**Request for Bid**
**Lick Creek Interceptor CIPP Addendum No. 2 to**
**RFB No. 179821.71.0406**
**July 10, 2015**

The following information encompasses Addendum No. 2 for the above referenced RFB. Bidders shall fully consider and acknowledge this Addendum in the preparation and submittal of its formal Bid. Failure to do so may result in the rejection of the Bid.

Section 1 – Additional Questions

Section 2 – Updated 00370 Commercial Bid Form

Section 3 – Updated Specifications

**All other conditions and requirements remain unchanged.**

---

## Additional Questions

**Q1**: Will the Owner provide a budget for the project?
**SARP10:** No. Please provide your most competitive bid based on the requirements stated in the RFB.

**Q2**: Please confirm that the bid bond should be made payable to the "Purchaser", Overland Contracting Inc. and not to the "Owner", the City of Memphis, TN.
**SARP10**: Bid Bond is to be made payable to the Purchaser, Overland Contracting Inc. RFB section 00672.7 Bid Bond references "Owner". In this context, the "Owner" of the bid bond is Overland Contracting Inc.

**Q3**: Please provide the plan holders list and the mandatory pre-bid attendees list.
**SARP10**: There is no plan holders list, and the mandatory pre-bid attendees list was provided with Addendum 1 on 6Jul15.

**Q4**: 120 days for completion seems very aggressive and not enough time for this scope of work, would the owner/prime consider adding more time? Is that correct for completion 120 days?
**SARP10**: The completion date has been updated to 180 days, please see updated 00370 Commercial Bid Form, which also includes updates to Unit Prices line items.

**Q5**: Typically with the city of Memphis it takes 2 to 3 months for a contract to be awarded, will this award of bid be within 5 days after opening?
**SARP10**: SARP10 will make every effort to provide a Notice of Intent to Award to the City within 5 days of bid opening. The City's approval is required prior to executing the contract, which is usually approximately 1 week after the Notice of Intent to Award has been issued.

**Q6**: Typically an escrow account is required with Memphis contracts, will this be a requirement of the contractor?
**SARP10**: An escrow account is not a requirement for this contract. Retention will be 5% as described in 00572.4.3.

**Q7**: Item Number 00009 – 6.02 (Traffic Control per Manhole Repair). Part 5 – Measurements for Traffic Control – States "Traffic Control will be paid per each manhole rehabilitated". If the contractor has multiple setups of Traffic Control for a manhole rehab, will the contractor be paid for each traffic control setup? The contractor may have to setup once for rehab, once for testing, or multiple times to complete his work.
**SARP10**: No, the contractor will be paid one time for traffic control at each necessary manhole. If the bidder anticipates multiple setups for the same manhole, bidder should include it in the cost for this item. Traffic control for the post construction manhole inspection is included in that line item (00001-6.03).

**Q8**: Item Number 09910-7.05 (Traffic Control for CIPP) – Will the contractor be paid for each traffic control setup, if he has to setup more than once to complete the CIPP?
**SARP10**: No, the contractor will be paid one time for traffic control at each necessary CIPP reach. If the bidder anticipates multiple setups for the same CIPP reach, bidder should include it in the cost for this item. Traffic control for Heavy Cleaning is included in that line item (09910-7.06). Traffic control for the post construction pipe inspection is included in that line item (00003-6.01).

**Q9**: Is it the intent to have the contractor perform a leakage test prior to reinstatement of laterals, also, a low –pressure air test once the laterals have been rehab? Also, sample testing of plates. If the line does not pass the low pressure air test after several attempts, what are the expectations of the owner/engineer?
**SARP10**: See revised spec Section 09910

---

## Updated Commercial Bid Form

# 00370 - Commercial Bid Form

**Bidder should refer to Section 00270, Instructions to Bidders, when completing this Bid Form. Bidder shall complete this form entirely and return it with Bidder's Bid.**

| **00370.1 Bid Submitted by** | **Bidder Response Column** |
|---|---|
| Company Name | |
| Mailing Address/Number, Street | |
| Mailing Address/State, Zip Code | |
| Country | |
| Taxpayer ID Number (or EIN) | |
| Bidder's Bid Date | |
| Bidder's Bid No. | |
| **00370.2 General Bid Parameters** | |
| **Bidder is providing the information defined by the articles comprising Section 00270, INSTRUCTIONS TO BIDDERS, in the corresponding fields of this Section 00370, COMMERCIAL BID FORM.** | |
| **00370.2.1 Bidder's Contact Information** | **Bidder Response Column** |
| Bidder's Representative Name | |
| Title | |
| Mailing Address/Number, Street | |
| Mailing Address/City | |
| Mailing Address/State, Zip Code | |
| Delivery Address/Number, Street | |
| Delivery Address/State, Zip Code | |
| Country | |
| Email Address | |
| Phone Number | ( ) - ( ) |
| Mobile Phone Number | ( ) - ( ) |
| Fax Number | ( ) - ( ) |
| **Business Interruption Plan** | |
| Confirm that Bidder maintains a Business Interruption/Disaster Recovery Plan that documents how Bidder will respond to disaster or pandemic to help minimize impact - Yes/No<br>If Yes, plan should be submitted with RFB. | |
| **00370.2.2 Addenda to Request for Bid** | |
| Bidder acknowledges receipt and inclusion of the following Addenda to the RFB - **Yes/No** | **Bidder Response Column** |
| **Addenda Number** / **Date Issued** | **Received and Incorporated** |
| | |
| | |
| | |
| **00370.3 Bid Pricing Information** | |
| **00370.3.1 Bid Prices** | **See Attached Pricing Table(s) [Bidder to List Tables Used]** |
| **00370.4 Supplemental Bid Information** | |
| Bidder provides the following information to supplement the Bidder's bid pricing. | |
| **00370.4.1 Company Status** | **Bidder Response Column** |
| Bidder's company status is:(i.e., partnership, individual owned, joint venture, corporation, etc.) | |
| in State of | |
| in Country of | |
| **00370.4.2 Contractor License** | **Bidder Response Column** |
| Bidder certifies that it is licensed, as required, to engage in the RFB Work scope in the State/Province/Country the RFB Work is to be performed. - **Yes/No** | |
| 1st License Title | |
| in State/Province of | |
| License Number | |
| 2nd License Title | |
| in State/Province of | |
| License Number | |
| **00370.4.3 DUNs Number** | |

| 00370.4.4 Bid Validity Duration | Bidder Response Column |
|---|---|
| Bidder's bid is valid for acceptance by the Purchaser for a period of 180 days from the bid due date. - **Yes/No** | |
| If no, Bidder's bid is valid for indicated days from bid due date. - **No. Days** | |
| **00370.4.5 Firm Non-Escalatable Pricing** | **Bidder Response Column** |
| All of Bidder's prices herein bid are firm and are non-escalatable. - **Yes/No**<br>If No, explanation is included as an Exception. | |
| **00370.4.6 Taxes** | **Bidder Response Column** |
| Bidder's prices included herein are in accordance with Article 00571.6 Taxes. - **Yes/No**<br>If No, explanation is included as an Exception. | |
| **00370.4.7 Work at Jobsite** | **Bidder Response Column** |
| Bidder's source of craft labor to be utilized in the performance of the Work is - **Open-Shop/Merit-shop/Union-shop** | |
| If applicable, identify the local union(s) used for hiring craft labor: 1st Local Union Name | |
| Address/Number, Street | |
| Address/City, State, Zip Code | |
| Phone | |
| Email | |
| 2nd Local Union Name | |
| Address/Number, Street | |
| Address/City, State, Zip Code | |
| Phone | |
| Email | |
| Bidder has accounted for all Jobsite existing and controlling conditions and limitations which may affect the Work performance and the Bidder's Bid. - **Yes/No** If No, explanation is included in Exception. | |
| Bidder proposes that it will perform all the Work at the Jobsite with its own forces. - **Yes/No** | |
| Bidder has indicated proposed sub-subcontracted Work in attached Table 00370.4.7. - **Yes/No** | |
| Bidder has provided proposed Small Business/Minority/Disadvantaged Entrepreneur Participation Plan with its bid. - **Yes/No** | |
| **00370.5 Schedule Compliance** | |
| Bidder agrees to meet the schedule dates indicated in the RFB documents: - **Yes/No**<br>If No, explanation is included in Exception. | |
| If No, Bidder has completed and submitted an attached alternative summary level schedule: - **Yes/No** | |
| **00370.6 Compliance with Request for Bid** | |
| NOTE: A bid based on Bidder's standard terms and conditions will not be considered. The bid must address specific exceptions, if any, to Purchaser's terms and conditions. | |
| Bidder certifies that its bid complies with all RFB commercial and technical requirements without exception and clarification. - **Yes/No** | |
| **00370.6.1 Exceptions** | |
| Bidder certifies that its bid complies with all RFB commercial and technical requirements except for the following: | **Bidder Response Column** |
| Bid is based on acceptance of all commercial requirements of this RFB. - **Yes/No** | |
| If No, all Commercial Exceptions have been accurately defined and identified as "Commercial Exceptions" on the Purchaser provided and Bidder attached Exceptions Form: - **Yes/No** | |
| Bid is based on acceptance of all technical requirements of this RFB. - **Yes/No** | |
| If No, all Technical Exceptions have been accurately defined and identified as "Technical Exceptions" on the Purchaser provided and Bidder attached Exceptions Form. - **Yes/No** | |

| **00370.6.2 Clarifications** | **Bidder Response Column** |
|---|---|
| Bidder certifies that its bid complies with all RFB commercial and technical requirements without clarification. - **Yes/No** | |
| If No, all Commercial Clarifications have been accurately defined and identified as "Commercial Clarifications" on the Purchaser provided and Bidder attached Clarification Form. - **Yes/No** | |
| If No, all Technical Clarification have been accurately defined and identified as "Technical Clarifications" on the Purchaser provided and Bidder attached Clarification Form. - **Yes/No** | |
| **00370.7 Bid Attachments** | |
| In addition to this Commercial Bid Form and Tables indicated herein, the Bidder's Bid contains supplemental information and details attached to this bid consisting of the following: | **Bidder Response Column** |
| (Attachment 1) | |
| (Attachment 2) | |
| (Attachment 3) | |
| (Attachment 4) | |
| (Attachment 5) (Add additional lines as needed) | |
| **00370.8 Declarations** | |
| The Bidder declares that it has familiarized itself with the conditions affecting the Work. The Bidder also declares that only the persons or firms interested in the bid as principal or principals are named herein; that no other persons or firms have any interest in this bid or in the Subcontract to be entered into; that this bid is made without connection with any person, company, or party likewise submitting a bid; and that it is in all respects for and in good faith, without collusion or fraud. - **Yes/No** | |
| If written notice of acceptance of this bid is delivered to the Bidder within "Bid Validity" days after the date set for receipt of bid, or any time thereafter before the bid validity expires, the Bidder will, within 5 days after receipt of a formal Subcontract for signature, exercise and deliver to Purchaser a signed Subcontract in the form provided by the Purchaser in accordance with the documents provided herein. - **Yes/No** | |

## Table 00370.3.1 - Unit Price Bid Form

**Bidder should refer to Section 00270, Instructions to Bidders, when completing this Bid Form. Bidder shall complete this form entirely and return it with Bidder's Bid.**

**Bid Submitted by** (Company Name)

**00370.3 Bid Pricing Information**

**00370.3.1 Unit Pricing**

Bidder proposes to complete the RFB Work based on firm, fixed, unit prices (US dollars), which prices multiplied by the final Work quantities would represent the full consideration to Bidder for its complete and satisfactory performance of the Work in compliance with all the terms and conditions of the RFB Documents. The Unit Prices in this Table include the cost of all the work which is required or implied by the RFB documents or which may be inferred therefrom, and which is customarily provided in furnishing a complete and finished work item of its kind. Further, any and all alterations, modifications, and adjustments to the work item, which is reasonably foreseeable or customarily encountered in providing and installing equipment, material, and services of the work item kind, will be performed without additional compensation.

In the event of a Purchaser-approved change in the scope of Work for which a unit price from this Table is not applicable, as determined by the Purchaser, the Subcontractor shall provide a new unit price for review and acceptance by the Purchaser. Subcontractor shall provide all information requested by the Purchaser to substantiate the value of the new unit price.

**00370.3.1.1 Unit Prices** — **Bidder Response Columns**

| Item Number | Item Description | Unit of Measure | Estimated Quantity | Unit Price | Extension Price |
|---|---|---|---|---|---|
| 00001-6.01 | GPS Coordinates of Manhole Cover | EA | 17 | $ - | $ - |
| 00001-6.03 | MACP Level 2 Manhole Inspections | EA | 17 | $ - | $ - |
| 00003-6.01 | Light Cleaning & Mainline CCTV Inspection For All Diameters | LF | 1917 | $ - | $ - |
| 00004-6.01 | CCTV & Sonar Inspection for Each Diameter | LF | 8266 | $ - | $ - |
| 00009-6.01 | Cementitious Manhole Lining | VF | 455 | $ - | $ - |
| 00009-6.02 | Traffic Control per Manhole Repair | EA | 17 | $ - | $ - |
| 00009-6.03.01.08 | 8" Diameter Drop Construction in Existing Manhole | VF | 13 | $ - | $ - |
| 00009-6-04 | Invert and Bench Replacement | EA | 5 | $ - | $ - |
| 02532-5.01 | Standard Manhole Adjustment (Adjustments >5" & <18") | EA | 5 | $ - | $ - |
| 02532-5.02 | Manhole Adjustments with Adapter Rings (Adjustments <5") | EA | 3 | $ - | $ - |
| 02532-5.03 | Traffic Control per Construction Area | EA | 8 | $ - | $ - |
| 02532-5.04 | Site Preparation and Restoration | LS | 1 | $ - | $ - |
| 02540-5.01.07 | Sewer Point Repair, 20" Through 24" Pipe (<10' Deep) | EA | 2 | $ - | $ - |
| 02540-5.01.07a | Each Additional Linear Foot Beyond the 10' Minimum, for Sewer Point Repair, 20" through 24" Pipe (<10' Deep) | LF | 10 | | |
| 02540-5.02 | Traffic Control per Point Repair | EA | 2 | $ - | $ - |
| 02540-5.03 | Site Preparation and Restoration per Point Repair | LS | 1 | $ - | $ - |
| 02540-5.04 | Pavement Backfill | Ton | 38 | $ - | $ - |
| 02950-01.01 | Asphaltic Concrete Pavement Removal and Replacement | SY | 10 | $ - | $ - |
| 02950-02 | Concrete Sidewalk Removal and Replacement | SF | 30 | $ - | $ - |
| 02950-04 | Concrete Curb and Gutter Removal and Replacement | LF | 10 | $ - | $ - |
| 09910-7.01.01 | 18" Diameter CIPP (0-10 feet depth) | LF | 630 | $ - | $ - |
| 09910-7.01.02 | 18" Diameter CIPP (10.1-20 feet depth) | LF | 189 | $ - | $ - |
| 09910-7.01.03 | 20" Diameter CIPP (0-10 feet depth) | LF | 906 | $ - | $ - |
| 09910-7.01.04 | 20" Diameter CIPP (10.1-20 feet depth) | LF | 192 | $ - | $ - |
| 09910-7.01.05 | 24" Diameter CIPP (0-10 feet depth) | LF | 1922 | $ - | $ - |
| 09910-7.01.06 | 24" Diameter CIPP (10.1-20 feet depth) | LF | 3118 | $ - | $ - |
| 09910-7.01.07 | 27" Diameter CIPP (0-10 feet depth) | LF | 2060 | $ - | $ - |
| 09910-7.01.09 | 36" Diameter CIPP (0-10 feet depth) | LF | 1166 | $ - | $ - |
| 09910-7.01 | Lateral Reinstatement for Pipes 24" and Smaller | EA | 51 | $ - | $ - |
| 09910-7.02 | Lateral Reinstatement for Pipes > 24" | EA | 24 | $ - | $ - |
| 09910-7.03 | Cut Intruding Tap | EA | 25 | $ - | $ - |
| 09910-7.04 | Permanent Service Lateral Renewal | EA | 1 | $ - | $ - |
| 09910-7.05 | Traffic Control for CIPP | EA | 45 | $ - | $ - |
| 09910-7.06.01 | Heavy Cleaning for 18" Pipe | LF | 314 | $ - | |

## Table 00370.3.1 - Unit Price Bid Form

| | | | | | |
|---|---|---|---|---|---|
| 09910-7.06.02 | Heavy Cleaning for 20" Pipe | LF | 1078 | $ - | |
| 09910-7.06.03 | Heavy Cleaning for 24" Pipe | LF | 3129 | $ - | |
| 09910-7.06.04 | Heavy Cleaning for 27" Pipe | LF | 553 | $ - | |
| | 100% Performance and Payment Bonds | Lot | 1 | $ - | $ - |
| | | | | **Total Estimated Unit Price Value** | $ - |
| Note the Subcontractor shall provide documentation to determine compensated cost per point repair using the rates described above. | | | | | |

## Table 00370.4.7 - Sub-Subcontracts

| | | | | | |
|---|---|---|---|---|---|
| **Bidder should refer to Section 00270, Instructions to Bidders, when completing this Table.** | | | | | |
| **Bid Submitted by** (Company Name) | | | | | |
| **00370.4.7 Sub-Subcontracts** | | | | | |
| Bidder proposes that specific portions of the Work scope not performed by Bidder will be Sub-Subcontracted to the Sub-subcontractors indicated below. The value of each Sub-subcontract is indicated as an approximate percentage value of the total monetary value of the Bidder's Bid. | | | | | |
| Subcontractor must obtain a safety prequalification for any Sub-subcontractor that will be performing any portion of the Work at the Jobsite, prior to their arrival at the Jobsite. Refer to the "Subcontracting" article within the terms and conditions for applicable submission information. | | | | | |
| **00370.4.7.1 Sub-Subcontracted Work** | | | | | |
| **Scope of Sub-Subcontracted Work** | **Sub-subcontractors** (Name and Address) | **MBE or WBE** | **% of Total Work Value** | **Safety Information Included (Y/N)** | **Current EMR** |
| % of Work performed by Bidder. | (Bidder Company Name) | | 100.0% | | |
| (a) | | | | | |
| (b) | | | | | |
| (c) | | | | | |
| (d) | | | | | |
| (e) | | | | | |
| (f) | | | | | |
| (g) | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | **Total Percentage Value** (Must Equal 100%) | | 100.0% | | |

# Table 00370.6.1 - Exceptions Form

| **Bidder should refer to Section 00270, Instructions to Bidders, when completing this Form.** | |
|---|---|
| **Bid Submitted by** (Company Name) | |

**00370.6.1 Exceptions**

The Bidder's specific Exceptions herein itemized and included with the bid represent an exhaustive list of any and all explicit variations or deviations from the requirements of the RFB documents. Bidder confirms that otherwise, it is the intent of Bidder's bid that the Work will be performed in strict accordance with the requirements of the RFB documents.

**00370.6.1.1 Commercial Exceptions**

| Count | Reference Article | Stated Commercial Exception |
|---|---|---|
| CE1 | | |
| CE2 | | |
| CE3 | | |
| CE4 | | |
| CE5 | | |
| CE6 | | |
| CE7 | | |
| CE8 | | |
| CE9 | | |

**00370.6.1.2 Technical Exceptions**

| Count | Reference | Stated Technical Exceptions |
|---|---|---|
| TE1 | | |
| TE2 | | |
| TE3 | | |
| TE4 | | |
| TE5 | | |
| TE6 | | |
| TE7 | | |
| TE8 | | |
| TE9 | | |
| TE10 | | |
| TE11 | | |
| TE12 | | |
| TE13 | | |
| TE14 | | |
| TE15 | | |
| TE16 | | |
| TE17 | | |
| TE18 | | |
| TE19 | | |
| TE20 | | |

# Table 00370.6.2 - Clarifications Form

| **Bidder should refer to Section 00270, Instructions to Bidders, when completing this Form.** | |
|---|---|
| **Bid Submitted by** (Company Name) | |
| **00370.6.2 Clarifications** | |
| All of Bidder's Clarifications herein itemized and included with the bid **do not** constitute explicit variation or deviation from performance of the Work by the Bidder in strict accordance with the requirements of RFB documents. | |

**00370.6.2.1 Commercial Clarifications**

| Count | Reference Article | Stated Commercial Clarification |
|---|---|---|
| CC1 | | |
| CC2 | | |
| CC3 | | |
| CC4 | | |
| CC5 | | |
| CC6 | | |
| CC7 | | |
| CC8 | | |
| CC9 | | |

**00370.6.2.2 Technical Clarifications**

| Count | Reference | Stated Technical Clarification |
|---|---|---|
| TC1 | | |
| TC2 | | |
| TC3 | | |
| TC4 | | |
| TC5 | | |
| TC6 | | |
| TC7 | | |
| TC8 | | |
| TC9 | | |
| TC10 | | |
| TC11 | | |
| TC12 | | |
| TC13 | | |
| TC14 | | |
| TC15 | | |
| TC16 | | |
| TC17 | | |
| TC18 | | |
| TC19 | | |
| TC20 | | |

| 00370.7 Schedule Compliance |
|---|
| State any exceptions in 00370.6.1. |

| 00370.7.1 Construction Milestone Completion Dates | | | | |
|---|---|---|---|---|
| Item | Milestone Description | Construction Milestone Completion Date | *LDs Apply? | Bidder Complies? (Yes/No) |
| 1 | Completion of work as described in the Notice to Proceed | 180 days after receiving the Notice to Proceed from Purchaser | Yes | |
| *LD indicates that completion of the Work after the "Construction Milestone Completion Date" is subject to liquidated damages per applicable Articles of Section 00571. | | | | |
| *Note Subcontractor performance will directly impact future procurements for the SARP10 Program, schedule is critical and must be maintained. | | | | |

**00370.8 Schedule of Submittals**

**Effective Date:** TBD

The following are post-award Subcontract submittals. This list is not all-inclusive. The RFB documents contain submittal requirements that are not included in this list. It will, however, remain the successful Bidder's responsibility to comply with submittal requirements whether or not the submittal is included in the following list:

If Bidder does not agree, state an exception in 00370.6.1.

| Item | Reference Section | Submittal Item | Submittal Dates: Calendar Days | | Submittal Dates: Event | Submittal Dates: Due Date | Bidder Agrees? Yes/No |
|---|---|---|---|---|---|---|---|
| **00370.8.1 Commercial Submittals** | | | | | | | |
| C01 | None | Executed Subcontract in the form provided by the Purchaser | 5 | After | Receipt of Subcontract for Signature | | |
| C02 | 00571 | Payment Estimate Breakdown | 10 | After | Effective Date and Prior to First Payment with monthly updates | | |
| C03 | 00571 | Security Instruments | 10 | After | Effective Date | | |
| C04 | 00572 | Lien Waivers and Report of Disadvantaged Business Enterprise Participation Form | | With | Each Invoice | | |
| C05 | 00572 | Final Lien Waivers from Subcontractor and Sub-subcontractors and Sub-subcontractors subcontractors and Report of Disadvantaged Business Enterprise Participation Form | | With | Final Invoice | | |
| C06 | 00571 | Final Payment Invoice and Report of Disadvantaged Business Enterprise Participation Form | 45 | After | Issuance of the Notice Of Final Completion and Acceptance | | |
| C07 | 00572 | Contractor Licenses | 14 | Before | Mobilization Onsite | | |
| C08 | 00572 | Written Notice and Supporting Documentation, of all Claims | 5 | After | Occurrence of Event Giving Rise to the Claim | | |
| C09 | 00572 | Insurance Certificates for Purchaser Approval | | Prior to | Mobilization | | |
| C10 | 00572 | Initial Issue Subcontractor's Work Execution Schedule | 30 | After | Effective Date | | |
| C11 | 00571 | Subcontractor Actual Man-hours Expended and Quantities Installed | Weekly | After | Mobilization Onsite | | |
| C12 | 00575 | Subcontractor's Daily Report | Daily | After | Mobilization Onsite | | |
| C13 | 00575 | Signed Daily Reports | | Daily | After Mobilization Onsite | | |
| C14 | 00575 | Weekly Coordination Meeting Agenda Input | Weekly | Prior to | Weekly Coordination Meeting | | |
| C15 | 00575 | Subcontractor's Safety, Health and Accident Prevention Program | | Prior to | Mobilization Onsite | | |
| C16 | 00575 | Subcontractor's Hazardous Waste Project Health and Safety Plan | | Prior to | Mobilization Onsite | | |
| C17 | 00575 | Safety and Health Representative Resume | | Prior to | Assignment and Mobilization | | |
| C18 | 00575 | Verification of meeting Hazardous Waste Requirements of 29CFR1910.120 | 5 | Prior to | Mobilization Onsite | | |
| C19 | 00575 | Hazardous Materials Documentation | | With | Each Hazmat Shipment | | |
| C20 | 00575 | Safety and Health Records | Monthly | After | Mobilization Onsite | | |
| C21 | 00575 | Evidence that Jobsite Personnel have Passed Drug Testing | 10 | Prior to | Mobilization Onsite | | |
| C22 | Loss Control Manual | Fall Protection Plan | 5 | Prior to | Starting Work Operations | | |
| C23 | Loss Control Manual | Chemical Hazard Communication Plan, as applicable | 5 | Prior to | Mobilization Onsite | | |
| C24 | Loss Control Manual | Substance Abuse Program | 5 | Prior to | Mobilization Onsite | | |
| C25 | SRF | W-9 of Subcontractor and Sub-subcontractors also include Contact Information for each including email and address | | With | Bid | | |
| C26 | 00672.3 | Certificate of Nondiscrimination for Subcontractor and Sub-subcontractors | | With | Bid | | |
| C27 | 00672.4 | Equal Business Opportunity Program Compliance Form for Subcontractor and Sub-subcontractors | | With | Bid | | |
| C28 | 00672.6 | Certification Regarding Debarment Subcontractor and Sub-subcontractors | | With | Bid | | |

**00370.8 Schedule of Submittals**

**Effective Date:** TBD

The following are post-award Subcontract submittals. This list is not all-inclusive. The RFB documents contain submittal requirements that are not included in this list. It will, however, remain the successful Bidder's responsibility to comply with submittal requirements whether or not the submittal is included in the following list:

If Bidder does not agree, state an exception in 00370.6.1.

| Item | Reference Section | Submittal Item | Submittal Dates | | | | Bidder Agrees? Yes/No |
|---|---|---|---|---|---|---|---|
| | | | Calendar Days | | Event | Due Date | |
| C29 | 00672.6 | Certification Regarding Equal Employment Opportunity for Subcontractor and Sub-subcontractors | | With | Bid | | |
| C30 | SRF | M/WBE Certificates for both Subcontractor and Sub-subcontractors as applicable | | With | Bid | | |
| | 00170.4 | Bid Bond | | With | Bid | | |
| C31 | SRF | EPA Form 6100-2 for DBE/MBE/WBE Sub-subcontractors | 10 | After | Effective Date and as updated | | |
| C32 | SRF | EPA Form 6100-3 for DBE/MBE/WBE Sub-subcontractors | | With | Bid and as updated | | |
| C33 | SRF | EPA Form 6100-4 for Subcontractor | | With | Bid and as updated | | |
| C34 | SRF | Employee Rights under the Davis-Bacon Act Poster (English and Spanish) | | Posted | All Sites to be easily accessed/viewed and protected from weather | | |
| C35 | SRF | WH-1321 poster | | Posted | All Sites to be easily accessed/viewed and protected from weather | | |
| C36 | SRF | Wage Decision | | Posted | All Sites to be easily accessed/viewed and protected from weather | | |

---

## Updated Specifications

**CITY OF MEMPHIS – STANDARD CONSTRUCTION SPECIFICATIONS**
**Modified By SARP10 Program**
**SECTION 00009 – REHABILITATION AND REPAIR OF MANHOLES**

## PART 1 – SCOPE

1.01 This work consists of the repair and rehabilitation of manholes for sanitary sewers as shown on the Plans, stipulated in the Contract Documents, or as directed by the Purchaser. The construction will be accomplished by these Specifications and in conformity with the details shown on the Plans or established by the Purchaser. The Subcontractor shall perform all work necessary to complete the Contract with the best modern practice. Unless otherwise provided, the Subcontractor is required to furnish all labor, materials, equipment, and incidentals required to rehabilitate or repair manholes as noted on the Drawings or directed by the Purchaser.

1.02 Accurately field measure and size each individual manhole. Each existing sewer manhole designated to be repaired or rehabilitated may have a different configuration and varying field dimensions.

1.03 Each manhole to be rehabilitated shall be thoroughly cleaned and then inspected for loose or missing bricks, loose mortar, holes, etc. All leaks shall be plugged prior to manhole rehabilitation.

1.04 The presence or absence of leakage through manhole walls noted on the manhole inspection reports and as seen in the Subcontractor's independent manhole inspections prior to bidding or construction depend on the groundwater levels and conditions at the time of the inspections. High groundwater levels in the project area typically occur in the dormant season (December through May), but will vary with rainfall in any given year and sewer location. Be advised the groundwater currently entering the leaking sewer mains and laterals may migrate to the manholes after the sewer mains and laterals are rehabilitated or replaced. Reflect assumptions and judgments on leakage through manhole walls based on this information in the unit prices bid for lining manholes. All leakage shall be stopped prior to lining manholes. No additional payment will be made for repairing leaks not visible prior to bidding or sewer rehabilitation.

1.05 When applicable, the manhole lining shall not be installed until all main sewer lining and other manhole rehabilitation work is complete.

1.06 Where existing manholes are being repaired or rehabilitated, the Subcontractor will arrange his work so that sewage flow will be maintained during the construction period with no discharge of sewage into the open trench, and no backup of sewage into the existing line. The subcontractor will provide necessary bypass pumping capacity to carry flow downstream of the manhole to be rehabilitated or repaired.

1.07 Replacement Manholes shall conform to Specification Section 02531.

1.08 Cast iron frames shall be set at the required elevation and properly bonded to the flat top, eccentric cone, or grade rings with two rings of butyl mastic sealant and anchor bolts.

1.09 Definitions/Standards:

ASTM D-638: Test Method for Tensile Properties of Plastics.
ASTM D-695: Test Method for Compressive Properties of Rigid Plastics.
ASTM D-790: Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
ASTM D-4541: Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
ASTM D-412: Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
ASTM D-2240: Standard Test Method for Rubber Property Durometer Hardness
ASTM D-522: Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings

1.10 Quality Assurance. Furnish materials of quality required by the American Society for Testing and Materials (ASTM) standards and industry approved standards and specifications. Provide guarantee against defective materials and workmanship in accordance with the requirements of these specifications.

1.11 Sequencing. All required interruptions of flow through manholes or any other portion of the sanitary sewer system shall be coordinated with the Owner, and approval must be received from the Owner prior to the interruption.

1.12 When rehabilitating manholes, the material for stopping active leaks and repairing nonleaking holes, cracks, etc. in concrete and masonry manholes shall be compatible with the coating used for rehabilitation.

1.13 Substitutions. Should the Subcontractor wish to use any brand or type of material other than as specified herein, he shall so state in writing to the Purchaser naming the proposed substitution and manufacturer. This statement shall be accompanied by a certificate of compliance from an approved independent testing laboratory that the proposed substitute meets or exceeds the specified requirements and has been tested in accordance with the specified test standards. The statement shall also include documented proof that the proposed brand or type of material has a proven record of performance when used in the intended application as confirmed by actual field test or successful installations.

1.14 The Subcontractor shall apply the manhole lining system material on a sample area not less than four square feet (4 $ft^2$) in size. When approved, the sample area shall serve as a standard of acceptance for all further work.

## PART 2 - MATERIALS AND EQUIPMENT

2.01 MATERIALS

A. Submittals

1. Unless otherwise specified all sample submittals shall be delivered to the Purchaser within two weeks of the NTP.

2. Site Subcontractor emergency phone numbers.

3. Schedules of work on a weekly basis that will be delivered no later than 2:00 PM on Thursday for the week following with daily AM email updates of approximate crew locations each day. Weekly schedule format shall contain a map, with sufficient streets labeled and identified at a scale to provide clarity, along with the nature and type of crew located by map area.

4. Product Data on the following:
   - Crack and hole repair products.
   - Cementitious plug material.
   - Frame and cover seals.
   - Cementitious coating system including application requirements and chemical resistance data..
   - Gasket Polymer Properties

5. Manufacturer's Certificate of Compliance for each type of product that product furnished meets requirements of this Section.

6. Manufacturer's written recommendations for product handling and installation.

7. Confined space entry plans.

8. Plan for diversion of flow during installation of manhole over existing piping.

9. Subcontractor shall submit to the Purchaser (when requested) evidence indicating that the proposed applicators are fully qualified to perform the work, and any proposed applicator found to be not qualified shall (at the written request of the Purchaser) be removed forthwith by the Subcontractor.

10. The COATINGS MANUFACTURER shall warranty the entire project to include any and all aspects of the surface preparation, base material installation and protective coating applications for a period of TEN (10) YEARS from the date of acceptance by the Purchaser. The warranty shall make no distinction between installation practices and material performance and shall not be prorated with respect to elapsed time for the entire warranty period. Manufacturer shall, within a reasonable period of time after receipt of written notice thereof by the Purchaser [period not to exceed sixty (60) calendar days], repair defects in materials or workmanship during said TEN (10) year period, and any damage to other work caused by such defects or repairing of same at his own expense and without cost to the Purchaser.

B. Manhole Lining System. Spray applied or centrifugally cast lightweight structural reinforced cement manhole coating:

1. The material applied onto the surface of brick or precast manholes shall be a cementitious system formulated for application within a sanitary sewer environment. For concrete manholes in good structural condition, install the lining to a minimum ½-inch thickness. For all other concrete manholes and for all brick manholes, install the lining to a minimum 1-inch thickness. The coat of material will be used to smooth the walls, benches, and inverts of the manhole and, as necessary, prepare the manhole for a final coat of a urethane or epoxy resin system. When a urethane or epoxy resin system is used, the base coat (cementitious layer) will be 1/2-inch for epoxy systems and 1/8-inch thick for urethane systems. Subcontractor can request to not use a base coat but must provide to the Owner and Purchaser evidence of successful installations of the product without using a base coat and its capability to properly adhere to the manhole wall and form a smooth finish on the wall, bench, and invert. In cases where the base coat is not used, the thickness of the top coating will be increased by the base coat thickness listed above.

2. The material applied to the surface of the manhole shall be a cementitious blend of acid resistant binders, siliceous aggregates, non-metallic fibers and other additives for constructing a coating that is impervious to the flow of water, is resistant to sulfide attack, and restores structural integrity to existing manhole walls. The product shall be Quadex QM-1S Restore or approved equal, unless otherwise specified for urethane or epoxy resin coating top coat.

3. A monolithic liner shall be formed which covers all interior manhole surfaces and shall have the following minimum requirements at 28 days:

Compressive Strength (ASTM C-109) 3000 PSI
Tensile Strength (ASTM C-496) 300 PSI
Flexural Strength (ASTM C-293) (Modified) 600 PSI
Shrinkage (ASTM C-596) 0% at 90% R.H.
Bond (ASTM C-882) 130 PSI

Density, when applied 130 ± PCF

4. The installer shall warrant and save harmless the Owner and his Purchaser against all claims for patent infringement and any loss thereof. The Subcontractor shall handle and store all material and shall dispose of all wastes in accordance with applicable regulations.

5. Each system shall be designed for application over wet (but not active running water) surfaces without degradation of the final product and the bond between the product and the manhole surfaces. Active leaks shall be stopped using a premixed fast-setting, volume-stable waterproof cement plug consisting of hydraulic cement, graded silica aggregates, special plasticizing and accelerating agents. It shall not contain chlorides, gypsum, plasters, iron particles, aluminum powder or gas-forming agents, or promote corrosion of steel it may come in contact with. Set time shall be approximately 1 minute. Ten-minute compressive strength shall be approximately 500 PSI.

1. All invert channels shall be coated with cementitious mortar to prevent infiltration and to build up the invert channel to the new sewer main invert elevations; to fill all voids, cracks, holes, etc.; and to form a smooth flow channel. The entire channel shall be coated. The coating shall be a minimum ¼- to ½-inch thick.

C. Mortar

1. Mortar shall be composed of one part Portland cement and two parts sand (volumetric measure) thoroughly mixed in a tight box, with water added gradually and mixed continually until mortar has attained the proper consistency for use in brick masonry; prepared only in such quantities as needed for immediate use; mortar mixed for more than 30 minutes, retempered, or previously set will not be allowed.

D. Butyl Mastic Sealant

1. The sealant shall be used when joining the casting frame to the precast manhole and for all manhole adjustments to provide a watertight structure. The sealing compound shall be produced from blends of refined hydrocarbon resins and plasticizing compounds reinforced with inert mineral filler, and shall contain no solvents, irritating fumes, or obnoxious odors. The compound shall not depend on oxidizing, evaporating, or chemical action for its adhesive or cohesive strength. It shall be supplied in extruded rope form of suitable cross section and in such sizes as to seal the joint space. Use two complete ropes at each joint. The sealing compound shall be protected by a suitable removable two-piece wrapper, which shall be designed so that half may be removed longitudinally without disturbing the other half in order to facilitate application of the sealing compound. The sealant shall also meet the requirements of the following table:

| Composition | Test Method | Minimum | Maximum |
|---|---|---|---|
| Bitumen (Petroleum Plastic Content | ASTM D4 | 50 | 70 |
| Ash Inert Mineral Matter | AASHTO T11 | 30 | 50 |
| Volatile Matter | ASTM D6 | --- | 2.0 |
| **Property** | **Test Method** | **Minimum** | **Maximum** |
| Specific Gravity at 77 degrees F | ASTM D71 | 1.2 | 1.3 |
| Ductility at 77 degrees F(cm) | ASTM D113 | 5.0 | --- |
| Softening Point | ASTM D36 | 320 degrees F | --- |
| Penetration 77 degrees F (150 gms) 5 sec. | ASTM D217 | 50 | 120 |

2.02 EQUIPMENT

A. The Subcontractor will furnish and maintain in good condition all equipment and facilities as required for the proper execution and inspection of the Work. All equipment and facilities will be on site and approved by the Purchaser before work will be permitted to begin.

## PART 3 – CONSTRUCTION REQUIREMENTS

3.01 PRELIMINARY AND GENERAL ITEMS

A. Notify all property owners who discharge sewage directly to the manhole being surface that their service will be discontinued while the lining is being placed, cured, and active pipe and service connections reopened. The Subcontractor shall notify individual property owners at least 72 hours in advance, giving the date, start time, and estimated completion time for the work being conducted. This notification shall be coordinated with the door hanger distribution.

B. Traffic Control

1. All traffic control shall be installed and maintained in accordance with the Manual on Uniform Traffic Control Devices (MUTCD). At a minimum, the Subcontractor must have two trucks with flashing yellow lights on the work site. Traffic cones must also be placed downstream of the construction site to divert cars into the adjacent lane(s) per MUTCD requirements. On roads with heavy traffic volume, a flagman may also be needed to assist with traffic control. For bidding purposes, the Subcontractor should assume that a flagman will be needed on 30 percent of the setups.

C. Fall Protection

1. Subcontractor shall install and maintain all fall protection measures in accordance with the SARP10 Loss Control Manual. The Subcontractor shall construct a controlled access zone around the manhole being adjusted. At a minimum, the fall protection zone shall include traffic cones encircled with pennant tape. The controlled access zone must

have one point of access with an entrance log.

D. Cleaning

1. All manholes to be rehabilitated shall be thoroughly cleaned before rehabilitation. All grease, oil, laitance, coatings, loose bricks, mortar, unsound concrete and other foreign materials shall be completely removed. Debris resulting from cleaning shall be removed from the manhole and not allowed to be carried downstream.

E. Flow Control:

1. The Subcontractor shall be responsible for plugging or diverting the flow of sewage as needed for repair and coating of manhole inverts and benches.

3.02 MANHOLE REHABILITATION – CEMENTITIOUS LINERS

A. The surface prior to spraying shall be damp without noticeable water droplets or running water. Materials shall be spray applied to a minimum uniform thickness to ensure that all cracks, crevices, and voids are filled and a smooth surface remains after light troweling. Perform light troweling to compact the material into voids and to set the bond.

B. The first application shall have begun to take an initial set (disappearance of surface sheen which could be 15 minutes to one hour depending upon ambient conditions) before the second application to ensure a minimum total finished thickness of 1/2 inch. The final finished thickness may need to be greater than 1/2 inch as recommended by the manufacturer to withstand groundwater pressures. A depth gauge shall be used during application, at various locations, to verify the required thickness. The surface then shall be trowelled to smooth finish with care taken not to over trowel so as to bring additional water to the surface and weaken it. Manufacturer's recommendation shall be followed whenever more than 24 hours have elapsed between applications.

C. The bench covers used to catch debris shall be removed and the bench and invert sprayed such that a gradual slope is produced from the walls to the invert with the thickness at the edge of the invert being no less than 1/2 inch. The wall-bench intersection shall be rounded to a uniform radius the full circumference of the intersection.

D. No application shall be made to frozen surfaces or if freezing is expected to occur within the manhole for 24 hours after application. If ambient temperatures are in excess of 95°F, precautions shall be taken to keep the mix temperature at time of application below 90°F, using ice if necessary.

E. The final application shall have a minimum of four (4) hours cure time before subjected to actual flow.

3.03 INVERT AND BENCH REPLACEMENT

A. Remove all loose grout and rubble from existing channel. Rebuild channel, if required, by reshaping, repairing slope of shelves or benches. Work shall include aligning inflow and outflow ports in such a manner as to prevent the deposition of solids at the transition point. All inverts shall follow the grades of the pipe entering the manhole. Changes in direction of the sewer and entering branch or branches shall have a true curve of as large a radius as the size of the manhole will permit, but shall be shaped to allow easy entrance of maintenance equipment including buckets, T.V. camera, etc.

B. Where noted on Drawings or directed by the Purchaser, replace the invert and benching. Remove existing invert and bench and reconstruct with concrete conforming to Section 03050 Portland Cement Concrete.

C. Manhole inverts shall be constructed to conform to flow-through sewers sizes and shapes. At changes in directions, the inverts shall be laid out in curves of the longest possible radii tangent to the sewer pipes' centerline. Benches shall be constructed to the highest pipe crown elevation and sloped to drain toward the flow-through channel.

D. Apply a ½ inch finished thickness of cementitious liner material over the surface of the replaced invert and bench. Allow the liner material to cure for a minimum of four hours before being subjected to flow.

3.04 RESET AND RESEAL MANHOLE FRAME AND COVER, REINSTALLATION OR REPLACEMENT

A. If the existing manhole frame is misaligned on the manhole, the Subcontractor shall remove the existing manhole frame and cover and, if they are not being reused, dispose of them as required by the Purchaser. It shall be the responsibility of the Subcontractor, at no additional cost to the Purchaser, to repair any damage to the chimney or corbel caused by the removal of the existing manhole frame. Existing frames and covers that are to be reused shall be thoroughly cleaned before reinstallation.

B. If the manhole frame is to be raised, the work shall be performed in conformance with Section 02532 of the City of Memphis Standard Construction Specifications modified by the SARP10 Program.

C. The manhole frame for the cover shall be set on the manhole sidewall in a full bed of flexible butyl resin gasket material at the required elevation. In addition, the frame shall be bolted to the grade rings. Where manholes are constructed in paved areas or fill slopes, the surface of the frame and cover shall be tilted so as to conform to the exact slope, crown, and grade of the existing pavement or area adjacent thereto.

D. Any new manhole frame and cover replacement shall result in a minimum 24 inches diameter clear opening to the manhole.

3.05 DROP CONSTRUCTION FOR EXISTING MANHOLES

A. Drop construction will be installed in existing manholes at the locations shown on the plans and/or as directed by the Purchaser. Drop construction will conform to the details shown on the Drawing for inside drop construction. The Subcontractor will cut a hole in the manhole wall to permit inserting the inlet pipe at the required flow line elevation, horizontal angle, and slope, and to allow two (2) inches space around the pipe for bedding and filling solidly with nonshrinking grout. Care will be used to avoid unnecessary damage to the existing masonry or concrete.

B. All loose material will be removed from the cut surfaces, which will be completely coated with grout before setting the pipe. Before inserting the pipe and flexible connector, a sufficient thickness of grout will be placed at the bottom and sides of the opening for proper bedding of the pipe. After setting, all spaces around the pipe will be solidly filled with grout and neatly pointed up on the inside to present a smooth joint, flush with the inner and outer wall surface. Any necessary modifications to the existing invert will be made to provide a smooth, plastered surface for properly channeled sewage flow from the new connection. All drop construction will be constructed of either ductile iron pipe with push on or mechanical joints or PVC pipe

conforming to the appropriate section of these Specifications. Solvent cement joints may be used on PVC for drop construction. The vertical drop construction will have the dead weight held by suitable means until the steel support straps are secured in place and tightened. The pipe mechanical joint bolts, if used, will not be positioned against the manhole wall. The steel support straps will be fastened to the manhole wall with two bolts per strap set in expansion sleeves in drilled holes.

3.06 MANHOLE REHABILITATION ACCEPTANCE

A. After the manhole rehabilitation work has been completed, the manhole shall be visually inspected by the Subcontractor in the presence of the Purchaser's Representative and the work shall be accepted if found satisfactory to the Purchaser's Representative. The finished surface shall be free of blisters, "runs" or "sags" or other indications of uneven coating thickness. No evidence of visible leaks shall be allowed.

B. Vacuum Testing will be required for all manholes that receive a cementitious liner. The vacuum testing method shall be conducted as follows:

1. Subcontractor shall plug all pipe openings, taking care to securely brace the plugs and the pipe. The plugs shall be placed a minimum of 6 feet beyond the manhole wall.

2. With the vacuum tester in place, inflate the compression to affect a seal between the vacuum base and the structure. Connect the vacuum pump to the outlet port with the valve open and evacuate the manhole to 10 inches Hg (0.3 bar) for 48 inch diameter manholes and 5 inches Hg (0.15 bar) for 60-inch and greater diameter manholes.

3. Close vacuum inlet/outlet ball valve, disconnect the vacuum pump, and monitor the vacuum for the specified time period. If the vacuum does not drop in excess of 1 inch Hg over the specified time period, the manhole if considered acceptable passes the test. If the manhole fails the test, identify the leaking areas by removing the head assembly, coating the interior surfaces of the manhole with a soap and water solution, and repeating the vacuum test for approximately thirty seconds. Once the leaks have been identified, complete all necessary repairs by sealing the leaks of the manhole to the satisfaction of the Purchaser's Representative, and repeat test procedures until satisfactory results are obtained.

**Vacuum Test Timetable**

| **Depth (Feet)** | **Manhole Diameter (Inches)** | | |
|---|---|---|---|
| | **48"** | **60"** | **72"** |
| 4' | 10 sec. | 13 sec. | 16 sec. |
| 8' | 20 sec. | 26 sec. | 32 sec. |
| 12' | 30 sec. | 39 sec. | 48 sec. |
| 16' | 40 sec. | 52 sec. | 64 sec. |
| 20' | 50 sec. | 65 sec. | 80 sec. |
| 24' | 60 sec. | 78 sec. | 96 sec. |

| **Vacuum Test Timetable** | | | |
|---|---|---|---|
| | **Manhole Diameter (Inches)** | | |
| **Depth (Feet)** | **48”** | **60”** | **72”** |
| * | 5.0 sec. | 6.5 sec. | 8.0 sec. |
| *Add extra testing time “T”, for each additional 2-foot depth. (The values listed above have been extrapolated for ASTM designation C924-85. | | | |

4. The Purchaser reserves the right to reject any and all manholes that do not pass vacuum testing requirements, and replacement shall be at the Subcontractor’s expense. A significant number of leaks on a single manhole or significant number of manholes leaking shall be considered as a basis for rejection and replacement of manholes.

3.07 WARRANTY AND GUARANTEE FOR REHABILITATED MANHOLES

A. The Subcontractor shall guarantee the rehabilitated manholes for ten (10) years after acceptance by the Purchaser to the extent that he will repair any leaks that may appear in them during this period because of faulty workmanship or materials furnished by him at no additional expense to the Owner.

PART 4 – DELIVERABLES

4.01 Provide post-rehabilitation MACP inspection for each manhole. Refer to Section 00001 Manhole GPS & MACP Inspection.

PART 5 – MEASUREMENTS

5.01 CEMENTITIOUS MANHOLE LINING

A. Cementitious lining shall be measured per vertical foot of manhole from the downstream invert up to the bottom of the frame casting.

5.02 TRAFFIC CONTROL

A. Traffic control will be paid per each manhole rehabilitated.

5.03 SEWER MANHOLE DROP CONSTRUCTION

A. Drop construction in existing manholes will be measured per vertical foot as measured from the upper inlet pipe flowline to the flowline of drop pipe elbows at the bottom of the drop construction.

5.04 INVERT AND BENCH REPLACEMENT

A. Invert and bench replacement will be measured per each.

5.05 RESET AND RESEAL MANHOLE FRAME AND COVER, REINSTALLATION OR REPLACEMENT

A. Manhole frame and cover rehabilitation shall be measured per each.

5.06 DEWATERING

A. Dewatering is considered to be an incidental to sewer manhole rehabilitation.

5.08 BYPASS PUMPING

A. Bypass pumping is considered to be an incidental to sewer manhole rehabilitation.

PART 6 – PAYMENT

6.01 CEMENTITIOUS MANHOLE LINING

A. Cementitious lining of manhole shall consist of surface preparation, sprayed on lining, removal and disposal of manhole steps, and vacuum testing.

6.02 TRAFFIC CONTROL

A. Traffic control will be paid per each manhole rehabilitated including all appurtenances required to comply with MUTCD standards.

6.03 SEWER MANHOLE DROP CONSTRUCTION

A. The accepted quantities of sewer manhole drop construction will be paid for at the contract unit price per vertical foot, complete in place for drop construction in new manholes or drop construction in existing manholes, which will be full compensation for materials and materials testing, excavation, special protection, maintenance of sewage flow during construction, construction of drop pipe, pipe fitting and connections, installation of steel support straps, placement, curing, and protection of concrete from the manhole base to the top of drop construction, cleaning and inspection, and backfilling outside of pavement areas. Payment for drop construction for new manholes will be in addition to payment for standard depth manhole and extra depth construction (if required).

6.04 INVERT AND BENCH REPLACMENT

A. The accepted quantities of invert and bench replacement will be paid for at the contract unit price per each. It shall include all work and material to install new inverts in existing manholes, as directed by the Purchaser.

6.05 RESET AND RESEAL MANHOLE FRAME AND COVER

The accepted quantities for frame and cover rehabilitation will be paid for at the contract unit price per each.

6.07 PAYMENT WILL BE MADE UNDER:

| Item No. | Pay Item | Pay Unit |
|---|---|---|
| 00009-6.01 | CEMENTITIOUS MANHOLE LINING | VF |
| 00009-6.02 | TRAFFIC CONTROL | Each |
| 00009-6.03.01._____ | In. Diameter Drop Construction in Exist Manhole | VF |
| 00009-6.04 | INVERT AND BENCH REPLACEMENT | Each |
| 00009-6.05 | RESET/RESEAL MANHOLE FRAME AND COVER | Each |

END OF SECTION 00009

**CITY OF MEMPHIS – STANDARD CONSTRUCTION SPECIFICATION**
**Modified by SARP10 Program**
**SECTION 02540 SANITARY SEWER POINT REPAIRS**

The Subcontractor shall complete the Work in accordance with Section 02540 herein and supplemented by the City of Memphis Standard Construction Specifications, which are available for viewing at the SARP10 Program Office.

## PART 1 - SCOPE

This section covers the performance of point repairs on gravity sewer lines.

1.01 REFERENCES

A. City of Memphis Standard Construction Specifications.

B. American Standard for Testing and Materials (ASTM).

C. American National Standards Institute (ANSI).

1.02 DEFINITIONS

A point repair as used in these Specifications shall mean repair of pipe segments of existing sanitary sewer mains or service lines and connections which require excavation to accurately locate a defect and make the necessary repair.

## PART 2 - MATERIALS AND EQUIPMENT

2.01 PIPE MATERIAL

All repairs to existing gravity sewer lines shall be made using ductile iron pipe. Ductile iron pipe for gravity sewer and service connections will conform to ASTM A 746. The pipe thickness design will conform to ANSI A 21.50. If no thickness class is specified on the Plans or Subcontract Documents, Class 50 or approved equivalent will be used. All ductile iron pipe will be lined with Protecto 401 Ceramic Epoxy, or approved equal. Linings will be applied according to manufacturer's recommendations. Fittings will conform to the requirements of ANSI A 21.10. Unless otherwise specified, joints will be push on gasket type conforming to the requirements of ANSI A 21.11. Mechanical joints will conform to the requirements of ANSI A 21.11. Flanged joints will conform to the requirements of ANSI A 21.15. Steel retainer rings will conform to ASTM A 148 for Grade 90 60.

2.02 ELASTOMERIC COUPLINGS

Elastomeric couplings for connecting replacement pipe to existing pipe shall be Fernco Series 5000 RC Shielded Couplings with nut and bolt clamp, Mission "Flex-Seal" adjustable shielded repair coupling or approved equal.

2.03 BACKFILL UNDER PAVEMENT

Backfill beneath all paved areas shall be either crushed limestone or recycled crushed concrete.

Crushed limestone will be size No. 67 Coarse Aggregate meeting the requirements of the Tennessee DOT Standard Specifications for Road and Bridge Construction and the following gradation:

| | Total Percent by Dry Weight, Passing Each Sieve (U.S. Standard) | | | | |
|---|---|---|---|---|---|
| Size No. | 1" | 3/4" | 3/8" | No. 4 | No. 8 |
| 67 | 100 | 90-100 | 20-55 | 0-10 | 0-5 |

## PART 3 - CONSTRUCTION REQUIREMENTS

3.01 SITE PREPARATION AND RESTORATION

A. Rights-of-Way and Easements

The Subcontractor will confine his construction activities to the existing rights-of-way or sanitary sewer easements. The Subcontractor will be responsible for obtaining written agreements for use of private property outside City acquired rights of way/easements for such purposes as storage of material and equipment and access to the construction site. The Subcontractor will immediately provide a copy of all such written agreements to the City upon obtaining the same.

B. Clearing of Rights-of-Way and Easements

The Subcontractor will confine his clearing of rights of way and easements to the least area necessary for construction of facilities shown on the Plans. The Subcontractor will protect as many trees and shrubs within the area as possible. Where necessary for construction, the Subcontractor will clear all live and dead vegetation and growth, pole stubs, logs, and other objectionable material. Cleared material will be removed to within 3 inches of existing ground. This work will be done well before excavation operations but only after erosion controls have been placed.

C. Location of Existing Obstructions

Locations of obstructions shown on the Plans are approximate and are not intended as an accurate location of such obstructions. Obstructions not shown on the Plans but encountered by the Subcontractor will be removed and replaced in their original state or protected by the Subcontractor at no additional cost to the Purchaser.

D. Removal of Obstructions

The Subcontractor will demolish and remove all structures and structure foundations, abandoned vehicles, appliances, and rubbish within the right of way/easement limits necessary for the performance of the work.

E. Protection of Obstructions Outside Easement Limits

The Subcontractor will protect and avoid damage to all trees, shrubs, plants, fences, structures, and all other objects outside the right of way/easement limits shown on the Plans and/or Plats due to construction operations. All damage will be repaired or restored at the Subcontractor's expense. Particular attention will

be paid to avoid damage to trees, shrubs, bushes, and private property located next to rights of way/easements. No trees, plants, or other objects may be removed out-side such limits without written permission of the property owner.

F. Special Protection of Obstructions Inside Easement Limits

Wherever the underground installation of sanitary sewer facilities will go through surface improvements previously made by the City, other governmental bodies, or property owners, the Subcontractor will be responsible for their protection and preservation. This responsibility includes the removal and storage of such improvements to allow replacement and restoration as close as possible to the undisturbed condition.

G. Disposal of Debris

All trees, brush, logs, snags, leaves, sawdust, bark, and refuse will be collected and disposed of according to the City Code of Ordinances at the expense of the Subcontractor. There will be no separate pay item for disposal of debris. Debris will be removed from the site when practical and will not be left until the completion of the contract. When material is to be disposed of outside the easement, the Subcontractor will first obtain written permission from the property owner on whose property the disposal is to be made and will file a copy with the Purchaser. Unless otherwise provided in the Subcontract Documents, the Subcontractor will arrange for disposing of such material outside the right of way/easement. No debris will be deposited in wetlands.

H. Replacement of Fences

Any fences disturbed inside the right of way/easement limits will be replaced or restored to their original or better condition. Any fences removed will be replaced in their original location. Fences in such poor condition that they cannot be taken down and rebuilt with the same material will be replaced with new fence material similar in original quality, size, and appearance to the removed fence. Exceptions to this requirement will be allowed if written releases are obtained from the property owners by the Subcontractor and submitted to the Purchaser.

I. Disposition of Excavated Material

1. Excavated material suitable for backfill will be stored no closer than 2 feet from the edge of the excavation. Excavated material will not obstruct crosswalks, side-walks, driveways, street intersections, nor interfere unreasonably with travel on streets. Gutters or other surface drainage facilities will not be obstructed. The Subcontractor must provide access to fire hydrants, mail boxes, sewer and conduit manholes and similar utility or municipal service facility as required. Excavated material intended for backfill will be stored in a way that minimizes loss of excavated material due to erosion. The Subcontractor shall comply with all applicable OSHA regulations and City of Memphis Storm Water Ordinances.

2. Unless otherwise directed, all excavated material that will not be used for backfilling or restoration will be removed from the site and disposed of by the Subcontractor. If the Subcontractor proposes to store or place such excess excavated material upon any private property, written consent of the property

owner or owners must be obtained by the Subcontractor in advance. A certified copy will be given to the Purchaser. No surplus or excess material will be deposited in any stream channel nor anywhere that would change preconstruction surface drainage.

J. Control of Water

1. The Subcontractor will keep all excavations free of water. If the trench subgrade consists of good soil in good condition at the time of excavation, it will be the Subcontractor's responsibility to maintain it in suitable condition. Dams, flumes, channels, sumps, or other work and equipment necessary to keep the excavation clear of water will be provided by the Subcontractor. Dewatering of trenches, will be incidental to trench excavation. The Subcontractor will avoid producing mud in the trench bottom by his operations. If necessary or so ordered by the Purchaser, the Subcontractor will re-move any soil that becomes unacceptable and replace it with limestone or other approved aggregate at his own expense to maintain a firm, dry base.

2. Pipe embedment, laying, jointing, and the placing of concrete or masonry will be done in a water free trench or excavation. Trenches will be kept clear of water until pipe joints, concrete and masonry have set and are resistant to water damage. The water will be disposed of in a manner acceptable to the Purchaser.

3. All gutters, pipes, drains, conduits, culverts, catch basins, storm water inlets, ditches, creeks, and other storm water facilities will be kept in operation, or their flows will be satisfactorily diverted and provided for during construction. Any facilities disturbed during construction will be restored to the satisfaction of the Purchaser.

K. Excavation Around Obstructions

1. The Subcontractor will perform all excavation by hand where excavation by machinery would endanger trees, structures, or utilities that otherwise might be saved by hand excavation.

2. The Subcontractor will cautiously excavate test holes to find the limits of under-ground obstructions anticipated within the excavation. When a water pipe, gas pipe, other sanitary sewer, storm drain, or similar utility comes within the limits of the trench, such facilities will be properly supported.

L. Special Protection

1. Treacherous Ground: When running sand, quicksand, or other treacherous ground is encountered, the work will be carried on with the utmost urgency and will continue day and night should the Purchaser so direct.

2. Sheeting and Shoring: The Subcontractor will furnish, place, and maintain sheeting and shoring as required to support the sides of any excavation to prevent earth movement that could endanger the workers or public and to prevent damage to the excavation, adjacent utilities or property. The Subcontractor will place this sheeting and shoring without the Purchaser’s instructions.

3. Sheeting will extend below structure invert a sufficient depth to assure adequate support. In the installation of sheeting, the use of vibratory type pile drivers (as opposed to impact type) will be limited to sheeting driven no greater than 5 feet below the invert. The sheeted trench width, as measured between those faces of the sheeting in contact with the earth trench wall, will not exceed the maximum width of a trench per Specification Section 02530 Paragraph 3.02.B. Walers and struts will be designed and installed to present no obstructions to proper placement of the pipe, pipe embedment, cradle or encasement, and they will not interfere with the satisfactory installation of the pipe.

4. Sheeting, bracing, and shoring will be withdrawn and removed as the back-filling is being done, except where the Purchaser permits the material to be left in place. The Subcontractor will cut off sheeting left in place at least 2 feet below the surface and will remove the cut off material from the excavation.

5. All sheeting, bracing, and shoring which are not left in place under this provision will be removed in a way that will not endanger the completed work or other structures, utilities, storm drains, sewers, or property. The Subcontractor will be careful to prevent the opening of voids during the extraction process.

6. If sheeting and shoring are not specifically required on the Plans or in the Specifications, steel drag shields or trench boxes may be used subject to the authorization of the Purchaser. Voids left by the advancement of the shield will be carefully backfilled and compacted following trench backfill requirements.

M. Existing Utilities

1. Location: It will be the Subcontractor's responsibility to arrange for the location of existing utilities prior to excavation. The Subcontractor will also be responsible for coordinating the relocation of any existing utilities with the appropriate utility owner.

2. Protection: The Subcontractor will protect any storm drain, sewer, or utility within the limits of the construction. The Subcontractor will proceed with caution and will use every means to establish the exact location of underground structures and facilities before excavating in the vicinity. The City or Purchaser will not be responsible for the cost of protection or repair or replacement of any structure, pipe line, conduit, service connection, or similar facility broken or damaged by the Subcontractor's operations. All water and gas pipes and other conduits near or crossing the excavation will be properly supported and protected by the Subcontractor.

3. If the construction requires the removal and replacement of any overhead wires or poles, underground pipes, conduits, structures or other facilities, the Subcontractor will arrange for such work with the Owner or Owners of the facilities. No additional payment will be made by the City or Purchaser for this work.

4. Service Connections: Sewer and utility services between mains and buildings will be maintained and adjusted as necessary by the Subcontractor to provide as

nearly a continuous operation as can be expected. This will be accomplished in any way that the Subcontractor chooses, provided the individual service is not interrupted for more than two consecutive hours. The occupants will be notified by the Subcontractor at least six hours before such service interruptions. When a break occurs, the Subcontractor will notify the affected occupant(s) of the probable length of time that the service will be interrupted.

5. If existing underground facilities or utilities require removal and replacement for the performance of this work, all replacements will be made with new material conforming to the requirements of these Specifications. If not specified, the material will be as approved by the Purchaser.

6. The removal and replacement of water services to adapt to new construction will be the Subcontractor's responsibility within the limits where the new service line grade blends smoothly with the existing service line grade.

7. The removal and replacement of sewer house connections to adapt to new construction will be the Subcontractor's responsibility from the sewer main to a point where the new grade and existing grade can be matched.

8. The Subcontractor will be responsible for any damage to the sewer house connection because of his operations. The Purchaser does not guarantee the number, size, condition, nor length of adjustment necessary to bring a service to a new grade.

N. Maintenance of Flow

Where existing sewer lines are being modified, the Subcontractor will arrange his work so that sewage flow will be maintained during the construction period with no discharge of sewage into the open trench, and no back up of sewage in the existing line. The Subcontractor will provide necessary bypass pumping capacity to carry flow downstream of the section to be modified.

O. Removal and Replacement of Vegetated Areas

The Subcontractor shall remove the vegetated area around a manhole as needed to adjust the manhole frame and cover. All disturbed areas shall be restored as nearly as practical to their original condition. The disturbed area shall be cleared and raked to the level of the existing turf and then watered. New sod shall be installed over the entire disturbed area. New sod shall consist of live, dense, well rooted growth of Bermuda grass, free from Johnson grass, nutgrass, and other obnoxious grasses or weeds, well suited for the intended purpose and for the soil in which it is to be planted. All sod shall be cleanly cut in strips having a reasonably uniform thickness of not less than 2 inches and cut in 10 to 12 inch squares.

P. Cleanup

After the installation work has been completed, the Subcontractor shall cleanup the entire project area. All excess material and debris not incorporated into the permanent installation shall be disposed of by the Subcontractor. The work area shall be left in a condition equal to or better than it was prior to the performance of the Work. Disturbed grassed areas shall be seeded or sod placed as directed by the Purchaser at no additional cost to the Owner. Site restoration shall be performed in accordance with the City of Memphis Standard Construction Specifications.

3.02 BACKFILLING

A. General

1. After sanitary sewer facilities have been bedded and installed according to these Specifications and upon permission of the Purchaser, the backfill may be placed. Backfilling operations will continue following as closely behind pipe installation as practical. All backfill will be placed in uniform horizontal layers. Pushing backfill material down a ramp into excavated areas will not be permitted. No trash will be allowed to accumulate in the space to be backfilled. Particular care will be taken to avoid allowing wood to be included in the backfill, other than sheeting and shoring that has been approved to be left in place.

2. The Subcontractor will be responsible for the condition of the trenches and filled areas during the contract and warranty period. The Subcontractor will maintain frequent inspection of the same. Anytime during the 12-month warranty period the trenches or filled areas settle and sunken places appear, the Subcontractor will be required to refill these sunken places when they are discovered with suitable material and will replace all damaged curb, gutter, and sidewalk. All soft or dangerous trenches will be marked, barricaded and caution lighted for the protection of the public.

3. Property with an existing dwelling located on it or lots within a developed subdivision or planned development are considered improved property.

B. Street Right of Way and Improved Property

1. Backfill Material: Backfill for pipe trench excavations through pavements in street or highway right of way or where the Purchaser orders, will be made with pit run gravel or other acceptable material as approved by the Purchaser. The backfill will be from the top of the pipe embedment material or manhole foundation to the subgrade elevation of the pavement. Pea gravel or similar granular material approximately uniform in size and without bonding properties will not be used.

2. Backfill for pipe trench excavations beyond pavements in street or highway right of way or outside public right of way will be made with select earth from the top level of the pipe embedment material or foundation to the subgrade elevation in paved area, or within 1 inch of the surface in areas to be sodded, or to the surface in all other areas.

3. Select material will be free from debris, organic matter, perishable compressible material and will contain no stones or lumps larger than 6 inches. Rocks and lumps smaller than 6 inches will not exceed an amount that will interfere with the consolidating properties of the fill material. Care will be taken that stones and lumps are kept separated and well distributed, and that all voids are completely filled with fine material. No rocks or lumps will come in direct contact with the pipe. The upper 3 feet of backfill in sodded or planted areas will be free of rocks or lumps larger than 1 inch in diameter.

4. Placement and Compaction: Backfill material will be placed by hand in 6 inch loose layers and tamped to a point 2 feet above the outside top of the pipe. Backfill will be compacted with suitable mechanical tamping equipment with special care being taken not to damage the pipe or joints. Use of compaction equipment directly above semi-rigid and flexible pipe should be avoided until sufficient backfill has been placed to ensure that the equipment will not damage the pipe. A minimum of 36 inches of compacted backfill above the top of semi-rigid and flexible pipe will be in place before wheel loading and a minimum of 48 inches of compacted backfill before use of pneumatic tampers. From these elevations to the subgrade elevation of the pavement, bottom of the sod, or to the original ground surface, suitable backfill will be mechanically placed in 9 inch, maximum, loose layers. All backfill material will be compacted to 95 percent of maximum density at plus or minus 2 percent of optimum moisture content as determined by Laboratory Standard Proctor Test (ASTM D 698).

C. Open Areas and Unimproved Property

Backfill of excavations on unimproved property will be made with select material from the top level of pipe embedment material or foundation to the surface. Non-granular select material to be used for backfill will be free from debris, organic matter and perishable compressible material, and will contain no stones or lumps or rock fragments larger than 6 inches. Rocks or lumps smaller than 6 inches in diameter will not exceed an amount that will interfere with the consolidating properties of the fill material. No rocks or lumps will come in direct contact with the pipe. Stones and lumps will be kept separated and well distributed, and all voids will be completely filled with fine material.

3.03 METHOD OF REPAIR

A. The Subcontractor shall replace a sufficient number of entire pipe joints to ensure that defective pipe is removed and replaced up to 10 feet in length, per repair, at the discretion of the Purchaser, in accordance with the SARP10 Sanitary Sewer Point Repair detail.

B. If the length of the required replacement segment is not adequate to locate sufficient competent pipe for connection with the new section, the Subcontractor, at the Purchaser's instruction, may be directed to replace additional sections of pipe such that an appropriate connection is possible.

C. The Subcontractor shall replace service wyes encountered within the point repair. Any defective service lines encountered within the point repair shall be replaced.

D. Any service line or competent main line pipe broken by the Subcontractor shall be replaced at the Subcontractor's expense.

E. The Subcontractor shall remove any fences, base materials, storm sewer, etc. that may interfere with the repair made at each specified point. The Subcontractor is responsible for the replacement of said fences, base materials, storm sewer etc., in the same or better condition than found.

F. The bottom of the trench shall be reshaped so that the grade of the pipe replaced will match that required for the existing sewer line. The pipe embedment material shall be placed and the repair area shall be backfilled in accordance with Section 02530 Sewer Pipe Installation of the City of Memphis Standard Construction Specifications Modified by the SARP10 Program.

G. If the material in the bottom of the trench is of such consistency that it is not stable, then the Subcontractor shall stabilize the bottom of the trench by placing suitable materials at the direction of the Purchaser in accordance with the 3.02 C. 1. Undercut Excavation of Section 02530 Sewer Pipe Installation of the City of Memphis Standard Construction Specifications Modified by the SARP10 Program.

H. Prior to backfilling, point repairs shall be inspected by the Purchaser.

3.04 VISUAL INSPECTION

All work will be subject to visual inspection for faults or defects and any such deviation or omission will be corrected at once. All tests will be made by the Subcontractor who will provide necessary equipment for testing and lamping the system in the presence of and under the supervision and instructions of the Purchaser. Lamp tests will be observed first hand by the Purchaser. Each section of sewer line will show a full circle of light when lamped between manholes. All defects located will be corrected before conducting leakage tests

After backfilling and resurfacing, sewer segments containing point repairs shall be internally televised (CCTV) by the Subcontractor in their entirety in accordance with Section 00003 – Closed Circuit Television Inspection of Sewer Mains and Connections for final review and approval by the Purchaser.

3.05 TRAFFIC CONTROL

All traffic control shall be installed and maintained in accordance with the Manual on Uniform Traffic Control Devices (MUTCD). At a minimum, the Subcontractor must have two trucks with flashing yellow lights on the work site. Traffic cones must also be placed downstream of the construction site to divert cars into the adjacent lane(s) per MUTCD requirements. On roads with a heavy traffic volume, a flagman may also be needed to assist with traffic control. For bidding purposes, the Subcontractor should assume that a flagman will be needed on 30 percent of the setups.

3.06 FALL PROTECTION

Subcontractor shall install and maintain all fall protection measures in accordance with the SARP10 Loss Control Manual. The Subcontractor shall construct a controlled access zone around the manhole being adjusted. At a minimum, the fall protection zone shall include traffic cones encircled with pennant tape. The controlled access zone must have one point of access with an entrance log.

## PART 4 – MEASUREMENT

4.01 SEWER POINT REPAIR

Sewer point repairs will be measured per each. The repair length of ten linear feet will be measured along the centerline of the new pipe. Each additional linear foot of repair, directed by the Purchaser, beyond the minimum 10 feet will be measured for payment. The depth of the repair is measured from the existing grade to the pipe invert.

4.02 TRAFFIC CONTROL

Traffic control will be paid per each sewer point repair.

4.03 SITE PREPARATION AND RESTORATION

The area to be considered for measurement will be the limit of the construction area unless otherwise directed by the Purchaser.

4.04 PAVEMENT BACKFILL

A. Pit run gravel or other acceptable material used for backfill under pavements or other areas directed by the Purchaser will be measured by the cubic yard in the following manner. Cubic yards of Pavement Backfill equals the linear feet of sewer pipe installed directly below pavement as measured along the centerline of the pipe multiplied by the trench payline width in feet multiplied by the depth of pavement backfill material in feet divided by 27. The trench payline width is defined as the outside diameter of the sewer pipe plus 2 feet. The depth of pavement backfill is defined as the distance from 6 inches above the top of the sewer pipe to the subgrade elevation of the pavement.

## PART 5 – PAYMENT

5.01 SEWER POINT REPAIR

The accepted quantities of all mainline sewer point repairs will be paid for at the contract unit price per each for the various pipe sizes and depth of repair, which will be full compensation for material and material testing, excavation, special protection, protection of existing utilities, maintenance of sewage flow, pipe embedment, haunching, laying, jointing, cleaning and inspection, conducting acceptance tests, installation of pipe wyes, connection to manholes, adapters and couplings, stoppers, and removal and/or abandonment of existing pipe within the limits of excavation and backfilling outside pavement areas.

5.02 TRAFFIC CONTROL

Traffic control will be paid per each sewer point repair including all appurtenances required to comply with MUTCD standards.

5.03 SITE PREPARATION AND RESTORATION

A. Payment will be made for Site Preparation and Restoration at the contract lump sum price, which will be full compensation for removal of trees, shrubs, plants, brush, rubbish, fences, manmade obstructions including but not limited to structures, abandoned cars and appliances, building foundations, and all other obstructions as may be directed by the Purchaser; the disposal of debris, removing of obstructions, and the restoration of fences, turfed areas, and all other items will be as specified in the Plans and Contract Documents or as directed by the Purchaser.

5.04 PAVEMENT BACKFILL

Accepted quantities of pit run gravel or other acceptable material used for backfill under pavements or other areas designated by the Purchaser will be paid for at the contract unit price per cubic yard furnished and placed, which will be full compensation for furnishing, placing and compacting the selected material.
.

5.05 PAYMENT WILL BE MADE UNDER:

| Item No. | Pay Item | Pay Unit |
|---|---|---|
| 02540-5.01.07 | Sewer Point Repair, 20” through 24” Pipe (<10’ Deep) | Each |
| 02540-5.01.07a | Each additional linear foot beyond the 10 feet minimum, for Sewer Point Repair, 6” through 10” Pipe (<10’ Deep) | Linear Feet |
| 02540-5.01.10 | Each service connection and associated lateral pipe included in a Sewer Point Repair, all depths, all diameters | Each |
| 02540-5.02 | Traffic Control per Point Repair | Each |
| 02540-5.03 | Site Preparation and Restoration per Point Repair | Lump Sum |
| 02540-5.04 | Pavement Backfill | Ton |
| 02540-5.01.07 | Sewer Point Repair, 21” through 24” Pipe (<10’ Deep) | Each |
| 02540-5.01.07a | Each additional linear foot beyond the 10 feet minimum, for Sewer Point Repair, 21” through 24” Pipe (<10’ Deep) | Linear Foot |
| 02540-5.01.08 | Sewer Point Repair, 21” through 24” Pipe (10.1’-15’ Deep) | Each |
| 02540-5.01.08a | Each additional linear foot beyond the 10 feet minimum, for Sewer Point Repair, 21” through 24” Pipe (10.1’-15’ Deep) | Linear Foot |

| | | |
|---|---|---|
| 02540-5.01.09 | Sewer Point Repair, 21" through 24" Pipe (15.1'-20' Deep) | Each |
| 02540-5.01.09a | Each additional linear foot beyond the 10 feet minimum, for Sewer Point Repair, 21" through 24" Pipe (15.1'-20' Deep) | Linear Foot |
| 02540-5.01.10 | Each service connection and associated lateral pipe included in a Sewer Point Repair, all depths, all diameters | Each |
| 02540-5.02 | Traffic Control per Point Repair | Each |
| 02540-5.03 | Site Preparation and Restoration per Point Repair | Each |
| 02540-5.04 | Pavement Backfill | Ton |

**END OF SECTION 02540**

# CITY OF MEMPHIS – STANDARD CONSTRUCTION SPECIFICATION
# Modified by SARP10 Program
# SECTION 09910 – CURED IN PLACE PIPE (CIPP) INSTALLATION

## PART 1 - GENERAL

1.01 CONTRACTOR LICENSE

Subcontractors must be licensed to operate in the State of Tennessee under the appropriate classification as determined by the laws of the State of Tennessee. Classification for this project shall be MU A or B- Municipal and Utility Construction.

1.02 WORK INCLUDED

A. The work covered by this contract will be for the installation of Cured-In-Place- Pipe (CIPP) in existing sanitary sewer lines that the Purchaser has selected for inclusion in this bid package. The contractor will go to each site and will ascertain the appropriate thickness of the CIPP material needed for the repair and will measure the actual lengths. The Purchaser will review and approve the design and will inspect the installation. The pipes selected for the work shown in the bid form range in size. The lengths of each run shown on the bid form are based upon plan measurements. The contractor will be paid based upon actual lengths determined from the post construction video log which may be less or more than the original bid quantities. The price for each size will include all bypass pumping, “tube” insertion and curing as well as any other work needed to complete the CIPP installation, and does not include heavy cleaning, point repairs, or cutting of protruding service laterals. CCTV work shall be done and paid for in accordance with Specification Section 00003.

B. This specification covers the general requirements for the referenced specifications, CIPP manufacturer and installer qualifications, submittal and guaranty guidelines, materials, pre-installation and installation procedures, and testing.

C. The object of this work is to pro-actively rehabilitate those sanitary sewers selected for this contract since failure could be very disruptive, hazardous to public health, and/or very expensive to repair after failure. It is critical that both the Product and the Installer have the ability to meet or exceed all requirements of the Purchaser. The intent of this Specification is to cover the minimum acceptable quality standards of a CIPP method for the complete rehabilitation of the designated sanitary sewer pipes.

1.03 DESCRIPTION OF SERVICES PROVIDED BY CONTRACTOR

It is the intent of this specification for the Subcontractor to provide for the rehabilitation and repair of certain underground piping ranging in diameter by the trenchless cured-in-place pipe reconstruction method.

A. The process is defined as the rehabilitation of existing sewer lines by installation of a thermosetting resin impregnated flexible felt fiber tube coated on one side with polyurethane which is installed in the sewer by pulling it into place or by water column inversion. Curing is accomplished by circulating hot water or steam throughout the length of the inverted tube to cure the thermosetting resin into a hard impermeable pipe with the polyurethane coating on the interior surface of the reconstructed pipe. After reconstruction, the “cured-in-place pipe” (CIPP) shall provide flow capa greater than 100 percent of the original pipe’s flow capacity when new. The reconstructed pipe shall extend the full length of the original pipe and shall provide a structurally sound, joint-less, close fitting and corrosion resistant conduit suitable for service in a municipal sanitary sewage environment.

B. The following work and components shall be provided by the Subcontractor:

1. Traffic Control if needed (in accordance with local, state and federal regulations)
2. Pre-Installation Cleaning and CCTV Inspection of Each Pipe Segment (including bypass pumping operations)
3. Insertion and curing of the resin-impregnated tube.
4. Post-Lining Inspection and Testing (see PART 4 – FIELD QUALITY CONTROL of these specifications)
5. Reopening all existing service connections
6. Post Rehabilitation CCTV inspection of the Pipe Segment
7. Site Cleanup

1.04 REFERENCED SPECIFICATIONS

This specification references American Society for Testing and Materials (ASTM) standards, which are made part hereof by such reference, and shall be the latest edition and revision thereof. If there is a conflict between those standards and this specification, this specification will govern.

A. Installation and material tests of cured-in-place pipe (CIPP) must meet the minimum requirements demonstrated in the latest revisions of the following ASTM standards:

ASTM D543 – Standard and Practice for Evaluating the Resistance of Plastics to Chemical Reagents

ASTM D638 – Standard Test Method for Tensile Properties of Plastics

ASTM D790 – Standard Test Method for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

ASTM F1216 – Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube

ASTM F1743 – Standard Practice for Rehabilitation of Existing Pipelines and Conduits by Pulled-in-Place Installation of Cured-in-Place Thermosetting Resin Pipe (CIPP)

ASTM D5813 – Standard Specification for Cured-in-Place Thermosetting Resin Sewer Piping Systems

ASTM D2990 – Standard Test Methods for Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics

B. Any approved process shall strictly adhere to this specification with regard to all standards and requirements. Where discrepancies exist, or any latitude is either inferred or interpreted between this specification and ASTM product and process standards, this Specification shall govern.

C. The City of Memphis Standard Construction Specifications

1.05 PRE-SUBMITTAL

Alternate materials and/or methods must be approved by the Purchaser not less than 10 calendar days prior to bid date. The purpose for these submittals is to allow the Purchaser the opportunity to conduct a complete, thorough and objective evaluation of the proposed alternative CIPP

products to determine if the submitted products meet all quality and utility standards provided by the specified products. Products submitted for approval must provide independent, third party test data supporting the long term performance and structural strength of the product and such data shall be satisfactory to the Purchaser. The Purchaser will evaluate only the alternate CIPP Product submittal(s) received by the stipulated time frame and provide review response(s) to all bidders by issuing addenda a minimum of 3 calendar days prior to the bid date. Any and all bids received that are not based on a listed acceptable CIPP product or a Purchaser reviewed and approved alternative CIPP product will be rejected. The decision of the Purchaser relative to pre-approval or subsequent approval of manufacturers, contractors and/or installers, qualifying superintendents and crews shall be final and without recourse.

1.06 QUALITY ASSURANCE

A. Acceptable CIPP Manufacturers

Pre-approved resin-impregnated cured-in-place pipe (CIPP) products shall be Insituform® (Insituform Technologies), MooreLiner (Moore Construction), products of Inland Pipe Rehabilitation, LLC (Improved Technologies Group/Texas Repipe), products of Spiniello Companies, SAK Construction LLC, Layne Inliner (Reynolds), A&H Contractors, Inc., Suncoast Infrastructure Inc., Visu-Sewer, or approved equal.

B. MAINLINE CURED IN PLACE PIPE

Any currently approved process or subsequently approved equal shall strictly adhere to this specification with regard to all standards and requirements. Where discrepancies exist between this specification and established manufacturer's product and process specifications, this specification shall govern. All approved manufacturers must submit the qualifying documentation for the specific individuals who will be in charge in the field on this particular project. Any manufacturer which submits a proposal and does not include the information on the specific supervisory personnel who will be installing this job will have its bid disqualified. Any bidder which submits certain individuals for approval cannot then substitute other individuals for the actual construction without written approval of the Purchaser. Failure by the bidder/Subcontractor to meet this stipulation will be cause for termination of any executed contract and disqualification from future bids.

C. LATERAL MAINLINE INTERFACE

1. Rehabilitation of lateral-mainline interface by lining specified herin
    a. Follow Mainline CIPP for sample submissions, reviews, results, and corrections
2. Rehabilitation of lateral-mainline interface by resin injection seal
    a. Record and document installer's certificate of training number and manufacturer's batch identification number.
    b. Mark identification number on corresponding resin sample (5 to 6 ounce cubes) poured at start of each new batch at beginning of each day.
    c. Submit 10 percent of prepared samples to independent third party laboratory for testing under Engineer's direction.
    d. If half of samples fail, additional 10 percent may be required to be tested.
    e. Record resin injection process with CCTV for Engineer's approval.
    f. Cure: Follow manufacturer's recommendations.
    g. Clearly see resin ring at lateral-mainline interface.

3. Follow Mainline CIPP for review and correction process

1.07 QUALIFICATIONS

A. The Subcontractor performing the CIPP lining work shall be experienced and equipped to complete this work expeditiously and in a satisfactory manner, and shall be certified and/or licensed as an installer by the CIPP lining manufacturer.

B. The Subcontractor shall have successfully installed a minimum of 500,000 feet (total) or 2,000 manhole-to-manhole line sections for the proposed CIPP lining for at least a 5-year continuous period installing CIPP linings in pipe of a similar size, length, and configuration as contained in this Contract as documented by verifiable references.

C. The full-time, on-site supervisor who will supervise the CIPP lining installation under this Contract shall have successfully installed a minimum of 150,000 feet (total) of the proposed CIPP lining for at least a 3-year period as documented by verifiable references.

D. The Subcontractors personnel including the supervisor, the foreman, and the lead crew personnel for the CCTV inspection, resin wet-out, the CIPP lining installation, lining curing and the robotic service reconnections each must have a 3-year minimum total experience with the CIPP technology proposed for this Contract, and must have demonstrated competency and experience to perform the scope of work contained in this Contract. The name and experience for each lead individual performing work on this contract shall be submitted. Personnel replaced by the Subcontractor on this contract shall have similar, verifiable experience as the personnel originally submitted for the project.

E. The Purchaser reserves the right to approve or disapprove the Subcontractor, Supervisor, and/or manufacturer based on the submitted qualifications and a follow-up interview.

1.08 SUBMITTALS

A. Submit product data, design calculations, installation details, and shop drawings to the Purchaser. The Subcontractor shall provide this information without delay or claim to any confidentiality. Submittals shall include the following and be divided into three sections of qualifications, pre-installation, and post-installation:

1. CIPP lining supplier's name and a materials list
2. CIPP lining schedules including field-verified lengths and diameters for all CIPP linings and appurtenances required. Plans should include map(s) showing insertion points for all CIPP installations.
3. Shop drawings and product data to demonstrate compliance with these specifications and identify construction materials including resins, catalysts, felt, etc., felt manufacturer and facility location, wet-out facility location, etc.
4. Manufacturers' shipping, storage, and handling recommendations for all CIPP system components.
5. MSDS sheets for all materials to be furnished for the project
6. Detailed installation procedures including CIPP lining production schedule, acceptable inversion heads and pressures, inversion procedures, curing and cool-down procedures and temperatures, and times for each process stage
7. Prior to each CIPP lining shipment, certified test reports showing the CIPP lining for this Contract was manufactured and tested in accordance with all ASTM Standards specified and referenced herein.

8. An odor control plan which ensures project specific odors will be minimized at the project site and surrounding area
9. A detailed public notification plan shall be prepared and submitted including detailed staged notification to residences affected by the CIPP installation.
10. A complete description for the proposed wet-out procedure for the proposed technology
11. Wet-out forms with detailed information including, but not limited to: resin volumes and/or weights, CIPP liner length, roller gap settings, start times, finish times, gel times, resin injection locations, and any other pertinent data documenting the wet-out for each CIPP liner section manufactured.
12. Design data and specification data sheets listing all parameters used in the CIPP liner design and thickness calculations based on ASTM F1216. All calculations shall be prepared under and stamped by a Tennessee registered professional engineer.
13. A list with all service laterals abandoned or reconnected as part of the work as further defined herein.
14. Manufacturer's recommended cure method for each CIPP liner diameter and thickness to be installed including detailed curing procedures describing the curing medium and the application method.
15. CIPP lining curing log reports documenting the liner installation for all sewer segments. The CIPP lining reports shall document all lining installation details including manhole numbers, street names/sewer location, project number, date, time, temperature, curing temperature, curing time, CIPP liner thickness, etc. A sample report shall be submitted to the Construction Manager for approval prior to installing any CIPP lining.
16. Pre- and post-rehabilitation CCTV inspection data as further defined herein. The pre-rehabilitation CCTV inspection shall be performed in the presence of the Purchaser's Resident Project Representative.
17. Ten reports from projects within the past 2 years from independent testing laboratory for liner materials analysis showing: elasticity modulus as determined by appropriate ASTM standard and flexural stress as determined by appropriate ASTM standard. The lining must be the same resin system and felt tube materials as proposed for this project.
18. Installed liner(s) samples for testing to be performed by an ASTM-certified independent testing laboratory, as described further herein.
19. Data on the maximum allowable stresses and elongation of the tube during installation and the means the Subcontractor will use to monitor stress and elongation.
20. A detailed summary about the proposed quality controls to be performed by the Subcontractor including:
    a. Proposed procedures for quality control.
    b. Product sampling and testing method and frequency for product sampling and testing in raw material form and cured product form.
    c. Inspection forms and guidelines for quality control inspections.

B. Submit the name and experience for lead personnel including verifiable references, as described in the Qualifications in subsection 1.07.

**PART 2 – PRODUCTS**

2.01 PATENTS

The bidder must prepare his bid package with the knowledge that it is his responsibility to advise

the Purchaser of any patent or copyright infringement associated with this project. The Subcontractor ultimately hired to do this work shall bear responsibility for payment of all royalties and license fees. All costs associated with patent infringement shall be borne by the Subcontractor.

2.02 MATERIALS

A. The CIPP material shall be fabricated from materials which, when cured, will be suitable for the environment intended, i.e., meeting the chemical resistance requirements from ASTM F1216. The final product must not deteriorate, corrode, or lose structural strength in any manner that will preclude meeting the expected design life. The structural performance of the inverted cured-in-place pipe must be adequate to accommodate all internal and external loads (live and dead) over its service life. The CIPP liner shall be designed considering the host pipe is fully deteriorated, a prism loading, a soil loading of 120 pcf, a 2.0 factor of safety, a 2-percent ovality, a 5-percent maximum deflection, a 1,000 psi modulus of soil reaction, a flexural modulus of 250,000 psi for Standard Polyester, 400,000 psi for Enhanced Polyester, 4,500 psi flexural strength, a 3,000 psi tensile strength, a lining enhancement factor (K) of 7 maximum, H-20 live loads where applicable, 50-percent long-term modulus reduction factor and a hydrostatic load beginning at the surface.

B. The finished pipe will be such that when the thermosetting resin cures, the total wall thickness will be a homogeneous and monolithic felt and resin composite matrix that will be chemically resistant to exposure to domestic sewage. When cured, the installed CIPP must allow for sufficient resin to account for migration into the host pipe without adversely affecting the integrity of the CIPP. No encapsulating or containment material layer between the resin saturated felt and the host pipe will be permitted. No annular space will be allowed between the tube and the host pipe.

C. Pricing for cured-in-place pipe will be based on original as-constructed nominal pipe diameters. It will be the responsibility of the Subcontractor to custom manufacture cured-in-place pipe to conform to pipe diameters other than those listed, due to deterioration or other factors, without additional compensation.

2.03 LINER TUBE

A. The tube shall consist of one or more layers of absorbent non-woven felt fabric and meet the requirements of ASTM F1216. In the event of a discrepancy between the referenced ASTM requirement and the CITY's Specification as modified by SARP10 Program, the CITY's Specification as modified by SARP10 Program will govern.

B. The acceptable liner tube shall be constructed under ISO 9002 certified procedures. (Proper certification shall be submitted with the "alternative products application"). At time of manufacture, each lot of liner shall be inspected for defects and tested in accordance with applicable ASTM and industry standards.

C. Liner tube manufacturers must be able to certify that a minimum of 1 million linear feet has been installed in cured-in-place pipe applications within the US.

D. The Subcontractor shall measure the inside diameter of the existing pipelines in the field prior to ordering lining, so the lining can be installed in a tight-fitted condition. The Subcontractor shall verify the lengths in the field prior to ordering and prior to impregnating the tube with resin to ensure the tube will have sufficient length to extend

the run's entire length. The CIPP lining's length shall be as deemed necessary by the Subcontractor to effectively carry out inserting and sealing the CIPP lining at the outlet and inlet manholes.

1. The CIPP lining tube shall be manufactured or fabricated to a size that will tightly fit the internal circumference of the sewer being rehabilitated after being installed and cured.
2. The CIPP lining shall be able to fit into irregularly shaped pipe sections and through bends and dips (up to 45 degrees) within the pipeline.
3. Allowance for longitudinal and circumferential expansion shall be taken into account when sizing and installing the CIPP lining.
4. The tube shall be properly sized to the existing pipe's diameter and the length to be rehabilitated, and be able to stretch to fit irregular pipe sections and negotiate bends.

E. The wet-out tube shall have a uniform thickness that, when compressed at installation pressures, shall meet or exceed design thickness.

F. The tube shall be manufactured to a size that, when installed, it shall tightly fit the internal circumference and length of the original pipe. Allowances shall be made for circumferential stretching during inversion.

G. Overlapped layers of felt fabric in the longitudinal seams that cause abnormalities (lumps) in the final product shall not be used. Seams in the felt liner tube shall also have cross sectional strength greater than un-seamed felt fabric.

H. The outside layer of the tube, before installation, shall have an impermeable polyurethane plastic coating, with a roughness coefficient (Manning's "n") no greater than 0.010. This coating shall be an impermeable, flexible membrane that shall contain the resin and facilitate monitoring of resin saturation during the resin impregnation (wet-out) procedure. This coating shall form the inner layer of the finished pipe and is required for enhancement of corrosion resistance, flow and abrasion properties.

I. At the time of delivery to the jobsite, the tube shall be homogeneous across the entire wall thickness containing no intermediate or encapsulated layers. It shall be uniform in color, free of cracks, holes, blisters, or deleterious faults. No foreign materials may be included in the tube that may cause de-lamination in the cured liner, and no dry or unsaturated areas or layers shall be evident.

J. The wall color of the interior liner surface after installation shall be a light-reflective color (preferably white) so that a clear, detailed inspection with closed-circuit television equipment may be conducted.

K. The outside of the tube shall be marked for distance at regular intervals not to exceed 10 feet. Such markings shall include the Manufacturers name or identifying symbol.

L. The minimum liner length shall be that deemed necessary by the Purchaser to effectively span the distance between manhole sections of the segment to be lined unless otherwise specified. The line lengths shall be verified by the Subcontractor in the field before impregnation of the tube with resin.

M. Product Handling – Subcontractor shall use all means necessary to protect lining material during transportation, before, during, and after installation and to protect the installed work and materials of all other trades. In the event the liner material is damaged, Subcontractor shall immediately make all repairs or replacements necessary to the approval of the Purchaser, at no additional cost to the Purchaser.

2.04 RESIN

A. The resin class for CIPP installed under this contract shall be a Standard or Enhanced Polyester unless otherwise directed by the Purchaser due to site-specific field conditions and/or design requirements.

Unless otherwise specified, the Subcontractor shall furnish a resin and catalyst system compatible with the reconstruction process that provides the cured physical strengths specified herein.

B. Standard Polyester Resin

1. The resin used shall be high-grade corrosion resistant isophthalic polyester specifically designed for the CIPP being installed. Only premium, non-recycled resin shall be used. The acceptable resin, (Reichhold Polylite® 33420 or approved equal) shall have been tested according to ASTM D2990, D5813, and F1216 by accredited, third-party testing facilities. Results of these tests shall be made available to the Purchaser upon request.

2. The resin must be manufactured under ISO 9002 certified procedures. The resin vendor must be able to reference the corrosion scale with the resin itself having a heat deflection temperature greater than 212 degrees Fahrenheit. Only PREMIUM, NON-RECYCLED resins will be accepted.

C. Enhanced Polyester Resin

1. The resin used shall be a corrosion resistant enhanced thixotropic, medium reactivity, high viscosity, and rigid, chemical resistant isophthalic resin. These resins contain a mineral filler to enhance mechanical properties and are specifically formulated for use in the cured-in-place pipe (CIPP) industry.

2. The acceptable resin, (Reichhold Polylite® 33420-E or approved equal) shall have been tested according to ASTM D2990, D 5813 and F 1216 by accredited third party testing facilities. Results of these tests shall be made available to the Purchaser upon request.

3. The resin must be manufactured under ISO 9002 certified procedures. The resin vendor must be able to reference the corrosion scale with the resin itself having a heat deflection temperature greater than 224 degrees Fahrenheit. Only PREMIUM, NON-RECYCLED resins will be accepted.

D. No Intermediate Mixing Facilities Allowed

The resin shall be shipped directly from the resin manufacturer's facility to the CIPP wet-out facility. The resin shall not be sent to any intermediate mixing facility. Copies of the shipping documents from the resin manufacturer shall be submitted to the Purchaser indicating dates of shipment, originating and receiving locations.

E. Urethane-modified Vinyl Ester Resins (if applicable)

1. The resin used shall be a high-grade, premium vinyl ester combining outstanding corrosion resistance and high-temperature performance with excellent laminating characteristics. The resin must be manufactured under ISO 9002 certified procedures. (Proper certification shall be submitted with the "alternative products application").

2. The resin vendor must be able to reference the heat corrosion scale with the resin itself having a heat deflection temperature greater than 244 degrees Fahrenheit. Only premium, non-recycled resins will be accepted. PET resins or those containing enhancement additives and/or fillers will not be accepted without prior written approval by the PURCHASER.

2.05 Lateral-Mainline Interface Seal:

A. ASTM F2561-06 following mainline CIPP wet-out requirements
   1. 2-piece Hydrophilic, Full Circle Structural Connection Seal
      a. Approved manufacturers:
         i. LMK Enterprises Inc.
         ii. BLD Services
         iii. Or equal

B. Resin injection process following manufacturer's recommendation.
   1. Injected resin without the use of grout.
      a. Approved manufacturers
         i. Janssen Process Company
         ii. ProKasro
         iii. Or equal

2.06 ADDITIONAL PROVISIONS

In order that the Purchaser is assured that the specified resin is used for the duration of the project, the following provisions are made part of this specification:

A. The Subcontractor shall designate a wet-out facility and shall provide wet-out liner tubes from the designated facility only. If determined to be absolutely necessary, an alternate wet-out facility may be utilized with the approval of the Purchaser. If an alternate facility is used to supply wet-out liner tubes, the Subcontractor shall provide all necessary documentation to the satisfaction of the Purchaser to ensure compliance with the specifications of this contract.

B. The Subcontractor shall place a sampling valve in-line at a point in the resin/catalyst mixing stage so that a sample of non-catalyzed resin may be taken. A second sampling valve shall be placed in-line at a point after the resin/catalyst mixing stage, but prior to catalyzed resin injection into the liner so that a resin sample may be taken. Both sampling valves shall be left in place for the duration of the contract.

C. The Purchaser shall have the right to inspect the designated wet-out facility and draw samples from one or both sampling valves without prior notice to the Subcontractor.

D. Resins shall be tested as specified by ASTM D5813, and the same frequency as liner samples, and the tests shall be performed by an independent lab and paid for by the Subcontractor.

E. The Purchaser may perform Infrared Scans (IR Scans) at its expense to insure resin quality and consistency throughout the project.

2.06 CATALYST SYSTEMS

A. The exact mixture ratio of resin and catalyst shall also be submitted. The catalyst system shall be identified by product name. The resin/catalyst ratio shall be approved by the resin manufacturer in writing. The catalyst system shall be made up of a primary catalyst and a secondary catalyst. Catalyst shall be compatible with the resin to control resin cure time and also compatible with the reconstruction process that provides cured physical strengths specified herein.

B. Cure schedules for the CIPP shall be submitted to the Purchaser for review. The proposed curing schedules/process shall be approved by the resin manufacturer in writing. Cure schedules shall include specific information on “step curing” procedures, “cooking times”, duration and “cool down” procedures – all to be approved by the resin manufacturer in writing.

C. The resin shall be shipped directly from the resin manufacturer’s facility to the CIPP wet-out facility. The resin shall not be sent to any intermediate mixing facility. Copies of the shipping documents from the resin manufacturer shall be submitted to the Purchaser indicating dates of shipment, originating and receiving locations.

D. The Subcontractor shall submit a Certificate of Authenticity from the resin manufacturer for each shipment to the wet-out facility to include the date of manufacture and Heat Distortion Temperature. This information shall be submitted before the manufacture or installation of any CIPP.

2.07 PIPE DESIGN

A. Liner Thickness

The Subcontractor shall submit liner thickness calculations to the Purchaser for review. Overall, the hydraulic profile shall be kept as large as possible. The CIPP shall at a minimum have the full flow capacity of the original pipe before rehabilitation. The CIPP

shall be designed in accordance with the applicable provisions of ASTM F1216 and D2412 for "fully deteriorated gravity pipe conditions" and shall meet the following design conditions:

1. AASHTO H-20 Live Load with two trucks passing for CIPP in streets (16,000 lbs.)
2. A soil modulus of elasticity of 1,000 psi, soil weight of 120 pounds per cubic foot and a coefficient of friction of $K_u'$=0.13.
3. Standard Polyester Resin: Short-term flexural modulus of 250,000 psi and long-term modulus of 125,000 psi. Enhanced Polyester Resin: Short-term flexural modulus of 400,000 psi and long-term modulus of 200,000 psi. Initial flexural strength of 4,500 psi and long term flexural strength of 2,250 psi.
4. Safety factor of 2.0 shall be used.
5. Groundwater elevation at the ground surface.
6. Pipe ovality of 2% (unless actual field measurements prove otherwise).
7. Poisson ratio of 0.3.
8. Enhancement factor (K) of 7.
9. Service temperature range shall be 40 to 140 degrees F.
10. Maximum long-term deflection shall be 5%.
11. The installed, cured thickness shall be the largest thickness as calculated for deflection, bending, buckling, minimum stiffness and a 50 year design life.

The Minimum Acceptable Pipe Thickness **(Finished and Installed)**, shall be based on design parameters in section 2.07, Items (1) through (11) of this Specification adjusted for site-specific field conditions and approved by the Purchaser prior to tube manufacture.

B. It is the Subcontractor's responsibility to determine the site specific external loads on the liner and increase or decrease its thickness as required. In the event actual field conditions allow for a deviation in the above thickness table, the Subcontractor shall submit any proposed changes to the Purchaser for approval to ensure installed CIPP meets minimum thickness requirements. The plan shall include detailed inversion procedures to reduce stretching and resin loss and to minimize shrinkage.

C. The Subcontractor shall submit his price proposal based on the appropriate length, size, and existing pipe parameters. The deterioration of sewers is an on-going process. In the event pre-construction inspections reveal the sewers to be in substantially different conditions than those in the design considerations, the Subcontractor shall request such changes in reconstruction liner thickness, supporting such requests with the appropriate design data satisfactory to the Purchaser. The deviation, if approved, shall be reflected by the appropriate addition or reduction in the unit cost for that size as agreed to by the Purchaser.

D. Any liner that does not meet the specified strength and/or thickness requirements, regardless of the amount below the specified requirements, shall be corrected by the Subcontractor in a manner approved by the Purchaser at no additional cost to the Purchaser. The PURCHASER's decision on how to correct deficient CIPP installations

shall be final. Options for correcting deficient liners that will be considered by the PURCHASER include removing the liner and re-lining the sewer, excavating and replacing the sewer from manhole to manhole, or providing the PURCHASER with a substantial credit. The primary option that will be considered will be to re-line the sewer. Credits will only be authorized for CIPP that does not meet required thickness. If a credit is acceptable to the PURCHASER, the credit shall be calculated by multiplying the bid price by the percent that the liner thickness is below the required installed thickness as follows:

**Credit = (1 – Installed CIPP thickness/required CIPP thickness) x bid price**

E. The Subcontractor shall not assume a credit will be acceptable to the PURCHASER in any case.

F. The finished CIPP will provide a uniform smooth, interior wall surface and will have at least 100% of the flow capacity of the original pipe before rehabilitation.

**PART 3 - EXECUTION**

3.01 INSTALLATION

A. General

1. All reconstruction of existing gravity sewer mains using an approved CIPP Product and Installer shall be performed in accordance with the latest revision of ASTM F1216.

2. The Subcontractor shall carry out his operations in strict accordance with all applicable OSHA standards. Particular attention is drawn to those safety requirements involving work on an elevated platform and entry into a confined space.

3. All surfaces, which have been damaged by the Subcontractor's operations, shall be restored to a condition at least equal to that in which they were found immediately prior to the beginning of the Subcontractor's operations. Suitable materials and methods shall be used for such restoration. The restoration of existing property or structures shall be done as promptly as practicable and shall not be left until the end of the construction period. Compensation for this work will be included in the rehabilitation item to which it pertains.

B. Installation Procedures

1. Cleaning and Inspections – Sewers shall be cleaned of all debris, roots and other materials that would block proper inversion of the cured-in-place pipe. Inspection of the sewer pipe shall be performed by the Subcontractor's experienced personnel trained in location breaks and obstacles by CCTV inspection and certified under National Association of Sewer Service Companies (NASSCO) Pipeline Assessment Certification Program (PACP®). Utilizing a color video inspection system with data recording capabilities, the entire pipe section to be

lined shall be inspected in accordance with the CCTV specifications. The interior of the pipe shall be carefully inspected to determine the location of any conditions, which may prevent the proper installation of the CIPP, and it shall be noted so that these conditions can be corrected. The video inspection shall be performed in the presence of the Purchaser's Resident Project Representative. The DVD/CD-ROM and suitable log shall be submitted to the Purchaser with database and reports in a PACP compliant format to be incorporated into the Purchaser's computer management system and GIS.

2. Sewer service connections shall also be CCTV inspected, which shall identify all service connections, openings, and condition of service connections to main.

3. Utilizing high-pressure jet cleaning equipment, several passes are completed to assure that all debris is removed from the pipe. If roots are present, root cutters or mechanical brushes are attached to the jet nozzle and sent through the line to remove all root intrusions. Should equipment other than that described above be needed to remove debris or heavy roots, additional payment may be authorized by the PURCHASER.

4. Heavy Cleaning of Sewers – If roots are present which require the use of mechanical brushes or dragging devices or, if in the judgment of the PURCHASER, the pipe is more than 25% full of debris, the pipe shall be cleaned to the satisfaction of the PURCHASER and additional payment authorized under the appropriate Pay Item on the bid form. Heavy Cleaning shall be defined as the pipe being more than 25% full of debris or requiring the use of apparatus other than normal high-pressure jetting equipment. The Subcontractor shall be paid for heavy cleaning at the contract unit price shown on the bid form. Any heavy cleaning shall be supported by visual evidence in the form of video or digital image and must be pre-approved by the PURCHASER.

5. The Subcontractor shall be responsible for determination of active services. No payment shall be made for reinstatement of inactive services unless approved by the Owner. Damages or fines resulting from failure to renew any active service(s) shall be Subcontractor's responsibility. If the Subcontractor reinstates an inactive service that is not approved, the Subcontractor shall make a point repair by excavation or shall apply an approved internal patch to repair the cut-in hole. The Subcontractor shall make the necessary repairs at no cost to the Owner.

6. Bypass of Flow – As required for acceptable completion of the work and/or to avoid damages due to sewer spills or overflows, the Subcontractor shall provide for sewer flow maintenance around the section or sections of pipe designated for rehabilitation. The bypass shall typically be made by plugging the line at an existing upstream manhole and pumping the flow into a downstream manhole or adjacent sanitary sewer system. The pump and bypass lines shall be of adequate capacity and size to handle the anticipated flow. Bypassing of sanitary sewerage into the storm water system will not be allowed. For all bypass pumping, pump noise shall be kept to a minimum to the satisfaction of the Purchaser. The Subcontractor shall be required to contact all residential and commercial

customers whose service lines connect to the sewer main being bypassed and inform them that they will be temporarily out of service. The Subcontractor shall also advise those customers against water usage until the mainline is back in service. After completing the necessary work on the main line to allow its reuse, the Subcontractor shall advise those customers that the sewer main is back in service.

7. If the CIPP lining manufacturer believes the infiltration rate in the sewer segment is high enough to risk washing out the resin, the Subcontractor shall perform required measures to minimize infiltration prior to installation. If any infiltration runners or gushers are observed during the pre-CCTV inspection, the Subcontractor shall submit, in writing for approval by the Construction Manager, the methods and materials for mitigating any adverse impacts from the infiltration.

8. Resin Impregnation of the CIPP Tube – The Subcontractor shall designate a location where the tube shall be impregnated or "wet out" with resin, using distribution rollers and a "single-source" or "serial" vacuum system to thoroughly saturate the tube's felt fiber prior to installation in the field. The impregnated tube shall be free of pinholes, resin voids and other defects and sufficient excess resin shall be provided to allow for resin migration into the host pipe. If the cured-in-place pipe is impregnated at the manufacturing plant, it shall be delivered to the job site packed in ice in a refrigerated truck, and remain refrigerated prior to installation to prevent premature curing. If an "over the hole" or remote wet out is proposed, installation and wet out procedures shall be submitted in detail and must be approved by PURCHASER prior to installation.

9. Inversion of CIPP Liner Tube – Installation shall be carried out in accordance with this Specification only. The impregnated tube shall be water inverted through an existing manhole or other approved access point utilizing a hydrostatic water column or pressurized steam until it has fully traversed the designated line length and the inversion face breaches the destination manhole or termination point. The fluid column or air pressure shall have been adjusted and maintained to be sufficient to cause the impregnated tube to hold tight against the existing pipe wall, produce dimples at side connections, and flared ends at the manholes. Lubricant during inversion shall be used as necessary in accordance with the CIPP manufacturer's recommendations. Thermocouples shall be placed at the top and bottom interface of both ends of the liner for monitoring temperature during the cure cycle. Temperature monitoring systems shall be Zia systems or Vericure by Pipeline Renewal Technologies. Care should be taken during tube installation not to over-stress the fabric fiber.

    a. The CIPP lining for 6-inch through 18-inch sewers without sags greater than 30% may be installed via inversion using hydrostatic head or air pressure or pull-in methods in accordance with ASTM F1216 and manufacturer's recommendations.
    b. The CIPP lining for greater than 18-inch sewers or with sags greater than 30% (depth of water in the pipe) shall be installed via inversion using hydrostatic head in accordance with ASTM F1216 and manufacturer's recommendations.

10. When using pressurized air, particular attention should be given to the maintenance of the minimum required "finished and installed" thickness of the CIPP. Before the inversion begins, the tube manufacturer shall provide the minimum air pressure required to hold the tube tight against the host pipe and the maximum allowable pressure so as not to damage the tube. Once the inversion has started, pressure shall be maintained between the minimum and maximum pressures until the inversion has been accomplished.

11. The preferred method of installation for CIPP shall be inversion using a hydrostatic head (water column). The use of pressurized air will be considered on a case-by-case basis only. The Subcontractor shall submit a written request for the use of pressurized air in sewer segments where the Subcontractor feels that the utilization of pressurized air will be beneficial to the PURCHASER. The Subcontractor shall not assume in any case that the use of pressurized air is acceptable to the PURCHASER without prior written authorization from the PURCHASER.

12. After mainline lining is completed and the laterals have been recently reinstated, install watertight lateral-mainline interface seal and extend minimum of 18 inches into lateral to create water tight seal ensuring interface is smooth and does not impede flow from lateral. Open cutting or excavation shall not be allowed for installation of water tight seals.
    a. Approved for lateral lining seal.
        i. LMK Enterprises
            1. 2-piece Hydrophilic, Full circle Structural Connection Seal
        ii. BLD Services
    b. Approved for Interface Injection Seal.
        i. Janssen Process Company.
        ii. ProKasro Interface Injection
13. Perform manufacturer's required and industry standard preparation work to alleviate lateral-mainline interface seal problems and as specified herein.
    a. As necessary for access of equipment, contour manhole bench and channel by saw cutting.
    b. Internally remove any obstructions, roots, debris, or grease that impact lateral-mainline interface seal
    c. Remove tuberculation on ductile iron lateral.
    d. Do not back-up or blow-back waste into property owners' building.
    e. Perform pre-lining leakage control by chemical grout method to eliminate cold spots.
        i. Chemical grouting not required for Janssen resin seal method.
    f. Lateral, mainline, or property damaged as result of improper use of equipment: Repaired at no cost to the Commission.

14. Setup bypass pumping, if necessary, or turn off water to building with Engineer's approval.

3.02 CURING

A. *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 thermocouples indicate that the temperature is of a magnitude to realize an exothermic reaction or cure in the resin. After initial cure is reached, the temperature shall be raised to the post-cure temperature recommended by the resin manufacturer. Post-Cure temperature shall be held for a period as recommended by the resin manufacturer, during which time the recirculation of the water and cycling of the heat source to maintain the temperature continues.

Prior to any inversion, the Subcontractor shall provide a *Post-Cure Hold Time and Temperature Table*. This table shall indicate the minimum time and temperature the inverted tube will be held at in order to achieve desired physical properties. The resin manufacturer shall certify both the time and temperatures presented in the table.

Curing must take into account the existing pipe material, the resin system, and the ground conditions (temperature, moisture level, and thermal conductivity of the soil).

1. Using Circulated Heated Water

    a. A suitable heat source and water recirculation equipment is required to circulate heated water throughout the pipe. The equipment shall be capable of delivering hot water throughout the inverted tube to uniformly raise the temperature required to cause a cure of the resin.

2. Using Controlled Steam

    a. Suitable steam-generating equipment is required to distribute steam throughout the pipe. The equipment shall be capable of delivering steam throughout the inverted tube to uniformly raise the temperature required to cause a cure of the resin.

    b. The Time and Temperature Table submitted when using steam curing shall be identical to time and temperature hold times when curing with heated, circulated water.

B. The preferred method of curing CIPP shall be by circulated water. The use of controlled steam will be considered on a case-by-case basis only. The Subcontractor shall submit a written request for the use of steam in sewer segments where the Subcontractor feels that curing by steam will be beneficial to the finished product. The Subcontractor shall not assume in any case that the use of controlled steam for the curing of CIPP is acceptable to the Purchaser without prior written authorization from the Purchaser.

3.03 POST CURING

A. CIPP Processing (Curing and Cool Down) - The cure cycle and cool down will be dictated with consideration given to actual field conditions and shall be according to the manufacturer's recommendations. The curing temperatures shall be monitored at the

heater truck's water inlet and outlet lines. The temperature readings from the truck will be compared to the thermocouples to insure that sufficient heat is being supplied to the system to affect proper cure. Once the pipe has been cured, cool water shall be slowly introduced into the rehabilitated pipe. The water temperature shall be cooled inside of the pipe at a rate of 20 to 30 degrees per hour until the water temperature is within 20 degrees of the ambient temperature. The cool down process will also be affected by actual field conditions and may be modified in cases of severe conditions or below normal ground temperatures.

B. Temperature monitoring systems shall be required for all 18-inch or larger sewers, any sized sewer that crosses a stream, creek, or other body of water, or as noted on the Drawings. This system shall be installed at the pipe invert per the manufacturer's recommended procedures. The temperature sensors shall be placed at intervals as recommended by the sensor manufacturer. Additional sensors shall be placed where significant heat sinks are likely or anticipated. The sensors, if installed, shall be monitored by a computer using a tamper-proof database which can record temperatures at the lining interface and the host pipe. Temperature monitoring systems shall be Zia systems or Vericure by Pipeline Renewal Technologies..

C. Termination and Sealing at Manhole Outlets – The Subcontractor shall install a hydrophilic seal at each manhole face prior to inverting or pulling in the uncured CIPP lining. These seals should be per Hydrotite by Greenstreak, Insignia by LMK, or an approved equal.

All CIPP lining cutting and sealing at manhole connections shall provide watertight pipe and manhole seals. All cured lining cut edges shall be thoroughly sealed with the same resin as used in the lining. The catalyst or hardener used shall be compatible with the resin/catalyst previously used in the lining, but shall not require an external heat source to begin the exothermic reaction (curing).

D. Testing - testing of finished CIPP and leakage testing of the finished CIPP-lined sewer mains shall be conducted prior to the reinstatement of laterals in the presence of the Purchaser, and shall follow Part 4 of these specifications.

E. Internal Reconnection of Lateral Services - For each inversion run after the CIPP has been cured in place and leakage testing results of the finished CIPP are deemed acceptable by the Purchaser, the Subcontractor shall reopen the existing active sanitary sewer connections for each inversion run. This shall be done without excavation from the interior of the pipeline by means of a television camera and a cutting device that re-establishes the sanitary sewer connections to not less than 95% of their original size and render them fully functional. Restored openings shall be neatly and smoothly cut and without rough edges. Care must be exercised not to damage the CIPP or the existing main or lateral pipes. Holes cut outside the lateral opening or oversized cutting (more than 100%) must be corrected at the Subcontractor's expense.

3.04 CLEAN UP

A. Upon acceptance of any installation by the Purchaser, the Subcontractor shall reinstate the project area affected by his operations to a condition at least equal to that existing prior

to the work. The Subcontractor shall flush and clean each newly lined section, if necessary, to remove all accumulated debris, rocks, gravel, sand, silt and other foreign material from the system at or near the closest downstream manhole. Debris shall not be allowed to pass downstream. If it does, the Subcontractor shall clean the next segment at no additional cost.

3.05 BYPASS PUMPING

A. The Subcontractor must provide bypass pumping as required by conditions. Bypass pumping will be included in the per-foot price for all sewer lines included in the bid. The Subcontractor may choose to use multiple parallel pipes to accommodate the bypass in lieu of a single pipe.

B. All bypass pump and piping schemes must be submitted to and approved by the Purchaser in advance.

C. Bypass pumping is defined as providing pumps, standby pumps, piping, manpower to operate, routine maintenance and repair capability, pipe plugs, fuel, route and pump site clearing and whatever else is necessary to provide a complete bypass pumping operation. The bypass shall typically be made by plugging the line at an existing upstream manhole and pumping the flow into a downstream manhole. The pump and bypass lines shall be of adequate capacity and size to handle the anticipated flow. The Subcontractor will be required to attenuate noise associated with bypass pumping so that the general public is not disturbed by the sound level. Any structures proposed by the Subcontractor for construction over or penetration into the interceptor piping for the purpose of performing the bypass operations must be approved by the Purchaser prior to implementation. This approval will be based upon the submittal by Subcontractor of Tennessee professional engineer prepared design drawings and details.

3.06 PERMANENT SERVICE LATERAL RENEWAL

A. When specified or shown on the Drawings, permanent service lateral renewals (replacement) shall be made using epoxied-on PVC saddle with a gasketed lead and skirt as manufactured by GPK Products, Inc., DFW/HPI Flex Saddle T Version, or approved equal. Two stainless steel bands shall be used to attach the saddle to the CIPP.
   1. Service laterals shall be replaced from the main sewer line to the right-of-way or property line of the sewer customer. A cleanout shall be installed at the property line.
   2. Installation of service laterals, including fittings and cleanouts, by excavating and backfilling shall be accomplished using 6-inch SDR 35 PVC pipe conforming to ASTM D3034. Joints shall be integral bell and spigot type joints conforming to ASTM D-3139. Gaskets shall conform to ASTM F477. Pipe markings shall conform to ASTM D1785, including manufacturer's name or trademark, pipe size, PVC cell classification (12454 B), Schedule 40 PVC sewer pipe, and designation ASTM D1785.

3. Flexible couplings manufactured by Fernco, Inc. or approved equal shall be used to connect the service lateral to the service piping and to connect the new service piping to the existing service piping. All restraining bands shall be stainless steel.
4. Construction of the service reconnection shall terminate at the property line with the installation of a cleanout assembly.

## PART 4 - FIELD QUALITY CONTROL

4.01 SAMPLE PREPARATION AND TESTING OF CURED CIPP

Sample preparation, sample testing, and leakage testing of the finished CIPP-lined sewer mains shall be performed in accordance with this specification. The Subcontractor shall furnish all equipment and personnel necessary to conduct these preparations and tests.

A. The Subcontractor shall prepare CIPP samples for each inversion according to this Specification and ASTM F-1216. The Purchaser may, at its discretion, submit samples of the cured CIPP for laboratory determination of flexural strength, flexural modulus and wall thickness for each test sample during the execution of this Contract. These three individual analyses shall comprise one completed test. All samples shall be collected per the sampling protocols set forth in ASTM F-1216.

B. The Subcontractor shall prepare one restrained sample of the installed liner at least 12 inches in length for testing. For sewers 15 inches and larger, plate samples may be taken and cured in the same manner as the installed CIPP. For each sample taken, the Subcontractor shall cut and deliver a 1-inch wide representative sample (taken at least 2 inches from the end of the specimen) to the Purchaser. The sample delivered to the Purchaser shall be labeled and removed from any restraining mold. The Purchaser may return such samples to the Subcontractor for disposal.

C. The tests shall be used to verify that the installed CIPP meets these specifications. CIPP thickness shall be measured in accordance with ASTM D5813. Flexural properties shall be determined per ASTM D790. The Subcontractor shall label and date all samples and deliver the samples directly to the Purchaser. All testing shall be performed by an independent, ASTM-certified testing laboratory of the PURCHASER's designation and at the Purchaser's expense. Payment to the Subcontractor shall be withheld pending the Purchaser's acceptance of the CIPP test results.

D. Any liner that does not meet the specified strength and/or thickness requirements, regardless of the amount below the specified requirements, shall be corrected by the Subcontractor in a manner approved by the Purchaser at no additional cost to the Purchaser. The Purchaser's decision on how to correct deficient CIPP installations shall be final.

4.02 EXFILTRATION TESTING OF CIPP SEWER MAINS

A. Leakage testing of all finished CIPP lined sewer mains shall be conducted prior to the reinstatement of laterals in the presence of the Purchaser in accordance with the exfiltration test method for gravity pipes described in the latest revision of ASTM F1216 unless revised herein. The Contractor shall furnish all equipment and personnel necessary to conduct all of the leakage tests. If, in the judgement of the Purchaser, any unsatisfactory conditions are present, the Subcontractor shall correct conditions in these areas at no additional cost to the Purchaser.

4.03 FINAL VIDEO INSPECTION

A. CCTV in accordance with Section 00003 shall be submitted after liner installation. This inspection shall be performed, one section at a time, by a color video inspection system. The finished CIPP shall be continuous over the entire length of all inversion runs and be free of dry spots, wrinkles, pinholes, holidays, lifts, and delaminations. The camera's rate of travel shall not exceed 20 feet per minute. The footage meter count shall be clearly visible. Logs shall include date, line size, length, manhole numbers and project number, direction of camera travel, direction of flow, and any observed defects or comments. Videos between manhole segments shall be continuous; no breaks or "blink-outs" in the video shall be observed. No infiltration of groundwater shall be observed. All service entrances shall be accounted for and shall be unobstructed including all rehabilitated service lateral connection repair(s). If, in the judgment of the Purchaser, any unsatisfactory conditions are present, the Subcontractor shall correct conditions in these areas at no additional cost to the Purchaser.

**PART 5 - SUBCONTRACTOR RESPONSIBILITIES**

5.01 PROTECTION OF DOWNSTREAM FACILITIES

The Subcontractor must take all steps necessary to assure that no material is allowed to fall into the line during his installation process. The Subcontractor shall bear all cost of repairs resulting from any damages to downstream facilities resulting from failure to abide by this stipulation.

5.02 WASTEWATER SPILLS

A. Should the Subcontractor spill any wastewater, such that the sewage either immediately or ultimately enters the waters of the State of Tennessee, then the Subcontractor will be completely responsible for any fines or penalties imposed on the Purchaser or the Subcontractor by the USEPA or the State of Tennessee.

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

C. The Subcontractor will be required to provide businesses with temporary service, as needed, and will be responsible for all necessary bypass pumping flows.

5.03 WATER

The Subcontractor will be required to Contact Memphis Light, Gas, & Water (MLGW) located at

3941 Grandview Avenue (telephone: 901-320-3910) in order to acquire a water meter for the lining process. Any water costs associated with the lining process will be considered incidental to the contract and not a separate pay item. Water for all construction operations shall be available from identified MLGW fire hydrants at normal commercial rates. Water usage shall be in accordance with MLGW's backflow and metering policies.

5.04 SAFETY

A. The Subcontractor shall carry out his operations in strict accordance with all applicable OSHA standards. Particular attention is drawn to those safety requirements involving work on an elevated platform and entry into a confined space.

B. The Subcontractor will be responsible for locating and accessing all manholes, or other structures associated with the pipe system to be lined. The Purchaser will provide personnel to guide the Subcontractor to the locations but will not provide additional access

5.05 SITE RESTORATION

A. The Subcontractor shall restore or replace all removed or damaged paving, curbing, sidewalks, gutters, shrubbery, fences, sod or other disturbed surfaces or structures to a condition equal to that before the work began, to the satisfaction of the Purchaser, and shall furnish all labor and material incidental thereto.

B. The restoration of existing property or structures shall be done as promptly as practicable and shall not be left until the end of the contract period. Compensation for this work will be included in the rehabilitation item to which it pertains.

5.06 PUBLIC NOTIFICATION

A. Public

Prior to conducting CIPP field work, the Subcontractor shall provide notification to every residence and business that may be affected. The Subcontractor shall distribute the Purchaser approved door hangers between 48 and 72 hours prior to the start of the CIPP effort. Door hangers shall be double-sided with the notification information in the English language on one side and in the Spanish language on the reverse side. The local fire department shall be notified of the smoke testing at least seven days in advance.

At a minimum, the notifications shall advise residents of what to expect during the lining process, and the Subcontractor shall notify utility customers 48 hours in advance of disconnecting sewer services if the service will be offline for more than eight (8) hours.

Door hanger notifications shall use a fluorescent color for visibility and incorporate any SARP10-specific mascot or logo (if available and agreed upon by the Purchaser) to link the CIPP work to the Purchaser's sewer improvement effort.

B. Purchaser

The Subcontractor shall provide daily morning updates prior to beginning daily field operations to the Purchaser, fire, police, or other agencies as directed by the Purchaser. List of entities and individuals requiring notification will be distributed prior to work

commencing.

5.07 WARRANTY

The warranty period shall be for a period of five (5) years from the installation date of the tube. Any defects, which in the opinion of the Purchaser, will affect the integrity or strength of the pipe shall be repaired at the Subcontractor's expense in a manner acceptable to the Purchaser. The material shall be unconditionally guaranteed to meet or exceed the design criteria detailed in this Specification.

**PART 6 – MEASUREMENT**

6.01 CURED-IN-PLACE-PIPE
Cured-In-Place-Pipe will be measured by the linear foot as measured by the final inspection video. The line lengths and quantities shown on the Bid Form are to provide a value for cost extension purposes and are approximate. The Subcontractor will be paid for actual quantities installed in the field. Documented lengths shall be the distance from the upstream inside face of manhole to the downstream inside face of manhole or similar structure. All lengths will be verified by the Purchaser. Diameters will be based on the original as-constructed nominal pipe diameter. Light Cleaning is to be included in the individual line bids.

6.02 LATERAL REINSTATEMENT
Services reinstated shall be measured per each.

6.03 CUT INTRUDING TAP
Services cutting an intruding laterals shall be measure per each.

6.04 PERMANENT SERVICE LATERAL RENEWAL
Permanent Service Lateral Renewal shall be measured for each renewal installed.

6.05 TRAFFIC CONTROL
Traffic Control shall be measured for each CIPP reach.

6.06 HEAVY CLEANING
Heavy Cleaning shall be measured by linear foot of each diameter of heavy cleaning approved by the Program Manager and documented.

**PART 7 – PAYMENT**

7.01 CURED-IN-PLACE-PIPE
The accepted quantities of CIPP will be paid for at the contract extended unit price per linear foot, based upon the verified liner diameter and thickness. The price paid per linear foot for pipe lining shall include full compensation for furnishing labor, materials, tools, equipment, and incidentals necessary to furnish, install, and test the CIPP lining, plus sewage bypassing, water control, manhole connections, preconstruction inspection, cleaning, sewer cleaning materials disposal,

final inspection, post-construction inspection, protecting existing utilities and adjacent property, and all required surface restoration work, complete in place, as shown on the Drawings and specified herein.

7.02 LATERAL REINSTATEMENT

The accepted quantities of Lateral Reinstatement will be paid for at the contract unit price per each. This price will be full compensation for furnishing labor, materials, tools, equipment, and incidentals necessary to complete the lateral reinstatement and the lateral/mainline interface seal, plus sewage bypassing, water control, preconstruction inspection, cleaning, sewer cleaning materials disposal, final inspection, and post-construction inspection, complete in place, as shown on the Drawings and specified herein.

7.03 CUT INTRUDING TAP

The accepted quantities for cutting the intruding tap will be paid for at the contract unit price per each. This price will be full compensation for furnishing labor, materials, tools, equipment, and incidentals necessary to cut intruding taps, plus sewage bypassing, water control, preconstruction inspection, cleaning, sewer cleaning materials disposal, final inspection, post-construction inspection, protecting existing utilities and adjacent property, and all required surface restoration work, complete in place, as shown on the Drawings and specified herein.

7.04 PERMANENT SERVICE LATERAL RENEWAL

The accepted quantities of Permanent Service Lateral Renewal will be paid for at the contract unit price per each. This price will be full compensation for furnishing labor, materials, tools, equipment, and incidentals necessary to complete the lateral renewal, plus sewage bypassing, water control, preconstruction inspection, cleaning, sewer cleaning materials disposal, final inspection, post-construction inspection, protecting existing utilities and adjacent property, and all required surface restoration work, complete in place, as shown on the Drawings and specified herein.

7.05 TRAFFIC CONTROL

Traffic Control will be paid per each CIPP reach including all appurtenances required to comply with MUTCD Standards.

7.06 HEAVY CLEANING

Heavy Cleaning shall be paid for at the unit price for each linear foot of each diameter of heavy cleaned sewers at the direction of the Program Manager and in accordance with the specification.

The unit price for Heavy Cleaning shall include the entire cost including but not limited to labor, mobilization and access, traffic control, appropriate disposal of sewer debris removed from sewer at permitted site and all other appurtenant work. Payment includes non-hydraulic jet efforts such as porcupines, cutters, power rodding, clam buckets, and other mechanical means, traffic control, and re-cleaning with hydraulic jet, labor, materials, and equipment necessary to clean mainline sufficiently to allow video reviewers a clear picture of pipe conditions.

No additional payment will be made for:

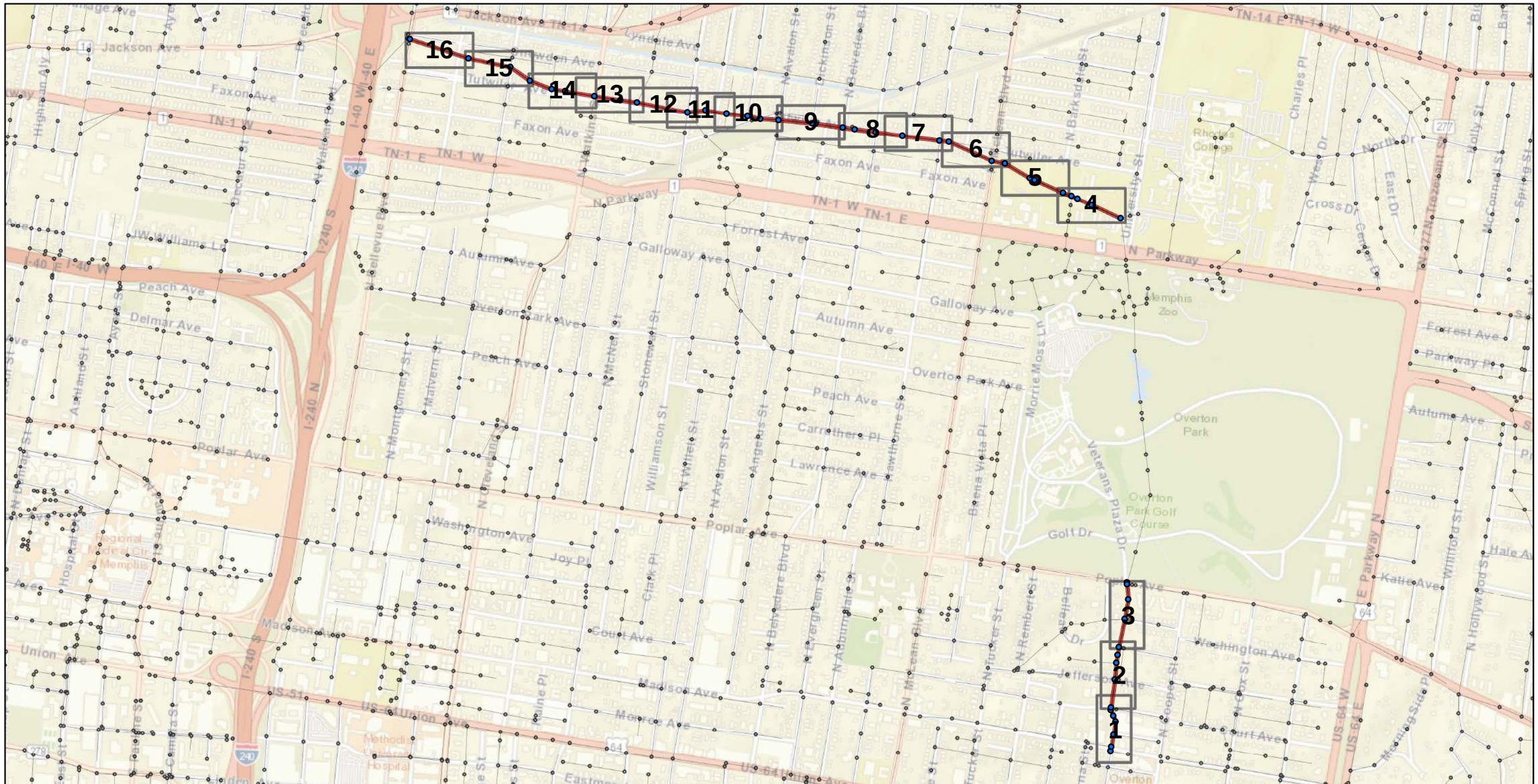
1. Additional passes of heavy cleaning if the inspection observation reveals roots, grease or

other debris remaining in the sewer after the heavy cleaning passes.

7.07 PAYMENT WILL BE MADE UNDER:

| Item No. | Pay Item | Pay Unit |
|---|---|---|
| 09910-7.01.01 | CIPP 18” Diameter (0-10’ depth) | Linear Foot |
| 09910-7.01.02 | CIPP 18” Diameter (10.1-20’ depth) | Linear Foot |
| 09910-7.01.03 | CIPP 20” Diameter (0-10’ depth) | Linear Foot |
| 09910-7.01.04 | CIPP 20” Diameter (10.1-20’ depth) | Linear Foot |
| 09910-7.01.05 | CIPP 24” Diameter (0-10’ depth) | Linear Foot |
| 09910-7.01.06 | CIPP 24” Diameter (10.1-20’ depth) | Linear Foot |
| 09910-7.01.07 | CIPP 27” Diameter (0-10’ depth) | Linear Foot |
| 09910-7.01.08 | CIPP 27” Diameter (10.1-20’ depth) | Linear Foot |
| 09910-7.01.09 | CIPP 36” Diameter (0-10’ depth) | Linear Foot |
| 09910-7.01.10 | CIPP 36” Diameter (10.1-20’ depth) | Linear Foot |
| 09910-7.02 | Lateral Reinstatement | Each |
| 09910-7.03 | Cut Intruding Tap | Each |
| 09910-7.04 | Permanent Service Lateral Renewal | Each |
| 09910-7.05 | Traffic Control | Lump Sum |
| 09910-7.06.01 | Heavy Cleaning for 18” Pipe | Linear Foot |
| 09910-7.06.02 | Heavy Cleaning for 20” Pipe | Linear Foot |
| 09910-7.06.03 | Heavy Cleaning for 24” Pipe | Linear Foot |
| 09910-7.06.04 | Heavy Cleaning for 27” Pipe | Linear Foot |

**END OF SECTION 9910**


16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
Jackson Ave
Faxon Ave
TN-1 W
TN-1 E
N Parkway
Forrest Ave
Gallowway Ave
Autumn Ave
Overton Park Ave
Peach Ave
Delmar Ave
Poplar Ave
Washington Ave
Madison Ave
Union Ave
Court Ave
Monroe Ave
I-240 S
I-240 N
I-40 W
I-40 E
Memphis Zoo
Overton Park
Overton Park Golf Course
Golf Dr
Veterans Plaza Dr
Rhodes College
Regional Medical Center at Memphis
Methodist University Hospital
Legend
Manholes to Receive Rehab
Line to Receive CIPP
Manhole (No Rehab)
Gravity Main (No Rehab)
Sheet Boundary
N
BLACK & VEATCH
Building a world of difference.
Lick Creek Interceptor Rehabilitation Project


## Legend

- Line to receive CIPP
- Manhole (No rehab)
- Gravity Main (No Rehab)

### Manhole Rehab

- Apply Coating
- Install Inside Drop and Apply Coating
- Repair Bench and Channel and Apply Coating
- Raise to Grade and Apply Coating
- Locate and Apply Coating

*If locating a manhole requires raising the manhole, it is the Contractor's responsibility to raise to grade with the Program Manager's approval in accordance with the Specifications.

N

0 25 50
Feet

1 inch = 50 feet

BLACK & VEATCH
Building a world of difference.

# Lick Creek Interceptor Rehabilitation Project


## Legend

- Line to receive CIPP
- Manhole (No Rehab)
- Gravity Main (No Rehab)

### Manhole Rehab

- Apply Coating
- Install Inside Drop and Apply Coating
- Repair Bench and Channel and Apply Coating
- Raise to Grade and Apply Coating
- Locate and Apply Coating

*If locating a manhole requires raising the manhole, it is the Contractor's responsibility to raise to grade with the Program Manager's approval in accordance with the Specifications.

0 25 50
Feet

1 inch = 50 feet

BLACK & VEATCH
Building a world of difference.

# Lick Creek Interceptor Rehabilitation Project


## Legend

- Line to receive CIPP
- Manhole (No rehab)
- Gravity Main (No Rehab)

### Manhole Rehab

- Apply Coating
- Install Inside Drop and Apply Coating
- Repair Bench and Channel and Apply Coating
- Raise to Grade and Apply Coating
- Locate and Apply Coating

*If locating a manhole requires raising the manhole, it is the Contractor's responsibility to raise to grade with the Program Manager's approval in accordance with the Specifications.

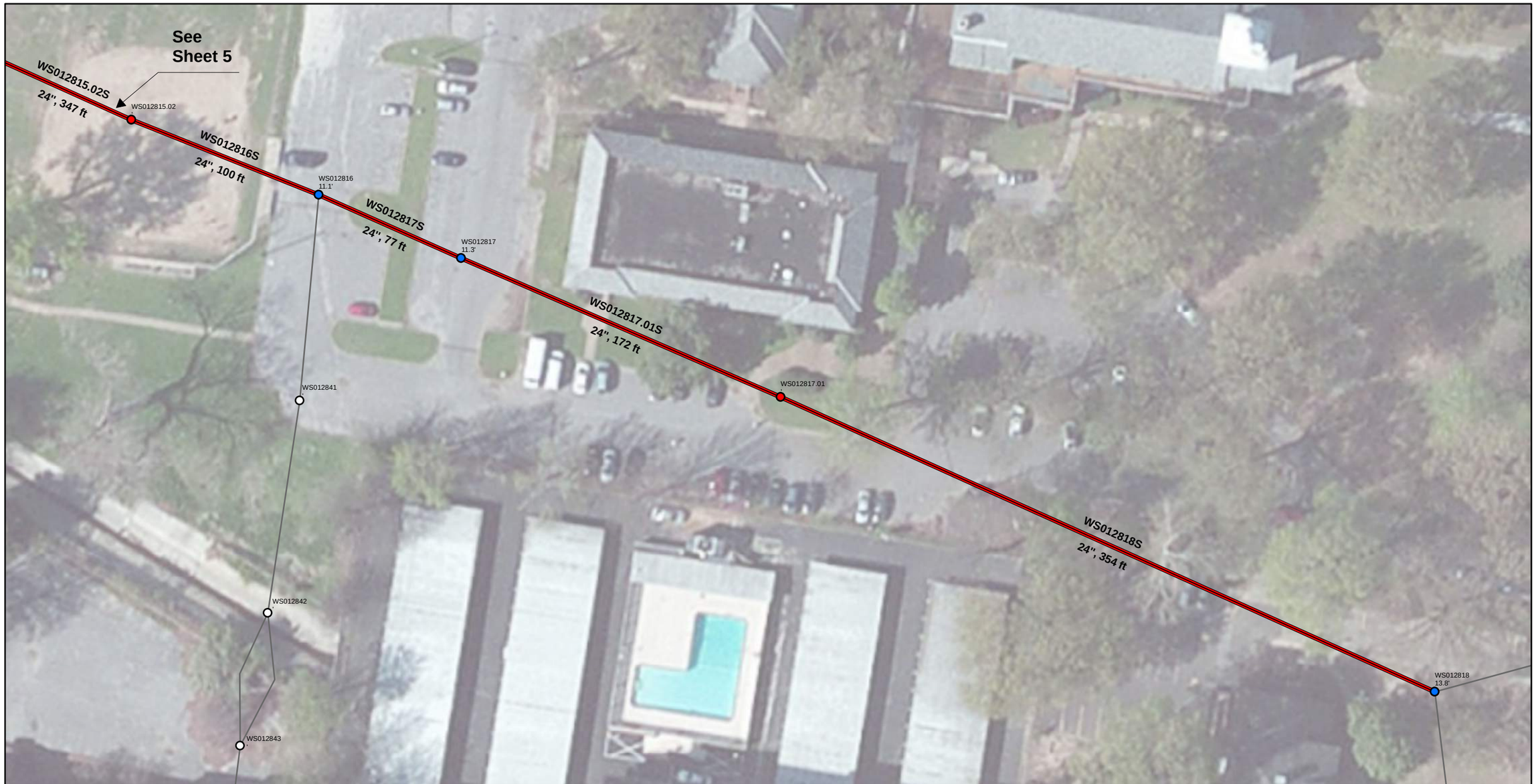
N

0 25 50
Feet

1 inch = 50 feet

BLACK & VEATCH
Building a world of difference.

# Lick Creek Interceptor Rehabilitation Project




## Legend

- Line to receive CIPP
- Manhole (No Rehab)
- Gravity Main (No Rehab)

### Manhole Rehab

- Apply Coating
- Install Inside Drop and Apply Coating
- Repair Bench and Channel and Apply Coating
- Raise to Grade and Apply Coating
- Locate and Apply Coating

*If locating a manhole requires raising the manhole, it is the Contractor's responsibility to raise to grade with the Program Manager's approval in accordance with the Specifications.

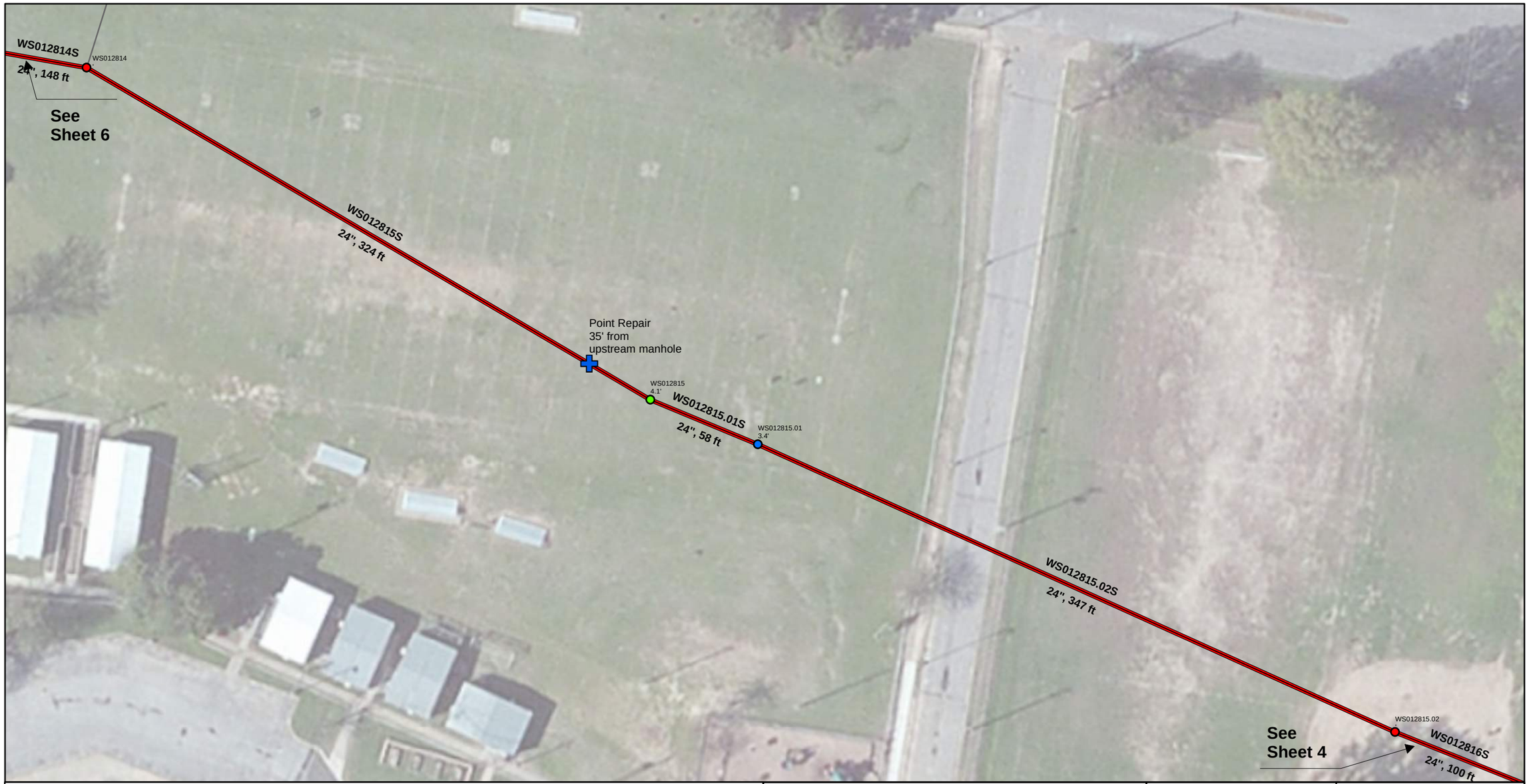
N

0 25 50
Feet

1 inch = 50 feet

BLACK & VEATCH
Building a world of difference.

# Lick Creek Interceptor Rehabilitation Project




## Legend

- Line to receive CIPP
- Point Repair for CIPP
- Manhole (No Rehab)
- Gravity Main (No Rehab)

### Manhole Rehab

- Apply Coating
- Install Inside Drop and Apply Coating
- Repair Bench and Channel and Apply Coating
- Raise to Grade and Apply Coating
- Locate and Apply Coating

*If locating a manhole requires raising the manhole, it is the Contractor's responsibility to raise to grade with the Program Manager's approval in accordance with the Specifications.

N

0 25 50
Feet

1 inch = 50 feet

BLACK & VEATCH
Building a world of difference.

# Lick Creek Interceptor Rehabilitation Project


## Legend

- Line to receive CIPP
- Manhole (No Rehab)
- Gravity Main (No Rehab)

### Manhole Rehab

- Apply Coating
- Install Inside Drop and Apply Coating
- Repair Bench and Channel and Apply Coating
- Raise to Grade and Apply Coating
- Locate and Apply Coating

*If locating a manhole requires raising the manhole, it is the Contractor's responsibility to raise to grade with the Program Manager's approval in accordance with the Specifications.

N

0 25 50
Feet

1 inch = 50 feet

BLACK & VEATCH
Building a world of difference.

# Lick Creek Interceptor Rehabilitation Project


## Legend

- Line to receive CIPP
- Point Repair for CIPP
- Manhole (No Rehab)
- Gravity Main (No Rehab)

### Manhole Rehab

- Apply Coating
- Install Inside Drop and Apply Coating
- Repair Bench and Channel and Apply Coating
- Raise to Grade and Apply Coating
- Locate and Apply Coating

*If locating a manhole requires raising the manhole, it is the Contractor's responsibility to raise to grade with the Program Manager's approval in accordance with the Specifications.

N

0 25 50
Feet

1 inch = 50 feet

BLACK & VEATCH
Building a world of difference.

# Lick Creek Interceptor Rehabilitation Project


**Legend**

- Line to receive CIPP
- Manhole (No Rehab)
- Gravity Main (No Rehab)

**Manhole Rehab**

- Apply Coating
- Install Inside Drop and Apply Coating
- Repair Bench and Channel and Apply Coating
- Raise to Grade and Apply Coating
- Locate and Apply Coating

*If locating a manhole requires raising the manhole, it is the Contractor's responsibility to raise to grade with the Program Manager's approval in accordance with the Specifications.

N

0 25 50
Feet

1 inch = 50 feet

BLACK & VEATCH
Building a world of difference.

# Lick Creek Interceptor Rehabilitation Project


## Legend

- Line to receive CIPP
- Manhole (No Rehab)
- Gravity Main (No Rehab)

### Manhole Rehab

- Apply Coating
- Install Inside Drop and Apply Coating
- Repair Bench and Channel and Apply Coating
- Raise to Grade and Apply Coating
- Locate and Apply Coating

*If locating a manhole requires rasing the manhole, it is the Contractor's responsibility to raise to grade with the Program Manager's approval in accordance with the Specifications.

N

0 25 50
Feet

1 inch = 50 feet

BLACK & VEATCH
Building a world of difference.

# Lick Creek Interceptor Rehabilitation Project


## Legend

- Line to receive CIPP
- Manhole (No Rehab)
- Gravity Main (No Rehab)

### Manhole Rehab

- Apply Coating
- Install Inside Drop and Apply Coating
- Repair Bench and Channel and Apply Coating
- Raise to Grade and Apply Coating
- Locate and Apply Coating

*If locating a manhole requires raising the manhole, it is the Contractor's responsibility to raise to grade with the Program Manager's approval in accordance with the Specifications.

N

0 25 50
Feet

1 inch = 50 feet

BLACK & VEATCH
Building a world of difference.

# Lick Creek Interceptor Rehabilitation Project


**Legend**

- Line to receive CIPP
- Manhole (No Rehab)
- Gravity Main (No Rehab)

**Manhole Rehab**

- Apply Coating
- Install Inside Drop and Apply Coating
- Repair Bench and Channel and Apply Coating
- Raise to Grade and Apply Coating
- Locate and Apply Coating

*If locating a manhole requires raising the manhole, it is the Contractor's responsibility to raise to grade with the Program Manager's approval in accordance with the Specifications.

N

0 25 50
Feet

1 inch = 50 feet

BLACK & VEATCH
Building a world of difference.

# Lick Creek Interceptor Rehabilitation Project


**Legend**

- Line to receive CIPP
- Manhole (No Rehab)
- Gravity Main (No Rehab)

**Manhole Rehab**

- Apply Coating
- Install Inside Drop and Apply Coating
- Repair Bench and Channel and Apply Coating
- Raise to Grade and Apply Coating
- Locate and Apply Coating

*If locating a manhole requires raising the manhole, it is the Contractor's responsibility to raise to grade with the Program Manager's approval in accordance with the Specifications.

N

0 25 50
Feet

1 inch = 50 feet

BLACK & VEATCH
Building a world of difference.

# Lick Creek Interceptor Rehabilitation Project


## Legend

- Line to receive CIPP
- Manhole (No Rehab)
- Gravity Main (No Rehab)

### Manhole Rehab

- Apply Coating
- Install Inside Drop and Apply Coating
- Repair Bench and Channel and Apply Coating
- Raise to Grade and Apply Coating
- Locate and Apply Coating

*If locating a manhole requires raising the manhole, it is the Contractor's responsibility to raise to grade with the Program Manager's approval in accordance with the Specifications.

N

0 25 50
Feet

1 inch = 50 feet

BLACK & VEATCH
Building a world of difference.

# Lick Creek Interceptor Rehabilitation Project


## Legend

- Line to receive CIPP
- Manhole (No Rehab)
- Gravity Main (No Rehab)

**Manhole Rehab**

- Apply Coating
- Install Inside Drop and Apply Coating
- Repair Bench and Channel and Apply Coating
- Raise to Grade and Apply Coating
- Locate and Apply Coating

*If locating a manhole requires raising the manhole, it is the Contractor's responsibility to raise to grade with the Program Manager's approval in accordance with the Specifications.

N

0 25 50
Feet

1 inch = 50 feet

BLACK & VEATCH
Building a world of difference.

# Lick Creek Interceptor Rehabilitation Project


## Legend

- Line to receive CIPP
- Manhole (No Rehab)
- Gravity Main (No Rehab)

### Manhole Rehab

- Apply Coating
- Install Inside Drop and Apply Coating
- Locate and Apply Coating
- Raise to Grade and Apply Coating
- Repair Bench and Channel and Apply Coating

*If locating a manhole requires raising the manhole,, it is the Contractor's responsibility to raise to grade with the Program Manager's approval in accordance with the Specifications.

N

0 25 50
Feet

1 inch = 50 feet

BLACK & VEATCH
Building a world of difference.

# Lick Creek Interceptor Rehabilitation Project


**Legend**

- Line to receive CIPP
- Manhole (No Rehab)
- Gravity Main (No Rehab)

**Manhole Rehab**

- Apply Coating
- Install Inside Drop and Apply Coating
- Repair Bench and Channel and Apply Coating
- Raise to Grade and Apply Coating
- Locate and Apply Coating

*If locating a manhole requires raising the manhole, it is the Contractor's responsibility to raise to grade with the Program Manager's approval in accordance with the Specifications.

N

0 25 50
Feet

1 inch = 50 feet

BLACK & VEATCH
Building a world of difference.

# Lick Creek Interceptor Rehabilitation Project