Application for Construction Code Appeal

Facility Information			
Facility Name City of Ann Arbor -Plumbing Dept.		County Washtenaw	
Facility Street Address 301 E Huron St		City Ann Arbor	Zip 48107
Permit Number PLUM14-1848			
Building Data			
New Building ☐	Addition ☐	Alteration ☐	Repair ☑
Classification Per Building Code Building Use	No. Of Floors	Construction Type	Area/Floor	No. Of Occupants
Permit Holder			
Name (Company or Individual) RooterMD Plbg LLC		Contact Name Peter Wood	
Street Address 31675 W Eight Mile	City Livonia	State MI	Zip 48152
Phone 248-888-7777	Fax	Email	
Building Owner			
Name (Company or Individual) DOROTHY BROOKS		Contact Name	
Street Address 1625 Waltham Dr.	City Ann Arbor	State MI	Zip 48103
Phone	Fax	Email	
Summary Of Appeal			
CODE SECTION(s) MRC P3005.3, R109.4 are the primary sections.		*Provide copies of the following as appropriate:* Statement of Facts and Reasoning Please see attached. ☐	
DESIRED RELIEF (State Briefly) 1. A finding that SOP-501 (3.6.2016) applies to this permit. 2. A finding that there is no violation of MRC P3005.3 3. See attachment for additional request for relief.			
BASIS OF APPEAL (State Briefly) The inspector did not apply the proper SOP and has no evidence that there is in fact non-compliance with P3005.3. See attachment for additional information.		Supporting Material Please see attached. ☐	

Applicant (all correspondence will be sent to this address)			
Name (company or individual) Peter Wood c/o Hooper Hathaway PC		Applicant Name c/o Oscar A. Rodriguez	
Street Address 126 S. Main St.	City Ann Arbor	State MI	Zip 48104
Phone 734-662-4426	Fax 734-662-6098	Email orod@hooperhathaway.com	

Application Fee (applicant is responsible for paying fee)

Residential $250.00 ☑ Commercial $500.00 ☐

Note: *You have the right to appeal the City of Ann Arbor's Building Boards of Appeals decision to the State of Michigan. If you choose to appeal this decision, then application must be made within 10 days of the decision to the address listed below, in accordance with Section 16 of 1972 PA 230. Michigan Department of Labor & Economic Growth, Bureau of Construction Codes, P.O. Box 30255, Lansing, MI 28909 517-241-9303, www.michigan.gov/bcc*

Note *: Reasons for Appeal (Per MRC, Section R112.2, MBC, Section 113.2) include:*

1. *The true intent of the code or the rules roverning construction have been incorrectly interpreted*
2. *The provisions of the code do not apply*
3. *An equal or better form of construction is proposed*

Applicant Signature [signature] Date 10/5/18

HOOPER HATHAWAY, P.C.

ATTORNEYS AT LAW

126 SOUTH MAIN STREET

ANN ARBOR, MICHIGAN 48104-1945

(734) 662-4426

FAX (734) 662-6098

orod@hooperhathaway.com

JAMES R. BEUCHE
BRUCE T. WALLACE
CHARLES W. BORGSDORF
GREGORY A. SPALY
WILLIAM J. STAPLETON
SUSAN T. CANNELL
ANGELA L. JACKSON
OSCAR A. RODRIGUEZ
MARTA A. MANILDI
CHRISTOPHER M. TAYLOR
WILLIAM M. BEUCHE
FRANCYNE B. STACEY
ADAM M. LINKNER

JOSEPH C. HOOPER
1899-1980

JOHN R. HATHAWAY
1929-2001

ALAN E. PRICE
OF COUNSEL

October 5, 2018

City of Ann Arbor
Building Board of Appeals
301. E. Huron St., First Floor
Ann Arbor, MI 48107

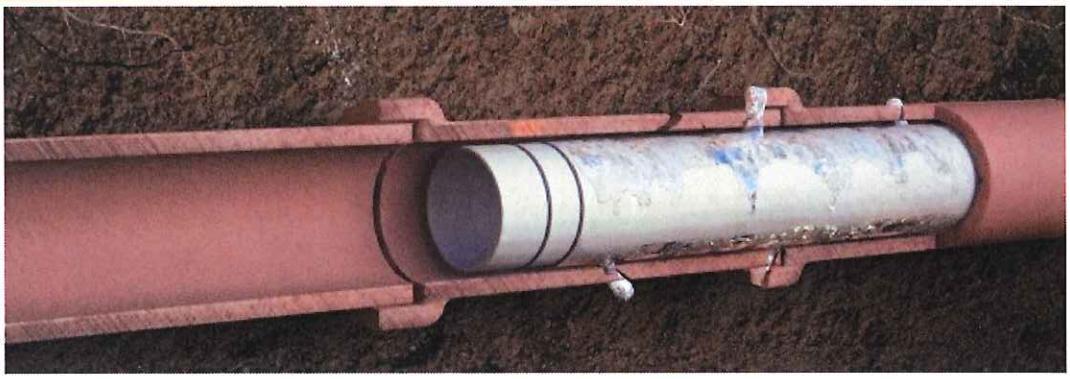
VIA HAND DELIVERY

Re: Appeal Relating to Plumbing Permit PLUM14-1848 issued for the rehabilitation of the sewer line at 1625 Waltham Drive, Ann Arbor, MI 48103.

Appellant, Peter J. Wood ("Mr. Wood"), by and through his attorney, for his Appeal pursuant to Michigan Residential Code R112.2, states as follows:

INTRODUCTION

1. The sewer line at 1625 Waltham Drive needed to be rehabilitated. The homeowner hired Mr. Wood to improve the failing sewer line by installing what is known as "cured-in-place-piping or CIPP." CIPP is a trenchless pipeline rehabilitation process involving a textile liner tube and liquid resin combination. The liner is inserted into the host sewer pipe and cures to a hard state, forming a new, seamless pipe within a pipe. The process is popular for homeowners because it is completed without any digging. An illustration of the concept is provided below (see also Exhibit 1):



2. Exhibit 1 contains information about the product and equipment used by Mr. Wood to complete CIPP installations.

3. This appeal relates to a March 6, 2018 notice issued by Ann Arbor Code Official Ryan Miller ("Mr. Miller"). The notice indicates that an inspection was completed on October 30, 2017. The inspection was not approved. Mr. Miller contends that there is a violation of the 2009 Michigan Residential Code P3005.3 ("P3005.3). Please refer to Exhibit 2 for the notice and related documents. The video inspected is accessible at: https://youtu.be/3rRgabN_UMM The video of the sewer prior to CIPP installation is accessible at: https://youtu.be/_O1uJB-S5lA

4. P3005.3 provides:

> **Horizontal drainage piping slope**. Horizontal drainage piping shall be installed in uniform alignment at uniform slopes not less than 1/4 unit vertical in 12 units horizontal (2-percent slope) for 21/2 inch (64 mm) diameter and less, and not less than 1/8 unit vertical in 12 units horizontal (1-percent slope) for diameters of 3 inches (76 mm) or more.

5. Mr. Miller cites as evidence that there is a "belly in liner from 81- to 56' (pipe holding water)."

6. **Basis of Appeal:** Mr. Wood appeals under 2009 Michigan Residential Code R112.1. In particular, Mr. Wood believes that Mr. Miller and the City 1) did not apply the true intent of the code, and 2) incorrectly applied the code in that P3005.3 requires concrete evidence that the slope requirement is not met. Mr. Wood also appeals on grounds that P3005.3 does not apply to CIPP installations which are trenchless and do not permit for accurate measurement of slope. In support of the claim that P3005.3 does not apply, Mr. Wood will discuss Standard Operating Procedure 501 (Exhibit 8), which expressly provides the criteria that should be applied to inspections of CIPP installations.

BACKGROUND ON DISPUTE

7. Mr. Wood is the owner of RooterMD Plbg, LLC ("RooterMD"). Mr. Wood has been performing residential and commercial plumbing services in Southeast Michigan for over 45 years. RooterMD has been using CIPP technology since 2002.

8. RooterMD has performed over 50 CIPP installations in Ann Arbor alone. Mr. Wood has never received a request by a homeowner to replace or repair[1] a CIPP liner. RooterMD offers a 10 year "repair or replace" warranty for any CIPP liner that experiences "defects in material or workmanship." See Exhibit 3. **To date, RooterMD has not received a claim under its warranty.**

9. The City has issued violation notices on Waltham and 7 other permits, all dealing with RooterMD's installation of CIPP liners into existing residential sewer lines. While this appeal only deals with 1625 Waltham Dr. (PLUM14-1848), it is Mr. Wood's position that if this appeal is resolved in his favor, an appeal will not be necessary on the remaining 7 cases. The Board of Building Appeals can appreciate Mr. Wood's efforts to conserve precious resources when all 8 cases involve the exact same issues[2].

10. The City claims that violation of P3005.3 may lead to sewer backups at affected residences. The Board should note that in each of the 8 cases (with one exception, which is addressed in footnote 1) there has not be a **single** complaint about a sewer backup. All of the CIPP liners at issue were installed and operational in 2013 (1), 2014 (4) and 2015(2). The CIPP liner at issue in this appeal was installed in 2014 and has been working without fault. Mr. Wood cannot stress enough: not a single complaint, not a single warranty claim.

MR. RYAN MILLER'S POSITION

11. The City's position seems to be that this alleged violation of P3005.3 requires a full dig up and replacement of the respective sewer lines. Not only is this impractical because the homeowners chose a trenchless option in the first place to avoid disruption of their yards, but it would cost RooterMD thousands and thousands to do the work.

THE CITY'S HAS PREVIOUSLY APPROVED PERMITS WHICH CONTAIN THE "ISSUE" IT NOW COMPLAINS OF

12. This is evidence that the true intent of the code is not being served.

13. Take for example the permit at 1517 Granada Av (PLUM-10-1441). See materials at Exhibit 4. The permit was issued to "replace sewer from basement to manhole using pipe bursting[3]."

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[1] The job at 2866 Gloucester Way was completed with the homeowner's understanding that CIPP may not work. The homeowner chose to use CIPP, as opposed to the traditional "trench" sewer line replacement option, in hopes of saving his existing mature landscaping. Ultimately, the CIPP liner was replaced.

[2] To date, Mr. Wood has incurred over $30,000 in attorney fees and costs dealing with these cases.

3 "Refers to the technique of inserting a "bursting head" into and through the existing pipe. In doing so, the old pipe fractures and sends the remaining materials and fragments through to the surrounding soil area. At the same time, the

Pipe bursting is a trenchless technology. The video reviewed by City shows in the last 1 ½ minutes (staring at 6:27) a condition very similar to that complained of in these cases- minor divots where water is present. The approval makes no mention that slope was measured or that P3005.3 even came in to play in the inspection. See Exhibit 4. The Granada video is provided as Exhibit 5. At the Board meeting for this appeal Mr. Wood requests that inspector Don Ratliff be present to explain Granada other similar permits that were approved despite the presence of the water in the inspection videos.

14. Please refer to additional videos dealing with trenchless installations that inspector Ryan Miller and others approved which also have the divot/water issue at Exhibit 6.

15. eTrakit shows dozens of similar permits where no video was required at all. Take for example the job at 1605 Pontiac St (PLUM10-0272), where a complete Orangeburg sewer line was replaced using the pipe bursting method. The eTrakit notes (Exhibit 4) show an approval but no video review. This is also the case on PLUM10-0271, PLUM13-0220, to provide a few more examples. More will be provided at the meeting if necessary.

THERE IS NO EVIDENCE OF VIOLATION OF P3005.3

16. The code is being incorrectly interpreted.

17. There is no evidence that the CIPP liner does not have the proper slope. The CIPP installed at Waltham was 4 inches in diameter. See Exhibit 2. Therefore, P3005.3 requires a 1% slope requirement. Nothing contained in Mr. Miller's notice (Exhibit 2) explains how the City came to the conclusion that the 1% slope was not met. Hey may argue that they "eye-balled" it. The problem with this method is that it is unfair to Mr. Wood and other permit holders because it does not allow for uniform application of the code. P3005.3 is written in precise language, which clearly requires 1% or 2% slope. In order to make such a determination, measurements need to be taken. There is no evidence that Mr. Miller took any measurements. Mr. Miller elected to violate Mr. Wood for not meeting the 1% slope. If that is the case then due process requires that Mr. Miller present evidence of the failure to meet the 1% slope requirement. There is no evidence. Therefore, the Code has been incorrectly applied to Mr. Wood.

P3005.3 DOES NOT APPLY TO THE INSTALLATION AT WALTHAM. MR. MILLER SHOULD HAVE FOLLOWED THE CRITERIA SET FORTH IN SOP-501

"new" pipe is pulled into place through pull-in-place method." See https://pipelt.com/trenchless-sewer-repair/pipe-bursting-explained/

18. The City has previously recognized that P3005.3 does not apply to CIPP installations. It should be required to follow its own rules.

19. Mr. Wood's counsel recently discovered inspection records from a 2016 CIPP installation completed by one of Mr. Wood's competitors, Roto Rooter (PLUM16-1781). See Exhibit 7. The permit was issued on September 16, 2016. Mr. Ryan Miller inspected the completed job on October 14, 2016. That same morning at 7:19AM he approved the installation, noting: "Final plumbing OK – see sop in attachments." Exhibit 7. There is no evidence of a video being reviewed by Mr. Miller[4]. There is no evidence that any measurements were taken. A copy of the March 6, 2016 SOP 501 (Standard Operating Procedure) on which Mr. Miller relied to approve that job is attached as Exhibit 8. It provides a directive from Code Enforcement Services Director Craig E. Strong on the subject: "Plumbing/Cure in Place Pipe (CIPP) Inspection Policy." A few pertinent passages are embedded below:

	Ann Arbor Community Service Area **Standard Operating Procedure**	
DIVISION: **Building**	SUBJECT: **Plumbing/Cured in Place Pipe (CIPP) Inspection Policy**	SOP#: **501**

PURPOSE:

To provide a policy specific to plumbing inspectors assigned to the Community Services Area Building Department to outline the proper workflow for performing an inspection within the City as it pertains to "Cured in Place Pipe" (CIPP).

POLICY:

This policy shall apply to all the plumbing inspectors of the CSA Building Department. Authority to deviate from this procedure shall have prior approval from the Assistant Building Official (ABO) or Building Official (BO).

RESPONSIBILITY:

The primary purpose of an inspection is to assure CIPP installations are installed in accordance with the manufactures specifications referenced standard ASTM F1216-09, and the State of Michigan Product Approval Certificate.

[4] A FOIA request seeking a video in this case and others was submitted to the City on June 28, 2018.No documents/videos have been produced. A status print out from July 28, 2018 states that the request was "granted/denied." Counsel for the City was provided the FOIA request but has not responded. See Exhibit 9.

20. **It is worth noting that this SOP has never been provided by the City to Mr. Wood. It was found by counsel through happenstance through review of the eTrakit system.** They City has also never referred to the policy in connection with any cases involving Mr. Wood.

21. The SOP was initially sent by Mr. Strong through email to the inspectors, including Mr. Ryan Miller. See Exhibit 8. The email provides the "inspection criteria" for CIPP installations. The issues covered are directly on point in this case, see email below:

Miller, Ryan

From: Craig Strong [cstrong@cwaplan.com]
Sent: Saturday, March 19, 2016 6:31 PM
To: Taylor, Ellen; Miller, Ryan; Ratliff, Don; MacFarland, Chris
Cc: Strong, Craig
Subject: Revised CIPP Policy
Attachments: CIPP Inspection Policy.docx

All: I have revised the policy to include sections in ASTM F1216-09 which I hope will guide you through the inspection process. I have underlined key statements in the policy with regard to condition variables that shall be considered as approved by the State. The inspection criteria is as follows:

1. No point intrusions of more than 15%
2. No reductions in the cross-sectional area of more than 40 %.
3. Keep in mind that variations from true line and grade may be inherent because of the conditions of the original piping. This would include belly's and humps in the line. As long as the original pipe had the proper fall from the start to end then we shall except it.

I would like to meet with you so we are all on the same page with these inspections.

Most pertinent is Mr. Strong's guidance that "variations from true line grade may be inherent because of the conditions of the original piping. This would include **BELLY'S and HUMPS** in the line. As long as the original pipe had the proper fall from the start to end then **we shall except [sic] it**." The original email is also attached in Exhibit 8.

22. Mr. Wood has been advocating Mr. Strong's reasoning all along to Mr. Miller and the City, of course without the support of this email and SOP. Mr. Miller, having the benefit of the SOP, having previously applied it to other cases, for whatever reason, has not brought it to Mr. Wood's attention. And, most importantly, he has not applied it to Mr. Wood's cases, despite the clear directive from Mr. Strong.

23. Every single one of the eight notice violations issued to Mr. Wood is for alleged violation of Michigan Residential Code section P3005.3. As was stated previously, P3005.3 provides:

> **Horizontal drainage piping slope**. Horizontal drainage piping shall be installed in uniform alignment at uniform slopes not less than 1/4 unit vertical in 12 units horizontal (2-percent slope) for 21/2 inch (64 mm) diameter and less, and not less

than 1/8 unit vertical in 12 units horizontal (1-percent slope) for diameters of 3 inches (76 mm) or more.

24. The SOP clearly provides an alternative to P3005.3. However, there is no evidence that the City applied the policy to this or any of the cases it has violated Mr. Wood for. It should be required to apply the SOP. Specifically, the SOP requires installations in conformance with ASTM Standard F1216-09.5 The SOP then emphasizes/underlines[6] important considerations from that Standard, including:

> 3.2.1 *Cured-In-Place Pipe (CIPP)*—a hollow cylinder containing a nonwoven or a woven material, or a combination of nonwoven and woven material surrounded by a cured thermosetting resin. Plastic coatings may be included. This pipe is formed within an existing pipe. Therefore, it takes the shape of and fits tightly to the existing pipe.

> 7.1.3 *Inspection of Pipelines*—Inspection of pipelines should be performed by experienced personnel trained in locating breaks, obstacles, and service connections by closed-circuit television or man entry. The interior of the pipeline should be carefully inspected to determine the location of any conditions that may prevent proper installation of the impregnated tube, such as protruding service taps, collapsed or crushed pipe, and reductions in the cross-sectional area of more than 40 %. These conditions should be noted so that they can be corrected.
>
> 7.1.4 *Line Obstructions*—The original pipeline should be clear of obstructions such as solids, dropped joints, protruding service connections, crushed or collapsed pipe, and reductions in the cross-sectional area of more than 40 % that will prevent the insertion of the resin-impregnated tube. If inspection reveals an obstruction that cannot be removed by conventional sewer cleaning equipment, then a point repair excavation should be made to uncover and remove or repair the obstruction.

> 8.7 *Inspection and Acceptance*—The installation may be inspected visually if appropriate, or by closed-circuit television if visual inspection cannot be accomplished. Variations from true line and grade may be inherent because of the conditions of the original piping. No infiltration of groundwater should be observed. All service entrances should be accounted for and be unobstructed.

See Exhibit 8. Based on these recommendations, Mr. Strong directs in the email attached to the SOP that "No point intrusions of more than 15%" and "No reductions in the cross-sectional area of more than 40%" will be allowed. See page 6 above and Exhibit 8. There is no evidence that these

5 A copy of ASTM 1216-09 is attached as Exhibit 10.

6 The SOP is provided with the emphasis added by Mr. Strong. The only additional emphasis provided by counsel is indicated by the highlighted sections.

guidelines have been applied to Mr. Wood's installations. At the meeting on this appeal, Mr. Miller should have to explain why this SOP and its directives were not applied to Mr. Wood. Mr. Strong will also be asked to explain the purpose of his email and the SOP.

25. In short, P3005.3 does not apply to CIPP installations in the City of Ann Arbor. The SOP clearly provides that all CIPP installations should comply with ASTM Standard F1216-09. Mr. Miller has known for quite some time that Mr. Wood's installations are based on this exact standard. In fact, the manufacturer's specifications for the product Mr. Wood uses (LMK) clearly provide: "Installation Recommendations ASTM F1216-09: Standard Practice for the Installation of Cured In-Place Pipe by Inversion Lining." See Exhibit 11. Also, his product has a State of Michigan Certificate of Acceptability. See also Exhibit 11. This information has been previously provided to the City, including Mr. Miller in 2017.

CONCLUSION

26. Mr. Miller has issued 8 notices for 8 different CIPP installation permits for "Failure to comply with 3005.3". For the reasons set forth above, Mr. Wood requests that the Building Board of Appeals issue the following relief:

a. A finding that SOP 501 applies to all CIPP installations, including the one at issue in this appeal.

b. A finding that P3005.3 does not apply to CIPP installations, including the one at issue in this appeal.

c. A finding that there is no violation of P3005.3 and that Mr. Miller's notice of violation is overruled.

Very truly yours,

HOOPER HATHAWAY, P.C

Oscar A. Rodriguez

EXHIBIT 1

PERFORMANCE LINER® LATERAL LINING SYSTEM

The Performance Liner® Lateral Lining System is a continuous Cured-in-Place Pipe (CIPP) lining System. It utilizes an engineered, full-circle lateral tube with a uniform wall thicknesses appropriate for each pipe diameter. The lining is formed as a structural cylinder, renewing laterals from three to six inches in diameter up to 130 feet. Hydrophilic compression O-Ring gasket-sealing technology provides verifiable non-leaking seal with all pipe types. And best of all, the Performance Liner is installed without any digging by using an inside or an outside cleanout. Our unique patented delivery system allows us to position the liner anywhere in the pipe. In addition, we can perform custom liners with multiple starts and stops with a single inversion.

Lateral Inversion Tank and Accessories:

- Inversion Launching Unit, 36" diameter is used for the rehabilitation of 3" - 8" non-pressurized pipes up to 130' long. Includes tank cones and containment sleeves. (Fig. 1)
- 40 Degree Camera Port. The LMK Camera Port accepts a lateral push camera, which when inserted through the port after liner installation, allows verification that the liner is installed properly and fully inverted prior to full cure. The camera port design is patented and ensures that the highest quality liner is installed every time. (Fig. 1)
- 15' Soft Cleanout Shoes to invert a liner through a 4" or 6" TEE shaped cleanout either upstream or downstream. (Fig. 2) Lateral Access Shoe can be used with cleaning and CCTV equipment to negotiate a TEE shaped cleanout. Two separate shoes; One 4" & One 6"
- Optional—10' Extension Hose for tight situations. (Fig. 3)

Fig. 1

Fig. 2

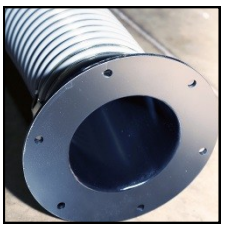

Fig. 3

20 ft. CIPP Lining Trailer

$35,250.00

Includes:

- Honda Generator, 5000 watt w/electric start
- Boss Bullet II Rotary Screw Air Compressor, 70 cfm rated delivery, 20hp Honda 4-cycle engine, 100 psig operating pressure rating, single stage oil flooded rotary screw, 80-115 psig operating pressure range, oil to air cooling system. Equipped with 2-25 ft. 3/4" air hoses. (Fig. 4)
- Hard Wired Vacuum Pump 1.1 CFM @ 25" of mercury, mounted on a shelf
- Interior Receptacles
- Digital Thermometer Gun
- Grommet Gun and Grommets
- Quick Bands
- Mixing Drill, Paddle and Holder with Resin Catch
- Wet-Out Slug Roller; 1-with Calibration Rings & 1-without Calibration Rings/Smooth
- Liner Wet-Out Clamp
- 2 Aluminum Wet Out Tables
- 2 Digital Scales; 1-Pound Scale for 5-Gallon Pails & 1-Gram Scales for Promoter & Catalyst
- Marlite Ceiling & Floor
- Epoxy Coated Floor
- LMK Easy Jack
- Flush Mount Floor Tie Downs
- Fire Extinguisher, First Aid Kit, and Eye Wash Station
- Universal Tool Kit
- Safety PPE Kit for 3 Crew Members
- Exterior LED Lighting
- Shore Power Adapter
- Full Rear Ramp Door
- Interior Fluorescent Lighting
- Wheel Chocks (2)
- 48" Passenger Side Service Door
- 2' x 3' White Board/Message Board
- On Board Freezer

Trailer Specifications

- Spare Tire
- Axle Size—Two 5,200 lbs.
- Width—8'6"
- Height—8'
- Length—20' 8"
- GVWR 9,900 lbs.

Fig.4

Superknit Liner, Calibration Bladder and Resin:

- Superknit Liner negotiates inverts easily and bends smoothly. (Fig. 5)
- Translucent TPU Calibration Bladder makes the resin saturation process efficient and foolproof by allowing the installer to see where the resin is and is not. (Fig. 6)
- Mini-Bulk Resin with catalyst to match in 5 gallon pails. (Fig. 7)

Fig. 5

Fig. 6

Training:

- 3 Days Training at LMK Training Facility
- 3 Days Training at Customer Project Site
- Additional Support Days Available Anytime
- Marketing Support

Contractor Supplied Items:

- Lateral Push Camera
- Jetter
- Cable Rodding Machine

Fig. 7

Optional Equipment Upgrades:

- Portable CIPP steam unit with pull handle and diesel fired engine for fast and efficient resin cure. Equipped with 25' of 3/4" steam rated hose and mixing valve assembly. (Fig. 8)

Fig. 8

Equipment Add-Ons:

Handling, Measuring and Mixing Equipment for Bulk Resin System:

- Fire Resistant Self-Closing Cabinet and 55 Gallon Drum Cradle and Gate Valve for drums (Fig. 9)
- Air Powered Bung Hole Drum Mixer (Fig. 10)
- 5-Gallon Lined Steel Pails with Lid and Catalyst Bag

Fig. 9

Picote Cutter and Cleaning Starter System:

- Maxi Miller 1/2" Shaft, 100 ft. (Fig. 11)
- Original Grinding Chain for 4" and 6" Pipes (Fig. 12)
- Circular Cyclone Grinding Chain for 4” and 6” Pipes (Fig. 13)
- Smart Cutter Starter Kit for 4” Pipe

Fig. 10

Fig. 11

Fig. 12

Fig. 11

Fig. 13

Performance Liner® Lateral Lining System Package

- *36 inch Lateral Launch Tank, 2 Soft Cleanout Shoes and 2 Lateral Access Shoes*
- *20 ft. Trailer and Wet-Out Equipment and Components listed on previous pages*
- *600 feet of Lining Material (4 inch or 6 inch)*
- *900 feet of Translucent Calibration Bladder Tube (4 inch or 6 inch)*
- *25 pails of Polyester Resin with Catalyst*
- *3 Days of In-House Training (at LMK facility)*
- *3 Days of Training in the Field (at Installer designated location)*

Retail Value **$81,625.00**

Buy the Entire Package for: **67,750.00**

SYSTEM PAYS FOR ITSELF IN LESS THAN A YEAR!

Install 12 liners at 50 feet each at $120.00/ft. (typical cost to homeowner) - $72,000 in Revenue

Only 1 liner per month pays for system!!

EXHIBIT 2

CITY OF ANN ARBOR, MICHIGAN
Community Services Area
Planning & Development Services Unit
301 East Huron St., P.O. Box 8647,
Ann Arbor, Michigan 48107-8647
Phone: (734) 794-6267
Fax: (734) 994-8460
www.a2gov.org

March 6, 2018

Rooter MD att:

Peter Wood
31675 W Eight Mile
Livonia, MI 48152

Re: 1625 Waltham Drive, Ann Arbor, MI 48103 - PLUM14-1848

Mr. Peter Wood:
On December 7,2017 you were notified and given 45 days to correct the conditions found with the installation of Cured in Place Pipe Liner at 1625 Waltham. You have not complied and the required corrections have not been made. By March 16, 2018 you shall schedule an on-site inspection, which you can do by phone during regular business hours at 734.794.6263 (select option 1) or through eTrakit (eTrakit.a2gov.org). If you By March 16, 2018, you use eTrakit, you must enter your request into eTrakit no later than 2:30 p.m. if you are requesting an inspection for the next day.

Failure to comply with the requirements of this letter by March 16,2018 will result in the issuance of a ticket to initiate legal proceedings against you.

Final inspection for *Cured in Place Pipe* installation was conducted on permit PLUM14-1848, Monday 10/30/2017. The inspection was not approved.

The following conditions were found to exist at 1625 Waltham, Ann Arbor, MI 48103:
1) Belly in liner from 81' to 56' (pipe holding water)

This condition is in violation of 2009 Michigan Residential code P3005.3 Please consider this a formal violation notice.

The video supplied by Rooter MD shows a large belly in the pipe. Solids collect in the belly and can cause future sewage back up inside of the house.

P3005.3 Horizontal drainage piping slope. Horizontal

drainage piping shall be installed in uniform alignment at uniform

slopes not less than 1/4 unit vertical in 12 units horizontal

(2-percent slope) for 21/2 inch (64 mm) diameter and less,

and not less than 1/8 unit vertical in 12 units horizontal (1-percent

slope) for diameters of 3 inches (76 mm) or more.

If you have any questions, please contact us at 734.794.6263 (select option 1) between 8:00 a.m. and 4:00 p.m., Monday through Friday.

Sincerely,

Ryan Miller
Code Official
City of Ann Arbor
rmiller@a2gov.org

cc: Glen Dempsey, Building Official
Kristen D. Larcom, Senior Assistant City Attorney
Dorothy Brooks (homeowner per Assessor's records)

NOTE: You have the right to appeal this decision. If you believed the CIPP Building Sewer is properly installed and feel The City of Ann Arbor interpretation of 2009 Michigan Residential Code is incorrect, you may apply to The City of Ann Arbor Building Board of Appeals. The appeal for this address must be submitted by March 16,2018

06/21/2018
8:28 PM

Permit No.	PLUM14-1848	**Permit Type**	PLUMBING	**Site Address**	1625 WALTHAM DR Ann Arbor, MI 48103

Applied	11/21/2014	**Applicant**	Rooter MD Plbg LLC
Approved	11/21/2014	**Owner**	BROOKS DOROTHY
Issued	11/21/2014	**Contractor**	Rooter MD Plbg LLC
Parent Permit No.		**Description**	85' of 4" CIP Liner from Clean out o Within 1' of Main
		Notes	

Date of Inspection	Inspection Type	Inspector	Result	Remarks	Notes
10/31/2017	PLM UNDERGROUND	MILLER RYAN	FAILED	No charge inspection	(10/31/2017 7:26 AM RMIL) - CIPP Holding water 81'-56' Repair required

PERMIT NO: PLUM14-1848 ON-LINE PERMIT

ANN ARBOR
301 E. Huron St., MI 48104

INSPECTION REQUEST LINE
734.794.6263
OR
SCHEDULE EXISTING INSPECTION
ON-LINE
http://etrakit.a2gov.org

PERMIT TYPE **PLUMBING**	APPLIED DATE **11/21/2014**	Seal
PERMIT SUB-TYPE **PLUMBING**	APPROVED DATE **11/21/2014**	
JOB VALUE **0**	ISSUED DATE **11/21/2014**	
APN **09-09-31-306-036**		
DESCRIPTION **85' of 4" CIP Liner from Clean out o Within 1' of Main**		

PERMIT INFORMATION

SITE	1625 WALTHAM DR Ann Arbor, MI 48103
APPLICANT	Rooter MD Plbg LLC 31675 W. Eight Mile Road Livonia MI 48152
OWNER	BROOKS DOROTHY 1625 WALTHAM DR Ann Arbor MI 48103
CONTRACTOR	Rooter MD Plbg LLC 31675 W. Eight Mile Road Livonia MI 48152

FEE SUMMARY

PLUMBING PERMIT FEES	$100.00
Total Fees Collected:	$100.00

NOTE: This job copy of this permit shall be kept on the job site to make the required entries thereon. The permit will expire if work is not started in 180 days, is abandoned, or does not receive an inspection for more than 180 days. Additional fees will be collected to renew expired permits. This is a Building Permit when properly filled out, signed and validated, and is not transferable. Construction Hour: Construction is limited to the hours of 7:00am to 7:00pm each day. No work shall be performed on certain holidays (MMC V-213-3(b)).

LICENSED CONTRACTORS DECLARATION

'hereby affirm under penalty of perjury that I am licensed under provisions of Chapter 9 (commencing with Section 7000) of Division 3 of the siness and Professions Code, and my license is in full force and effect.

icense No: Expiration Date: Contractor:

OWNER-BUILDER DECLARATION

I hereby affirm under penalty of perjury that I am exempt from the contractors license Law for the following reason (Sec. 7031.5, Business and Professions Code: Any city or county which requires a permit to construct, alter, improve, demolish, or repair any structure, prior to its issuance, also requires the applicant for such permit to file a signed statement that he or she is licensed pursuant to the provisions of the Contractors License Law (Chapter 9 (commencing with Section 7000) of Division 3 of the Business and Pofessions Code) or that he or she is exempt therefrom and the basis for the alleged exemption. Any violation of Section 7031.5 by an applicant for a permit subjects the applicant to a civil penalty of not more than five hundred dollars ($500).):

_____ I, as owner of the property, or my employees with wages as their sole compensation, will do the work, and the structure is not intended or offered for sale (Sec. 7044, Business and Professions Code: The Contractors License Law does not apply to an owner or property who builds or improves thereon, and who does such work himself or herself or through his or her own employees, provided that such improvements are not intended or offered for sale. If, however, the building or improvement is sold within one year of completion, the owner-builder will have the burdon of proving that he or she did not build or improve for the purpose of sale.)

_____ I, as owner of the property, am exclusively contracting with licensed contractors to construct the project (Sec. 7044, Business and Professions Code: The Contractors License Law does not apply to an owner or Property who builds or improves thereon, and who contracts for such projects with a contractor(s) licensed pursuant to the Contractors License Law.)

I am exempt under Sec. _____ B.P.C. for this reason _____

DATE _____ OWNER _____

WORKERS COMPENSATION DECLARATION

I hereby affirm under penalty of perjury one of the following declarations:

_____ I have and will maintain a certificate of consent to self-insure for workers' compensation, as provided for by Section 3700 of the Labor Code, for the performance of the permit is issued.

_____ I have and will maintain workers' compensation insurance, as required by Section 3700 of the Labor Code, for the performance of the work for which this permit is issued. My workers' compensation insurance carrier and policy number are:

Carrier/Policy No: _____

(This section need not be completed if the permit is for one hundred dollars ($100) or less).

_____ I certify that in the performance of the work for which this permit is issued, I shall not employ any person in any number so as to become subject to the workers' compensation laws or California, and agree that if I should become subject to the workers' compensation provisions of Section 3700 of the Labor Code, I shall forthwith comply with those provisions.

DATE _____ APPLICANT: _____

WARNING: FAILURE TO SECURE WORKERS' COMPENSATION COVERAGE IS UNLAWFUL, AND SHALL SUBJECT AN EMPLOYER TO CRIMINAL PENALTIES AND CIVIL FINES UP TO ONE HUNDRED THOUSAND DOLLARS ($100,000), IN ADDITION TO THE COST OF COMPENSATION, DAMAGES AS PROVIDED FOR IN SECTION 3706 OF THE LABOR CODE, INTEREST, AND ATTORNEY'S FEES.

CONSTRUCTION LENDING AGENCY

I hereby affirm under penalty of perjury that there is a construction lending agency for the performance of the work for which this permit is issued (Sec. 3097, Civ. C.).

DATE _____ APPLICANT: _____

* I certify that I have read this application and state that the above information is correct. I agree to comply with all city ordinances and state laws relating to building construction, and hereby authorize representatives of this city to enter upon the above-mentioned property for inspection purposes.

GNATURE OF APPLICANT OR AGENT : _____ DATE _____

INSPECTION SUMMARY

_____ PLM UNDERGROUND

Permit Finaled Date: _____ **Inspector Name:** _____ **Signature:** _____

EXHIBIT 3

RooterMD Plumbing
Plumbing Headaches Cured Today!

31675 W Eight Mile Road ~ Livonia, MI 48152
248) 888-7777 (248) 888-7786 fax

TEN YEAR WARRANTY

The undersigned Rooter MD Pipe Lining Contractor ("the contractor" herein) provides a 10-year warranty from the date of Substantial Completion for the Work that such piping systems restored by Contractor will be free of failure as a result of defects in material or workmanship with the following provisions:

a) Under normal use, the epoxy lining shall not de-bond, break down or otherwise flake off. Contractor does not warrant against failure caused by, contributed in whole or in part by, or resulting from any of the following: abuse, such as, without limitation, vandalism; the introduction into the piping system of any chemical that would not be permitted in potable water, or chemicals approved for potable water at concentrations higher than approved for potable water; operating the water system at temperatures greater than the domestic hot standard; natural disasters or causes, such as, without limitation, flooding, windstorm, lightning, tornado, or earthquake; attachments to or modifications of the piping system not authorized by Contractor; external causes, where external, physical or chemical qualities produce damage to the epoxy lining such as, without limitation, an unsuitable or hostile environment including the use of a flame or torch on the epoxy lining; or another cause beyond the Contractor's control including other stresses placed on the pipe or its contents that are not considered normal to the original intended use or function of the piping system.

b) Should the restored piping system by subjected to abuse, such as, without limitation, vandalism; the introduction into the piping system of any chemical that would not be permitted in potable water, or chemicals approved for potable water at concentrations higher than approved for potable water; operation of the water system at temperatures greater than the domestic hot standard; attachments to or modifications of the piping system not completed by methods authorized by Contractor; or other external causes including corrosion to the external surface of the piping that should result in leaks, or where external, physical or chemical qualities produce damage to the epoxy lining such as, without limitation, an unsuitable or hostile environment including the use of a flame or torch on the epoxy lining; or any other cause beyond the Contractor's control including other stresses placed on the pipe or its contents that are not considered normal to the original intended use of function of the piping system, this warranty will become immediately null and void with respect to such affected piping.

c) The Contractor shall not be liable under any circumstances for any other direct or any indirect, general, special, incidental or consequential damages of any kind from whatever cause except to repair or replace the affected piping as provided herein.

As long as such failure occurs during the warranty period and the Owner notifies Contractor in writing within five (5) business days of Owner's discover of the failure of the treated piping system through the notice provisions provided in the Contract Documents, and Contractor is permitted the opportunity to inspect the defect, Contractor will correct the failure by repairing or replacing the affected piping within a reasonable time, without charge to the Owner. This warranty is limited to the cost of repairing or replacing the affected piping, including installation or additional treatments, and specially excluded any costs of repair associated with ancillary damage. Failure to provide Contractor such notice and opportunity to inspect such affected piping will terminate this warranty. Should Contractor be called to the property for problems unrelated to matters for which this warranty applies, Owner will be charged a minimum four (4) hour call out fee at rates predominant in the local market.

It is expressly understood and agreed that Contractor shall in no way be deemed or held to be obligated, liable or accountable upon or under any guarantees or warranties, expressed or implied beyond this express warranty. This warranty is the only warrant for the pipe restoration provided by the Contractor, and is and shall be in lieu of any and all other warranties, express or implied, including but not limited to an implied warranty of merchantability, or fitness for a particular use an of all other obligations or liabilities on the part of the Contractor. None of the Contractor's employees, and no other person or business, is authorized to make any other warranty on the Contractor's behalf covering the Work.

This warranty is transferable to a new owner of the property for a $200.00 administrative fee payable to Contractor at the closing of the property transaction, and is otherwise non-transferable. This warranty gives Owner specific legal rights, and Owner may also have other rights that may vary from state to state. Some states do not allow the exclusion of limitation of incidental or consequential damages, and as a result may not apply to Owner.

All new valves and accessories installed as part of the work shall be covered by the manufacturers warranty(s) only for the period of such warranty(s). The Contractor shall turn over all manufacturers equipment warranties to the Owner upon completion and final sign-off of the work. Owner shall contact those manufacturers specifically regarding any claims thereto. The Contractor shall warrant the installation of such valves and accessories installed as part of the work for one year after final sign-off the work.

_____ _____

Date of Substantial Completion Authorized Signature

EXHIBIT 4

06/22/2018
1:26 PM

Permit No.	PLUM10-1441	**Permit Type**	PLUMBING	**Site Address**	1517 GRANADA AV Ann Arbor, MI 48103
Applied	11/18/2010	**Applicant**	Roto Rooter		
Approved	11/18/2010	**Owner**	BAUER ELIZABETH D		
Issued	11/18/2010	**Contractor**	Roto Rooter		
Parent Permit No.		**Description**	REPLACE SEWER FROM BASEMENT TO MANHOLE USING PIPE BURSTING		
		Notes			

Date of Inspection	Inspection Type	Inspector	Result	Remarks	Notes
11/24/2010	**PLM FINAL	RATLIFF DON	PASS		(11/24/2010 3:23 PM DR) The plumber must submit a video of the sewer for final review video is good and attached to this permit

06/22/2018
1:52 PM

Permit No.	PLUM10-0272	**Permit Type**	PLUMBING	**Site Address**	1605 PONTIAC ST Ann Arbor, MI 48105

Applied	03/22/2010	**Applicant**	Roto Rooter
Approved	03/22/2010	**Owner**	VREEDE QUINTA
Issued	03/22/2010	**Contractor**	Roto Rooter
Parent Permit No.		**Description**	Replace orangeburg sewer fr house to rd using pipe bursting
		Notes	**Excavators Inc to pull ROW permit per contractor**

Date of Inspection	Inspection Type	Inspector	Result	Remarks	Notes
04/06/2010	**PLM FINAL	CALVERT JOHN	PASS	Call John C. when ready for inspection	
	**PLM FINAL	DEFAULT PLUMBING		VOIDED (MG1 3/22/2010)	

06/22/2018
1:58 PM

Permit No. PLUM10-0271 **Permit Type** PLUMBING **Site Address** 2511 DEVONSHIRE RD
Ann Arbor, MI 48104

Applied 03/22/2010 **Applicant** Roto Rooter
Approved 03/22/2010 **Owner** K & J OF AMAGANSETT, LLC
Issued 03/22/2010 **Contractor** Roto Rooter
Parent Permit No. **Description** Replace orangeburg sewer fr house to rd using pipe bursting
Notes **Excavators Inc to pull ROW permit per contractor**

Date of Inspection	Inspection Type	Inspector	Result	Remarks	Notes
04/01/2010	**PLM FINAL	CALVERT JOHN	PASS	PM; 734-973-9194	

06/22/2018
2:07 PM

Permit No.	PLUM13-0220	**Permit Type**	PLUMBING	**Site Address**	1449 GREENVIEW DR Ann Arbor, MI 48103
Applied	02/19/2013	**Applicant**	Roto Rooter		
Approved	02/19/2013	**Owner**	BRAINARD DIANNE L		
Issued	02/19/2013	**Contractor**	Roto Rooter		
Parent Permit No.		**Description**	REPLACE SEWER FROM BASEMENT TO MANHOLE USING HDPE & PIPE BUR		
		Notes			

Date of Inspection	Inspection Type	Inspector	Result	Remarks	Notes
02/21/2013	**PLM FINAL	RUSSELL JIM	PASS		(2/21/2013 2:05 PM JR1) pulled from the basement to the manhole

EXHIBIT 5

(SEE USB)

EXHIBIT 6

(SEE USB)

EXHIBIT 7

06/27/2018
4:59 PM

Permit No.	PLUM16-1781	**Permit Type**	PLUMBING	**Site Address**	1400 W STADIUM BLVD Ann Arbor, MI 48103

Applied	09/16/2016	**Applicant**	Roto Rooter
Approved	09/16/2016	**Owner**	TRINITY LUTHERAN CHURCH
Issued	09/16/2016	**Contractor**	Roto Rooter
Parent Permit No.		**Description**	Place cured-in-place liner in sanitary sewer
		Notes	

Date of Inspection	Inspection Type	Inspector	Result	Remarks	Notes
10/14/2016	**PLM FINAL	MILLER RYAN	PASS	r	(10/14/2016 7:19 AM RMIL) Final plumbing OK - see sop in attachments

PLUMBING PERMIT

CITY OF ANN ARBOR

BUILDING DEPARTMENT
301 E Huron St, P.O. Box 8647
Ann Arbor, MI 48104
Phone: (734) 794-6267
Fax: (734) 994-8460

PLEASE VISIT THE CITY WEB SITE TO SCHEDULE YOUR INSPECTION - WWW.A2GOV.ORG/permits

Permit Number: **PLUM16-1781** Construction Type: Use Group:

Work Type: **PLUMBING** **Place cured-in-place liner in sanitary sewer**

Stipulations:

LOCATION	OWNER
1400 W STADIUM BLVD 09-09-31-112-073	TRINITY LUTHERAN CHURCH 1400 W STADIUM BLV Ann Arbor, MI 48103

Approved plans must be retained on job and this card kept posted until final inspection has been made. Permits and inspection notices must be posted at a single location on site (electrical panel, etc.). Where a Certificate of Occupancy is required, such building shall not be occupied until final inspection has been approved. Minimum 24 hour notice required for inspection. You must request inspection.

CONTRACTOR

Roto Rooter
3901 Bestech Dr. Ste 600
Ypsilanti, MI 48197
(734) 973-9194

Permit Item	Account Number	Fee Basis	Amount
BASE FEE -INCLUDING 1 INSPECTION	0026-033-3330-0000-431	1	50.00
SEWERS-UP TO 4 INCHES	0026-033-3330-0000-431	1	50.00

Craig Strong
Building Official

Date Issued: **09/16/2016**
Date Expires: **03/15/2017**

Fee Total: $100.00
Amount Paid: $100.00
BALANCE DUE: $0.00

I agree this permit is only for the work described and does not grant permission for additional work which requires separate permits. I understand that this permit will become invalid, and null and void if work is not started within 180 days, or if work is suspended or abandoned for a period of 180 days any time after work has commenced, and that I am responsible for assuring all required inspections are requested in conformance with the applicable code.

I hereby cerfity that the proposed work is authorized by the owner, and that I am authorized by the owner to make this application as authorized agent. I agree to conform to all applicable laws of the State of Michigan and local jurisdiction. Al information on the permit application is accurate.

Payment of permit fee constitutes acceptance of above terms.

2895

Insp 9/28

City of Ann Arbor

PLANNING & DEVELOPMENT SERVICES — CONSTRUCTION SERVICES

Mailing: 301 E. Huron Street | P.O. Box 8647 | Ann Arbor, Michigan 48107-8647
Location: Larcom City Hall | First Floor | 301 E. Huron St. | Ann Arbor, MI 48104-6120
p. 734.794.6263 | f. 734.994.8460 | building@a2gov.org

PERMIT # P16-1781

TRADE PERMIT APPLICATION

Date Submitted 9/12/16

Please provide payment information to process the application using the payment cover sheet.
Any application received without payment information included cannot be processed.

I. JOB LOCATION

Name of Owner/Agent Trinity Lutheran Church

Street Address & Job Location (Street No. & Name) 1400 West Stadium | *Suite/Apt No.* | *City* Ann Arbor | *Zip Code*

Has a building permit been obtained for this project? ☐ Yes ☐ No ☑ Not Required

II. CONTRACTOR/HOMEOWNER INFORMATION

☒ Contractor ☐ Homeowner | *Name* Roto-Rooter | *State License No.* 81-10114 | *Exp. Date* 4/30/16

Address (Street No. and Name) 3901 Bestech Rd. ste 600 | *Telephone Number* 734-973-9194

City Ypsilanti | *State* MI | *Zip Code* 48197 | *Email* a2rotorooter@comcast.net

III. TYPE OF JOB

Maximum 1 permit per application ☐ MECHANICAL ☑ PLUMBING ☐ ELECTRICAL

☐ Single Family ☐ New ☐ Tenant Finish ☐ Addition Rental Property? ☐ Yes
☑ Other ☐ Existing ☐ Special Inspection ☐ Alteration ☑ No
# of Units _____

DESCRIPTION OF WORK Place cured-in-place liner in sanitary sewer

IV. APPLICANT SIGNATURE

Section 23a of the State Construction Code Act of 1972, 1972 PA 230, MCL 125.1523A, prohibits a person from conspiring to circumvent the licensing requirements of this state relating to persons who are to perform work on a residential building or a residential structure. Violators of section 23a are subject to civil fines.

Signature of Licensee or Homeowner David D Fowler *Date* 9-12-16

Print Name David D. Fowler

(Homeowner signature indicates compliance with Section VI, Homeowner Affidavit)

V. HOMEOWNER AFFIDAVIT

I hereby certify the work described on this permit application shall be installed **by myself in my own home** in which I am living or about to occupy. All work shall be installed in accordance with the State Code and **shall not be enclosed, covered up,** or put into operation until it has been **inspected** and **approved** by the City Inspector. I will cooperate with the City Inspector and assume the responsibility to arrange for necessary inspections.

INITIAL HERE (homeowner only) _____

VI. PERMIT REQUIREMENTS

GENERAL: Work shall not be started until the application for permit has been filed with Planning & Development Services. All installations shall be in conformance with the applicable State Code. No work shall be concealed until it has been inspected. The telephone number for inspections will be provided on the permit form. When ready for inspection, visit www.a2gov.org/permits or automated phone at (734) 994-2674 providing as much advance notice as possible. The contractor will need the job location and permit number to schedule an inspection.

Expiration of Permit: A permit remains valid as long as work is progressing and inspections are requested & conducted. A permit will be closed when no inspections are requested and conducted within 180 days of the date of issuance or the date of a previous inspection. Closed permits cannot be refunded. The charge to re-open a closed permit is $35.00.

VII. FEES

Trades Plan Examination Fee is 25% of Building Plan Examination Fee

(R)) Residential, (C) = Commercial

Expired Permit Reactivation Fee $35 ---------- Industrial & Commercial Inspections, Annual Inspection Fee $500

ELECTRICAL

Qty	Item	Fee	Amt
1	**Base fee – includes one inspection**	**$50**	**$50**
	Each additional inspection	$35	
	Onsite Consultation with Inspector	$35	
	Special or Overtime Inspection $65/hr	$130	
	Branch Circuits, less than 220 volts	$7	
	Circuit Branch, over 200 volts	$20	
	Emergency Generator	$40	
	Interruptible Air Conditioning Panel	$35	
	Low Voltage HVAC Wiring	$25	
	Outdoor Meter Service	$20	
	Power Feeders - 220 Volts	$10	
	Service Panels Up to 400 am per panel	$45	
	Service Panels Over 400 amp per panel	$65	
	Service Panels/Sub-service panels (each)	$45	
	Solar Panel, per set of three panels	$20	
	Temporary Service	$45	
	Other miscellaneous wiring or code repairs	$25	
	TOTAL		

PLUMBING

1	**Base fee – includes one inspection**			**$50**	**$50**
	Each additional inspection			$35	
	Chimney Liner			$20	
	Back Flow Preventers		Laundry Standpipe	$15	
	Dental Chair		Lavatory/Sink	$15	
	Dishwashers		Sump pumps	$15	
	Drinking Fountain		Tub/Shower	$15	
	Floor Drain		Urinal	$15	
	Grease Trap		Water Closet	$15	
	Indirect Drain		Water Heater	$15	
	Drain Waste –Vent Replacement (R) Sin Fl			$35	
	Drain Waste –Vent Replacement (R) Two St			$45	
	Drain Waste –Vent Replacement (R) Tri-Quad Level			$55	
	Drain Waste –Vent Replacement (C)/ room or fix			$25	
	Drain Waste – Vent Replacement (C) Per Story			$15	
/	Sewers – Up to 4 inches			$50	50
	Sewers – Over 4 inches			$65	
	Water Distribution Replacement (R) Single F			$25	
	Water Distribution Replacement (R) Two St			$35	
	Water Distribution Replacement (R) T-Q Lev			$50	
	Water Distribution Replacement (C) / room or fix			$25	
	Water Distribution Replacement (C) Per Lev			$15	
	Water Service – up to 2" copper			$15	
	Water Service – over 2" copper			$25	
	Water Service – ductile iron			$100	
	Other plumbing items or code repairs, as			$25	
	TOTAL				100

MECHANICAL

Qty	Item	Fee	Amt
1	**Base fee – includes one**	**$50**	**$50**
	Each additional inspection	$35	
	Onsite Consultation with	$35	
	Special or Overtime Inspection	$130	
	Air handlers	$40	
	Chimney Liner	$20	
	Dryer, Bathroom, or Kitchen	$15	
	Emergency Generator	$40	
	Factory-built Fireplace	$50	
	Fan or Exhaust Hood (C)	$40	
	Fire and/or Smoke Damper	$30	
	Distribution System – Duct (R)	$40	
	Distribution System – Duct (C)	$50	
	Gas Distribution lines – includes pressure test (R)	$50	
	Gas Distribution lines – includes pressure test (C)	$70	
	Gas Pressure Test Only (R)	$45	
	Gas Pressure Test Only (C)	$65	
	Heat Recovery Unit, Variable Air Volume (VAV) Unit, Perimeter Terminal Air Conditioner (PTAC)	$10	
	Heating Units up to 200,000 BTU/hr	$50	
	Humidifiers with furnace installation	$10	
	Refrigeration or AC: 2 HP or less	$40	
	Refrigeration or AC: 2 ¼ – 5 HP	$55	
	Refrigeration or AC: 5 ¼ – 50 HP	$75	
	Refrigeration or AC: Over 50 HP	$120	
	Heating-Rooftop Unit including A/C	$135	
	Solar Panel per set of three panels	$20	
	Water Heater	$15	
	Variable Air Volume (VAV) Bxs	$10	
	Other Miscellaneous items/code repairs determined by Code Official	$25	
	TOTAL		

Revised 12/7/2011

EXHIBIT 8

	Ann Arbor Community Service Area **Standard Operating Procedure**	
DIVISION: **Building**	SUBJECT: **Plumbing/Cured in Place Pipe (CIPP) Inspection Policy**	SOP#: **501**

PURPOSE:

To provide a policy specific to plumbing inspectors assigned to the Community Services Area Building Department to outline the proper workflow for performing an inspection within the City as it pertains to "Cured in Place Pipe" (CIPP).

POLICY:

This policy shall apply to all the plumbing inspectors of the CSA Building Department. Authority to deviate from this procedure shall have prior approval from the Assistant Building Official (ABO) or Building Official (BO).

RESPONSIBILITY:

The primary purpose of an inspection is to assure CIPP installations are installed in accordance with the manufactures specifications referenced standard ASTM F1216-09, and the State of Michigan Product Approval Certificate.

MANUFACTURERS SPECIFICATIONS

Perma-Liner Industries, LLC
1300 Automobile Blvd., Suite 300
Clearwater, Florida 33706
info@perma-liner.com

3.1.3 Pipe Preparation
Perform pre-conditioning of the pipe section, including preparatory cleaning, corrosion removal, removal of grease buildup, or any other obstruction that may interfere with lining operations. Leave obstructions that are less than 15 percent of the pipe diameter that cannot be removed from the pipe, in place and line over. CCTV inspect to ensure that the pipe is ready for lining.

ASTM F1216-09

3.2.1 *Cured-In-Place Pipe (CIPP)*—a hollow cylinder containing a nonwoven or a woven material, or a combination of nonwoven and woven material surrounded by a cured thermosetting resin. Plastic coatings may be included. This pipe is formed within an existing pipe. Therefore, it takes the shape of and fits tightly to the existing pipe.

7.1.3 *Inspection of Pipelines*—Inspection of pipelines should be performed by experienced personnel trained in locating breaks, obstacles, and service connections by closed-circuit television or man entry. The interior of the pipeline should be carefully inspected to determine the location of any conditions that may prevent proper installation of the impregnated tube, such as protruding service taps, collapsed or crushed pipe, and reductions in the cross-sectional area of more than 40 %. These conditions should be noted so that they can be corrected.

7.1.4 *Line Obstructions*—The original pipeline should be clear of obstructions such as solids, dropped joints, protruding service connections, crushed or collapsed pipe, and reductions in the cross-sectional area of more than 40 % that will prevent the insertion of the resin-impregnated tube. If inspection reveals an obstruction that cannot be removed by conventional sewer cleaning equipment, then a point repair excavation should be made to uncover and remove or repair the obstruction.

Sec 8.2 *Gravity Pipe Leakage Testing*—If required by the owner in the contract documents or purchase order, gravity pipes should be tested using an exfiltration test method where the CIPP is plugged at both ends and filled with water. This test should take place after the CIPP has cooled down to ambient temperature. This test is limited to pipe lengths with no service laterals and diameters of 36 in. or less. The allowable water exfiltration for any length of pipe between termination points should not exceed 50 U.S. gallons per inch of internal pipe diameter per mile per day, providing that all air has been bled from the line. During exfiltration testing, the maximum internal pipe pressure at the lowest end should not exceed 10 ft (3.0 m) of water or 4.3 psi (29.7 kPA) and the water level inside of the inversion standpipe should be 2 ft (0.6 m) higher than the top of the pipe or 2 ft higher than the groundwater level, whichever is greater. The leakage quantity should be gaged by the water level in a temporary standpipe placed in the upstream plug. The test should be conducted for a minimum of one hour.

8.7 *Inspection and Acceptance*—The installation may be inspected visually if appropriate, or by closed-circuit television if visual inspection cannot be accomplished. Variations from true line and grade may be inherent because of the conditions of the original piping. No infiltration of groundwater should be observed. All service entrances should be accounted for and be unobstructed.

Miller, Ryan

From: Craig Strong [cstrong@cwaplan.com]
Sent: Saturday, March 19, 2016 6:31 PM
To: Taylor, Ellen; Miller, Ryan; Ratliff, Don; MacFarland, Chris
Cc: Strong, Craig
Subject: Revised CIPP Policy
Attachments: CIPP Inspection Policy.docx

All: I have revised the policy to include sections in ASTM F1216-09 which I hope will guide you through the inspection process. I have underlined key statements in the policy with regard to condition variables that shall be considered as approved by the State. The inspection criteria is as follows:

1. No point intrusions of more than 15%
2. No reductions in the cross-sectional area of more than 40 %.
3. Keep in mind that variations from true line and grade may be inherent because of the conditions of the original piping. This would include belly's and humps in the line. As long as the original pipe had the proper fall from the start to end then we shall except it.

I would like to meet with you so we are all on the same page with these inspections.

Thank you,
Craig E. Strong, Director
Code Enforcement Services
605 S. Main St., Suite 1
Ann Arbor, MI 48104
P- 734 662-2200
F- 734 662-1935
Mobile- 734 652-6813
Email- cstrong@cwaplan.com

EXHIBIT 9

ID	Name	Request	Received	Due Date	Status
1479	Hwang	Hello! I and my family are moving to Ann Arbor and would like to request the original blueprints for the house at 1508 Shadford Road, which we are currently under contract to purchase, with a closing date of July 18, 2018. The house is in Burns Park and we have been told that it was first constructed in 1928. It was last sold in the 1960's. We are also interested in any documents about the addition to the house, which was conducted since the house was first constructed. Thank you! Irene Hwang	7/2/2018	7/10/2018	Granted/denied
1478	Rodriguez	PLUMBING DEPARTMENT RECORDS REQUEST 1: With respect to the following Plumbing Permits: PLUM15-1935, PLUM14-1848, PLUM15-0280, PLUM14-0202, PLUM14-0680, PLUM13-0202, PLUM15-2072, PLUM14-0291, PLUM14-1663, PLUM18-0332, please produce (or allow inspection of): A. The City's entire file for each permit. B. Any correspondence received by the City regarding each permit and inspection. C. All documents related to every inspection completed for each permit. REQUEST 2: Please produce a copy of every written policy in effect between January 1, 2010 and the present related to trenchless sewer installation requirements in the city of Ann Arbor. This includes the pipe bursting method as well as the CIPP method. REQUEST 3: Please produce the video(s) reviewed in connection with the inspection for the following plumbing permits: PLUM14-0627 PLUM15-1782 PLUM15-1577 PLUM16-1781 PLUM16-2366 PLUM17-0466 PLUM18-0332	6/29/2018	7/23/2018	Granted/denied

FOIA REQUEST

PLUMBING DEPARTMENT RECORDS

REQUEST 1:

With respect to the following Plumbing Permits: PLUM15-1935, PLUM14-1848, PLUM15-0280, PLUM14-0202, PLUM14-0680, PLUM13-0202, PLUM15-2072, PLUM14-0291, PLUM14-1663, PLUM18-0332, please produce (or allow inspection of):

A. The City's entire file for each permit.

B. Any correspondence received by the City regarding each permit and inspection.

C. All documents related to every inspection completed for each permit.

REQUEST 2:

Please produce a copy of every written policy in effect between January 1, 2010 and the present related to trenchless sewer installation requirements in the city of Ann Arbor. This includes the pipe bursting method as well as the CIPP method.

REQUEST 3:

Please produce the video(s) reviewed in connection with the inspection for the following plumbing permits:

PLUM14-0627

PLUM15-1782

PLUM15-1577

PLUM16-1781

PLUM16-2366

PLUM17-0466

PLUM18-0332

Oscar Rodriguez

From: Oscar Rodriguez
Sent: Thursday, June 28, 2018 6:54 PM
To: 'Larcom, Kristen'
Subject: RE: RooterMD
Attachments: FOIA REQUEST 6.28.18.docx

Kristen- Additionally, we sent the attached FOIA request today. I send it to you in the hopes that you might be able to direct how this information will be produced.

Thanks,

Oscar A. Rodriguez
Hooper Hathaway, P.C.
126 South Main Street
Ann Arbor, MI 48104
(734) 662-4426 (office)
(734) 662-6098 (fax)
(734) 531-1346 (direct)
(734) 657-0055 (cell)
http://www.hooperhathaway.com

EXHIBIT 10

Designation: F1216 – 09

An American National Standard

Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube[1, 2]

This standard is issued under the fixed designation F1216; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 This practice describes the procedures for the reconstruction of pipelines and conduits (4 to 108-in. diameter) by the installation of a resin-impregnated, flexible tube which is inverted into the existing conduit by use of a hydrostatic head or air pressure. The resin is cured by circulating hot water or introducing controlled steam within the tube. When cured, the finished pipe will be continuous and tight-fitting. This reconstruction process can be used in a variety of gravity and pressure applications such as sanitary sewers, storm sewers, process piping, electrical conduits, and ventilation systems.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* For specific precautionary statements, see 7.4.2.

2. Referenced Documents

2.1 *ASTM Standards:*[3]

D543 Practices for Evaluating the Resistance of Plastics to Chemical Reagents

D638 Test Method for Tensile Properties of Plastics

D790 Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

D903 Test Method for Peel or Stripping Strength of Adhesive Bonds

D1600 Terminology for Abbreviated Terms Relating to Plastics

D3567 Practice for Determining Dimensions of "Fiberglass" (Glass-Fiber-Reinforced Thermosetting Resin) Pipe and Fittings

D3839 Guide for Underground Installation of "Fiberglass" (Glass-FiberReinforced Thermosetting-Resin) Pipe

D5813 Specification for Cured-In-Place Thermosetting Resin Sewer Piping Systems

E797 Practice for Measuring Thickness by Manual Ultrasonic Pulse-Echo Contact Method

F412 Terminology Relating to Plastic Piping Systems

2.2 *AWWA Standard:*

Manual on Cleaning and Lining Water Mains, M 28 [4]

2.3 *NASSCO Standard:*

Recommended Specifications for Sewer Collection System Rehabilitation [5]

3. Terminology

3.1 Definitions are in accordance with Terminology F412 and abbreviations are in accordance with Terminology D1600, unless otherwise specified.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *cured-in-place pipe (CIPP)*—a hollow cylinder containing a nonwoven or a woven material, or a combination of nonwoven and woven material surrounded by a cured thermosetting resin. Plastic coatings may be included. This pipe is formed within an existing pipe. Therefore, it takes the shape of and fits tightly to the existing pipe.

3.2.2 *inversion*—the process of turning the resin-impregnated tube inside out by the use of water pressure or air pressure.

3.2.3 *lift*—a portion of the CIPP that has cured in a position such that it has pulled away from the existing pipe wall.

[1] This practice is under the jurisdiction of ASTM Committee F17 on Plastic Piping Systems and is the direct responsibility of Subcommittee F17.67 on Trenchless Plastic Pipeline Technology.

Current edition approved March 1, 2009. Published March 2009. Originally approved in 1989. Last previous edition approved 2008 as F1216 – 08. DOI: 10.1520/F1216-09.

[2] The following report has been published on one of the processes: Driver, F. T., and Olson, M. R., " *Demonstration of Sewer Relining by the Insituform Process, Northbrook, Illinois*," EPA-600/2-83-064, Environmental Protection Agency, 1983. Interested parties can obtain copies from the Environmental Protection Agency or from a local technical library.

[3] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[4] Available from American Water Works Association (AWWA), 6666 W. Quincy Ave., Denver, CO 80235, http://www.awwa.org.

[5] Available from the National Association of Sewer Service Companies, 101 Wymore Rd., Suite 501, Altamonte, FL 32714.

***A Summary of Changes section appears at the end of this standard.**

4. Significance and Use

4.1 This practice is for use by designers and specifiers, regulatory agencies, owners, and inspection organizations who are involved in the rehabilitation of conduits through the use of a resin-impregnated tube inverted through the existing conduit. As for any practice, modifications may be required for specific job conditions.

5. Materials

5.1 *Tube*—The tube should consist of one or more layers of flexible needled felt or an equivalent nonwoven or woven material, or a combination of nonwoven and woven materials, capable of carrying resin, withstanding installation pressures and curing temperatures. The tube should be compatible with the resin system used. The material should be able to stretch to fit irregular pipe sections and negotiate bends. The outside layer of the tube should be plastic coated with a material that is compatible with the resin system used. The tube should be fabricated to a size that, when installed, will tightly fit the internal circumference and the length of the original conduit. Allowance should be made for circumferential stretching during inversion.

5.2 *Resin*—A general purpose, unsaturated, styrene-based, thermoset resin and catalyst system or an epoxy resin and hardener that is compatible with the inversion process should be used. The resin must be able to cure in the presence of water and the initiation temperature for cure should be less than 180°F (82.2°C). The CIPP system can be expected to have as a minimum the initial structural properties given in Table 1. These physical strength properties should be determined in accordance with Section 8.

6. Design Considerations

6.1 *General Guidelines*—The design thickness of the CIPP is largely a function of the condition of the existing pipe. Design equations and details are given in Appendix X1.

7. Installation

7.1 *Cleaning and Inspection*:

7.1.1 Prior to entering access areas such as manholes, and performing inspection or cleaning operations, an evaluation of the atmosphere to determine the presence of toxic or flammable vapors or lack of oxygen must be undertaken in accordance with local, state, or federal safety regulations.

7.1.2 *Cleaning of Pipeline*—All internal debris should be removed from the original pipeline. Gravity pipes should be cleaned with hydraulically powered equipment, high-velocity jet cleaners, or mechanically powered equipment (see NASSCO Recommended Specifications for Sewer Collection System Rehabilitation). Pressure pipelines should be cleaned with cable-attached devices or fluid-propelled devices as shown in AWWA Manual on Cleaning and Lining Water Mains, M 28.

TABLE 1 CIPP Initial Structural Properties[A]

Property	Test Method	Minimum Value	
		psi	(MPa)
Flexural strength	D790	4 500	(31)
Flexural modulus	D790	250 000	(1 724)
Tensile strength (for pressure pipes only)	D638	3 000	(21)

[A]The values in Table 1 are for field inspection. The purchaser should consult the manufacturer for the long-term structural properties.

7.1.3 *Inspection of Pipelines*—Inspection of pipelines should be performed by experienced personnel trained in locating breaks, obstacles, and service connections by closed-circuit television or man entry. The interior of the pipeline should be carefully inspected to determine the location of any conditions that may prevent proper installation of the impregnated tube, such as protruding service taps, collapsed or crushed pipe, and reductions in the cross-sectional area of more than 40 %. These conditions should be noted so that they can be corrected.

7.1.4 *Line Obstructions*—The original pipeline should be clear of obstructions such as solids, dropped joints, protruding service connections, crushed or collapsed pipe, and reductions in the cross-sectional area of more than 40 % that will prevent the insertion of the resin-impregnated tube. If inspection reveals an obstruction that cannot be removed by conventional sewer cleaning equipment, then a point repair excavation should be made to uncover and remove or repair the obstruction.

7.2 *Resin Impregnation*—The tube should be vacuum-impregnated with resin (wet-out) under controlled conditions. The volume of resin used should be sufficient to fill all voids in the tube material at nominal thickness and diameter. The volume should be adjusted by adding 5 to 10 % excess resin for the change in resin volume due to polymerization and to allow for any migration of resin into the cracks and joints in the original pipe.

7.3 *Bypassing*—If bypassing of the flow is required around the sections of pipe designated for reconstruction, the bypass should be made by plugging the line at a point upstream of the pipe to be reconstructed and pumping the flow to a downstream point or adjacent system. The pump and bypass lines should be of adequate capacity and size to handle the flow. Services within this reach will be temporarily out of service.

7.3.1 Public advisory services will be required to notify all parties whose service laterals will be out of commission and to advise against water usage until the mainline is back in service.

7.4 *Inversion*:

7.4.1 *Using Hydrostatic Head*—The wet-out tube should be inserted through an existing manhole or other approved access by means of an inversion process and the application of a hydrostatic head sufficient to fully extend it to the next designated manhole or termination point. The tube should be inserted into the vertical inversion standpipe with the impermeable plastic membrane side out. At the lower end of the inversion standpipe, the tube should be turned inside out and attached to the standpipe so that a leakproof seal is created. The inversion head should be adjusted to be of sufficient height to cause the impregnated tube to invert from point of inversion to point of termination and hold the tube tight to the pipe wall, producing dimples at side connections. Care should be taken during the inversion so as not to over-stress the felt fiber.

7.4.1.1 An alternative method of installation is a top inversion. In this case, the tube is attached to a top ring and is inverted to form a standpipe from the tube itself or another method accepted by the engineer.

NOTE 1—The tube manufacturer should provide information on the maximum allowable tensile stress for the tube.

7.4.2 *Using Air Pressure*—The wet-out tube should be inserted through an existing manhole or other approved access by means of an inversion process and the application of air pressure sufficient to fully extend it to the next designated manhole or termination point. The tube should be connected by an attachment at the upper end of the guide chute so that a leakproof seal is created and with the impermeable plastic membranes side out. As the tube enters the guide chute, the tube should be turned inside out. The inversion air pressure should be adjusted to be of sufficient pressure to cause the impregnated tube to invert from point of inversion to point of termination and hold the tube tight to the pipe wall, producing dimples at side connections. Care should be taken during the inversion so as not to overstress the woven and nonwoven materials.

NOTE 2—**Warning:** Suitable precautions should be taken to eliminate hazards to personnel in the proximity of the construction when pressurized air is being use.

7.4.3 *Required Pressures*—Before the inversion begins, the tube manufacturer shall provide the minimum pressure required to hold the tube tight against the existing conduit, and the maximum allowable pressure so as not to damage the tube. Once the inversion has started, the pressure shall be maintained between the minimum and maximum pressures until the inversion has been completed.

7.5 *Lubricant*—The use of a lubricant during inversion is recommended to reduce friction during inversion. This lubricant should be poured into the inversion water in the downtube or applied directly to the tube. The lubricant used should be a nontoxic, oil-based product that has no detrimental effects on the tube or boiler and pump system, will not support the growth of bacteria, and will not adversely affect the fluid to be transported.

7.6 *Curing*:

7.6.1 *Using Circulating Heated Water*— After inversion is completed, a suitable heat source and water recirculation equipment are required to circulate heated water throughout the pipe. The equipment should be capable of delivering hot water throughout the section to uniformly raise the water temperature above the temperature required to effect a cure of the resin. Water temperature in the line during the cure period should be as recommended by the resin manufacturer.

7.6.1.1 The heat source should be fitted with suitable monitors to gage the temperature of the incoming and outgoing water supply. Another such gage should be placed between the impregnated tube and the pipe invert at the termination to determine the temperatures during cure.

7.6.1.2 Initial cure will occur during temperature heat-up and is completed when exposed portions of the new pipe appear to be hard and sound and the remote temperature sensor indicates that the temperature is of a magnitude to realize an exotherm or cure in the resin. After initial cure is reached, the temperature should be raised to the post-cure temperature recommended by the resin manufacturer. The post-cure temperature should be held for a period as recommended by the resin manufacturer, during which time the recirculation of the water and cycling of the boiler to maintain the temperature continues. The curing of the CIPP must take into account the existing pipe material, the resin system, and ground conditions (temperature, moisture level, and thermal conductivity of soil).

7.6.2 *Using Steam*—After inversion is completed, suitable steam-generating equipment is required to distribute steam throughout the pipe. The equipment should be capable of delivering steam throughout the section to uniformly raise the temperature within the pipe above the temperature required to effect a cure of the resin. The temperature in the line during the cure period should be as recommended by the resin manufacturer.

7.6.2.1 The steam-generating equipment should be fitted with a suitable monitor to gage the temperature of the outgoing steam. The temperature of the resin being cured should be monitored by placing gages between the impregnated tube and the existing pipe at both ends to determine the temperature during cure.

7.6.2.2 Initial cure will occur during temperature heat-up and is completed when exposed portions of the new pipe appear to be hard and sound and the remote temperature sensor indicates that the temperature is of a magnitude to realize an exotherm or cure in the resin. After initial cure is reached, the temperature should be raised to post-cure temperatures recommended by the resin manufacturer. The post-cure temperature should be held for a period as recommended by the resin manufacturer, during which time the distribution and control of steam to maintain the temperature continues. The curing of the CIPP must take into account the existing pipe material, the resin system, and ground conditions (temperature, moisture level, and thermal conductivity of soil).

7.6.3 *Required Pressures*—As required by the purchase agreement, the estimated maximum and minimum pressure required to hold the flexible tube tight against the existing conduit during the curing process should be provided by the seller and shall be increased to include consideration of the external ground water, if present. Once the cure has started and dimpling for laterals is completed, the required pressures should be maintained until the cure has been completed. For water or steam, the pressure should be maintained within the estimated maximum and minimum pressure during the curing process. If the steam pressure or hydrostatic head drops below the recommended minimum during the cure, the CIPP should be inspected for lifts or delaminations and evaluated for its ability to fully meet the applicable requirements of 7.8 and Section 8.

7.7 *Cool-Down*:

7.7.1 *Using Cool Water After Heated Water Cure*—The new pipe should be cooled to a temperature below 100°F (38°C) before relieving the static head in the inversion standpipe. Cool-down may be accomplished by the introduction of cool water into the inversion standpipe to replace water being drained from a small hole made in the downstream end. Care

should be taken in the release of the static head so that a vacuum will not be developed that could damage the newly installed pipe.

7.7.2 *Using Cool Water After Steam Cure*— The new pipe should be cooled to a temperature below 113°F (45°C) before relieving the internal pressure within the section. Cool-down may be accomplished by the introduction of cool water into the section to replace the mixture of air and steam being drained from a small hole made in the downstream end. Care should be taken in the release of the air pressure so that a vacuum will not be developed that could damage the newly installed pipe.

7.8 *Workmanship*—The finished pipe should be continuous over the entire length of an inversion run and be free of dry spots, lifts, and delaminations. If these conditions are present, remove and replace the CIPP in these areas.

7.8.1 If the CIPP does not fit tightly against the original pipe at its termination point(s), the space between the pipes should be sealed by filling with a resin mixture compatible with the CIPP.

7.9 *Service Connections*—After the new pipe has been cured in place, the existing active service connections should be reconnected. This should generally be done without excavation, and in the case of non-man entry pipes, from the interior of the pipeline by means of a television camera and a remote-control cutting device.

8. Inspection Practices

8.1 For each inversion length designated by the owner in the Contract documents or purchase order, the preparation of a CIPP sample is required, using one of the following two methods, depending on the size of the host pipe.

8.1.1 For pipe sizes of 18 in. or less, the sample should be cut from a section of cured CIPP at an intermediate manhole or at the termination point that has been inverted through a like diameter pipe which has been held in place by a suitable heat sink, such as sandbags.

8.1.2 In medium and large-diameter applications and areas with limited access, the sample should be fabricated from material taken from the tube and the resin/catalyst system used and cured in a clamped mold placed in the downtube when circulating heated water is used and in the silencer when steam is used. This method can also be used for sizes 18 in. or less, in situations where preparing samples in accordance with 8.1.1 can not be obtained due to physical constrains, if approved by the owner.

8.1.3 The samples for each of these cases should be large enough to provide a minimum of three specimens and a recommended five specimens for flexural testing and also for tensile testing, if applicable. The following test procedures should be followed after the sample is cured and removed.

8.1.3.1 *Short-Term Flexural (Bending) Properties*—The initial tangent flexural modulus of elasticity and flexural stress should be measured for gravity and pressure pipe applications in accordance with Test Methods D790 and should meet the requirements of Table 1.

8.1.3.2 *Tensile Properties*—The tensile strength should be measured for pressure pipe applications in accordance with Test Method D638 and must meet the requirements of Table 1.

8.2 *Gravity Pipe Leakage Testing*—If required by the owner in the contract documents or purchase order, gravity pipes should be tested using an exfiltration test method where the CIPP is plugged at both ends and filled with water. This test should take place after the CIPP has cooled down to ambient temperature. This test is limited to pipe lengths with no service laterals and diameters of 36 in. or less. The allowable water exfiltration for any length of pipe between termination points should not exceed 50 U.S. gallons per inch of internal pipe diameter per mile per day, providing that all air has been bled from the line. During exfiltration testing, the maximum internal pipe pressure at the lowest end should not exceed 10 ft (3.0 m) of water or 4.3 psi (29.7 kPA) and the water level inside of the inversion standpipe should be 2 ft (0.6 m) higher than the top of the pipe or 2 ft higher than the groundwater level, whichever is greater. The leakage quantity should be gaged by the water level in a temporary standpipe placed in the upstream plug. The test should be conducted for a minimum of one hour.

NOTE 3—It is impractical to test pipes above 36-in. diameter for leakage due to the technology available in the pipe rehabilitation industry. Post inspection of larger pipes will detect major leaks or blockages.

8.3 *Pressure Pipe Testing*—If required by the owner in the contract documents or purchase order, pressure pipes should be subjected to a hydrostatic pressure test. A recommended pressure and leakage test would be at twice the known working pressure or at the working pressure plus 50 psi, whichever is less. Hold this pressure for a period of two to three hours to allow for stabilization of the CIPP. After this period, the pressure test will begin for a minimum of one hour. The allowable leakage during the pressure test should be 20 U.S. gallons per inch of internal pipe diameter per mile per day, providing that all air has been evacuated from the line prior to testing and the CIPP has cooled down to ambient temperature.

NOTE 4—The allowable leakage for gravity and pressure pipe testing is a function of water loss at the end seals and trapped air in the pipe.

8.4 *Delamination Test*—If required by the owner in the contract documents or purchase order, a delamination test should be performed on each inversion length specified. The CIPP samples should be prepared in accordance with 8.1.2, except that a portion of the tube material in the sample should be dry and isolated from the resin in order to separate tube layers for testing. (Consult the tube manufacturer for further information.) Delamination testing shall be in accordance with Test Method D903, with the following exceptions:

8.4.1 The rate of travel of the power-actuated grip shall be 1 in. (25 mm)/min.

8.4.2 Five test specimens shall be tested for each inversion specified.

8.4.3 The thickness of the test specimen shall be minimized, but should be sufficient to adequately test delamination of nonhomogeneous CIPP layers.

8.5 The peel or stripping strength between any nonhomogeneous layers of the CIPP laminate should be a minimum of 10 lb/in. (178.60 g/mm) of width for typical CIPP applications.

NOTE 5—The purchaser may designate the dissimilar layers between which the delamination test will be conducted.

NOTE 6—For additional details on conducting the delamination test, contact the CIPP contractor.

8.6 *CIPP Wall Thickness*—The method of obtaining CIPP wall thickness measurements should be determined in a manner consistent with 8.1.2 of Specification D5813. Thickness measurements should be made in accordance with Practice D3567 for samples prepared in accordance with 8.1. Make a minimum of eight measurements at evenly spaced intervals around the circumference of the pipe to ensure that minimum and maximum thicknesses have been determined. Deduct from the measured values the thickness of any plastic coatings or CIPP layers not included in the structural design of the CIPP. The average thickness should be calculated using all measured values and shall meet or exceed minimum design thickness as agreed upon between purchaser and seller. The minimum wall thickness at any point shall not be less than 87.5% of the specified design thickness as agreed upon between purchase and seller.

8.6.1 *Ultrasonic Testing of Wall Thickness*—An alternative method to 8.6 for measuring the wall thickness may be performed within the installed CIPP at either end of the pipe by the ultrasonic pulse echo method as described in Practice E797. A minimum of eight (8) evenly spaced measurements should be made around the internal circumference of the installed CIPP within the host pipe at a distance of 12 to 18 in. from the end of the pipe. For pipe diameters of fifteen (15) in. or greater, a minimum of sixteen (16) evenly spaced measurements shall be recorded. The ultrasonic method to be used is the flaw detector with A-scan display and direct thickness readout as defined in 6.1.2 of E797. A calibration block shall be manufactured from the identical materials used in the installed CIPP to calibrate sound velocity through the liner. Calibration of the transducer shall be performed daily in accordance with the equipment manufacturer's recommendations. The average thickness should be calculated using all measured values and shall meet or exceed minimum design thickness as agreed upon between purchaser and seller. The minimum wall thickness at any point shall not be less than 87.5 % of the specified design thickness as agreed upon between purchaser and seller.

8.7 *Inspection and Acceptance*—The installation may be inspected visually if appropriate, or by closed-circuit television if visual inspection cannot be accomplished. Variations from true line and grade may be inherent because of the conditions of the original piping. No infiltration of groundwater should be observed. All service entrances should be accounted for and be unobstructed.

APPENDIXES

(Nonmandatory Information)

X1. DESIGN CONSIDERATIONS

X1.1 *Terminology*:

X1.1.1 *partially deteriorated pipe*—the original pipe can support the soil and surcharge loads throughout the design life of the rehabilitated pipe. The soil adjacent to the existing pipe must provide adequate side support. The pipe may have longitudinal cracks and up to 10.0% distortion of the diameter. If the distortion of the diameter is greater than 10.0%, alternative design methods are required (see Note 1).

X1.1.2 *fully deteriorated pipe*—the original pipe is not structurally sound and cannot support soil and live loads or is expected to reach this condition over the design life of the rehabilitated pipe. This condition is evident when sections of the original pipe are missing, the pipe has lost its original shape, or the pipe has corroded due to the effects of the fluid, atmosphere, soil, or applied loads.

X1.2 *Gravity Pipe*:

X1.2.1 *Partially Deteriorated Gravity Pipe Condition*—The CIPP is designed to support the hydraulic loads due to groundwater, since the soil and surcharge loads can be supported by the original pipe. The groundwater level should be determined by the purchaser and the thickness of the CIPP should be sufficient to withstand this hydrostatic pressure without collapsing. The following equation may be used to determine the thickness required:

$$P = \frac{2KE_L}{(1-\nu^2)} \cdot \frac{1}{(DR-1)^3} \cdot \frac{C}{N} \qquad \text{(X1.1)}$$

where:

P = groundwater load, psi (MPa), measured from the invert of the pipe
K = enhancement factor of the soil and existing pipe adjacent to the new pipe (a minimum value of 7.0 is recommended where there is full support of the existing pipe),
E_L = long-term (time corrected) modulus of elasticity for CIPP, psi (MPa) (see Note X1.1),
ν = Poisson's ratio (0.3 average),
DR = dimension ratio of CIPP,
C = ovality reduction factor =

$$\left(\left[1-\frac{\Delta}{100}\right]/\left[1+\frac{\Delta}{100}\right]^2\right)^3$$

Δ = percentage ovality of original pipe =

$$100 \times \frac{(Mean\ Inside\ Diameter - Minimum\ Inside\ Diameter)}{Mean\ Inside\ Diameter}$$

or

$$100 \times \frac{(Maximum\ Inside\ Diameter - Mean\ Inside\ Diameter)}{Mean\ Inside\ Diameter}$$

and

N = factor of safety.

NOTE X1.1—The choice of value (from manufacturer's literature) of E_L will depend on the estimated duration of the application of the load, P, in relation to the design life of the structure. For example, if the total duration of the load, P, is estimated to be 50 years, either continuously applied, or the sum of intermittent periods of loading, the appropriately conservative choice of value for E_L will be that given for 50 years of continuous loading at the maximum ground or fluid temperature expected to be reached over the life of the structure.

NOTE X1.2—If there is no groundwater above the pipe invert, the CIPP should typically have a maximum *SDR* of 100, dependent upon design conditions.

X1.2.1.1 If the original pipe is oval, the CIPP design from Eq X1.1 shall have a minimum thickness as calculated by the following formula:

$$1.5\frac{\Delta}{100}\left(1+\frac{\Delta}{100}\right)DR^2 - 0.5\left(1+\frac{\Delta}{100}\right)DR = \frac{\sigma_L}{PN} \quad (X1.2)$$

where:

σ_L = long-term (time corrected) flexural strength for CIPP, psi (MPa) (see Note X1.5).

X1.2.1.2 See Table X1.1 for typical design calculations.

X1.2.2 *Fully Deteriorated Gravity Pipe Condition*—The CIPP is designed to support hydraulic, soil, and live loads. The groundwater level, soil type and depth, and live load should be determined by the purchaser, and the following equation should be used to calculate the CIPP thickness required to withstand these loads without collapsing:

$$q_t = \frac{1}{N}[32R_wB'\,E'_s{\cdot}C(E_LI/D^3)]^{1/2} \quad (X1.3)$$

TABLE X1.1 Maximum Groundwater Loads for Partially Deteriorated Gravity Pipe Condition

Diameter, in. (Inside Diameter of Original Pipe)	Nominal CIPP Thickness, mm	CIPP Thickness, *t*, in.	Maximum Allowable Groundwater Load[A] (above invert)	
			ft	m
8	6	0.236	40.0	12.2
10	6	0.236	20.1	6.1
12	6	0.236	11.5	3.5
15	9	0.354	20.1	6.1
18	9	0.354	11.5	3.5
18	12	0.472	27.8	8.5
24	12	0.472	11.5	3.5
24	15	0.591	22.8	6.9
30	15	0.591	11.5	3.5
30	18	0.709	20.1	6.1

[A]Assumes K = 7.0, E = 125 000 psi (862 MPa) (50-year strength), ν = 0.30, C = 0.64 (5 % ovality), and N = 2.0

where:

q_t = total external pressure on pipe, psi (MPa),
= $0.433H_w + wHR_w/144 + W_s$, (English Units),
$0.00981H_w + wHR_w/1000 + W_s$, (Metric Units)

R_w = water buoyancy factor (0.67 min) = $1 - 0.33\,(H_w/H)$,

w = soil density, lb.ft^3(KN/m^3),

W_s = live load, psi (Mpa),

H_w = height of water above top of pipe, ft (m)

H = height of soil above top of pipe, ft (m),

B' = coefficient of elastic support = $1/(1 + 4e^{-0.065H})$ inch-pound units, $(1/(1 + 4e^{-0.213H})$ SI units

I = moment of inertia of CIPP, in.^{4}/in. (mm^4/mm) = $t^3/12$,

t = thickness of CIPP, in. (mm),

C = ovality reduction factor (see X1.2.1),

N = factor of safety,

E'_s = modulus of soil reaction, psi (MPa) (see Note X1.4),

E_L = long-term modulus of elasticity for CIPP, psi (MPa), and

D = mean inside diameter of original pipe, in. (mm)

X1.2.2.1 The CIPP design from Eq X1.3 should have a minimum thickness as calculated by the following formula:

$$\frac{EI}{D^3} = \frac{E}{12(DR)^3} \geq 0.093\ (inch-pound\ units), \quad (X1.4)$$

or

$$\frac{E}{12(DR)^3} \geq 0.00064\ (SI\ units)$$

where:

E = initial modulus of elasticity, psi (MPa)

NOTE X1.3—For pipelines at depth not subject to construction disturbance, or if the pipeline was originally installed using tunneling method, the soil load may be calculated using a tunnel load analysis. Finite element analysis is an alternative design method for noncircular pipes.

NOTE X1.4—For definition of modulus of soil reaction, see Practice D3839.

X1.2.2.2 The minimum CIPP design thickness for a fully deteriorated condition should also meet the requirements of Eq X1.1 and X1.2.

X1.3 *Pressure Pipe*:

X1.3.1 *Partially Deteriorated Pressure Condition*—A CIPP installed in an existing underground pipe is designed to support external hydrostatic loads due to groundwater as well as withstand the internal pressure in spanning across any holes in the original pipe wall. The results of Eq X1.1 are compared to those from Eq X1.6 or Eq X1.7, as directed by Eq X1.5, and the largest of the thicknesses is selected. In an above-ground design condition, the CIPP is designed to withstand the internal pressure only by using Eq X1.5-X1.7 as applicable.

X1.3.1.1 If the ratio of the hole in the original pipe wall to the pipe diameter does not exceed the quantity shown in Eq X1.5, then the CIPP is assumed to be a circular flat plate fixed

at the edge and subjected to transverse pressure only. In this case, Eq X1.6 is used for design. For holes larger than the d/D value in Eq X1.5, the liner cannot be considered in flat plate loading, but rather in ring tension or hoop stress, and Eq X1.7 is used.

$$\frac{d}{D} \leq 1.83 \left(\frac{t}{D}\right)^{1/2} \quad \text{(X1.5)}$$

where:

d = diameter of hole or opening in original pipe wall, in. (mm),
D = mean inside diameter of original pipe, in. (mm), and
t = thickness of CIPP, in. (mm).

$$P = \frac{5.33}{(DR - 1)^2}\left(\frac{D}{d}\right)^2 \frac{\sigma_L}{N} \quad \text{(X1.6)}$$

where:

DR = dimension ratio of CIPP,
D = mean inside diameter of original pipe, in. (mm),
d = diameter of hole or opening in original pipe wall, in. (mm),
σ_L = long-term (time corrected) flexural strength for CIPP, psi (MPa) (see Note X1.5), and
N = factor of safety.

NOTE X1.5—The choice of value (from manufacturer's literature) of σ_L will depend on the estimated duration of the application of the load, P, in relation to the design life of the structure. For example, if the total duration of the load, P, is estimated to be 50 years, either continuously applied, or the sum of intermittent periods of loading, the appropriately conservative choice of value of σ_L will be that given for 50 years of continuous loading at the maximum ground or fluid temperature expected to be reached over the life of the structure.

X1.3.2 *Fully Deteriorated Pressure Pipe Condition*—A CIPP to be installed in an underground condition is designed to withstand all external loads and the full internal pressure. The design thicknesses are calculated from Eq X1.1, Eq X1.3, Eq X1.4, and Eq X1.7, and the largest thickness is selected. If the pipe is above ground, the CIPP is designed to withstand internal pressure only by using Eq X1.7.

$$P = \frac{2\sigma_{TL}}{(DR - 2)\,N} \quad \text{(X1.7)}$$

where:

P = internal pressure, psi (MPa),
σ_{TL} = long-term (time corrected) tensile strength for CIPP, psi (MPa) (see Note 12),
DR = dimension ratio of CIPP, and
N = factor of safety.

NOTE X1.6—The choice of value (from manufacturer's literature) of σ_{TL} will depend on the estimated duration of the application of the load, P, in relation to the design life of the structure. For example, if the total duration of the load, P, is estimated to be 50 years, either continuously applied, or the sum of intermittent periods of loading, the appropriately conservative choice of value of σ_{TL} will be that given for 50 years of continuous loading at the maximum ground or fluid temperature expected to be reached over the life of the structure.

X1.4 — *Negative Pressure*—Where the pipe is subject to a vacuum, the CIPP should be designed as a gravity pipe with the external hydrostatic pressure increased by an amount equal to the negative pressure.

NOTE X1.7—Table X1.1 presents maximum groundwater loads for partially deteriorated pipes for selected typical nominal pipe sizes. CIPP is custom made to fit the original pipe and can be fabricated to a variety of sizes from 4 to 96-in. diameter which would be impractical to list here.

X2. CHEMICAL-RESISTANCE TESTS

X2.1 *Scope*:

X2.1.1 This appendix covers the test procedures for chemical-resistance properties of CIPP. Minimum standards are presented for standard domestic sewer applications.

X2.2 *Procedure for Chemical-Resistance Testing*:

X2.2.1 Chemical resistance tests should be completed in accordance with Practices D543. Exposure should be for a minimum of one month at 73.4°F (23°C). During this period, the CIPP test specimens should lose no more than 20 % of their initial flexural strength and flexural modulus when tested in accordance with Section 8 of this practice.

X2.2.2 Table X2.1 presents a list of chemical solutions that serve as a recommended minimum requirement for the chemical-resistant properties of CIPP in standard domestic sanitary sewer applications.

X2.2.3 For applications other than standard domestic sewage, it is recommended that chemical-resistance tests be conducted with actual samples of the fluid flowing in the pipe. These tests can also be accomplished by depositing CIPP test specimens in the active pipe.

TABLE X2.1 Minimum Chemical Resistance Requirements for Domestic Sanitary Sewer Applications

Chemical Solution	Concentration, %
Tap water (pH 6–9)	100
Nitric acid	5
Phosphoric acid	10
Sulfuric acid	10
Gasoline	100
Vegetable oil	100
Detergent	0.1
Soap	0.1

SUMMARY OF CHANGES

Committee F17 has identified the location of selected changes to this standard since the last issue (F1216–08) that may impact the use of this standard. (Approved March 1, 2009.)

(*1*) 8.1, 8.1.1 and 8.1.2 were revised.

Committee F17 has identified the location of selected changes to this standard since the last issue (F1217–07b) that may impact the use of this standard.

(*1*) Added Practices D3567, E797, and Specification D5813 to Section 2, Reference Documents.
(*2*) Added 8.6 and 8.6.1 to include an alternative method of wall thickness measurement by Ultrasonic Methods.
(*3*) Renumbered Inspection and Acceptance from 8.6 to 8.7.

EXHIBIT 11

RICK SNYDER
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF LICENSING AND REGULATORY AFFAIRS
LANSING

SHELLY EDGERTON
DIRECTOR

CERTIFICATE of ACCEPTABILITY of PRODUCT

THIS ACKNOWLEDGES THAT

Performance Liner

Manufacturer Designation:

LMK Technologies
1779 Chessie Lane
Ottawa, IL 61350

Is acceptable for use in the State of Michigan and deemed adequate for its intended use and consistent with reasonable requirements for the health, safety and welfare of the people of this state.

Your Petition Application for Certificate of Acceptability was approved at the October 11, 2017 Construction Code Commission meeting in accordance with the authority granted under 1972 P.A. 230, MCL 125.1521. The product was reviewed in accordance with the 2015 Michigan Plumbing Code.

THIS CERTIFICATE SHALL NOT BE USED FOR ADVERTISING PURPOSES.

Product Approval Number: 1666-PA

Effective Date: October 11, 2017

P.O. BOX 30254 • LANSING, MICHIGAN 48909
www.michigan.gov/bcc • Telephone (517) 241-9303 • Fax (517) 241-9570

Installation Practice

Rehabilitation of a Sewer Service Lateral Pipe

Installation Practice for Rehabilitation of a Sewer Service Lateral Pipe

Using Cured-In-Place Pipe By Means Of Air Inversion

1. Intent

   It is the intent of this specification to provide materials and a standard practice for installing a cured-in-place pipe to renew a sewer service lateral that connects to a main pipe or directly to a manhole.

2. General

   2.1 The service lateral reconstruction shall be accomplished using a translucent inversion bladder, a non-woven fabric tube of particular length that includes a *compression gasket seal* at each end of the tube, and a thermo-set resin with physical/chemical properties appropriate for the application. The *tube* is positioned inside of a *translucent inversion bladder* forming a *liner/bladder assembly*. The tube shall be resin impregnated under a controlled vacuum within *the translucent bladder.* The liner/bladder assembly is then inserted into a *mobile air-inversion device*. The mobile air-inversion device shall include a *camera port* for inspecting the resin saturated tube inflated in the pipe before the resin is cured, and for visually verifying the liner has been fully deployed and the end is open. Access to an upstream end of the service lateral is accomplished by using an existing clean out or by making a small vacuum excavation.

   2.2 The mobile air-inversion device is aligned with the access opening in the service lateral pipe (manhole, excavated pit, inside clean out or outside clean out). When the mobile air-inversion device is properly positioned, the liner/bladder assembly is inverted into the lateral pipe under *controlled air pressure*. The liner/bladder assembly shall include a hold back rope for controlling the speed of inversion and protecting plumbing fixture traps in the building by ensuring a positive pressure is not created in the service lateral pipe. The inversion is complete when the liner is fully extended within the lateral pipe, and the bladder extending beyond the open end of the liner tube, with the compression gasket positioned between the host pipe and the liner.

   2.3 A lateral camera shall be inserted into a *camera port* and continuing through the bladder, under pressure providing visual inspection of the inflated liner tube prior to curing the resin. The inspection process shall verify that the liner is properly positioned in the pipe and the tube has been fully deployed with the end open. The resin impregnated tube is cured, the inflation bladder reverted from the cured tube, and the mobile launching device is removed.

3. Material

   3.1 Tube - The fabric tube shall consist of flexible needle punched felt, knitted tube or an equivalent non-woven material. The tube may be reinforced by incorporating scrim or fiberglass strands to limit length stretch and improve structural properties. The tube shall be a

butt seam constructed by longitudinal stitching and thermal tape seal bonding producing a

uniform wall thickness with no intermediate layers. The tube shall be capable of conforming to bends, offset joints, bells, and disfigured pipe sections. A hydrophilic O-ring shall be positioned at each end of the liner tube providing a leak-free compression gasket seal compatible with all piping materials.

3.3 The bladder shall be translucent to enable visual inspection of resin during saturation under a controlled vacuum and inspection of the liner once inflated in the pipe prior to curing of the resin.

3.4 Liner/Bladder Assembly - The tube positioned within the translucent bladder shall form a liner/bladder assembly engineered for inserting the liner tube and bladder simultaneously from a single access point maintaining inflation pressure from the initial inversion of the liner tube until the resin is cured.

3.5 Resin - The thermo-set resin system shall be polyester, vinyl ester, silicate or epoxy with proper catalysts as designed for the specific application.

3.6 Design Considerations - The design of the cured-in-place lateral liner system is largely a function of the condition of the existing pipeline and the loads stipulated by the customer's specification. Structural strength design calculations as per ASTM F1216-09, appendix X1.1.2

Minimum Structural Properties

Flexural Strength (ASTM D790) = 4,500 psi

Flexural Modulus (ASTM D790) = 250,000 psi

Chemical Resistance

The cured tube shall meet minimum tests standards described in ASTM F1216-09, appendix X2.

4. Installation Recommendations

ASTM F1216-09: Standard Practice for the Installation of Cured In-Place Pipe by Inversion Lining

4.1 Accessing the Pipe – Should a cleanout not exist; the lateral does not directly connect to a manhole, then the Installer shall excavate an access pit, or install a cleanout providing access to the lateral pipe.

4.2 Cleaning and Inspection – All roots and debris shall be removed from the pipe and a CCTV inspection shall be performed documenting length, diameter and pipe defects as per NASSCO Standards.

4.3 The tube is cut to the appropriate length and inserted within the translucent bladder.

4.4 Resin Impregnated Tube – The tube in good condition shall be resin impregnated under a controlled vacuum with the appropriate thermo-set resin designed for the pipe and its intended use. All resin shall be contained within the translucent bladder during vacuum impregnation. The Installer shall ensure that no public property is exposed to contamination by liquid resin

compounds or components.

4.5 Liner Insertion – The resin impregnated tube within the inflation bladder is inserted into the mobile launching device and positioned at the clean out, or pipe opening.

4.6 Inversion – The liner/bladder assembly is inverted out of the mobile launching device by controlled air pressure. Once the liner tube begins to invert, the tail of the tube progresses as the tube is pressed against the pipe wall. At no time shall the air pressure be removed causing interruption to inflation and pressing of the tube. The inversion shall be complete when the tube is fully deployed and the bladder is extending beyond the liner tube keeping the end of the liner open. The tube is held tightly in place against the wall of the host pipe under pressure until the cure is complete in accordance with **ASTM F1216-09 Sections 7.4.2 and 7.4.3: Using Air Pressure**. The inversion air pressure should be adjusted to be of sufficient pressure to cause the impregnated tube to invert from point of inversion to point of termination and hold the tube tight to the pipe wall, producing dimples at side connections. Care should be taken during the inversion so as not to overstress the woven and nonwoven materials.

4.7 Curing – The liner is chemically cured at ambient temperatures or by a suitable heat source. The heating equipment shall be capable of delivering a mixture of steam and air throughout the liner bladder assembly to uniformly raise the temperature above the temperature required to cure the resin. The curing of the CIPP must take into account the existing pipe material, the resin system, and ground conditions. The heat source temperatures shall be monitored and logged during the cure and cool down cycles. The manufacturer's recommended cure schedule shall be submitted.

4.8 CIPP Processing – Curing shall be done without pressure interruption with air or a mixture of air and steam for the proper duration of time per the resin manufacturer's recommendations. The bladder is reverted back into the launching device and removed from the manhole, cleanout or access pit. No barriers, coatings, or any material other than the cured tube/resin composite is to be left in the host pipe. The liner shall be leak-free with each end sealed to the host pipe by means of swelling compression gaskets.

4.9 Trimming – Any tube protruding into the main pipe shall be robotically trimmed flush.

4.10 Post Inspection – A second CCTV inspection is performed documenting liner placement and condition. The owner shall receive a video recording and a written report certified by NASSCO LACP documenting inspection of the CIPP.

4.11 Reinstatement of Service – Any side connections shall be reinstated and returned to service, unless otherwise directed by the owner.