinkling during lining.
- (b) Resin shall be manufactured with materials from a consistent supplier. All materials of similar type shall be from a single source for the entire project.
- (c) The resin shall have no fillers added for the sole purpose of increasing the resin volume.

00413.12 Liner Properties: - Furnish liners that have the minimum physical properties stated in ASTM F1216, ASTM F2019 and ASTM D2990, and are also resistant to chemical properties typically found in municipal sanitary sewer flows. Fabricate the liner to a size that when cured, will tightly fit the pipe being rehabilitated. The finished liner system shall be homogeneous across the wall thickness containing no intermediate or encapsulated elastomeric layers.

| Characteristic | Test Method | Test Value |
|--|--------------------|-------------------|
| Initial Flexural Strength | ASTM D-790 | 6,500 PSI |
| Initial Flexural Modulus of Elasticity | ASTM D-790 | 725,000 PSI |

Labor

00413.30 Personnel Qualifications: - Product, Manufacturer/Assembler and Installer Qualification Requirements:

1. The Manufacturer: Company specializing in manufacturing the products in this section shall have a minimum of 3 years' experience or otherwise allowed prior to bid acceptance.
2. The Contractor shall have a minimum of 5 years recent experience in CIPP pipe rehabilitation. Contractor shall have experience with projects of similar size and complexity as this project, minimum of 50,000 feet of installed UV CIPP product.
3. Certification showing that the Installer is currently licensed or certified by the manufacturer of the CIPP product system to be used on the project.

Construction

00413.40 General: Handle and store all liner material to ensure that the material is not torn, cut, exposed to direct sunlight or otherwise damaged. Before installing the liner, verify its condition with the Engineer. If any part of the liner material becomes torn, cut or damaged before or during insertion, repair or replace it at no additional cost to the City before proceeding further.

(a) Make all necessary provisions to ensure service conditions and structural conditions of host pipe are suitable for installation and warranty of the liner. Provisions shall include, but are not limited to temporary storm sewer bypassing, correction of structural, and sealing of active infiltration through pressure grouting.

(b) Bypass Pumping:

1. The Contractor shall provide bypass pumping and/or diversion for acceptable

completion of the liner installation. Bypass pumping shall consist of furnishing, installing, and maintain all power, primary pumps, appurtenances and bypass piping required to maintain existing flows. No flow that will negatively affect the liner shall be allowed in pipe during CIPP installation.

2. Bypass pumping shall be done in such a manner as to not damage private or public property, or create a nuisance or public menace. The pumped storm water shall be in an enclosed hose or pipe that is adequately protected from traffic, and shall be redirected into the downstream storm drain system along the curb line. All bypass piping on shall have traffic rated fully enclosed ramps specifically designed for this type installation across NE Cedar Street.
3. The Contractor shall take all necessary precautions to insure that no private residences or properties are subjected to receiving any of the bypassed storm water. After the work is completed, flow shall be restored to normal.

(c) Cleaning and Inspection of Existing Storm Sewer

The Contractor shall be responsible for cleaning, inspecting, confirming the in- side diameter and determining the condition of each manhole-to-manhole segment to be lined. The cleaning process shall include the removal and disposal of any and all obstructions/materials regardless of composition. A television inspection witnessed by Owners Representative shall be performed by the Contractor after the storm sewer cleaning operation. The television inspection shall be completed in the same direction each time and shall be done with a CCTV color camera recoded in DVD format. A copy of the television inspection video discs from all televising operations shall be provided to the City for review prior to the liner installation. Installation of the new liner shall commence within 48 hours of the final cleaning for each section of pipe from manhole to manhole. Installations delayed beyond the 48 hour period will require Contractor to clean the interior with a pressure washing operation again if in the opinion of the Owner there may be additional debris present. Television inspection will not be required during the subsequent cleanings unless excessive debris in the opinion of the Owner are found in the downstream manhole for each section.

(d) Manholes

Protect all manholes to withstand forces generated by the equipment while installing the liner.

(e) Pipeline Deficiencies

The City has determined the invert of each pipe has deteriorated over time and may eventually result in collapse of the pipe. Contractor is responsible for installation of the CIPP within the existing conduit in its current condition. Following completion

of new CCTV efforts by the Contractor, Contractor shall inform the City if the existing condition of the pipe invert is not suitable for installation of the CIPP and should be grouted.

00413.41 Installation: CIPP installation shall be in accordance with ASTM F2019 for UV light Curing Installations. Installation shall be in accordance with manufacturer's recommendations, which shall be available for verification by the Engineer.

- (a) Curing schedules shall be strictly adhered to, per manufacturer requirements.
- (b) The CIPP liner shall make a tight fitting seal with the existing pipe(s) in the manholes. If the CIPP liner fails to make a tight seal, the Contractor shall apply a seal at that point using a sealant or caulking material that is compatible with CIPP materials, watertight, flexible and impervious to hydrogen sulfide. The top half of the CIPP through a manhole shall be neatly cut off and not broken or sheared off. The channel in the manhole shall be a smooth continuation of the pipe(s) and shall be merged with other lines or channels. Void space between liner and channel wall shall be filled with non-shrink grout and sealed with sealant. CIPP and the existing pipe in the manhole must be sealed before proceeding on to the next manhole section and all manholes shall be individually inspected for CIPP cut-offs and sealing works. Liner shall be cut off at the pipes and all liner removed within intermediate manholes with deflection angles greater than 45 degrees.
- (c) The finished CIPP shall be continuous over the entire length of an insertion run between two manholes and be free from visual defects such as foreign inclusions, dry spots, pinholes, and delamination. If in the opinion of the Engineer, a portion of the liner is inadequate, the Contractor shall correct the defect(s) to the satisfaction of the Engineer.
- (d) Contractor shall terminate and seal end of CIPP liner to structures using one of the following approved methods:
 - 1. Expanding Hydrophilic Rubber Joint Seal
 - 2. CIPP manufacturer approved epoxy
- (e) A pre-liner will be allowed without prior approval from the Owner.
- (f) The liner shall be pulled into place via the manufacturer's instructions.
- (g) Prior to liner installation a tough, protective sliding foil shall be installed over the deteriorated CMP invert.
- (h) The liner shall be inflated with air before curing with Ultra Violet light according to the manufacturer's specifications.
- (i) The reconstruction tube will be impregnated to meet manufacturer specifications with UV Curing Resins in the manufacturing facility prior to installation. The Contractor shall allow the Owner to inspect the materials before installation.
- (j) The Pre Impregnated UV Light Fiberglass Liner shall be inserted through the existing manhole or other approved access by means of a pull in place process utilizing a winch which will fully extend it to the next designated manhole or termination point. The Fiberglass Liner shall be inflated in place slightly with air to the manufacturer's specification for installing the UV Chain. Liner cure schedule shall be adhered to per manufacturer's specifications. The Fiberglass liner will then be inspected with a camera mounted on the UV Chain as it is pulled to the end of the liner. After

inspection and complete inflation to manufacturer's specifications, the UV light bulbs will be turned on. The curing will commence at a rate specified by the manufacturer according to the total dimensions of the liner.

(k) As the liner is curing, the UV Curing System shall record all curing data in DVD format for the viewing of the Owner.

1. Date and Time
2. Length of Liner
3. Location of Installation
4. Curing Speed
5. Light Sources and Wattage
6. Inner Air Pressure

(l) Initial cure shall be deemed to be complete when the UV Chain arrives at the initial entry point of insertion.

00413.42 Service Line Reconnection: - Reinstate active service laterals using an internal cutter. Open hole to a minimum of 95%, but do not exceed 105% of the service lateral diameter. Make each connection free from burrs or projections, and with a smooth and crack-free edge.

Finishing, Cleaning Up and Testing

00413.70 General: - Remove temporary dams or filtration measures after work is complete and pipe is cleaned and restored

00413.71 Material Sampling and Testing: - This section contains references to ASTM F2019 (*The Rehabilitation of Existing Pipelines and Conduits by the Pulled in Place Installation of Glass Reinforced Plastic (GRP) Cured-in-Place Thermosetting Resin Pipe (CIPP)*). In case of conflict between the requirements of this section and those of ASTM F2019, the requirements of this section shall prevail.

(a) **CIPP Liner Samples:**

1. **Sample Preparation:** The Contractor shall prepare samples of the installed CIPP liner for subsequent testing of its physical properties. Contractor shall cut two samples of as yet uncured for each diameter of liner being installed. Contractor shall place the uncured liner between two sheets of plexiglas and cause the liner to cure. The samples shall be identified by: Date, Project Name, Size, Thickness and Resin. Contractor shall split the liner samples with the construction manager who will keep one sample for future reference.
2. **Sample Testing:** The cured sample shall be tested by an independent testing laboratory, as recommended by the CIPP liner manufacturer and approved by Project Manager, for the bending and tensile properties, as per ASTM D790 and ASTM D638 respectively. Chain of custody documentation shall be required for the

samples tracing their movement from the field to the testing lab. Final payment will not be made until test results are received. The Contractor shall be responsible for any deviation from the specified physical properties and those evaluated through testing. Failure to meet the specified physical properties may result in the CIPP liner being considered defective

work that will be handled in accordance with the Contract. The Contractor shall be responsible for all costs associated with the testing of the liner physical properties.

(b) Wall Thickness: The method of obtaining the CIPP wall thickness measurements shall be in a manner according to ASTM F2019 7.1.4 and consistent with 8.1.2 of Specifications D5813. The average thickness shall be calculated using all measured values and shall meet or exceed minimum design thickness as agreed between purchaser and seller. The minimum wall thickness at any point shall not be less than 87.5 % of the average specified design thickness as agreed between purchaser and seller.

(c) CIPP Liner Handling: Contractor shall exercise adequate care during transportation, handling and installation to ensure that the CIPP material is not torn, cut, or otherwise damaged. If any part or parts of the CIPP material becomes torn, cut or otherwise damaged before or during insertion, it shall be repaired or replaced in accordance with the manufacturer's recommendations and approval by Owner before proceeding further and at the Contractor's expense.

(d) Conformance Standards and Remedies: The finished product must meet or exceed the following:

1. No radially positioned (perpendicular to flow) wrinkles, fins or other discontinuities in the lower third of the pipe which exceed ½ inches in height, or more than 3 percent of the host pipe inside diameter.
2. No radial wrinkles, fins or other discontinuities in the upper two-thirds of the pipe having a height of 5 percent or more of the host pipe inside diameter, unless approved.
3. No leakage through the liner.
4. No separation of the liner from the existing pipe.
5. No delamination of the UV-CIPP layers
6. If an installed liner has unacceptable wrinkles, fins, leakage, delamination, pinholes, soft spots, blisters, failed tests, or other defects, remedy the defect by installing a second liner, removing and re-installing a full-thickness liner, constructing a full pipe replacement, or installing a liner repair as approved.

00413.72 Repairs: - Before making repairs, provide the CIPP liner system manufacturer's recommendations for liner repairs, subject to approval. Repair or replace CIPP liners that

have:

- Wrinkles, fins or other discontinuities in the lower one-third of the pipe that are perpendicular to the flow and exceed 1/2 inches in height, or are greater than 3 percent of the host pipe inside diameter.
- Wrinkles, fins or other discontinuities in the upper two-thirds of the pipe that are perpendicular to the flow and are greater than 5 percent of the host pipe inside diameter.
- Blisters or dry spots present.
- Leakage through the liner in excess of ASTM F1216 and ASTM F2019 standards.
- Separation of the liner from the host pipe.
- Delamination of CIPP layers.

00413.75 Warranty - The Contractor shall warrant each pipe lined with the specified product against defects in materials, surface preparation, lining application, and workmanship for a period of 24 months from the date of final acceptance of the project.

(c) The Contractor shall, within one month of written notice thereof, repair defects in materials or workmanship that may develop during said 24-month period. Defects shall be defined as: evidence of visible leakage of groundwater through the CIPP system, delamination of any portion of the CIPP system as visible from CCTV inspection, or separation of any part of the CIPP system from the host pipe to the extent that the CIPP system inside diameter in the separated area is 95 percent or less of the completed CIPP system inside diameter. The Contractor shall also repair any damage to other work, damage to buildings, houses or environmental damage caused by the backup of the storm runoff because of the failure of the lining system; or repairing of the same.

(d) Repairs shall include removal of the existing liner and re-lining if possible, or excavation and replacement of the section of pipe where the defect occurs.

Measurement

00413.80 Measurement: - The quantities of installed CIPP liners, of the various kinds, types and sizes will be measured on the length basis. The length will be measured, with no deduction for the structures or fittings, along the pipe flow line from center to center of manholes, inlets, structures, special sections, or the ends of the pipe, whichever is applicable.

The quantities of service line reconnections will be measured on the unit basis, regardless of size.

Payment

00413.90 Payment – The accepted quantities of work performed under this Section will be paid for at the Contract unit price, per unit of measurement, for the following items:

| PAY ITEM | UNIT OF MEASURE |
|---------------------------------|------------------------|
| (a) 24-Inch Diameter CIPP Liner | Linear Foot |
| (b) 30-Inch Diameter CIPP Liner | Linear Foot |
| (c) 42-Inch Diameter CIPP Liner | Linear Foot |
| (d) 48-inch Diameter CIPP Liner | Linear Foot |
| (e) Service Line Reconnections | Each |

In Item (a), the nominal size of the host pipe will be inserted in the blank.

Payment will be made in full for furnishing and placing all materials, and for furnishing all equipment, labor, dewatering, testing and incidentals necessary to complete the work as specified.

00413.91 Payment Deduction:

Payment will be based upon the Contract Unity Price and test results acquired in accordance with 00413.71(a) and (b). Should test results fail to meet the specified design parameters for thickness and initial modulus of elasticity, yet comply with Conformance Standards in 00413.71 (d), a payment deduction will be made according to the Payment Formula below:

$$\text{Payment} = \text{Length Installed} \times \text{Contract Unit Price} \times (\text{actual safety Factor/Design Safety Factor})$$

The Actual Safety Factor will be calculated using the governing design equations (i.e. equations yielding the greatest minimum thickness) from ASTM F1216-Appendix X1. The measured thickness, measured flexural strength and measured initial flexural modulus will be substituted for their respective design values while the remaining parameters specified 00413.16 are held constant. The Design Safety Factor is 2.0.

No additional payment is made for CIPP exceeding required design safety factor. The CIPP will be considered Defective Work if the actual safety factor is below 1.0. The Owner reserves the right to require the Contractor to remove and replace it, at its sole discretion.