



Specifications, Plans, Contract Proposal,
Proposal Bid Bond for the:

Cured-in-Place Pipe Lining for Various Sewers

City of Danville, Illinois

Bid Opening: November 5, 2014 @ 10:00 a.m.

**Office of the City Clerk, Municipal Building
Danville Municipal Building, 17 W. Main Street, Danville, IL 61832**

R. David Schnelle, City Engineer

Bid No. 530



CITY OF DANVILLE

Notice to Bidders

RETURN WITH BID

Project	<u>CIPP for Sewers</u>
County	<u>VERMILION</u>
Local Agency	<u>DANVILLE</u>
Project No.	<u>Bid 530</u>

Time and Place of Opening of Bids

Sealed proposals for the improvement described below will be received at the office of CITY CLERK

17 W MAIN ST DANVILLE, IL 61832

until 10:00 o'clock A M., November 5, 2014 (address) Proposals will be opened and read publicly
(date)

at 10:00 o'clock A M., November 5, 2014 at the office of CITY CLERK
(date)

17 W MAIN ST DANVILLE, IL 61832
(address)

Description of Work

Name Cured-in-Place Lining for Various Sewers Length 5168 feet (0.98 miles)

Location Multiple Locations.

Proposed Improvement Installation of Cured-in-Place Pipe (CIPP) lining at various locations throughout the city. The size of the sewers to be lined varies from 6" to 10" inches in diameter. Only sanitary sewers are scheduled to be lined.

Bidders Instructions

1. Plans, special provisions, and proposal forms will be available www.cityofdanville.org under the "Contact Us" tab located on the left side of the main page. There you will find a link to "Bids and Requests for Proposals."
2. If prequalification is required, the 2 low bidders must file within 24 hours after the letting an "Affidavit of Availability" (Form BC 57), in triplicate, showing all uncompleted contracts awarded to them and all low bids pending award for Federal, State, County, Municipal and private work. Two copies shall be filed with the Awarding Authority.
3. All proposals must be accompanied by either a proposal bid bond, proposal cashier's check, or a proposal certified check in the amount of 5% of the total bid price.
4. The Awarding Authority reserves the right to waive technicalities and to reject any or all proposals as provided in the General Conditions.
5. Bidders need not return the entire contract proposal when bids are submitted unless otherwise required. Portions of the proposal that must be returned include the following:

a. Contract Cover	e. Contract Schedule of Prices
b. Notice to Bidders	f. Signatures
c. Contract Proposal	g. Proposal Bid Bond (if applicable)
d. Acknowledgement of Receipt of Addenda	h. Vendor's Sworn Statement Re. Delinquent Taxes
6. The quantities appearing in the bid schedule are approximate and are prepared for the comparison of bids. Payment to the Contractor will be made only for the actual quantities of work performed and accepted or materials furnished according to the contract. The scheduled quantities of work to be done and materials to be furnished may be increased, decreased or omitted as hereinafter provided.



CITY OF DANVILLE

Schedule of Prices

RETURN WITH BID

Project
County
Local Agency
Project No.

CIPP for Sewers
VERMILION
DANVILLE
Bid 530

CCTV Inspection, 6"

DESCRIPTION CCTV Inspection of 6" diameter sewer line
QUANTITY: 425.4
UNIT: FOOT
UNIT COST: \$
TOTAL: \$

CCTV Inspection, 8"

DESCRIPTION CCTV Inspection of 8" diameter sewer line
QUANTITY: 4251.1
UNIT: FOOT
UNIT COST: \$
TOTAL: \$

CCTV Inspection, 10"

DESCRIPTION CCTV Inspection of 10" diameter sewer line
QUANTITY: 491.4
UNIT: FOOT
UNIT COST: \$
TOTAL: \$

Service Connection Inspection

DESCRIPTION Inspection of service connections
QUANTITY: 134
UNIT: EACH
UNIT COST: \$
TOTAL: \$

CIPP Lining, 6"

DESCRIPTION	CIPP Lining of 6" sewer line
QUANTITY:	425.4
UNIT:	FOOT
UNIT COST:	\$
TOTAL:	\$

CIPP Lining, 8"

DESCRIPTION	CIPP Lining of 8" sewer line
QUANTITY:	4251.1
UNIT:	FOOT
UNIT COST:	\$
TOTAL:	\$

CIPP Lining, 10"

DESCRIPTION	CIPP Lining of 10" sewer line
QUANTITY:	491.4
UNIT:	FOOT
UNIT COST:	\$
TOTAL:	\$

Manhole Connections

DESCRIPTION	Seal CIPP to manhole/wall interface
QUANTITY:	42
UNIT:	EACH
UNIT COST:	\$
TOTAL:	\$

Service Reconnections

DESCRIPTION	Cut opening for active service laterals
QUANTITY:	134
UNIT:	EACH
UNIT COST:	\$
TOTAL:	\$

Testing

DESCRIPTION Physical Testing of installed CIPP Lining
QUANTITY: 1
UNIT: L SUM
UNIT COST: \$
TOTAL: \$

Mobilization

DESCRIPTION Mobilization
QUANTITY: 1
UNIT: L SUM
UNIT COST: \$
TOTAL: \$

REQUIRED CIPP CERTIFICATION

Pre-Installation Electro Scanning Testing

DESCRIPTION Testing of sewer lines using Electro Scanning Technology prior to CIPP installation
QUANTITY: 1
UNIT: L SUM
UNIT COST: \$
TOTAL: \$

Post-Installation Electro Scanning Testing

DESCRIPTION Testing of sewer lines using Electro Scanning Technology post CIPP installation
QUANTITY: 1
UNIT: L SUM
UNIT COST: \$
TOTAL: \$

TOTAL ELECTRO SCAN CERTIFICATION: _____

DATE OF INSTALLATION (Weeks after award): _____

TOTAL BASE BID + ELECTRO SCAN CERTIFICATION: _____

BIDDING FIRM: _____

ADDRESS: _____

PHONE: _____ CONTACT PERSON: _____

Signature, Authorized Officer

Attest: _____

Title

Date: _____

<u>Labor & Equipment Rates for Point Repairs</u>				
Item No.	Description	Quantity	Hourly Rate	Total
1	Laborer		\$	\$
2	Operator		\$	\$
3	Foreman		\$	\$
4	Truck w/ Tools		\$	\$
5	Excavator		\$	\$
6	Haul Truck		\$	\$
7			\$	\$
8			\$	\$
9			\$	\$
10			\$	\$

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PROPOSAL REQUIREMENTS

1.0 CORRELATION OF CONTRACT DOCUMENTS

This project shall be governed by the general requirements of the latest edition of the “STANDARD SPECIFICATIONS FOR WATER AND SEWER MAIN CONSTRUCTION IN ILLINOIS”, hereinafter referred to as the STANDARD SPECIFICATIONS; the latest edition of the Illinois Department of Transportation SUPPLEMENTAL and STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, hereinafter referred to as the IDOT STANDARD SPECIFICATIONS; the latest addition of the applicable “AMERICAN SOCIETY FOR TESTING AND MATERIALS” standards, hereinafter referred to as the ASTM STANDARDS; and the latest edition of the MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS.

This document includes the general conditions and the special provisions and shall herein be referred to as the CONTRACT DOCUMENT. The plans prepared for this project are herein referred to as the CONTRACT DRAWINGS. If there are any conflicting variances, the following order of priority shall prevail, with the document listed first governing over the document listed second, etc.

1. Contract Document;
2. Contract Drawings;
3. ASTM Standards
4. Standard Specifications;
5. IDOT Standard Specifications;
6. Plan Details;
7. Standard Drawings.

2.0 DESCRIPTION OF THE WORK/APPROVALS

The work shall consist of providing 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 laterals, 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.

The product furnished shall be a complete Cured in Place Pipe (CIPP) system designed for a life of fifty (50) years or greater including all materials, applicable equipment and installation procedures. The City will select the contractor for this work evaluating the materials to be used, the experience of the manufacturer and installer, the availability of the vendor, and the expected overall project costs.

Minimum material requirements shall be according to the special provision for Cured-In-Place Pipe Lining. The CIPP product and manufacturer shall be chosen from the following systems:

1. Product – National Liner CIPP
Manufacturer – National Liner
www.nationalliner.com
1-800-547-1235

2. Product – Insituform CIPP, Manufacturer – Insituform Technologies www.insituform.com
1-800-234-2992
3. Product – CIPP Pipe Manufacturer – CIPP Corp www.cippcorp.com
1-888-485-2477
4. Product - Electro Scan for Sewers and/or Laterals -- Electro Scan Inc. www.electroscan.com
1-916-779-0660
5. Manufacturer's Equivalent

The installer shall be an approved installer of the selected manufacturer. The Contractor shall submit the product, manufacturer, and installer qualifications with the proposal.

3.0 COMPLETION DATE

This is a completion date contract. All work shall be completed by May 15, 2015.

4.0 AWARD OF CONTRACT

It is the intent of the City of Danville, Illinois, to make an award of contract within 30 days after receipt of proposals. The contractor shall have 14 calendar days to execute the contract. SUBMITTALS

5.0 SUBMITTALS

All materials to be incorporated into the work shall be submitted for approval and approved by the Engineer before any work on that item begins. Any work on an item before submittal documents are approved will be rejected and no compensation will be awarded for the work performed. Items requiring submittal and approval include but are not limited to:

1. Fabric Tube – including the manufacturer and description of product components
2. Flexible membrane (coating) material – including recommended repair (patching) procedure if applicable.
3. Raw Resin Data – including the manufacturer and description of product components
4. Manufacturers' shipping, storage and handling recommendations for all components of the CIPP system.
5. All MSDS sheets for all materials to be furnished for the project.
6. Tube wet-out and cure method including:
 - a. A complete description of the proposed wet-out procedure for the proposed technology.
 - b. The manufacturer's recommended cure method – for each diameter and thickness of CIPP liner to be installed. The PWS shall contain a detailed curing procedure detailing the curing medium and the method of application.
7. Engineering design calculations, in accordance with the Appendix of ASTM F 1216, 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 connection and apply that design to all the line sections. Calculations shall be prepared and sealed by an Illinois licensed Professional Engineer.

6.0 ALTERNATE BID

The project includes an alternate for Electro Scan Testing. The City will have sole discretion in deciding which Electro Scan Testing alternate(s), if any, to award. The Electro Scan alternative(s) selected will be based upon total available budget.

A bidder will not be considered unresponsive if the alternate bid is left blank.

7.0 TRAFFIC CONTROL AND PROTECTION

Throughout the duration of the proposed project, the Contractor is required to maintain two-way traffic on all streets except the block where sewer repairs are actually being performed. At that block only, local traffic must be maintained during evenings and weekends unless the Engineer has given authority to leave the street closed.

The Contractor shall notify the City Engineer's office at least one week prior to beginning construction. The Contractor shall notify the Engineer of individual lane, road, and alley closures a minimum of two (2) working days in advance of the closure.

The Contractor shall maintain at all times a sufficient number of barricades, signs and flaggers as is necessary to meet the requirements of the details in the ILLINOIS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

At the end of every work day, the Contractor shall clean up his/her work area so a safe traveling surface is available for night time use by local traffic. The Contractor shall be required to provide access to every driveway along each construction area before leaving the job site at the end of the day, unless other provisions to the contrary have been approved by the Engineer.

The Contractor shall install fencing around any open excavations at the end of each day's operations.

When working on arterial streets where one lane of traffic is to be kept open, the Contractor shall use an appropriate arrow board, in accordance with the above referenced manual, to divert traffic from one lane to another.

To ensure a prompt response to incidents involving the integrity of work zone traffic control, the Contractor shall provide a telephone number where a responsible individual can be contacted 24 hours-a-day.

When the Engineer is notified, or determines a traffic control deficiency exists, he/she will notify and direct the Contractor to correct the deficiency within a specified time. The specified time, which begins upon notification to the Contractor, will be from ½ hour to 12 hours based upon the urgency of the situation and the nature of the deficiency. The Engineer shall be the sole judge.

A. TRAFFIC CONTROL DEFICIENCY DEDUCTION (BDE)

A deficiency may be any lack of repair, maintenance, or non-compliance with the traffic control plan. A deficiency may also be applied to situations where corrective action is not an option such as the use of

non-certified flaggers for short term operations; working with lane closures beyond the time allowed in the contract; or failure to perform required contract obligations such as traffic control surveillance.

If the Contractor fails to correct a deficiency within the specified time, a daily monetary deduction will be imposed for each calendar day or fraction thereof the deficiency exists. The calendar day(s) will begin with notification to the Contractor and end with the Engineer's acceptance of the correction. The daily monetary deduction will be either \$1,000 or 0.05 percent of the awarded contract value, whichever is greater. For those deficiencies where corrective action was not an option, this monetary deduction will be immediate.

If the Contractor fails to respond, the Engineer may correct the deficiency and the cost thereof will be deducted from monies due or which may become due the Contractor. This corrective action will in no way relieve the Contractor of his/her contractual requirements or responsibilities.

8.0 WORK AREA

All work shall be performed on public rights-of-way unless the Contractor obtains written temporary easements approved by the City.

9.0 PRE-CONSTRUCTION MEETING

After contract award, the Engineer will schedule a pre-construction meeting for the project. The Contractor shall have his General Superintendent and Supervisor present at the pre-construction meeting to discuss all details of the project.

The contract shall submit a Performance Work Statement (PWS) at the pre-construction meeting, which clearly defines the CIPP product delivery in conformance with the requirements of these contract documents. 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. Where the scope of work is specifically delineated in the contract documents, a detailed installation plan describing 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 CIPP liner installation. A detailed installation schedule shall be prepared, submitted and conform to the requirements of this contract.
3. Contractor's description of the proposed CIPP lining technology, including a detailed plan for identifying all active service connections maintaining service, during mainline installation, to each home connected to the section of pipe being lined, including temporary service if required by the contract.
4. The PWS list the tools and equipment needed for the work and 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. 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.
6. 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.
7. A detailed public notification plan shall be prepared and submitted including detailed staged notification to residences affected by the CIPP installation
8. An odor control plan shall be prepared and submitted including detailed staged notification to residences affected by the CIPP installation.

10.0 GUARANTEE PERIOD

For a period of one (1) year from the date of completion, as evidence by the date of final acceptance of the work, the Contractor warrants that all work performed under his contract conforms to the contract requirements and is free of any defect of equipment, material or workmanship performed by the Contractor or any of his/her subcontractors or suppliers.

11.0 AS-BUILT DRAWINGS

As-Built drawings, pre and post inspection CDs and/or DVDs shall be submitted to the City of Danville by the Contractor within two (2) weeks of final acceptance of said work. As-Built drawings will include the identification of the work completed by the Contractor including installed length, number of services reconnected in each installation length and location of services reconnected including distance from upstream manhole and clock position and shall be prepared on one set of Contract Drawings provided to the Contractor at the onset of the project.

As-Built drawings 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 City of Danville and the Contractor at the start of the Contract and shall be updated as the work is being completed, and shall be clearly legible.

12.0 CCTV INSPECTION AND CLEANING

Date Prepared: January 2014

Prepared by: City of Danville

Description: This work shall consist of all pre-cleaning and post-cleaning and closed circuit television (CCTV) inspection of sanitary lines. CCTV inspection includes recording the inspection in a conventional digital format. The contractor shall clean all lines prior to lining followed by CCTV inspection. The contractor shall also clean and perform at CCTV inspection after lining.

The contractor shall remove all internal debris from the conduit that will interfere with the installation and the final product delivery of the CIPP, including roots, protruding service connection taps, etc., as required in these specifications. Solid debris and deposits shall be removed from the system and disposed of properly by the Contractor. Moving material from manhole section to manhole section shall not be allowed. As applicable the contractor shall either plug or install a flow bypass pumping system to properly clean the pipe lines. Precaution shall be taken by the Contractor in the use of cleaning

equipment to avoid damage to the existing pipe. Repairs required due to negligence in cleaning of the pipe lines shall be the responsibility of the Contractor.

The contractor shall be responsible for confirming the locations of all branch service connections prior lining. Service connections found during the pre-lining CCTV inspection shall be CCTV inspected to the maximum practical extent. Service connections that can be positively determined to be abandoned shall not be reconnected. The Contractor shall reconnect all active services.

Only PACP certified personnel trained in locating breaks, obstacles and service connections by CCTV shall perform the inspection. The Contractor shall provide the Engineer a copy of the CCTV videos and inspection logs upon their completion. The videos shall be unedited digital documentation of the inspection. Post-lining video shall be provided to the City of Danville within ten (10) working days of the liner installation. The data shall note the inspection date, location of all reconnected service laterals, 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 City of Danville may, at its discretion, suspend any further installation of CIPP until the post-installation documentation is submitted.

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.

Structural defects discovered during pre-lining inspection shall be repaired according to the special provision for Point Repairs.

Measurement and basis of payment: Cleaning, inspection logs, and video shall be measured for payment in place per foot between manhole centers at the contract unit price per foot of CCTV INSPECTION of the type specified. Inspection and televising of service connections shall be measured for payment in place and will be for at the contract unit price per each SERVICE CONNECTION INSPECTION. Service Connection Inspection may be deleted from the project prior to contract award.

13.0 POINT REPAIRS

Date Prepared: January 2014

Prepared by: City of Danville

Description: This work shall consist of repairing pipe segments along pipe lengths that have been determined to need structural repairs prior to lining. The location, length, depth and size of the point repair(s) shall be determined according to the special provision for CCTV Inspection and repaired prior to lining.

No work shall take place outside right-of-way or temporary easements. The Contractor shall restore all landscaped areas to the existing elevation of the ground by placing at least 6 inches of topsoil and seeding and mulching according to the Standard Specifications. Pavement removal and restoration shall be by others and the Contractor shall coordinate the work in advance with the Engineer.

Point repairs will be paid for on a time and material basis. The contractor shall submit equipment rates and expected labor requirements (e.g. number of operators, laborers, etc.) necessary for the work as part

of their proposal. Labor and material costs shall be paid for according to Article 9-4 of the Standard Specifications. The Engineer may control the number of laborers, foremen, and operators utilized for the repairs.

14.0 CURED-IN-PLACE PIPE LINING REQUIREMENTS

Date Prepared: January 2014

Prepared By: City of Danville

A. GENERAL

Description: This work shall consist of all design, labor, materials, equipment, and incidentals required to rehabilitate the sanitary sewers as shown on the plans and specifications by inserting a full length Cured-in-Place Pipe (CIPP) liner in between the access points indicated on the plans.

The sewer shall be lined with a resin impregnated flexible felt tube, which shall be inverted into the existing sewer line utilizing a vertical standpipe and hydrostatic head (or an equivalent system approved by the Engineer). When cured, the liner shall extend the full length of the pipe to be lined in a continuous tight fitting water tight pipe within a pipe. There shall be no annular space between the liner and the pipe. This method shall meet the requirements of ASTM F 1216, latest edition, "The Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube."

The liner shall be constructed of materials which, when cured, will be chemically resistant to withstand internal exposure to domestic sewage. The cured-in-place pipe shall provide a smooth bore interior with a coefficient of friction of n-0.10 or lower.

The liner shall be fabricated to a size that when installed will neatly fit the internal circumference of the conduit specified by the City of Danville. Allowance shall be made for circumferential stretching during insertion.

The lengths of the liner shall be determined by the Contractor to effectively span the distance from the inlet of the downstream manhole to the outlet of the upstream manhole. The Contractor shall verify the length and diameter of the existing sewer to be lined in the field prior to impregnation of the tube with resin. Excess liner shall be removed from inside the manholes by the Contractor at no additional cost.

Referenced Documents: The Contract references ASTM F 1216, ASTM D2990, ASTM D638, ASTM D543, ASTM D790 and ASTM D792, latest edition, which shall be considered part of these documents. ASTM F 1216 shall govern the installation, material, and methods of the CIPP lining for all items not specifically addressed by these specifications.

B. MATERIALS

1. FABRIC TUBE

The fabric tube shall consist of one or more layers of absorbent non-woven felt fabric, felt/fiberglass or fiberglass and meet the requirements of ASTM F 1216. 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.

The tube should be compatible with the resin system used. The outside layer of the tube should be plastic coated with a material that is compatible with the resin system used. The tube shall be fabricated to a size that, when installed, will tightly fit the internal circumference and the length of the original conduit, meeting applicable ASTM standards or better. Allowance shall be made for circumferential stretching during inversion. 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.

No material shall be included in the fabric tube that may cause de-lamination 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.

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 (CCTV) 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.

The outside of the fabric tube shall be marked with the name of the manufacturer or CIPP system, manufacturing lot and production footage.

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.

The nominal fabric tube 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. RESIN

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 F 1216, the physical properties herein, and those, which are to be utilized in the design of the CIPP for this project. The resin shall produce CIPP which will comply with or exceed the structural and chemical resistance requirements of this specification

3. STRUCTURAL REQUIREMENTS

The Contractor shall vary the material proportions and degree of cure to provide a CIPP system which meets or exceeds the minimum properties specified herein:

- a. The CIPP shall be designed as per ASTM F 1216 Appendixes. The CIPP 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 Contractor submits long term test data (ASTM D2990) to substantiate a higher retention factor.
- c. The cured pipe material (CIPP) shall, at a minimum, meet or exceed the structural properties, as listed below.

MINIMUM PHYSICAL REQUIREMENTS

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
Flexural Strength (Short Term)(Felt Tubes) Felt/Fiberglass, Fiberglass as recommended by the Manufacturer	ASTM D-790	4,500 psi	Contractor Value

The required structural CIPP wall thickness shall be based, as a minimum, on the physical properties of the cured composite and per the design of the Professional Engineer 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 (1.5 for pipes 36” or larger)
Creep Retention Factor	50%
Ovality	2% or as measured by field inspection
Constrained Soil Modulus	1,000 psi
Groundwater Depth	Assume saturation to grade
Soil Depth (above the crown)	As Specified or indicated on the plans
Live Load	Highway or railroad as applicable
Soil load (assumed)	120 lb/cu ft
Minimum Service Life	50 years

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

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.

C. INSTALLATION

1. PREPARATION

Preparation, cleaning, inspection sewage by-passing and public notification are required as part of this project. The Contractor shall clean and remove debris from the interior host pipe prior to installation of the CIPP liner according to the special provision for CCTV Inspection.

The CIPP 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.

The Contractor may utilize any of the existing manholes in the project area as installation access points.

By-passing Existing Sewage Flows: The Contractor shall provide for the flow of existing mainline and service connection effluent around the section or sections of pipe during CIPP installation. Service connection effluent may be plugged only after proper notification to the affected property and may not remain plugged for more than 6 hours. Installation of the liner shall not begin until the Contractor 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.

If the Contractor elects to use a pump by-pass system, an on-line backup pump shall be required to be on site at all times. All pumps shall be self-priming and shall be equipped with primary and backup floats to turn on and shut off the pumps. The contractor shall maintain sewer flow such that it will not cause surcharging of sewers, damage to sewers, and that it will protect public and private property from damage and flooding. The Contractor shall submit a detail of the bypass plan and design to the Engineer before proceeding with a CIPP installation.

Existing sewage flows shall be maintained until the resin/felt tube composite is fully cured, cooled, cleaned of excess resin, televised, and service laterals reestablished and the CIPP ends finished. The Contractor shall coordinate sewer bypass and flow interruptions with the City of Danville at least two (2) days in advance and with the property owners at least two (2) business days in advance.

Use of fire hydrants as a water source shall be coordinated with Aqua Illinois. The Contractor shall provide evidence of permission to use fire hydrants to the Engineer prior to doing so.

LININGCIPP installation shall be in accordance with applicable ASTM standards and the approved manufacturer installation instructions.

2. CURING

The Contractor shall perform the curing of the inverted tube in accordance with ASTM F 1216, Section 7.6 using circulated heated water or steam.

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. COOL DOWN

The Contractor shall cool down the hardened liner in accordance with ASTM F 1216, Section 7.7.

4. FINISH

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 de-lamination. The CIPP shall be impervious and free of any leakage from the pipe to the surrounding ground or from the ground to inside the lined pipe

Any defect, which will or could affect the structural integrity or strength of the linings, shall be repaired at the Contractor's expense.

The beginning and end of the CIPP shall be sealed to the existing host pipe. The sealing material shall be compatible with the pipe end and shall provide a watertight seal.

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.

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

5. MANHOLE CONNECTION AND SERVICE RECONNECTION

A seal consisting of a resin mixture or hydrophilic seal compatible with the installed CIPP shall be applied at manhole/wall interface in accordance with the CIPP system manufacturer's recommendations.

The Contractor shall reconnect all active service connections.. Reconnections of existing services shall be made after the CIPP has been installed, fully cured, and cooled.

A CCTV camera and remote cutting tool shall be used for internal reconnections. The machined opening shall be at least ninety (90%) of the service connection opening and the bottom of both openings must match. The opening shall not be more than one hundred (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.

In the event that service reinstatements result in openings that are greater than one hundred (100%) of the service connection opening, the Contractor shall install a CIPP 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.

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.

6. TESTING & CERTIFICATION OF INSTALLED CIPP

a) Physical Testing

The physical properties of the installed CIPP shall be verified through field sampling and laboratory testing. The Contractor shall engage a third party laboratory recommended by the CIPP manufacturer to verify installed materials meet or exceed the minimum requirements as specified herein. All tests shall be in accordance with applicable ASTM test methods.

The Contractor shall provide samples for testing to the laboratory from the actual installed CIPP liner at a rate of one location per 1000 linear feet of CIPP installed. The sample shall be 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. As an alternative, the Contractor may use industry proven, non-destructive methods for confirming the thickness of the installed CIPP. All curing, cutting and identification of samples will be witnessed by the City of Danville prior to transmittal to the testing laboratory.

The laboratory results shall identify the test sample location as reference to the nearest manhole. The liner thickness shall have tolerance of minus five (5%) percent plus ten (10%) percent. CIPP liner not meeting the physical and thickness requirements shall be repaired or replaced by the Contractor.

Hydraulic Capacity: The hydraulic capacity shall be maintained as large as possible.

b) Electro Scan Testing

1) Pipe Liner Testing

Acceptance testing of installed CIPP shall be performed using an electro scanning system in compliance with ASTM F2550-13 for pipe inspection and shall be performed by an independent third party contractor experienced in the use of the electro scan system.

2) Pipe Liner Test Method

The electro scan test shall be conducted on 100% of the total linear footage of mainline pipe rehabilitated using CIPP before and after installation. Testing shall be performed only on nonconductive host pipe. It shall be the responsibility of the CIPP contractor to accurately identify the host pipe material based on pre-installation TV or historical records.

The electro scan testing shall be conducted in accordance with the manufacturers recommended practices. The electro scanning contractor shall be responsible for any damages to public or private property resulting from electro scan testing activities.

The following limits shall be used to determine the significance of detected defects.

- Anomalies below the “Small Threshold” (<100 mA) are considered acceptable, but may be eligible for investigation at no cost to the CITY. This excludes anomalies detected at the beginning and end of pipe at manholes.
- Anomalies above the “Small Threshold” >100 mA, are initially considered “unacceptable”. Defects need to be further investigated and reviewed
 - If deemed unacceptable, the pipe will be failed.
- Anomalies that occur at the beginning and end of a lined pipe, where the probe is exiting or entering a manhole, will not be the responsibility of the contractor and will be accepted by the CITY
- If no lateral connection rehabilitation will take place, contractor will not be held liable for any anomalies detected at lateral reinstatements. However, lateral reinstatements must be performed to specification C.5.
- The CITY will have full access to all automatically recorded testing conditions via a cloud-based portal and will be verifying all tests are being performed within the manufacturer’s recommended parameters. All scans must be performed within the following testing parameters:
 - Pipe must be fully surcharged with water at the location of the probe to ensure a full 360 degree inspection of the pipe. This can be achieved in whatever way the contractor chooses, but the CITY and manufacturer recommend using a Sliding Funnel plug, in conjunction with a hydraulic jet truck. If chosen, probe must remain a minimum of three (3) feet from funnel plug.
 - Total Current readings must be a MINIMUM of 2800mA when probe is in a concrete manhole when starting the scan, and must not drop below 1000 mA after entering the lined pipe.
 - Speed must not exceed 40 feet per minute

CIPP installations shall be considered acceptable when no anomalies are detected.

All pipes with Defects above the “Small Threshold” shall be retested after CONTRACTOR has addressed the defect at no additional cost to the CITY

The Electro Scan contractor shall provide analyzed results to the both the CONTRACTOR and the CITY or its representative within 2 business days of testing each section via uploading the scans to the CITY’s cloud-based viewing platform account.

NOTE: CONTRACTOR will not have access to the CITY’s cloud-based viewing platform account.

3) Equipment

The electro scan technology system used for the survey shall be specifically designed and constructed for such inspection. This equipment shall be in full compliance with ASTM F2550-13 with capabilities as outlined in this Standard. These capabilities and proprietary algorithms shall include the following:

- City and State
- Date of Inspection
- Location of Inspection
- Pipeline size, type, and overall length
- Graph showing:
 - o Defect start / end and overall length (ft.)
 - o Possible GPM infiltration
 - o Possible GPM Defect Area (ft.)
 - o Defect Threshold:
 - Small
 - Medium
 - Large
 - o Overall chart indicating GPM summary in detail
 - Minor flow and percentage of total flow
 - Moderate flow and percentage of total flow
 - Severe flow and percentage of total flow
 - Total GPM
 - Total GPD

4) Performance

The inspection shall be performed on one sewer line section (i.e. manhole to manhole) at a time. Flow within the section is irrelevant except within the area of the inspection probe, which will be 100 percent flooded to within three (3) feet of the probe in both directions.

The probe shall be pulled through the line at a uniform rate in compliance with operator discretion. The rate of inspection should not be greater than 40 feet per minute, and the rate should not exceed the capability of encapsulating the probe with water.

5) Sewer Main Assessments

For each mainline sewer, executing the electro scan testing will begin with a light flushing of the sewer line and then using the hydraulic jet hose and reel to pull the electro scan probe through the pipe. The sewer line will be flushed from the downstream manhole, the nozzle removed at the upstream manhole, a Sliding Funnel Plug will be

attached to the hose, and the electro scan probe will be attached to the Plug. The hydraulically powered jet truck will then pull the probe through the pipeline while simultaneously providing the water necessary for the probe to electrically examine the pipe walls. Should a pipe segment be surcharged to the point where flushing is not appropriate, other techniques and equipment will be used, including, but not limited to, float lines, parachutes, and immediate-area flow restriction.

All data will be fed back to the PC via the standard coaxial cable. Once the data is collected on the laptop computer, it will be uploaded to a Cloud-Based portal where it will be instantly processed and available for Owner/engineer/contractor and staff to view. This portal shall be a secure site and only accessible by owner code and pathway security.

All mainline sewers as identified in this contract shall be inspected with the use of an approved supplier of the electro scan technology equipment that meets ASTM F2550-13. ONLY those licensed and pre-approved by the equipment manufacturer and Owner will be allowed to participate in this contract. Contractors with sub-contractors that have such prior licensing, training, and manufacturers approvable will be allowed to participate but only after having written documentation and certification. Training and certification of the electro scan system usage will only be from the electro scan equipment manufacturer or the local representative of electro scan.

The equipment manufacturer's custom and proprietary algorithms shall be used to grade the size and type of each leak, structural defects, or other possible defects, and graphically display the defect grade size, corrosion, type and frequency for each manhole-to-manhole pipeline section. In addition, the manufacturer's software will provide an estimated GPM gallons per minute, and GPD gallons per day infiltration rate per defect and for the entire pipeline segment. All must be in accordance with ASTM F2550-13.

All tasks as listed above in **Section C.6.b** shall be provided in the report for each line segment and for the overall project report.

6) Minimum Requirements

Contractor should not propose solutions which do not meet the following standards:

A. Electro Scan Sewer Mains & Laterals. The proposed solution must comply with ASTM F2550-13 "Standard Practice for Locating Leaks in Sewer Pipes By Measuring the Variation of Electric Current Flow Through the Pipe Wall" or equivalent. Instrumentation must represent a complete and fully functioning device to scan sewer lateral and record all pipe defects capable of causing leaks. The proposed solution must include any recommended accessories and spare parts necessary to complete this work.

B. CCTV Integration. The Contractor's solution must be capable of integration to an existing CCTV coaxial cable and reel.

C. Cloud-Based, Hosted Data Storage, Access& Export Capabilities. After each electro-scan is finalized in the field, Contractor's field computer system must be capable of transmitting each electro-scan to a central data base management system (DBMS) to

temporarily store data, allowing CITY personnel to view, display, and export data. The proposed solution must have industry accepted password protection and be hosted from a reputable third party.

7. MEASUREMENT AND BASIS OF PAYMENT

All work as described below will be measured for payment in place. Work not described shall not be measured or paid for separately but will be included in the cost of the item for which it is needed. CIPP lining shall be measured in feet from center to center of manhole at the contract unit price per foot for CIPP LINING of the diameter specified. Manhole connections will be paid for at the contract unit price per each for MANHOLE CONNECTIONS. Reconnection of existing services will be paid for at the contract unit price per each for SERVICE RECONNECTIONS. Testing will be paid for at the contract lump sum price for TESTING, PRE-INSTALLATION ELECTRO SCAN TESTING, and POST-INSTALLATION ELECTRO SCAN TESTING.

References

This document was adapted, in-part, from:

Gerry Muenchmeyer, Muenchmeyer Associates, LLC. Performance Specification Guideline for the Installation of Cured-In-Place Pipe (CIPP), 2nd Edition, June 2011: NASSCO

ASTM F2550-13, Standard Practices for Locating Leaks in Sewer Pipes By Measuring the Variation of Electric Current Flow Through the Pipe Wall