



**Request for Bid
Humphrey's Blvd CIPP Addendum No. 4 to
RFB No. 426565.71.0435
September 3, 2026**



The following information encompasses Addendum No. 4 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 Bidder Questions Received to Date

Section 2 – 00170.6 Minority - Women Business Enterprise (MWBE) Requirements

Section 3 – 00170.16 Selection Schedule

Section 4 – 00370.3.1 Unit Pricing

Section 5 – 00571.5.3 Construction Milestone Dates

Section 6 – 00672.4 Equal Business Opportunity Program

Section 7 – Updated / Additional Technical Specifications

All other conditions and requirements remain unchanged.

**Section 1
Additional Bidder Questions Received to Date**

Q1: Please provide any CCTV videos or logs for review?

SARP10: The requested CCTV videos are available at the following link:

https://ws2bv-60.myloadspring.com/CIPP_Docs/

Access credentials are:

User Name: CIPP_BID

Password: m3mph!s_B1DD3R

Q2: Please provide as-builts or additional plan and profile drawings with elevations of the interceptor to be rehabbed?

SARP10: No as-built drawings are available for the interceptor to be rehabilitated.

Q3: Please provide as-builts, additional plan and profile drawings with elevations, or additional information of the siphons and their structures to be rehabbed, as well as the siphon at the upstream end of the project?

SARP10: Refer to Addendum No. 4 for the available information regarding the siphons and associated structures.

Q4: Is access to a sewer GIS system available and if so, could we please receive a link?

SARP10: Access to the sewer GIS system will not be provided.

Q5: Please provide additional maps showing the diameters, manhole depths, flow directions, etc. of the adjacent sewer system so bidders can responsibly bid the required bypass pumping?

SARP10: Refer to Addendum No. 4 for a map identifying the sizes of the adjacent sewers.

Q6: Please provide additional maps showing the storm water system as well with diameters, etc. for consideration of utilizing for bypass piping in lieu of trenching?

SARP10: SARP10 does not have maps depicting the storm drainage system throughout the project area.



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Q7: Section 02565-6, 2.02 General, A: states the tensile strength of the proposed liner should be 3,000 PSI. Pursuant to ASTM F1216, this parameter is reserved for pressure CIPP. Therefore, will the Owner please consider removing this requirement?

SARP10: The specified minimum tensile strength of 3,000 psi will remain. Bidders shall provide a CIPP system that complies with all requirements of the Contract Documents.

Q8: Section 02565-6, 2.02 General, B: There is a table that has been provided setting forth the minimum finished cured thickness of the CIPP lining. However, the provided table only outlines diameters up to 21-inch. Will the Owner please provide minimum required thicknesses or guidance for 24-inch, 42-inch, and 48-inch diameter CIPP?

SARP10: The Contractor shall determine the required liner thickness for each pipe diameter in accordance with ASTM F1216 and the requirements of the Contract Documents.

Q9: Specification section 02535-1, 1.02 states the CIPP liner can be installed using steam or water. Then, Section 02535-15, 3.02 C2 states CIPP can be installed using controlled steam (when approved by Purchaser). It is also stated in section 02535-15, 3.02 C2 "the preferred method of curing CIPP shall be by circulated water". Therefore, will the Owner please formally approve air inversion/steam cure (AISC) for this project? Just conditionally approving AISC will likely cause all contractors to bid the project using water, which will likely be more expensive, since they don't know if AISC will actually be approved or not.

SARP10: Steam inversion and steam curing will not be permitted for this project. Permitted curing methods are circulated water and ultraviolet light.

Q10: The CIPP spec section 02535, paragraph 3.06.G for Warranty states a 5-year warranty. Is this a bonded warranty? Would you please consider reducing this warranty to industry standard one year?

SARP10: The specified five-year warranty requirement will remain. Bidders shall provide a CIPP system that complies with all requirements of the Contract Documents.

Q11: The CIPP spec section 02535, paragraph 3.01.B.3 mentions point repairs. Due to the unknown and size of the mains on this project, please confirm point repairs (if required) are not incidental to this project.

SARP10: No point repairs are currently known to be required for this project.

Q12: Spec section 02542 mentions Sonar surveys in addition to CCTV inspection. Please confirm Sonar will not be required on this project.

SARP10: Sonar inspection is required only when the post-installation inspection has not been completed before flow is returned to the pipe. When the pipe is dry, standard CCTV inspection is acceptable.

Q13: Will the Post CCTV Inspection immediately after CIPP lining suffice for this item, or will a separate, secondary post CCTV inspection be required after both CIPP lining and manhole rehabilitation?

SARP10: The post-CIPP CCTV inspection is acceptable for the lined pipe. A separate post-rehabilitation MACP inspection is required for each rehabilitated manhole.

Q14: After lining through the 50-yard line manhole, will the pipe liner be recut to open inside the buried manhole?

SARP10: No. The liner shall not be cut open at the buried manhole located within the football field.

Q15: Does the owner/engineer have any proposed bypass routes and if so, could you please provide them?

SARP10: The only route evaluated by the Owner was discussed during the pre-bid meeting. The Contractor and its bypass-pumping subcontractor are responsible for evaluating field conditions and determining the bypass route.



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Q16: Are there any known routes for crossing under I-240 on Drawing sheet 1 of 3 to discharge bypass?

SARP10: Based on available aerial mapping, a storm drain appears to cross beneath I-240 near the downstream manhole. The Contractor is responsible for verifying field conditions and determining whether the crossing is suitable for the proposed bypass system.

Q17: Do you have any flow data available for review for bypass purposes including average dry weather, peak dry weather, wet weather, and peak wet weather, including side lines if applicable?

SARP10: SARP10 does not have flow data available for use in the bypass-system design.

Q18: Please provide the required flow to be bypassed so all bidders bid on the same basis.

SARP10: SARP10 does not have flow data available for these pipes. The Contractor shall comply with Specification 02535, Section 3.05, Bypass Pumping, and shall design and operate the bypass system to safely convey full-pipe flow conditions for the duration of the work.

Q19: Will the Owner identify all testing requirements for bypass pumping. Will the Owner please include items such as: testing procedures with air or water, duration of test, etc.?

SARP10: No separate bypass-system testing procedure is required. The Contractor remains responsible for operating the bypass system continuously and without sewage spills.

Q20: Will the Owner include all bypass design requirements for the bypassing of side lines?

SARP10: The bypass system for each sideline shall be sized to convey full-pipe flow.

Q21: Will the Owner require the use of sound-attenuated pumps?

SARP10: Sound-attenuated pumps are required where pumps are located near residential properties.

Q22: Will the Owner consider adding a bypass trenching bid item per linear foot?

SARP10: No separate bid item for bypass trenching will be added. The Owner has not developed a bypass plan, and the quantity of trenching is unknown. The Contractor is responsible for developing its bypass plan and including all associated costs in its bid.

Q23: Is there a culvert under Wolf River Blvd that a bypass line can run through?

SARP10: Based on available aerial photography, a storm culvert appears to be located near Baptist Hospital Boulevard. The Contractor is responsible for verifying field conditions and selecting the bypass route.

Q24: Addendum 1 includes a revised bid form. These revised quantities for 42" CIPP and 48" CIPP are 7,604 LF and 5,947 LF, respectively. However, the quantities from provided information are 7,472 LF for 42" and 5,815 LF for 48", both 132 LF short of the revised bid quantity and also the length of the double barrel siphon. Could you please confirm correct quantities and either revise the bid form to correct quantities, or provide additional information/plans with footages that match the bid form?

SARP10: The applicable quantities have been revised in the bid tabulation. Bidders shall use the quantities shown in the revised bid documents.

Q25: Will the Owner include a separate bid item for the cleaning and CCTV of the proposed siphon barrels?

SARP10: A separate bid item for cleaning and CCTV inspection of the proposed siphon barrels was included in Addendum No. 1.

Q26: Will the Owner consider adding a bid item for clearing and grubbing?

SARP10: All costs associated with clearing and grubbing shall be included in the Site Preparation and Restoration bid item.



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Q27: The owner has identified approximately 14,079 cf (521 cy) of debris to be removed during the pre-cleaning process. However, the only bid item addressing this debris removal currently would be Bid Item 02541-4.01.A 42-48" Heavy cleaning 1 LS. Therefore, given the large amount of expected cleaning debris, will the owner please consider revising the bid schedule to reflect cleaning on a per linear foot basis, and then add an additional bid item for Heavy Cleaning per hour or Debris Removal per cubic yard?

SARP10: Addendum No. 1 revised the cleaning bid item to provide payment on a per-linear-foot basis.

Q28: Does the estimated debris of the line's account for the last six years?

SARP10: No. The estimated debris quantity is based on the available assessment reports and does not include debris that may have accumulated during the subsequent five-year period.

Q29: What is the engineer's estimate or budget for this project?

SARP10: SARP10 does not disclose the project budget or Engineer's estimate.

Q30: The provided manhole rehab schedule includes 34 manholes to be rehabbed from upstream manhole WO060123 down to manhole WO050146. However, there are 43 manholes on mains to be CIPP lined and also 47 called out on the plans. Please confirm the correct manhole rehab scope and revise the rehab table and bid form accordingly so all bidders bid on the same basis.

SARP10: The manhole rehabilitation scope has been revised by addendum. Bidders shall use the revised manhole rehabilitation requirements and bid documents.

Q31: Currently, the revised bid form in Addendum 1 includes one bid item for Manhole Rehabilitation of 522 VF. However, the provided MH Rehab Bid Schedule shows multiple manhole diameters (60" and 84") which will require different pricing. Please consider revising the bid form to include separate VF pricing for the differing manhole diameters.

SARP10: The bid form has been revised by addendum. Bidders shall use the revised bid form.

Q32: Could you please revise the MH Rehab Bid Schedule to identify each manhole dimensions (diameter, round/square, cone or flat top, manhole material – brick, RCP, etc.)?

SARP10: Refer to the MACP reports provided in Addendum No. 4 for the available information regarding the manhole dimensions, configuration, and materials.

Q33: Currently, the manhole rehab spec section 02537 mentions vacuum testing. Due to the size of the mains on this project and obvious safety concerns for performing a pressure test on these size mains and structures, please confirm no vacuum testing or other pressure testing will be required.

SARP10: The required test will depend on the manhole rehabilitation technology used. Each rehabilitated manhole shall be tested by either holiday testing or vacuum testing, as applicable to the selected rehabilitation system.

Q34: If manhole top sections are removed for bypass or CIPP lining, what is the requirement for placing the top back on the manhole? Will the existing material (cone/flat top, frame and cover, etc.) be allowed to place back, or will these materials need to be replaced with new?

SARP10: Existing cone or flat-top sections, frames, covers, and other components may be reinstalled if they are not damaged during removal. A component will be considered damaged if it can no longer function as designed. The Contractor shall replace damaged components at no additional cost to the Purchaser.

Q35: MH WO050149.01 appears to be located within the Christian Brothers High School football field at or near the 50 yard line. Will the Owner please identify its plan to access this manhole structure?

SARP10: The manhole will be lined through and will not be reopened.



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Q36: What about MH fenced in just up-stream from the syphon?

SARP10: SARP10 will provide access to the manhole upstream of the siphon if access is required for bypass pumping.

Q37: Portions of this project will likely require private property agreements for access or bypass pumping. Has the Owner/Engineer notified adjacent property owners of this project and discussed with them or obtained access to them for possible temporary access agreements? If so, could you please share?

SARP10: The Contractor is responsible for obtaining access. Any access agreement required outside existing easements or rights-of-way shall be obtained by the Contractor.

Q38: If not, and due to this large unknown at bid time as well as likely project delays to acquire these temporary private property agreements, would you please consider adding an allowance for this, or confirming that these extraordinary agreements will be paid as a change order during construction which will reduce risk and ultimately cost to the Owner? If not an allowance or extra later, this will add substantial cost to the project. Please advise.

SARP10: No allowance will be added for temporary private-property access agreements.

Q39: Can contractors assume that the Wolf River Conservation can be used for project area or storage, along with work restrictions within their property?

SARP10: The Contractor shall obtain approval from the Wolf River Conservancy before using its property for construction activities or storage.

Q40: What is the existing sewer easement width throughout the project?

SARP10: The sewer easement width varies along the project corridor. Bidders shall base their bids on the available Contract Documents and field observations.

Q41: What is the plan for ER routes and traffic control? Will the Owner please identify the traffic control requirements?

SARP10: SARP10 is coordinating with Baptist Hospital to determine the applicable traffic-detour route.

Q42: Section 01551-1 2.02 Submittals; states major streets will require an approved permit and stamped traffic control plans. Will the Owner please identify which street(s) will require this?

SARP10: Traffic control on any street other than a residential street, including private roads, requires an approved traffic-control plan. The Contractor shall submit the plan to SARP10 at least two weeks before beginning the affected work.

Q43: Will there be any DOT permits required and if so, has the Owner/Engineer started this process with DOT? Who would be responsible for the permits and associated costs, if applicable?

SARP10: The Contractor is responsible for identifying all permits required for its proposed means, methods, and access. SARP10 will obtain the applicable permits, if required.

Q44: Will the Owner clarify and define the proposed work areas that may/will impede TDOT jurisdictions?

SARP10: SARP10 does not currently anticipate work within TDOT jurisdiction.

Q45: Are there any specific time restrictions for work near Christian Brothers High School, the hospital, or other areas?

SARP10: SARP10 is coordinating with Baptist Hospital, Christian Brothers High School, and other affected property owners to identify applicable work-hour or schedule restrictions.



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Q46: Will the owner be responsible for obtaining any and all TDEC, NDPES, ARAP, or any other permits, and any associated costs?

SARP10: SARP10 does not currently anticipate that TDEC, NPDES, ARAP, or similar permits will be required.

Q47: Section 00571.6 regarding taxes states the subcontractor (bidder) is responsible for all taxes unless Purchaser provides an exemption. Could you please confirm taxes are to be included? Or will this project be tax exempt related to permanent materials?

SARP10: The project is not tax-exempt. Bidders shall include all applicable taxes in their bids.

Q48: Is there a disposal place where project waste can be disposed of?

SARP10: The City of Memphis holds permits for disposal at the Republic Services North and South landfills.

Q49: Since all previous lists and mentions of the City of Memphis MWBE/EBO have been removed from the City of Memphis website, where are we supposed to find a list of qualified subcontractors?

SARP10: This Contract is funded through the State Revolving Fund and remains subject to the applicable MWBE requirements. The prime contractor shall identify its proposed MWBE subcontractors in the bid documents.

Q50: There are existing manholes that are currently lined. Some of these manholes will require cone pulls. Will the Owner please provide what materials have been applied to these manholes? Also, will the Owner please include either an allowance or a bid item addressing this required manhole rehabilitation?

SARP10: SARP10 does not have complete records identifying the materials previously applied to all manholes. Refer to the MACP reports for available information regarding whether individual manholes have been lined. All manholes included in this project are scheduled to be lined or relined.

Q51: Will the Owner please also consider adding a bid item for manhole take downs and putting them back together?

SARP10: All costs associated with manhole takedown and re-stacking shall be included in the Site Preparation and Restoration bid item.

Q52: WO060125S is currently enclosed within a wooden fence and connected to several mechanical devices. Will the Contractor be able to utilize this manhole for bypassing purposes?

SARP10: Yes. The Contractor may use Manhole WO060125S for bypass pumping.

Q53: Will the Owner provide a detail drawing of MH WO050150? We are requesting this since it appears the line may have gradual 90-degree bend.

SARP10: Refer to the plan set provided in Addendum No. 4 for the available information regarding Manhole WO050150.

Q54: Addendum 1 has revised the Clean/CCTV to a per linear foot pay item. However, it was stated in the pre-bid meeting that the Sediment Volume (cf) provided by the Owner was estimated based on videos that were approximately six years old. Therefore, it is likely the pipe has accumulated additional debris since then. In the event more than the estimated 14,079 cf or 521.43 cy is encountered, how will the contractor be paid for additional debris removal?

SARP10: In accordance with the revised bid tabulation, interceptor cleaning will be paid per linear foot of pipe.



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Q55: Portions of this project are within areas known for flooding adjacent to the Wolf River and other surrounding bodies of water. The projected start time is set to begin within the wet season pursuant to section 00672.8, table 1. Does the included allotted days per month account for the physical impassibility of flooded areas? Also, with a major bypass in place how will the Owner reimburse the Contractor for bypass costs associated with extended delays from flooding or weather?

SARP10: Table 1 does not account for impassable flood conditions. Potential change orders arising from flood impacts will be reviewed on a case-by-case basis in accordance with the Contract Documents.

Q56: Will the Owner consider adding a bid item for road building at the lower end of the project? This area shows major evidence of flooding that will impede access to this area in the event of wet weather or flooding. In the event gravel roads are built, will the Owner allow the improvements to remain in place?

SARP10: The Owner does not currently intend to construct access roads. Any proposed access road, including whether it may remain after construction, will be reviewed on a case-by-case basis.

Q57: . During our site investigation, there is evidence that the many of the manholes appear to have surcharged near rim elevations during rain events. It was stated in the pre-bid meeting that we are to design the bypass to full capacity. Does this account for any redundancies in pumping, and discharge piping?

SARP10: The bypass pumping system shall be designed and operated in accordance with Specification 02535, Section 3.05, Bypass Pumping. As stated during the pre-bid meeting, the bypass system shall be capable of conveying the full-pipe flow for the sewer segment taken out of service. The Contractor is solely responsible for determining the required pumping capacity, number of pumps, standby pumps, discharge piping, and other redundancies necessary to safely and continuously convey the required flow under anticipated operating conditions.

Q58: Will the owner please confirm there are no connections with sump pumps/lift stations within the hospital district?

SARP10: SARP10 cannot confirm whether sump pumps or lift stations are present within the hospital district.

Q59: Currently, the only way to access Manholes WO050141, WO050140, WO050139, WO050138, WO050137, WO050136, and WO050135, is through the Madison Shelby Farms Apartments. There is currently only an inadequate dirt pathway located on the northwest corner of that property. As a result, all construction traffic for this area would need to pass through their property, which is enclosed within security gates. Is it the Owner's intent for all construction traffic to pass through the Apartments? If so, how will we gain access through the gates? Or, does the Owner have an alternate route or intend to construct a roadway around this property?

SARP10: SARP10 is coordinating with the applicable property owners regarding access to the sewer manholes.

Q60: There is currently a power line that has fallen off the power pole within the downstream area of the project. Will the Owner please confirm they will make arrangements to have this corrected prior to the start of construction?

SARP10: SARP10 will coordinate removal of the downed power line before the Contractor begins work in the affected area.

Q61: The downstream end of the project appears to be within a billboard road and power line easement. Has the Owner notified these parties of the proposed work? Will any access agreements be required?

SARP10: SARP10 is coordinating with the applicable property owners regarding access to the sewer manholes.



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Q62: There is an existing 72-inch sewer mainline on the project area. Will the owner allow bypass flows to be discharged into this mainline?

SARP10: Yes. Bypass flow may be discharged to the existing 72-inch sewer if the Contractor can establish an acceptable route. Shelby Farms Conservancy has stated that the pedestrian bridge and their property may not be used.

Q63: Will the Owner approve composite CIPP? This will be installed the same way as standard CIPP, it would just have a higher flex modulus due to the glass fiber reinforcement. This would allow the CIPP to be designed to a little thinner sidewall thickness due to the fiber reinforcement, which may allow for longer installations. As a result, this may lead to fewer access roads, less environmental impact, and fewer right-of-entry agreements and property owner meetings and complaints.

SARP10: Refer to Addendum No. 4 for additional direction. Composite CIPP has been added to the bid tabulation as an alternate.

Q64: Will the Owner consider adding a bid item for the removal and re-installation of any drop inlets within the manhole structures?

SARP10: Refer to the revised bid tabulation in Addendum No. 4, which includes a line item for removal and replacement of drop inlets.

Q65: The bid documents require bidders to comply with the SRF Loan Program's DBE requirements, including contacting a minimum of ten (10) qualified DBE subcontractors, professional service providers, vendors, or suppliers by certified mail to solicit bids. Will the Owner accept alternative methods of solicitation and outreach, such as legal advertisements, email correspondence, telephone calls, online bid postings/plan rooms, or other documented outreach efforts, in lieu of or in addition to certified mail, provided the bidder can demonstrate a good faith effort to solicit DBE participation?

SARP10: No. The Owner cannot waive or modify the applicable State Revolving Fund requirements. Bidders shall comply with the DBE solicitation and documentation requirements stated in the Contract Documents.

Q66: The Sealed Bid envelope must be labeled with the project name, bidder's name, license bidder number, license expiration date, license classification. The Sealed Bid envelope must contain one (1) hardcopy of the bid and one (1) electronic CD copy of the bid". Would one (1) hardcopy of the bid and one (1) USB Flash drive copy of the bid suffice?

SARP10: Yes. Submit one (1) hard copy of the bid and one (1) electronic copy on a USB flash drive with the bid submission. Both copies shall be submitted by the bid deadline and shall contain the complete bid package.

Q67: Would the owner/engineer consider United Felts an approved CIPP Liner manufacturer for this project?

SARP10: Yes, United Felts is an approved CIPP Liner manufacturer for this project.

Q68: Would Shotcrete or Thermoform be an acceptable alternative liner in lieu of the CIPP for this project?

SARP10: No, shotcrete nor thermoform is not an acceptable alternative to CIPP for this project.



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**Section 2
00170.6 Minority - Women Business Enterprise (MWBE) Requirements**

Bidder shall be liable to the Purchaser for full amount of proposal guarantee as representing damage to the Purchaser on account of default of bidder if:

- a) Bid is withdrawn within one hundred eighty (180) calendar days after receipt of bids without approval by Purchaser.
- b) Bidder fails to enter into contract with Purchaser and execute required Performance Bond and provide required insurance coverage within ten (10) calendar days subsequent to notice of award of the Subcontract.

**Firms desiring to submit a Bid should carefully review these instructions.
Compliance with all requirements will be solely the responsibility of the Respondent.**

00170.5 Request for Bid Definitions

Terms used in this Request for Bid documents are defined and have the meanings assigned to them as follows. The term "OCI", "Purchaser" or "Program Manager" means Overland Contracting Inc. The term "Respondent", "Firm", "Company", "Subcontractor" or "Bidder" means one who submits a Response for the purpose stated in this Solicitation Request for Bid documents. The terms "BID", "Response" or "Respondent's Response" mean all submittal documents provided by the Respondent as required by this Request for Bid. The terms "Request for Bid" or "Bid Documents" mean the documents included in this Request for Bid.

Every effort has been made to use industry-accepted terminology in this Request for Bid. Any statement in this document, which uses words such as "must", "shall", "should", "provide for" or "have/provide the capability of/for", means that compliance with the intent of the statement is mandatory and that failure by the Respondent to satisfy that intent may be cause for the Response to be rejected.

00170.6 Minority / Women Business Enterprise (M/WBE) Requirements

This section shall set forth the respondent's M/WBE Participation Plan that must be submitted and include: (1) the level and dollar amount of participation your firm anticipates to achieve in the performance of the Subcontract resulting from this RFB; (2) the type of Work to be performed by the M/WBE firms participating; and (3) the names of the M/WBE firms the Respondent plans to utilize in the performance of the Subcontract resulting from this RFB.

SRF Fair Share Goals:

MBE goal - Construction	2.6%
WBE goal - Construction	2.6%

(Vendors from the TDOT TNUCP DBE list, other State or Federal DBE lists, or the City of Memphis EBO list)

SARP10 DBE Participation Goal: **15%**

~~(Vendors from the City of Memphis EBO list only)~~

00170.7 Clarification of Bid

Purchaser reserves the right to obtain clarification of any point in a Response or to obtain additional information as necessary to properly evaluate a particular Response. Failure to respond to such request for additional information or clarification in a timely manner may result in rejection of the Response.

00170.8 Not Used

00170.9 Responsiveness

Respondents should respond to all requirements of the Bid to the maximum extent possible and are required to clearly identify any limitations.



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**Section 3
00170.16 Selection Schedule**

Response, in its sole discretion, if the City of Memphis believes that it would not be in its best interest to make an award to that Respondent. Purchaser reserves the right to reject any Response if the evidence submitted by the Responder or if the investigation of such Respondent fails to satisfy Purchaser that such Respondent is properly qualified to carry out the obligations and to complete the Work contemplated therein. All Responses will be rejected if there is reason to believe that collusion exists among Respondents. Responses will be considered irregular and may be rejected if they show serious omissions, alterations in form, additions not called for, conditions or unauthorized alterations, or irregularities of any kind.

00170.14 Other Items

This Bid does not commit Purchaser to enter into a Subcontract, nor does it obligate Purchaser to pay for any costs incurred in the preparation and submission of Responses or in anticipation of a Subcontract. Costs of preparing the Bid in response to this request are solely the responsibility of the Respondent.

By responding to this solicitation, the respondent attests that no employee of Black & Veatch, Overland Contracting, Allen & Hoshall, Allworld Project Management, Gresham Smith, Carter-Malone Group, or City of Memphis employee or any such person's spouse, child, parent, brother, sister, dependent or person assuming a relationship being the substantially equivalent of the above, has an existing or pending, direct or indirect, financial interest in the respondent's business.

No Respondents to this solicitation shall discriminate against any employee or applicant for employment because of race, religion, color, sex, age, or national origin.

00170.15 Selection Process

Purchaser intends to select one Firm based on price and successful completion and approval of the OCI Registration process. There is a local contractor preference of 5%. For evaluation purposes the 5% will be applied to the Total Estimated Unit Price Value.

00170.16 Selection Schedule

The following schedule will be adhered to during the selection process. It is subject to change at the sole discretion of OCI.

Event	Completed By
Advertising Date	July 28, 2026
Pre-Bid Meeting	August 11, 2026
Registration Information submitted per 426565.71.0435 Advertisement	August 21, 2026
Last Date for Bidder Questions	August 21, 2026
Issue Addendum for answers to questions	August 26 September 3, 2026
Receive all Bids	September 4 24 , 2026
Public Opening	September 4 24 , 2026 immediately following receipt of bids
Public Notice of Intent to Award	September 4 34 30 , 2026
Preconstruction Meeting with Subcontractor	October 17, 2026
Tentative Notice to Proceed	October 17, 2026

00170.17 Mandatory Pre-Bid Meeting

A mandatory pre-bid meeting will be held at **9:30 A.M** (local time) at **Environmental Maintenance 2865 Frayser Boulevard, Memphis, TN 38127** on **August 11, 2026**. Bidders are required to attend at their own cost.





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**Section 4
00370.3.1 Unit Pricing**

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 Breakdown				Bidder Response Columns	
Item Number	Item Description	Unit of Measure	Estimated Quantity	Unit Price	Extension Price
71.0435 Humphrey's Blvd CIPP					
CIPP					
02535-4.02.A	42" CIPP	Linear Foot	7,240 7,604 7,472		\$ -
02535-4.02.A	48" CIPP	Linear Foot	5,385 5,947 5,815		\$ -
02535-4.02.A	24" Siphon Barrel	Linear Foot	160 132		\$ -
02535-4.02.A	42" Siphon Barrel	Linear Foot	129 132		\$ -
02535-4.02F	Bypass Pumping	Lump-Sum	1		\$ -
Manhole Rehabilitation					
02537-4.02.A	Manhole Rehabilitation	Vertical Foot	463 522		\$ -
02537-4.02.A	Manhole Rehabilitation (60-inch)	Vertical Foot	518		\$ -
02537-4.02.A	Manhole Rehabilitation (84-inch)	Vertical Foot	124		\$ -
02537-4.02.C	Additional Leak-Stop Grouting	Hours	10		\$ -
2533-4.02D-3	Removal and Replacement of Manhole Drop Inlets (>10')	Each	10		\$ -
Post-Rehabilitation PACP Inspection					
02541-4.01.A	42-48" Heavy Cleaning	Lump-Sum	1		\$ -
02541-4.01.B	Post CCTV Inspection	Linear Foot	12,914 13,551		\$ -
Post-Rehabilitation MACP Inspection					
02544-4.01.A	GPS Coordinates of Manhole Cover	Each	83 43		\$ -
02544-4.01.C-1	Post Rehab MACP Level 2 Manhole Inspections	Each	68 42		\$ -
02544-4.01.C-2	Post Rehab MACP Level 2 Manhole Inspections with 3D Scan	Each	15 1		\$ -
Site Preparation and Restoration					
02630-4.01-A	Site Restoration	Lump Sum	1		\$ -

Item Number	Item Description	Unit of Measure	Estimated Quantity	Unit Price	Extension Price
Interceptor Cleaning					
<u>02547-4.02.A</u>	Interceptor Cleaning (42"&48")	Linear Foot	13,554 13,287		\$ -
<u>02547-4.02.B</u>	Siphon Cleaning (24"&42")	Linear Foot	264		\$ -
Miscellaneous					
00001	Mobilization	Lump Sum	1		\$ -
00002	Bypass Pumping (Sideline Incoming Pipes)	Lump Sum	1		\$ -
00003	Bypass Pumping (Conveying 42-Inch Line from Kimbrough LS) Set Up	Lump Sum	1		\$ -
00004	Bypass Pumping (Conveying 42-Inch Line from Kimbrough LS) Tear Down	Lump Sum	1		\$ -
00005	Bypass Pumping (Conveying 42-Inch Line from Kimbrough LS) Weekly Maintenance, Fuel, and Pump Watch	Weekly	40		\$ -
01551.6.01	Traffic Control	Lump Sum	1		\$ -
71.0435 Humphrey's Blvd CIPP - Total Estimated Unit Price Value					\$ -

<u>Alternate 1</u>					
<u>UV CURED CIPP</u>					
<u>02538-4.02.A</u>	<u>42" CIPP</u>	<u>Linear Foot</u>	<u>7,472</u>		<u>\$ -</u>
<u>02538-4.02.A</u>	<u>48" CIPP</u>	<u>Linear Foot</u>	<u>5,815</u>		<u>\$ -</u>
<u>02538-4.02.A</u>	<u>24" Siphon Barrel</u>	<u>Linear Foot</u>	<u>132</u>		<u>\$ -</u>
<u>02538-4.02.A</u>	<u>42" Siphon Barrel</u>	<u>Linear Foot</u>	<u>132</u>		<u>\$ -</u>
<u>71.0435 Humphrey's Blvd CIPP Alternate 1 - Total Estimated Unit Price Value</u>					<u>\$ -</u>



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**Section 5
00571.5.3 Construction Milestone Dates**

00571.2 Not Used

00571.3 Payment Terms

The following payment terms shall apply in addition to the corresponding provisions contained in Article 00572.4 Invoicing and Payment.

The Parties will meet each month at an agreed time in order to determine the quantity of materials used and man-hours expended during the invoice period. The Parties will use the field progress measurement system to calculate that month's payment total by adding the Subcontract unit price totals based on actual Work completed.

00571.4 Security Instruments

Subcontractor shall give Purchaser separate performance and payment bonds in the format of AIA Document 312 - 2010 Performance Bond and Payment Bond, each in the amount of the Subcontract Price. Subcontractor shall submit the bonds to Purchaser by the due date specified in the Article titled "Schedule of Submittals and Applicable Liquidated Damages". The bonding company must be licensed to bond in the state in which the Project is located and must be rated "A" or better by A.M. Best and included in the Department of the Treasury's Listing of Approved Sureties (Department Circular 570).

00571.5 Liquidated Damages

00571.5.1 General

Subcontractor's failure to meet the requirements identified in this Article 00571.5 will cause Purchaser to incur harm that will be very difficult to ascertain with certainty. The Parties therefore agree the liquidated damages specified in this Article 00571.5 represent a reasonable estimate of Purchaser's harm and are not intended as a penalty. Subcontractor's obligation to pay liquidated damages for breach of one specified requirement, does not relieve Subcontractor of its obligation to pay liquidated damages for breach of another specified requirement. Subcontractor's payment of liquidated damages for breach of the specified requirement is Purchaser's sole and exclusive remedy with regard to Subcontractor's breach of that requirement, except for any other express remedies stated in the Subcontract. If Purchaser terminates the Subcontract for cause, liquidated damages will cease to accrue after the termination date and Subcontractor's remaining liability will be calculated in accordance with Article 00572.17.

00571.5.2 Not Used

00571.5.3 Construction Milestone Dates

Each construction milestone subject to liquidated damages for late completion is listed in the article titled "Construction Milestone Completion Dates and Applicable Liquidated Damages". If all portions of the Work comprising the construction milestone do not meet the Subcontract requirements on the construction milestone completion date, liquidated damages will accrue for each failure as shown below.

Beginning on the first calendar day after the specified construction milestone completion date for each construction milestone and continuing until the construction milestone is completed, delay liquidated damages will be assessed at the rate of one thousand (\$1,000) dollars per calendar day.

Beginning on the thirty first calendar day after the specified milestone completion date for each milestone and continuing until the milestone is completed, delay liquidated damages will be assessed at the rate of one thousand **five hundred** dollars (\$1,500.00) per calendar day.

00571.6 Taxes

Subcontractor shall pay all payroll and other related employment compensation taxes for Subcontractor's employees, federal, state and other taxes which may be assessed on Subcontractor's income from the Project, engineering and business license costs (collectively, the "Subcontractor Taxes"). Subcontractor shall administer and pay all sales, use, gross receipts and excise taxes (collectively, the "Project Taxes"). Subcontract price includes Subcontractor Taxes and all Project Taxes. Purchaser will not be responsible



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**Section 6
00672.4 Equal Business Opportunity Program**

00672.4 Equal Business Opportunity Program

This form must be submitted with Bidder's bid. Failure to execute and submit this document with Bidder's bid may cause the Bid to be rejected as non-conforming. In addition, each Sub-Subcontractor must execute the form.

This Subcontract will be subject to the requirements of the City of Memphis Ordinance #5384 which establishes the Equal Business Opportunity ("EBO") Program. It is up to the Respondent to ensure that all requirements of this ordinance are met. The Ordinance may be accessed on the City's website at www.memphistn.gov under "Business - Contract Compliance". The intent of the EBO Program is to increase the participation of locally owned minority and women owned business enterprises ("M/WBE"). Toward achieving this objective, the overall M/WBE participation goal for this solicitation is 15%. The percentage of overall M/WBE participation is defined as the dollar value of subcontracts awarded to certified (as identified by the City of Memphis EBO list) minority and/or women business enterprises divided by the total proposed base bid amount.

Additionally, in accordance with federal executive Order 11625 and 12138, the local government must make a good faith effort to include participation from Disadvantage Business enterprises (DBE) in sub-agreement awards. The SRF Fair Share DBE goal for this project is a minimum of **2.6%** WBE and minimum of **2.6%** MBE (as identified by the Tennessee Uniform Certification Program list, other State or Federal DBE lists, or the City of Memphis EBO list). **Please note Subcontractor must meet both percentages independently to satisfy the requirements.**

SRF Fair Share Goals:

MBE goal - Construction **2.6%**

WBE goal - Construction **2.6%**

(Vendors from the TDOT TNUCP DBE list, other State or Federal DBE lists, ~~or the City of Memphis EBO list~~)

SARP10 DBE Participation Goal:

MBE/WBE minimum **15%**

~~(Vendors from the City of Memphis EBO list only)~~

Participation Plan

The Participation Plan must include: (1) level and dollar amount of participation your firm anticipates achieving in the performance of contract resulting from this RFB; (2) the type of work to be performed by the M/WBE participation; and (3) the names of the M/WBE and/or DBE firm(s) the Respondent plans to utilize in the performance of the contract resulting from this RFB.

Eligible M/WBE and/or DBE Firms

To qualify as a M/WBE firm, per the requirements of City of Memphis Ordinance #5384, a firm must be included on the City's EBO list of certified M/WBE firms. All contractors identified as an SRF Fair Share M/WBE firm must be on the Tennessee Uniform Certification Program (TNUCP) list, other State or Federal DBE lists, or the City of Memphis EBO list at the time of the bid opening.

A list of the City's eligible M/WBE firms may be requested from Purchaser as a guide only. If a Bidder desires to utilize an M/WBE firm not included on the list, it is the Bidder's responsibility to confirm that the desired firm is certified by the City of Memphis. Such confirmation must be obtained from the City's Contract Compliance Office, in writing, before the bid/response due date. Requests for verification must be submitted to the City's Contract Compliance Office listed below:

Ken Moody
City of Memphis, Contract Compliance Office
125 North Main Street, Suite 546
Memphis, TN 38103
Phone: (901) 576-6210
Fax: (901) 576-6560
Email: ken.moody@memphistn.gov





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Section 7

Updated / Additional Technical Specifications

Any exhibits, drawings, and maps relating to this RFB package will be made available for viewing and / or downloading on the SARP10 website.

SPECIAL INSTRUCTIONS – BYPASS PUMPING FOR CIPP INSTALLATION

The Contractor shall provide all labor, materials, equipment, fuel, maintenance, monitoring, and incidentals necessary to safely convey all wastewater flows during CIPP installation operations. Bypass pumping shall be measured and paid for under the following bid items only.

2. Bypass Pumping – Sideline Incoming Pipes

This item shall include the temporary diversion, plugging, pumping, conveyance, and control of all active sideline flows entering the sewer segment being rehabilitated. The Contractor shall maintain uninterrupted service to all upstream customers and prevent any surcharge, overflow, or backup resulting from the bypass operation. The cost shall include all pumps, hoses, piping, fittings, plugs, monitoring, labor, fuel, and restoration.

Bypass Pumping – Conveyance of 42-Inch Interceptor from Kimbrough Lift Station

This item shall include all work necessary to temporarily convey and maintain flows within the 42-inch sewer line originating from Kimbrough Lift Station during the CIPP rehabilitation activities. The Contractor shall size and operate the bypass system to safely handle full pipe flows. The Contractor shall be solely responsible for determining pump capacity, redundancy requirements, emergency response measures, and operational procedures necessary to maintain continuous service.

3. Setup

Setup shall include mobilization, delivery, installation, assembly, testing, and commissioning of all bypass pumping equipment and appurtenances required for the bypass operation. The bypass system shall be fully operational and approved by the Purchaser prior to commencement of any CIPP installation activities.

4. Tear Down

Tear Down shall include removal of all bypass pumping equipment, piping, hoses, temporary supports, plugs, and associated facilities following successful completion of the CIPP work. The Contractor shall restore all disturbed areas to their original condition at no additional cost to the Owner.

5. Weekly Maintenance, Fuel, and Pump Watch

This item shall include all costs associated with operation of the bypass system for the duration of the work, including but not limited to:

- Routine maintenance and servicing of pumps and generators.

- Fuel supply and refueling operations.
- Pump monitoring and pump watch personnel as required.
- Inspection and maintenance of bypass piping, hoses, connections, and appurtenances.

No separate payment will be made for maintenance, fuel, monitoring, standby equipment, or pump watch personnel other than under this pay item.

For planned dry-weather work, the City of Memphis has the capability to temporarily shut down the Kimbrough Lift Station and divert wastewater flows to an alternative sewer line. When this diversion is in operation, bypass pumping associated with this set up will not be utilized.

Measurement

1. Bypass (Sideline Incoming Pipes)

1. Measurement for Bypass (Sideline Incoming Pipes) shall be on a **lump sum basis**. No separate measurement of labor, equipment, materials, temporary piping, plugs, fittings, monitoring, maintenance, restoration, or incidental work will be made. The lump sum measurement shall include all work necessary to provide and maintain bypass pumping for sideline incoming pipes in accordance with Specification 02535 and these Special Instructions.

2. Bypass (Conveying 42-Inch Line from Kimbrough Lift Station) Setup

1. Measurement for Bypass (Conveying 42-Inch Line from Kimbrough Lift Station) Setup shall be on a **lump sum basis**. The item will be considered measured upon complete installation and commissioning of the bypass system and acceptance by the Purchaser. Measurement shall include all labor, materials, equipment, traffic control, buried bypass piping, sewer line plugs, temporary connections, pumps, standby pumps, appurtenances, testing, startup activities, and all other work required to place the bypass system into operation.

3. Bypass (Conveying 42-Inch Line from Kimbrough Lift Station) Tear Down

1. Measurement for Bypass (Conveying 42-Inch Line from Kimbrough Lift Station) Tear Down shall be on a **lump sum basis**. The item will be considered measured upon complete removal of the bypass system and restoration of the site to the satisfaction of the Purchaser. Measurement shall include removal of all pumps, piping, plugs, temporary structures, traffic control devices associated with the

bypass operation, restoration of existing sewer facilities, site cleanup, demobilization, and restoration of disturbed areas.

4. Bypass (Conveying 42-Inch Line from Kimbrough Lift Station) Weekly Maintenance of Pumps, Including Fuel and Pump Watch

1. Measurement for Bypass Pumping Maintenance shall be made by the **week** that the bypass pumping system is fully operational, and required by the Contract Documents. A week shall consist of seven (7) consecutive calendar days. Partial weeks shall be measured on a prorated basis unless otherwise approved by the Purchaser. Measurement shall begin once the bypass system is placed into service and shall end when bypass operations are no longer required and the Purchaser authorizes shutdown of the system.

No separate measurements shall be made for fuel, pump watch personnel, routine maintenance, repairs, standby equipment, replacement equipment, monitoring, alarms, communication devices, or any other incidentals necessary to maintain continuous bypass operations. These costs shall be included in the unit price bid per week.

Payment

Payment for bypass pumping shall be limited to the following bid items:

1. Bypass (Sideline Incoming Pipes)
 1. Bypass pumping will be paid lump sum. This item includes all materials and labor necessary to properly comply with the bypass pumping requirements listed in Specification 02535.
2. Bypass (Conveying 42-Inch Line from Kimbrough Lift Station) Setup
 1. Bypass Pumping will be paid at the Subcontractor lump sum, which payment shall constitute full compensation for all bypass pumping setup by a qualified bypass pumping expert, the provision, installations, and initiation of all necessary pipe plugs on incoming sewer lines, dismantling of existing sewer structures for the connection of new bypass suction and discharge lines at existing sewer facilities, buried bypass lines, pedestrian protection, traffic protection, provision and installation of all necessary bypass pumps, standby pump, and appurtenances required to completely accomplish all bypass pumping setup.
3. Bypass (Conveying 42-Inch Line from Kimbrough Lift Station) Tear Down

1. Bypass Pumping Tear Down will be paid at the Subcontractor's lump sum bid price. This payment shall constitute full compensation for all labor, materials, equipment, supervision, and incidentals required to safely and completely remove the bypass pumping system upon completion of the work. The tear down shall include the removal of all bypass pumps, standby pumps, piping, hoses, fittings, plugs, temporary connections, appurtenances, traffic control devices associated with the bypass operation, and any temporary structures or facilities installed to support the bypass system.

The work shall also include the abandonment or removal of temporary bypass suction and discharge connections, restoration of existing sewer structures and facilities to their pre-construction condition, removal of buried bypass piping where required, site cleanup, demobilization, and restoration of all disturbed areas. The Contractor shall dispose of all materials in accordance with applicable regulations and leave the site in a neat and acceptable condition.

No separate payment will be made for tear down activities not specifically identified herein, and all such costs shall be included in the lump sum price for Bypass Pumping Tear Down.

4. Bypass (Conveying 42-Inch Line from Kimbrough Lift Station) Weekly Maintenance of Pumps, Including Fuel and Pump Watch

1. Bypass Pumping Maintenance shall be paid at the applicable Subcontractor unit price per week. Payment shall be based on the period during which the bypass pumping system is actively operating and maintained in service as directed by the Purchaser. Measurement shall be made with each pay application and shall be prorated as necessary based on the actual duration of operation during the payment period. No payment for Bypass Pumping Maintenance shall be made for any period in which the Purchaser has directed that the bypass pumping system be shut down or placed out of service. Compensation under this pay item shall be limited to periods when the bypass pumping system is fully operational and performing its intended function.

All other costs associated with bypass pumping operations not specifically identified above shall be considered incidental to the work and included in the Contractor's bid prices.

**SECTION 02533
REHABILITATION AND REPAIR OF EXISTING MANHOLES**

PART 1 GENERAL

1.01 SCOPE

- A. This work shall consist of the repair and rehabilitation of existing sanitary sewer manholes as shown on the Drawings, 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 Drawings 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.
- B. The Subcontractor shall 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.
- C. Each manhole to be rehabilitated shall be thoroughly cleaned of all loose or missing bricks, loose mortar, holes, etc. shall be repaired. All leaks shall be plugged with active leak-stop material prior to manhole rehabilitation. The material for stopping leaks and repairing nonleaking holes, cracks, etc. in concrete and masonry manholes shall be compatible with the coating system used for rehabilitation.
- D. 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. Under certain circumstances, 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. The Subcontractor shall 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.
- E. When applicable, the manhole lining shall not be installed until all main sewer lining and other manhole rehabilitation work is complete.
- F. Where existing manholes are being repaired or rehabilitated, the Subcontractor shall arrange his work so that sewage flow will be maintained during the construction period with no discharge of sewage into an open trench, and no backup of sewage into the existing line. The Subcontractor shall provide necessary bypass pumping capacity to carry flow downstream of the manhole to be rehabilitated or repaired.
- G. Replacement Manholes shall conform to Specification Section 02531.
- H. 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 as specified in Section 02532 Sanitary Sewer Manhole Adjustments.
- I. Definitions/Standards
 - 1. ASTM D-638: Test Method for Tensile Properties of Plastics.

2. ASTM D-695: Test Method for Compressive Properties of Rigid Plastics.
3. ASTM D-790: Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
4. ASTM D-4541: Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
5. ASTM D-412: Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
6. ASTM D-2240: Standard Test Method for Rubber Property Durometer Hardness
7. ASTM D-522: Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings
8. ICRI03732: Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays

J. Quality Assurance

1. The Subcontractor shall furnish materials of quality required by the American Society for Testing and Materials (ASTM) standards and industry approved standards and specifications.
2. The Subcontractor shall provide guarantee against defective materials and workmanship in accordance with the requirements of these specifications.

K. Sequencing

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

L. Substitutions

1. 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.

M. Samples

1. The Subcontractor shall apply the manhole lining system material on a sample area not less than four square feet (4 ft²) in size. When approved, the sample area shall serve as a standard of acceptance for all further work.

1.02 SUBMITTALS

- A. Unless otherwise specified, all sample submittals shall be delivered to the Purchaser within two weeks of the NTP.
- B. Product Data on the following:
 - 1. Crack and hole repair products
 - 2. Cementitious plug material
 - 3. Active leak-stop material
 - 4. Frame and cover seals
 - 5. Cementitious coating system including application requirements and chemical resistance data
 - 6. Gasket polymer properties
- C. Manufacturer's Certificate of Compliance for each type of product that product furnished meets requirements of this Section.
- D. Manufacturer's written recommendations for product handling and installation.
- E. Subcontractor shall submit to the Purchaser 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.
- F. The Coating 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.

1.03 DELIVERABLES

- A. The Subcontractor shall provide post-rehabilitation MACP inspection for each manhole. Refer to Section 02544 Manhole GPS & MACP Inspection.

PART 2 PRODUCTS

2.01 MATERIALS

A. Manhole Lining System

- 1. 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, Reliner MSP by Standard Cement Materials, or approved equal, unless otherwise specified for urethane or epoxy resin coating top coat.

2. The manhole lining system shall be spray applied or centrifugally cast lightweight structurally reinforced cement manhole coating.
3. The material applied onto the surface of brick or concrete manholes shall be a cementitious system formulated for application within a sanitary sewer environment. For concrete manholes in good structural condition, the Subcontractor shall install the lining to a minimum ½-inch thickness. For all other concrete manholes and for all brick manholes, the Subcontractor shall install the lining to a minimum 1-inch thickness. The coat of material shall 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 directed by the Purchaser. When a urethane or epoxy resin system is used, the base coat (cementitious layer) shall be 1/2-inch for epoxy systems and 1/8-inch thick for urethane systems. The 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 shall be increased by the base coat thickness listed above.
4. A monolithic liner shall be formed which covers all interior manhole surfaces and shall have the following minimum requirements at 28 days:
 - a. Compressive Strength (ASTM C-109) 3000 PSI
 - b. Tensile Strength (ASTM C-496) 300 PSI
 - c. Flexural Strength (ASTM C-293) (Modified) 600 PSI
 - d. Shrinkage (ASTM C-596) 0% at 90% R.H.
 - e. Bond (ASTM C-882) 130 PSI
 - f. Density, when applied 130 ± PCF
5. 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.
6. Each system shall be designed for application over damp (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.
7. 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, where applicable; to fill all voids, cracks, and holes and to form a smooth flow channel. The entire channel shall be coated. The coating shall be a minimum ¼-inch to ½-inch thick.

B. 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, re-tempered, or previously set will not be allowed.

C. Butyl Mastic Sealant

1. The sealant shall be used when joining the casting frame to the existing 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 shall 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 shall be on site and approved by the Purchaser before work will be permitted to begin.

PART 3 EXECUTION

3.01 PRELIMINARY AND GENERAL ITEMS

A. Notification of Work

1. The Subcontractor shall notify all property owners who discharge sewage directly to the manhole being rehabilitated that their service will be discontinued while the work is completed. 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. The Subcontractor shall install and maintain all fall protection measures in accordance with OSHA standards and the SARP10 Loss Control Manual. The Subcontractor shall construct a controlled access zone around the manhole being rehabilitated, repaired or 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/Surface Prep

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.

F. Bypass of Flow

1. 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 manholes 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 sewage 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, the Subcontractor shall advise those customers that the sewer main is back in service.
2. Bypass pumping is defined as providing pumps, standby pumps, piping, elevated structural support for aerial crossings, manpower to operate, routine maintenance and repair capability, pipe plugs, fuel, route and pump site clearing and any other work necessary to provide a complete bypass pumping operation. 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. The Subcontractor shall submit design drawings and details that are signed and sealed by a professional engineer licensed in the State of Tennessee. All bypass pump schemes must be submitted to and approved by the Purchaser in advance.

3. Public advisory services shall 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.
4. The Subcontractor shall be required to provide businesses with temporary service, as needed, and will be responsible for all necessary bypass pumping flows.

G. Wastewater Spills

1. 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 shall be completely responsible for any fines or penalties imposed on the Purchaser or the Subcontractor by the USEPA or the State of Tennessee.

3.02 MANHOLE REHABILITATION – CEMENTITIOUS COATINGS

- 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. The Subcontractor shall perform light troweling to compact the material into voids and to set the bond, where applicable.
- B. Application procedures shall conform to the recommendations of the protective coating manufacturer, including handling, thickness, mixing, environmental controls during application, safety, and spray equipment
- C. Existing manhole steps shall be cut and removed prior to coating. Manhole steps are not to be replaced.
- D. 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 in accordance with the manufacturer's recommendations 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 troweled 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.
- E. 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.
- F. 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.
- G. 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. Replace the invert and bench by removing the existing invert and bench and reconstructing with concrete conforming to Section 03050 Portland Cement Concrete. 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, TV camera, etc. Benches shall be constructed to the highest pipe crown elevation and sloped to drain toward the flow-through channel.
- B. Apply a minimum ½-inch finished thickness of cementitious liner material over the surface of the replaced invert and bench where cementitious coating is noted on Drawings or directed by the Purchaser. 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

- 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 directed 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 SEWER MANHOLE DROP CONSTRUCTION

- A. Inside drop structures shall be installed in existing manholes at the locations shown on the Drawings and/or as directed by the Purchaser. Drop construction shall conform to the details shown on *Sanitary Manhole Drop Construction* Detail. The Subcontractor shall 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 shall be used to avoid unnecessary damage to the existing masonry or concrete. Drop structure construction shall be installed before cementitious coating is applied where shown on the Drawings or directed by the Purchaser.
- B. All loose material shall be removed from the cut surfaces, which shall be completely coated with grout before setting the pipe. Before inserting the pipe and flexible connector, a sufficient thickness of grout shall be placed at the bottom and sides of the opening for proper bedding of the pipe. After setting, all spaces around the pipe shall 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 shall be made to provide a smooth, plastered surface for properly channeled sewage flow from the new connection. All drop construction shall be constructed of either ductile iron pipe with push on or mechanical joints or PVC pipe. Solvent cement joints may be used on PVC for drop construction. The vertical drop construction shall 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, shall not be positioned against the manhole wall. The steel support straps shall 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. When a cementitious coating is applied, 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 coating. 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, the Subcontractor shall inflate the compression to affect a seal between the vacuum base and the structure. The Subcontractor shall 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. Subcontractor shall 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 is considered acceptable and passes the test. If the manhole fails the test, The Subcontractor shall 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, the Subcontractor shall 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			
	Manhole Diameter (Inches)		
Depth (Feet)	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.

Vacuum Test Timetable			
	Manhole Diameter (Inches)		
Depth (Feet)	48"	60"	72"
20'	50 sec.	65 sec.	80 sec.
24'	60 sec.	78 sec.	96 sec.
*	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.
5. Where vacuum testing is not applicable, the Subcontractor shall be directed by the Purchaser to conduct a high-voltage holiday test.

3.07 PROTECTION OF DOWNSTREAM FACILITIES

- A. 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.

3.08 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. As required by 2.01.A.9, the Subcontractor shall also have written documentation that the Coating Manufacturer provides a ten (10) year warranty for all manholes receiving a cementitious coating.

PART 4 MEASUREMENT & PAYMENT

4.01 MEASUREMENTS

- A. Manhole Rehabilitation – Cementitious Coating
 1. Cementitious coating will be measured per vertical foot of manhole from the downstream invert up to the bottom of the frame casting.
- B. Invert and Bench Replacement
 1. Invert and bench replacement will be measured per each.

C. Reset and Reseal Manhole Frame and Cover

1. Manhole frame and cover rehabilitation will be measured per each.

D. Sewer Manhole Drop Construction

1. 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.

E. Sewer Manhole Drop Construction

1. 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.

F. Traffic Control

1. Traffic control will be measured per each standalone manhole being rehabilitated when not associated with an adjoining sewer segment being rehabilitated.

G. Bypass Pumping

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

H. Dewatering

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

4.02 PAYMENTS

A. Manhole Rehabilitation - Cementitious Coating

1. Cementitious coating of manholes will be paid for at the contract unit price per vertical foot which shall be compensation for surface preparation, sprayed on lining, removal and disposal of manhole steps, and vacuum testing.

B. Invert and Bench Replacement

1. 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.

C. Reset and Reseal Manhole Frame and Cover

1. The accepted quantities for frame and cover rehabilitation will be paid for at the contract unit price per each which shall be full compensation for all labor and material necessary to complete the item as specified in these Contract Documents.

D. Sewer Manhole Drop Construction

1. 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

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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).

E. Traffic Control

1. Traffic control will be paid per Crew Day for manholes rehabilitated including all appurtenances required to comply with MUTCD standards. Only standalone manhole rehabilitation will include a separate traffic control payment. All traffic control for manholes with adjoining sewer segment rehabilitation will be included in the traffic control for the associated pipe.

4.03 PAYMENT WILL BE MADE UNDER:

Item No.	Pay Item	Pay Unit
02533-4.02.A	MANHOLE REHABILITATION – CEMENTIOUS COATING	VF
02533-4.02.B-1	INVERT AND BENCH REPLACEMENT (48" Diameter)	EACH
02533-4.02.B-2	INVERT AND BENCH REPLACEMENT (>48" Diameter)	EACH
02533-4.02.C	RESET/RESEAL MANHOLE FRAME AND COVER	EACH
02533-4.02.D-1	SEWER MANHOLE DROP CONSTRUCTION (<5')	EACH
02533-4.02.D-2	SEWER MANHOLE DROP CONSTRUCTION (5'-10')	EACH
02533-4.02.D-3	SEWER MANHOLE DROP CONSTRUCTION (>10')	EACH
02533-4.02.E	TRAFFIC CONTROL	CREW DAY

END OF SECTION 02533

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SECTION 02538 ULTRAVIOLET LIGHT-CURED GLASS-REINFORCED CURED-IN-PLACE PIPE (UV GRP CIPP) INSTALLATION

PART 1 GENERAL

1.01 SCOPE

- A. The work shall consist of 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 subcontractor 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 02541 Closed Circuit Television Inspection of Sewer Mains & Connections.
- 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.
Technology-Specific Precedence: This revision permits UV light-cured, glass-reinforced CIPP while retaining the City of Memphis/SARP10 requirements for qualifications, design basis, submittals, testing, acceptance, bypass pumping, restoration, public notification, warranty, measurement, and payment. Manufacturer literature supplements but does not reduce these requirements.
- C. 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 DESCRIPTION OF SERVICES PROVIDED BY CONTRACTOR

- A. 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.
- B. The UV GRP CIPP process is the rehabilitation of existing sanitary sewers by installation of a factory resin-impregnated, glass-fiber-reinforced tube protected by inner and outer styrene-resistant films. The liner shall be pulled into place, inflated with controlled air pressure to fit tightly against the host pipe, and cured by ultraviolet light. After curing, the liner shall provide a structurally sound, jointless, close-fitting, corrosion-resistant conduit suitable for municipal sanitary sewer service. The completed liner shall meet the hydraulic, structural, testing, and acceptance requirements of this Specification.

1.03 REFERENCED SPECIFICATIONS

- A. 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.
- B. 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:
 - 1. ASTM D543 – Practices for Evaluating the Resistance of Plastics to Chemical Reagents
 - 2. ASTM D638 – Standard Test Method for Tensile Properties of Plastics

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3. ASTM D790 – Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
4. ASTM F1216 – Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube
5. 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 D578 – Standard Specification for Glass Fiber Strands

ASTM F2019-22 – Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Pulled-in-Place Installation of Glass Reinforced Plastic (GRP-CIPP) Using the UV-Light Curing Method

ASTM D3567 – Standard Practice for Determining Dimensions of “Fiberglass” (Glass-Fiber-Reinforced Thermosetting Resin) Pipe and Fittings

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

ASTM F1417 – Standard Practice for Installation Acceptance of Plastic Non-pressure Sewer Lines Using Low-Pressure Air, when low-pressure air testing is specified by the Purchaser

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

ASTM C1920 – Standard Practice for Cleaning of Vitrified Clay Sanitary Sewer Pipelines, where applicable

- C. 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

1.04 SUBSTITUTIONS

- A. 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.

1.05 QUALITY ASSURANCE

- A. Acceptable CIPP Manufacturers

1. 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.

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B. Mainline Cured-in-Place Pipe

1. 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 who 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.

1.06 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 system manufacturer.
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 Subcontractor's personnel including the supervisor, foreman, and lead crew personnel responsible for CCTV inspection, liner installation, UV curing, and robotic service reconnections shall each have a minimum of 3 years of experience with the UV GRP CIPP technology proposed for this Contract and shall have demonstrated competency to perform the work. The name and experience of each lead individual performing work on this Contract shall be submitted. Personnel replaced by the Subcontractor 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.

1.07 SUBMITTALS

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

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3. Shop drawings and product data to demonstrate compliance with these Specifications and identify all construction materials and system components, including the glass-fiber reinforcement, resin system, photo-initiator system, inner film/calibration hose, external films, end seals, sliding foil, and other installation materials. The manufacturer's facility and the location of liner impregnation/manufacture shall also be identified.
4. Manufacturers' shipping, storage, and handling recommendations for all CIPP system components.
5. Safety Data Sheets (SDS) for all materials to be furnished for the project.
6. Detailed installation procedures including CIPP production schedule, field verification, sliding-foil procedures, maximum allowable pulling force, inflation-pressure range, end-seal procedures, integrated CCTV inspection, UV lamp configuration and wattage, curing speed, temperature limits, storage and handling requirements, cool-down/stabilization requirements, and contingency procedures for lamp, pressure, power, or equipment interruption.
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 of the proposed liner manufacturing and resin-impregnation process. For factory-impregnated UV GRP CIPP, the submittal shall describe the manufacturer's factory wet-out and quality-control process. Field wet-out or field resin mixing shall not be permitted unless specifically approved in writing by the Purchaser.
11. For each liner manufactured for the project, provide manufacturer production/quality-control records identifying, at a minimum, resin system and lot, photo-initiator system, glass-fiber type, liner diameter, design thickness, liner length, manufacturing date, storage temperature requirements, and applicable factory quality-control test results and certifications.
12. Design data and specification data sheets listing all parameters used in the CIPP liner design and thickness calculations based on ASTM F1216 and the applicable requirements of ASTM F2019-22. All calculations shall be prepared under and stamped by a Tennessee registered professional engineer.
13. Manufacturer's recommended UV cure schedule for each liner diameter and thickness, including resin/photo-initiator system, lamp configuration and wattage, allowable curing speed, inflation-pressure range, temperature limits, start and stop procedures, requirements for the first and last 15 feet of the liner, and contingency procedures for interruptions.
14. UV curing log reports documenting each sewer segment, including manhole numbers, location, project number, date, start and finish times, liner diameter and thickness, liner identification/batch, lamp train identification and wattage, individual lamp status, curing speed, internal pressure, liner temperature, liner length, and any alarms or interruptions. The curing system shall automatically record the curing data from the beginning of inflation through completion of UV exposure. A sample electronic report shall be submitted to the Construction Manager before installation.
15. Post-rehabilitation PACP CCTV inspection data as further defined herein.
16. At least ten representative third-party laboratory reports from projects within the past five (5) years demonstrating the physical properties and long-term performance of the proposed UV GRP CIPP

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- system. The reports shall identify the resin system and glass-fiber reinforcement and shall include flexural strength and flexural modulus data. Where tensile strength is used in the project design or acceptance criteria, tensile test data shall also be provided.
17. Installed liner(s) samples for testing to be performed by an ASTM-certified independent testing laboratory, as described further herein.
 18. 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.
 19. 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.

1.08 DELIVERABLES

A. Sample Preparation and Testing of Cured CIPP

1. Sample preparation, sample testing, and leakage testing of the finished CIPP-lined sewer mains shall be performed in accordance with this Specification, ASTM F2019-22, and the applicable requirements of ASTM D5813. The Subcontractor shall furnish all equipment and personnel necessary to conduct these preparations and tests.
 - a. The Subcontractor shall prepare representative CIPP samples for each installed liner segment as designated by the Purchaser. Samples shall be taken from a cured portion of the installed liner at an intermediate manhole or termination point, or from an approved restrained or flat-plate sample cured under the same conditions as the installed CIPP. The Purchaser may submit samples for laboratory determination of wall thickness, flexural strength, flexural modulus, and tensile strength. All samples shall be collected and prepared in accordance with ASTM F2019-22.
 - b. The Subcontractor shall prepare a restrained sample or flat-plate sample of the installed liner at each test location. The sample shall be of sufficient size to provide the recommended five (5) flexural specimens, each 2 inches wide, unless the Purchaser approves a minimum of three (3) specimens where five suitable specimens cannot be obtained. The sample shall represent the same liner, resin system, glass reinforcement, installation pressure, stretch, and UV curing conditions as the installed CIPP. Each sample shall be labeled with the project, line segment, liner identification, date, and test location.
 - c. The tests shall be used to verify that the installed CIPP meets these Specifications. Composite structural wall thickness shall be measured in accordance with ASTM D5813 and ASTM F2019-22; the mean structural wall thickness shall not be less than the design wall thickness, and no measured point shall be less than 80 percent of the design wall thickness or 3.0 mm, whichever is greater. Flexural properties shall be determined in accordance with ASTM D790 and shall meet the specified minimum values in this Specification. Tensile strength, when required by the approved design or this Specification, shall be determined in accordance with ASTM D638 or ASTM D3039, as applicable to the reinforcement. All testing shall be performed by an independent laboratory accredited to ISO/IEC 17025 or otherwise

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acceptable to the Purchaser. Testing required for acceptance shall be at the Purchaser's expense unless otherwise specified. 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.

B. Final Video Inspection

1. A PACP CCTV inspection in accordance with Section 02541 shall be submitted after liner installation and completion of service reinstatements. 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 each installation and be free of dry spots, wrinkles, pinholes, holidays, lifts, and delaminations. All service entrances shall be accounted for and shall be unobstructed, including all rehabilitated service lateral connections. If, in the judgment of the Purchaser, any unsatisfactory conditions are present, the Subcontractor shall correct the conditions at no additional cost to the Purchaser.

PART 2 PRODUCTS

2.01 PATENTS

- A. 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 GENERAL

- A. The CIPP material shall be fabricated from corrosion-resistant glass-fiber reinforcement and a thermosetting resin system which, when cured, will be suitable for the environment intended and shall meet the chemical-resistance requirements of ASTM D5813 and the applicable requirements of ASTM F2019-22. The final product shall not deteriorate, corrode, or lose structural strength in a manner that would preclude meeting the specified design life. The structural performance of the cured CIPP shall be adequate to accommodate all applicable internal and external loads over its service life. The CIPP liner shall be designed for fully deteriorated gravity pipe conditions using a soil weight of 120 pcf, a factor of safety of 2.0, 2-percent ovality unless field measurements demonstrate otherwise, groundwater at the ground surface, an enhancement factor (K) not greater than 7 unless a lower value is required by the design, H-20 live loads where applicable, and the long-term material properties established by the approved design.
- B. The finished CIPP shall consist of a homogeneous and monolithic glass-fiber-reinforced thermosetting resin composite structural wall. External protective films and a UV-transparent calibration hose/inner film are permitted as components of the UV GRP CIPP system. No separate structural liner or containment layer between the CIPP structural wall and the host pipe shall be permitted. The cured CIPP shall be installed as a close-fit liner with minimal or no annular space or cavities between the host pipe and liner.
- 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 liner tube shall consist of corrosion-resistant glass-fiber reinforcement and a UV-curable

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thermosetting resin system meeting ASTM F2019 and the applicable requirements of ASTM F1216. EC-R glass or an approved equal shall be used. Inner and outer styrene-resistant films shall protect and contain the resin during handling, pull-in, inflation, and curing. If a conflict exists between the referenced ASTM requirements and this City Specification as modified by the SARP10 Program, this Specification shall govern.

- B. The acceptable liner tube shall be manufactured under an ISO 9001 certified quality-management system, or under a documented quality system that meets or exceeds the requirements of ISO 9001. Proper certification shall be submitted with the alternative products application. At the time of manufacture, each lot of liner shall be inspected for defects and tested in accordance with ASTM F2019-22, applicable ASTM standards, and the manufacturer's documented quality-control procedures.
- C. The Subcontractor shall measure and verify the inside diameter and length of the existing pipeline in the field prior to ordering the liner so the liner can be installed in a tight-fitting condition. The Subcontractor shall verify the length immediately prior to installation and shall ensure the liner is of sufficient length to extend the entire rehabilitation run and provide adequate material for sealing and termination at the manholes or other approved access structures.
 - 1. The CIPP lining tube shall be manufactured or fabricated to a size that, when installed and inflated in accordance with the approved manufacturer's procedures, will tightly fit the internal circumference of the sewer being rehabilitated.
 - 2. The CIPP lining shall be capable of accommodating irregularly shaped pipe sections and bends or dips within the limits demonstrated by the manufacturer's product qualification and installation procedures. Where bends or dips up to 45 degrees are encountered, the proposed system shall be specifically approved by the manufacturer for the applicable geometry.
 - 3. Allowances for longitudinal and circumferential changes during pull-in and inflation shall be incorporated into the liner sizing and installation procedures.
 - 4. The tube shall be properly sized for the existing pipe diameter, length, and configuration and shall be capable of stretching sufficiently to fit the host pipe without overstressing the liner or creating unacceptable wrinkles, lifts, or folds.
- D. The factory-impregnated glass-fiber tube shall have a uniform structural wall composition and resin distribution. The cured composite thickness shall meet or exceed the approved design thickness in accordance with Paragraph 2.07 and ASTM F2019-22.
- E. The tube shall be manufactured to provide a close-fit installation against the internal circumference and length of the host pipe. Allowances shall be made for circumferential stretching during pull-in and inflation. Wrinkles, lifts, fins, or folds that are avoidable under the manufacturer's approved installation procedure and that adversely affect structural or hydraulic performance shall be cause for rejection.
- F. The glass-fiber reinforcement shall be constructed without discontinuities, overlaps, or manufacturing defects that create abnormalities in the finished structural wall. The liner shall include longitudinal unidirectional glass reinforcement of sufficient strength to withstand the manufacturer's maximum allowable pulling force. Glass-fiber reinforcement shall be corrosion-resistant E-CR glass or approved equal and shall comply with ASTM D578.
- G. The liner shall include inner and outer styrene-resistant films suitable for the proposed UV curing process. The inner film shall be removed after cure unless the manufacturer's approved system requires it to remain as part of the finished product. The finished interior surface shall be smooth, continuous, and have a Manning's roughness coefficient no greater than 0.013.
- H. 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,

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blisters, or deleterious faults. No foreign materials may be included in the tube that may cause delamination in the cured liner, and no dry or unsaturated areas or layers shall be evident.

- I. 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.
- J. 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.
- K. 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.
- L. **Product Handling**
 - 1. 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 system for UV GRP CIPP shall be a corrosion-resistant, UV-curable polyester or vinyl ester thermosetting resin specifically formulated for glass-reinforced CIPP and compatible with the proposed liner system, photo-initiator system, host-pipe environment, and UV curing equipment. The Purchaser may require vinyl ester resin for site-specific chemical or temperature exposure.
- B. Unless otherwise specified, the Subcontractor shall furnish a resin and photo-initiator system compatible with the proposed UV GRP CIPP reconstruction process and capable of producing the cured physical properties specified herein.

C. **UV-Curable Polyester Resin**

- 1. Polyester resin shall be a high-grade, corrosion-resistant, UV-curable resin specifically formulated for glass-reinforced CIPP. The proposed resin and liner composite shall have third-party test data demonstrating compliance with ASTM D2990, ASTM D5813, ASTM F2019-22, and applicable chemical-resistance requirements. Only premium, non-recycled resin shall be used. The resin manufacturer shall certify compatibility with the glass reinforcement, liner films, photo-initiator system, UV lamp system, proposed cure schedule, and municipal sanitary sewer environment.
- 2. The resin shall be manufactured under a documented quality-management system. The resin manufacturer shall certify compatibility with the glass reinforcement, films, UV lamp system, proposed cure schedule, and municipal sanitary sewer environment. Only premium, non-recycled resin shall be accepted.

D. **No Intermediate Mixing Facilities Allowed**

- 1. Resin and photo-initiator materials used to manufacture the UV GRP CIPP liner shall be traceable from the resin manufacturer through the liner manufacturing/impregnation facility. Shipping and receiving records, batch/lot numbers, manufacturing dates, and certificates of compliance shall be maintained and submitted to the Purchaser upon request. No intermediate resin mixing facility shall be permitted.

E. **UV-Curable Vinyl Ester Resin (if required)**

- 1. Vinyl ester resin shall be a high-grade, premium, corrosion-resistant, UV-curable system formulated for glass-reinforced CIPP. The resin manufacturer shall certify compatibility with the glass

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reinforcement, films, UV lamp system, proposed cure schedule, and intended service environment. Applicable third-party physical-property, chemical-resistance, and long-term testing shall be submitted.

2. Only premium, non-recycled vinyl ester resin shall be accepted. PET resin, fillers, or enhancement additives shall not be used unless specifically identified in the design data and approved in writing by the Purchaser.

2.05 ADDITIONAL PROVISIONS

- A. 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:
 1. The Subcontractor shall designate the liner manufacturing/impregnation facility and shall provide liners manufactured only at that facility unless an alternate facility is approved in writing by the Purchaser. The designated facility shall maintain documented quality-control procedures and records sufficient to establish traceability of the resin, photo-initiator, glass reinforcement, liner dimensions, and manufacturing date for each liner installed on the project.
 2. The Purchaser shall have the right to inspect the designated liner manufacturing/impregnation facility, review quality-control records, and obtain representative material samples upon reasonable notice, subject to the manufacturer's reasonable safety and security requirements. The Subcontractor shall provide access and documentation necessary to verify compliance with this Specification.
 3. The Purchaser may require independent testing of resin, glass reinforcement, or cured CIPP samples to verify compliance with this Specification. Sampling and testing required solely for Purchaser quality assurance shall be performed by an independent laboratory acceptable to the Purchaser.
 4. Factory resin and liner quality-control testing shall be performed at the frequency established by ASTM F2019-22, the approved manufacturer's quality-control plan, and this Specification. Records of all required tests shall be retained and submitted to the Purchaser upon request.

2.06 UV INITIATOR AND RESIN SYSTEM

- A. The complete resin and photo-initiator system shall be identified by product name and manufacturer. The formulation, initiator concentration or range, additives, and compatibility with the proposed glass reinforcement and UV curing equipment shall be certified by the resin and liner manufacturers. Any changes to the resin, photo-initiator, glass reinforcement, liner construction, or UV curing equipment after approval shall require written approval by the Purchaser before use.
- B. UV cure schedules shall be submitted to the Purchaser for review and shall be approved in writing by the resin and liner manufacturers. Schedules shall identify lamp configuration and wattage, curing speed, inflation-pressure range, temperature limitations, start and stop procedures, first- and last-15-foot requirements, and contingency procedures for lamp or equipment interruption. The cure schedule shall be specific to the liner diameter, design thickness, resin/photo-initiator system, and UV curing equipment proposed.
- C. The resin and photo-initiator used in each liner shall be traceable to the manufacturer's batch or lot documentation. Copies of applicable shipping documents and certificates of compliance shall be submitted to the Purchaser before installation upon request.
- D. The Subcontractor shall submit a Certificate of Authenticity or Certificate of Compliance from the resin/liner manufacturer for each liner shipment or production lot. The certification shall identify, at a

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minimum, the resin system, photo-initiator system, glass-fiber type, liner diameter and design thickness, manufacturing date, lot/batch number, and required storage temperature range.

2.07 PIPE DESIGN

A. Design Capacity

1. The Contractor shall utilize a Manning's roughness coefficient of 0.013 for design capacity calculations.

B. Liner Thickness

1. The Subcontractor shall submit liner thickness calculations to the Purchaser for review. Overall, the hydraulic profile shall be kept as large as practicable. The CIPP shall be designed in accordance with the applicable provisions of ASTM F1216 and ASTM F2019-22 for fully deteriorated gravity pipe conditions and shall meet the following design conditions:
 - a. AASHTO H-20 Live Load with two trucks passing for CIPP in streets (16,000 lbs.)
 - b. A soil modulus of elasticity of 1,000 psi, soil weight of 120 pounds per cubic foot and a coefficient of friction of $K_u' = 0.13$.
 - c. UV GRP CIPP: minimum initial flexural modulus of 725,000 psi, minimum initial flexural strength of 15,000 psi, and minimum tensile strength of 9,000 psi where tensile strength is used as a design or project acceptance criterion. Long-term flexural properties shall be based on manufacturer-specific data supported by ASTM D2990 or other approved long-term testing. Unless a higher retention factor is supported by such data and approved by the Purchaser, a 50-percent retention factor shall be used for long-term design properties.
 - d. Safety factor of 2.0 shall be used.
 - e. Groundwater elevation at the ground surface.
 - f. Pipe ovality of 2% (unless actual field measurements prove otherwise).
 - g. Poisson's ratio of 0.3, unless a different value is justified by manufacturer test data and approved by the Purchaser.
 - h. Enhancement factor (K) of 7.
 - i. Service temperature range shall be 40 to 140 degrees F.
 - j. Maximum long-term deflection shall be 5%.
 - k. The installed, cured thickness shall be the largest thickness as calculated for deflection, bending, buckling, minimum stiffness and a 50 year design life.
2. The Minimum Acceptable Pipe Thickness (Finished and Installed) shall be based on the design conditions in Paragraph 2.07.A.1, adjusted for site-specific field conditions, and approved by the Purchaser prior to liner manufacture. The mean structural wall thickness shall not be less than the design wall thickness, and the minimum structural wall thickness at any measured point shall not be less than 80 percent of the design wall thickness or 3.0 mm, whichever is greater, unless a more stringent project-specific requirement is established by the Purchaser.

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- a. The Subcontractor shall determine the site-specific external loads on the liner and increase or decrease its thickness as required by the approved design. Any proposed change to liner thickness shall be submitted to the Purchaser for approval before manufacture. The installation plan shall include procedures to control pulling force, liner stretch, inflation pressure, and curing conditions and to minimize wrinkles, resin loss, and other installation defects.
- b. 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.
- c. 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 existing, deficient CIPP liner and inserting a new CIPP liner into the sewer, excavating and replacing the sewer from manhole to manhole per Section 02530, or providing the Purchaser with a substantial credit. The primary option that will be considered will be to remove and replace the CIPP liner in the sewer. Credits will only be authorized for CIPP that does not meet required thickness and solely at the discretion of the Purchaser. 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:

$$\text{Credit} = (1 - \text{Installed CIPP thickness/required CIPP thickness}) \times \text{bid price}$$

- d. The Subcontractor shall not assume a credit will be acceptable to the Purchaser in any case.

2.08 EQUIPMENT

- A. The Subcontractor shall 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 shall be on site and approved by the Purchaser before work will be permitted to begin.

PART 3 EXECUTION

3.01 INSTALLATION

A. General

1. All reconstruction of existing gravity sewer mains using an approved UV GRP CIPP product and installer shall be performed in accordance with the latest edition of ASTM F2019-22, the applicable requirements of ASTM F1216 and ASTM F1743, and the approved manufacturer's written procedures. Where this Specification is more stringent, this Specification shall govern.
2. 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

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the rehabilitation item to which it pertains.

B. Installation Procedures

1. **Cleaning and Inspections:** Sewers shall be cleaned of all debris, roots, sediment, protrusions, and other materials that would interfere with installation of the resin-impregnated glass-fiber liner. Inspection of the sewer shall be performed by experienced personnel trained in locating breaks, obstacles, and service connections by CCTV inspection and certified under the 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 Section 02541. The interior of the pipe shall be carefully inspected to determine conditions that may prevent proper installation or curing of the CIPP. Conditions shall be noted and corrected before installation. The video inspection shall be performed in the presence of the Purchaser's Resident Project Representative when directed by the Purchaser.
2. Utilizing high-pressure jet cleaning equipment, several passes shall be completed to assure that all debris is removed from the pipe. If roots are present, root cutters or mechanical brushes shall be 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.
3. The Subcontractor shall complete all necessary mainline point repairs in accordance with Specification 02540 Sanitary Sewer Point Repairs. These repairs shall be performed at locations indicated on the Bid Schedule or where deemed necessary by the Subcontractor if approved by the Purchaser before work begins.
4. The Subcontractor shall remove all pipeline obstructions and cut or trim protruding service connections flush as required to complete the CIPP rehabilitation.
5. 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 Purchaser, the methods and materials for mitigating any adverse impacts from the infiltration.
6. **Resin Impregnation of the CIPP Tube:**
 - a. **Factory Resin Impregnation of the CIPP Tube:** The glass-fiber tube shall be fully impregnated with the approved UV-curable resin/photo-initiator system at the manufacturer's facility under controlled quality-assurance conditions in accordance with ASTM F2019-22. The impregnation process shall provide uniform resin distribution throughout the structural wall. The impregnated liner shall be protected from UV exposure and contamination and shall be stored and transported within the temperature limits established by ASTM F2019-22 and the manufacturer. Field resin impregnation or resin mixing shall not be permitted unless specifically approved in writing by the Purchaser.
7. **Pull-In, Inflation, and Pre-Cure Inspection of UV GRP CIPP Liner:**
 - a. Installation shall comply with this Specification, ASTM F2019-22, the applicable requirements of ASTM F1216 and F1743, and the approved manufacturer's written procedures. The liner shall be securely attached to a winch and pulled through the host pipe without exceeding the manufacturer's maximum allowable pulling force. A continuous sliding foil shall protect the liner during pull-in. End closures, the calibration hose/inner film, and associated fittings shall be installed as required by the approved UV GRP CIPP system. The liner shall be inflated to the approved working pressure so it fits tightly against the host pipe. Pressure shall remain within the approved minimum and maximum limits throughout pre-cure inspection and curing. The installer shall use the UV system's integrated CCTV camera to verify liner position and fit before

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curing. Thermocouples or other temperature sensors shall be installed as required by the approved UV system.

- i. UV GRP CIPP shall be installed by the pulled-in-place method using a powered winch, sliding foil, and the manufacturer's approved pulling head or manifold. The installation method, maximum pulling force, liner stretch, and inflation pressure shall be controlled and documented in accordance with ASTM F2019-22 and the manufacturer's approved procedures. Inversion shall not be used unless specifically approved in writing by the Purchaser for a system demonstrated by the manufacturer to be suitable for that installation.
 - ii. For installations with significant sags, offsets, bends, or other adverse geometry, the Subcontractor shall demonstrate in the installation submittal that the proposed UV GRP CIPP system can be installed and cured without excessive stretch, wrinkles, lifts, folds, or loss of structural performance. The Purchaser may require a pre-installation trial, additional CCTV inspection, or revised installation procedure before work proceeds.
8. Before installation, the liner manufacturer shall submit the minimum pressure required to hold the liner against the host pipe, the normal working pressure, and the maximum allowable pressure that will not damage or over-expand the liner. The Contractor shall continuously monitor and record pressure during inflation and curing. Pressure outside the approved range is cause to stop work and evaluate the liner before proceeding.
 9. The UV GRP liner shall be pulled into place over a continuous sliding foil or other manufacturer-approved protective layer. Pulling force shall be continuously monitored and shall not exceed the manufacturer's published limit. The liner shall be inflated and maintained between the manufacturer's minimum and maximum approved pressures. Before curing, an integrated CCTV inspection mounted on the UV light train or otherwise approved by the manufacturer shall verify liner position, fit, expansion, end seals, and absence of folds, damage, or other conditions requiring correction. Inflation pressure shall be continuously recorded through completion of cure.
 10. The Subcontractor shall be responsible for verifying all active customer service connections prior to rehabilitation.
 11. Locate and Expose Mainline Terminus: The Subcontractor shall, at the direction of the Purchaser, use all means necessary to locate and expose the terminus end of a sanitary sewer mainline when no upstream manhole exists. This may include but is not limited to: CCTV inspection, Sonde, and subsequent excavation of the located terminus. The area exposed shall be large enough to install a new manhole in accordance with Specification Section 02531 Installation and Replacement of Manholes.

3.02 ULTRAVIOLET LIGHT CURING

- A. The UV light train shall be sized and configured for the liner diameter, structural wall thickness, resin/photo-initiator system, and manufacturer's approved cure schedule. The liner shall be inflated to the approved working pressure, and the light train shall be inserted without damaging the inner film/calibration hose or structural liner. UV lamps shall be activated and advanced at the manufacturer's approved speed. The first and last 15 feet shall be cured in accordance with the approved cure schedule. Lamp wattage, operating status, travel speed, internal pressure, liner temperature, date, time, line segment, liner identification, and liner length shall be continuously recorded by the curing system.
- B. Before installation, the Subcontractor shall submit a manufacturer-certified UV Cure Schedule stating lamp configuration and wattage, allowable curing speed, inflation-pressure range, temperature limitations, start and stop procedures, and requirements for the first and last 15 feet of liner. The submitted schedule shall correspond to each liner diameter, structural wall thickness, resin/photo-initiator system, and equipment configuration proposed.

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- C. Curing shall account for liner thickness, resin/photo-initiator system, ambient and host-pipe temperature, groundwater or infiltration, equipment configuration, and other site conditions affecting cure. The UV lamps shall be tuned or optimized for the photo-initiator system, or the photo-initiator system shall be optimized for the output of the UV curing equipment. Deviations from the approved cure schedule require written acceptance by the liner manufacturer and Purchaser.

3.03 POST-CURING AND COOL-DOWN

- A. After the UV light train completes the cure, the liner shall remain under controlled pressure until the manufacturer's specified cool-down and stabilization requirements are met. The Contractor shall then remove the light train, inner film when required, end closures, and temporary equipment without damaging the cured liner. The complete electronic cure log shall be submitted for each liner segment.
- B. The UV curing equipment shall include an integrated camera and tamper-resistant electronic data-acquisition system that continuously records the required curing parameters. The system shall document project name, line segment, date and time, liner identification, curing speed, lamp identification and wattage, lamp status, internal air pressure, internal temperature, and liner length. The complete electronic record shall be provided to the Purchaser with the post-installation submittal.
- C. Termination and Sealing at Manhole Outlets
 - 1. The Subcontractor shall install a pre-formed hydrophilic seal at each location where the CIPP enters or exits a manhole or other access structure. The seal shall fully encircle the liner and shall be designed for sanitary sewer service. Hydrotite by Greenstreak, Insignia by LMK, or an approved equal may be used.
- D. All CIPP lining cutting and sealing at manhole connections shall provide watertight pipe-to-manhole seals. Cured liner ends shall be neatly trimmed and sealed in accordance with the CIPP system manufacturer's approved procedure. Any resin or sealant used at liner terminations shall be compatible with the cured CIPP and shall provide a durable watertight seal without requiring an external heat source unless specifically approved by the Purchaser.
- E. Lateral Reinstatement
 - 1. After the new CIPP lining has been cured and cooled/stabilized in accordance with the manufacturer's requirements, the Subcontractor shall reconnect the existing service laterals identified by the pre-installation CCTV inspection. Reinstatement shall be performed without excavation from the pipeline interior using a television camera and remotely controlled cutting device. Service connections shall be reinstated to at least 95 percent of the original opening area, measured where the lateral enters the host pipe, unless a greater restriction is prohibited by the host-pipe geometry. All connections shall be clean, neat, and free of protruding material that may hinder flow or catch debris. All rehabilitated connections shall be watertight to the extent achievable by the approved CIPP system.
 - 2. Inactive service laterals shall be abandoned by not reopening the service connection after installing the CIPP liner under the direction of the Purchaser.
 - 3. The Subcontractor shall provide a fully operational backup device for reinstating service laterals. If for any reason the remote cutting device fails during a service lateral's reinstatement, the

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subcontractor shall immediately deploy the standby device to complete the reinstatement. The backup equipment shall be on site throughout the reinstatement process

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. 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 line segments and manholes 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 sewage 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, the Subcontractor shall advise those customers that the sewer main is back in service.
- B. Bypass pumping is defined as providing pumps, standby pumps, piping, elevated structural support for aerial crossings, manpower to operate, routine maintenance and repair capability, pipe plugs, fuel, route and pump site clearing and any other work necessary to provide a complete bypass pumping operation. 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. The Subcontractor shall submit design drawings and details that are signed and sealed by a professional engineer licensed in the State of Tennessee. All bypass pump schemes must be submitted to and approved by the Purchaser in advance.
- C. Public advisory services shall 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.
- D. The Subcontractor shall be required to provide businesses with temporary service, as needed, and will be responsible for all necessary bypass pumping flows.

3.06 SUBCONTRACTOR RESPONSIBILITIES

- A. Protection of Downstream Facilities
 - 1. 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.
- B. Wastewater Spills
 - 1. 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

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USEPA or the State of Tennessee.

C. Water

1. The Subcontractor shall 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 shall 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.

D. Safety

1. The Subcontractor shall carry out his operations in strict accordance with all applicable OSHA and SARP10 standards. Particular attention is drawn to those safety requirements involving work on an elevated platform and entry into a confined space.
2. 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.

E. Site Restoration

1. 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.
2. 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.

F. Public Notification

1. Public
 - a. 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.
 - b. 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.
 - c. 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.
2. Purchaser
 - a. 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.

G. Warranty

Modified by SARP10 Program

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

H. 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 a heavy traffic volume, a flagman may also be needed to assist with traffic control. For bidding purposes, the Subcontractor shall assume that a flagman will be needed on 30 percent of the setups. At the end of each working period, the Subcontractor shall plate all open excavations to maintain traffic flow.

PART 4 MEASUREMENT & PAYMENT

4.01 MEASUREMENT

A. Cured-in-Place-Pipe

1. 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.

B. Bypass Pumping

1. Bypass pumping is considered an incidental to CIPP installation for lines 10-inches in diameter and smaller. For lines greater than 10-inches, bypass pumping will be measured per each sewer segment being rehabilitated

C. Lateral Reinstatement

1. Services reinstated shall be measured per each.

D. Locate and Expose Mainline Terminus

1. Service lateral reinstatements using a robotic cutter will be measured per each.

E. Traffic Control

1. Traffic Control will be measured per Crew Day for line segments being rehabilitated. Traffic control does not apply to segments being rehabilitated in alleys or other locations where traffic is not impacted.

4.02 PAYMENT

A. Cured-in-Place-Pipe

1. 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

Modified by SARP10 Program

shall include full compensation for furnishing labor, materials, tools, equipment, and incidentals necessary to furnish, install, and test the CIPP lining, plus 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. This item also includes all sewer bypass for 10-inches and smaller diameter CIPP rehabilitation. Payment will be based on approval and acceptance of post-rehabilitation CCTV in accordance with Section 02541.

B. Bypass Pumping

1. For line segments larger than 10-inches in diameter, bypass pumping will be paid per each line segment being rehabilitated. This item includes all materials and labor necessary to properly comply with the bypass pumping requirements listed in the Specification.

C. Lateral Reinstatement

1. The accepted quantities of lateral reinstatements will be paid per each. This item includes all materials and labor necessary to properly comply with the Specification.

D. Locate and Expose Manhole Terminus

1. Locate and expose mainline terminus will be paid for at the contract unit price per each. This item will include but not be limited to all means necessary for locating and excavating the terminus of the sewer when no manhole exists. This item will not include any pay items related to the installation of a new manhole

E. Traffic Control

1. Traffic control will be paid per Crew Day for sewer segments rehabilitated including all appurtenances required to comply with MUTCD standards. Traffic control does not apply to segments being rehabilitated in alleys or other locations where traffic is not impacted.

4.03 PAYMENT WILL BE MADE UNDER:

Item No.	Pay Item	Pay Unit
02538-4.02.A	CURED-IN-PLACE PIPE, EACH DIAMETER	LINEAR FOOT
02538-4.02.B	BYPASS PUMPING	EACH
02538-4.02.C	LATERAL REINSTATEMENT	EACH
02538-4.02.D	LOCATE AND EXPOSE MAINLINE TERMINUS	EACH
02538-4.02.E	TRAFFIC CONTROL	CREW DAY

END OF SECTION 02538

Christian Brothers - Humphrey CIPP Rehab Project - Pipe Bid Schedule

Numbers in RED are estimated numbers and have not been field verified

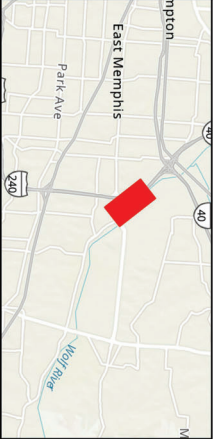
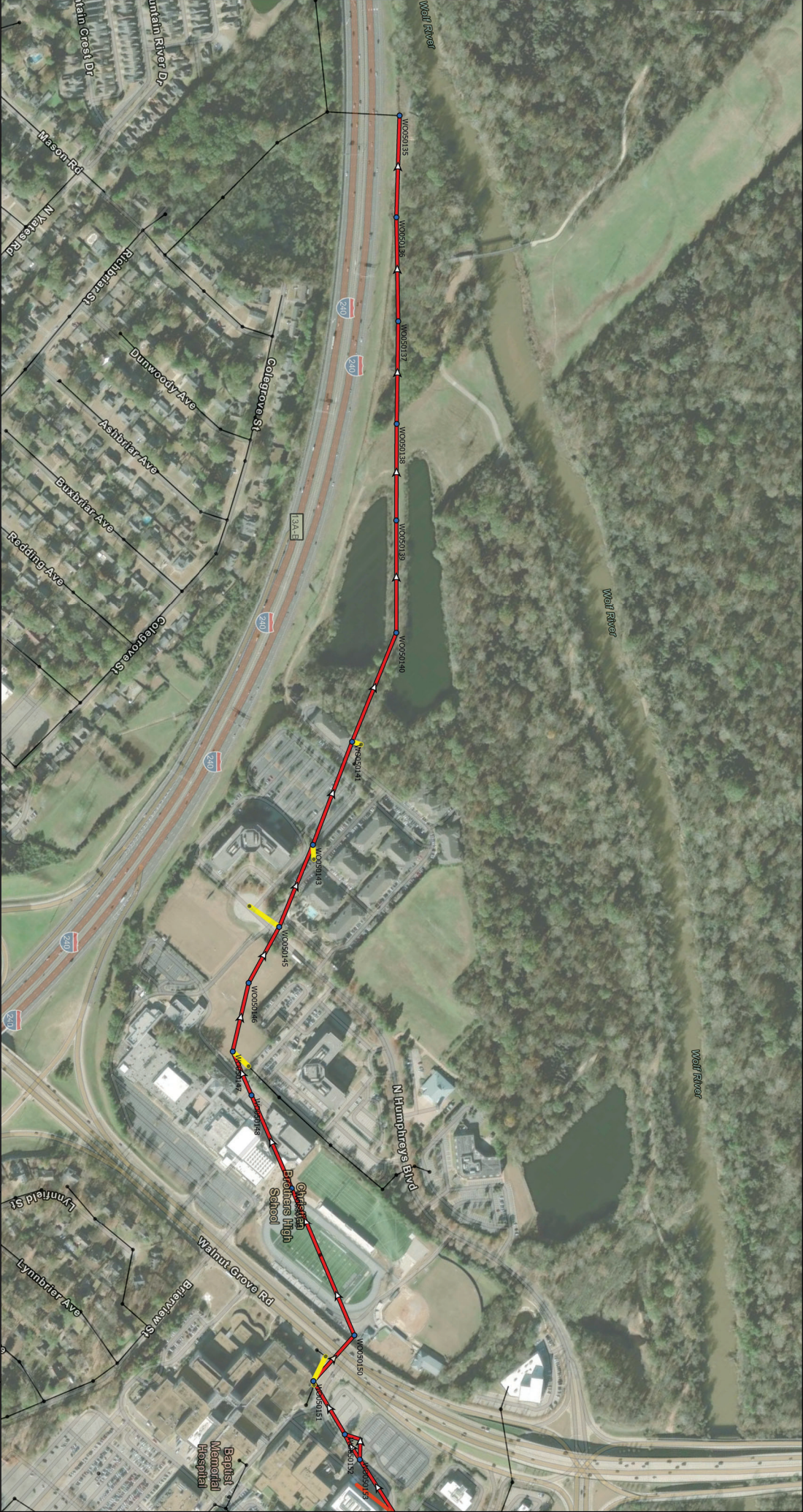
	Sheet	US MH [Approx. Depth (ft)]	DS MH [Approx. Depth (ft)]	Diameter (in.)	Material	Repair Method	Pipe Length (lf)	Sediment Volume (cf)
WO050136S	1	WO050136 [11.07]	WO050135 [11.08]	42	Reinforced Concrete Pipe	CIPP	446	61.73
WO050137S	1	WO050137 [11.14]	WO050136 [11.07]	42	Reinforced Concrete Pipe	CIPP	514	53.01
WO050138S	1	WO050138 [11.39]	WO050137 [11.14]	42	Reinforced Concrete Pipe	CIPP	397	25.67
WO050139S	1	WO050139 [11.54]	WO050138 [11.39]	48	Reinforced Concrete Pipe	CIPP	427	209.42
WO050140S	1	WO050140 [8.78]	WO050139 [11.54]	48	Reinforced Concrete Pipe	CIPP	476	527.84
WO050141S	1	WO050141 [15.74]	WO050140 [8.78]	48	Reinforced Concrete Pipe	CIPP	515	598
WO050143S	1	WO050143 [18.4]	WO050141 [15.74]	48	Reinforced Concrete Pipe	CIPP	511	716
WO050145S	1	WO050145 [15.46]	WO050143 [18.4]	48	Reinforced Concrete Pipe	CIPP	382	456
WO050146S-2	1	WO050146 [17.58]	WO050145 [15.46]	48	Reinforced Concrete Pipe	CIPP	282	267
WO050147S	1	WO050147 [18.17]	WO050146 [17.58]	48	Reinforced Concrete Pipe	CIPP	303	415
WO050148S	1	WO050148 [20.19]	WO050147 [18.17]	48	Reinforced Concrete Pipe	CIPP	210	169
WO050149S	1	WO050149 [13.83]	WO050148 [20.19]	48	Reinforced Concrete Pipe	CIPP	450	669
WO050149.01S	1	WO050149.01 [12.21]	WO050149 [13.83]	48	Reinforced Concrete Pipe	CIPP	319	424
WO050150S	1	WO050150 [11.19]	WO050149.01 [12.21]	48	Reinforced Concrete Pipe	CIPP	382	669
WO050151S	1	WO050151 [25.8]	WO050150 [11.19]	48	Reinforced Concrete Pipe	CIPP	259	257
WO050152S	1	WO050152 [18.7]	WO050151 [25.8]	48	Reinforced Concrete Pipe	CIPP	269	414
WO050153S-1	1	WO050153 [13]	WO050152 [18.7]	24	Ductile Iron Pipe	CIPP	132	68
WO050153S-2	1	WO050153 [13]	WO050152 [18.7]	42	Ductile Iron Pipe	CIPP	132	307
WO050154S	1	WO050154 [13.65]	WO050153 [13]	48	Reinforced Concrete Pipe	CIPP	290	132
WO050155S	2	WO050155 [12.71]	WO050154 [13.65]	48	Reinforced Concrete Pipe	CIPP	433	444
WO050156S	2	WO050156 [13.2]	WO050155 [12.71]	48	Reinforced Concrete Pipe	CIPP	203	263
WO050157S	2	WO050157 [13.34]	WO050156 [13.2]	48	Reinforced Concrete Pipe	CIPP	104	167
WO050158S	2	WO050158 [13.76]	WO050157 [13.34]	42	Reinforced Concrete Pipe	CIPP	115	67
WO050159S	2	WO050159 [14.9]	WO050158 [13.76]	42	Reinforced Concrete Pipe	CIPP	500	438
WO050160S	2	WO050160 [14.9]	WO050159 [14.9]	42	Reinforced Concrete Pipe	CIPP	55	28.44
WO050161S	2	WO050161 [15.1]	WO050160 [14.9]	42	Reinforced Concrete Pipe	CIPP	337	289.5
WO050162S	2	WO050162 [12.16]	WO050161 [15.1]	42	Reinforced Concrete Pipe	CIPP	209	226

WO050163S	2	WO050163 [14.8]	WO050162 [12.16]	42	Reinforced Concrete Pipe	CIPP	168	180.17
WO050163.01S	2	WO050163.01 [15.05]	WO050163 [14.8]	42	Reinforced Concrete Pipe	CIPP	418	368.44
WO050164S	2	WO050164 [17.15]	WO050163.01 [15.05]	42	Reinforced Concrete Pipe	CIPP	425	333.11
WO050165.01S	2	WO050165.01 [13.95]	WO050165 [14.02]	42	Reinforced Concrete Pipe	CIPP	136	319.55
WO050165S	2	WO050165 [14.02]	WO050164 [17.15]	42	Reinforced Concrete Pipe	CIPP	314	219.64
WO060116.01S	2	WO060116.01 [16.41]	WO060116 [17.84]	42	Reinforced Concrete Pipe	CIPP	80	132
WO060116S	2	WO060116 [17.84]	WO060115 [18.29]	42	Reinforced Concrete Pipe	CIPP	482	451
WO060117S	2	WO060117 [14.16]	WO060116.01 [16.41]	42	Reinforced Concrete Pipe	CIPP	407	522
WO060118S	3	WO060118 [16.8]	WO060117 [14.16]	42	Reinforced Concrete Pipe	CIPP	577	688
WO060118.01S	3	WO060118.01 [17.1]	WO060118 [16.8]	42	Reinforced Concrete Pipe	CIPP	383	488
WO060119S	3	WO060119 [17.95]	WO060118.01 [17.1]	42	Reinforced Concrete Pipe	CIPP	135	128
WO060120S	3	WO060120 [17.9]	WO060119 [17.95]	42	Reinforced Concrete Pipe	CIPP	330	423
WO060121S	3	WO060121 [17.84]	WO060120 [17.9]	42	Reinforced Concrete Pipe	CIPP	190	196
WO060122S	3	WO060122 [11.1]	WO060121 [17.84]	42	Reinforced Concrete Pipe	CIPP	280	505
WO060123S	3	WO060123 [8.33]	WO060122 [11.1]	42	Reinforced Concrete Pipe	CIPP	574	763
Estimated Total Debris								14,079

Christian Brothers - Humphrey CIPP Rehab Project -
Manhole Rehab Bid Schedule

**Numbers in RED are estimated numbers and have not
been field verified**

MH ID	Sheet	Diameter (in.)	Manhole Height (ft)
WO050135	1	60	11.1
WO050136	1	60	11.1
WO050137	1	60	11.1
WO050138	1	60	11.4
WO050139	1	60	11.5
WO050140	1	60	13.7
WO050141	1	60	15.7
WO050143	1	60	18.4
WO050145	1	60	15.5
WO050146	1	60	17.6
WO050147	1	60	17.0
WO050148	1	60	20.2
WO050149	1	60	13.8
WO050149.01	1	60	12.2
WO050150	1	60	10.0
WO050151	1	84	25.8
WO050152	1	84	18.7
WO050153	2	84	13.0
WO050154	2	84	13.7
WO050155	2	84	12.7
WO050156	2	84	13.2
WO050157	2	84	13.3
WO050158	2	84	13.8
WO050159	2	60	14.9
WO050160	2	60	14.9
WO050161	2	60	15.1
WO050162	2	60	12.2
WO050163	2	60	14.8
WO050163.01	2	60	15.1
WO050164	2	60	17.2
WO050165	2	60	14.0
WO050165.01	2	60	14.0
WO060115	2	60	18.3
WO060116	2	60	17.8
WO060116.01	2	60	16.4
WO060117	2	60	14.2
WO060118	3	60	16.8
WO060118.01	3	60	17.1
WO060119	3	60	18.0
WO060120	3	60	17.9
WO060121	3	60	17.8
WO060122	3	60	11.1
WO060123	3	60	10.0
Total			641.9



Manhole Rehab

- Manhole Rehab (17)

Pipe Rehab

- Gravity Sewer for CIPP (20)

Sideline Sizes

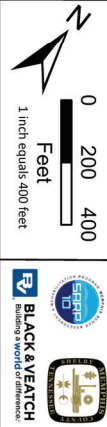
- Private Line (1)
- Private Line (1)
- 8" (6)
- 10" (0)
- 15" (0)
- 24" (0)
- 42" (0)

Existing Manhole (No Rehab)

Sewer Gravity Main (no Rehab)

Current Grid: 1

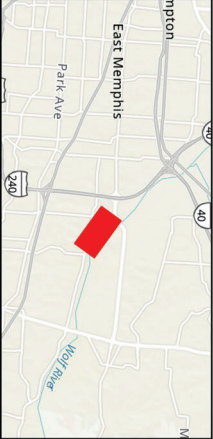
Page 1 of 3



SARP10 Rehabilitation Project

Humphrey's Blvd CIPP- Group 6 CIPP





Manhole Rehab

- Manhole Rehab (18)

Pipe Rehab

- Gravity Sewer for CIPP (20)

Sideline Sizes

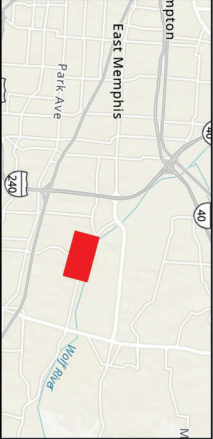
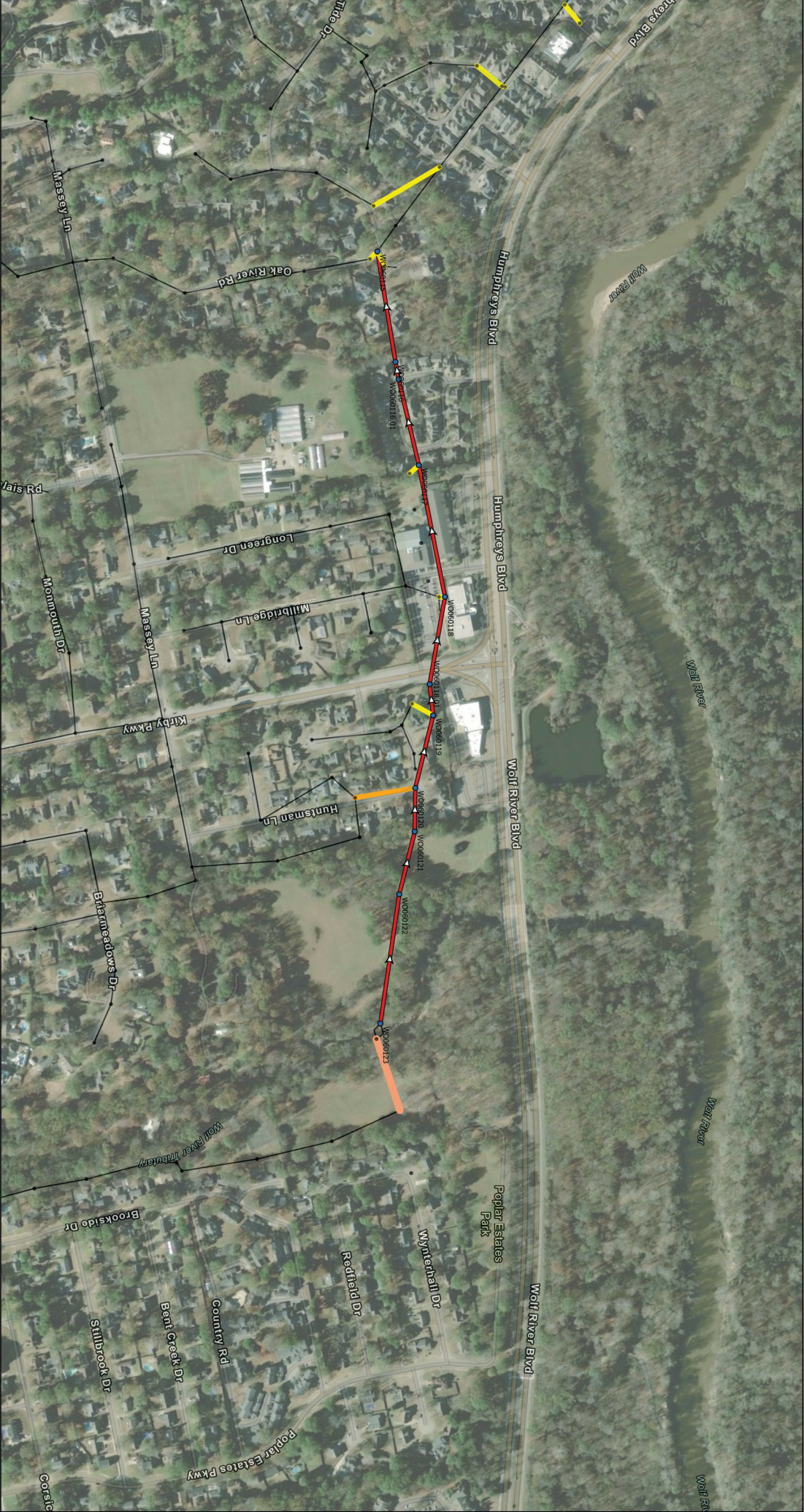
- Private Line (4)
 - 8" (12)
 - 10" (1)
 - 15" (0)
 - 24" (1)
 - 42" (0)

- Existing Manhole (No Rehab)
- Sewer Gravity Main (no Rehab)

Current Grid: 2
Page 2 of 3



SARP10 Rehabilitation Project
Humphreys Blvd CIPP - Group 6 CIPP



Manhole Rehab

- Manhole Rehab (11)

Pipe Rehab

- Gravity Sewer for CIPP (10)

Sideline Sizes

- Private Line (0)
- 8" (9)
- 10" (0)
- 15" (1)
- 24" (0)
- 42" (1)

Existing Manhole (No Rehab)

Sewer Gravity Main (no Rehab)

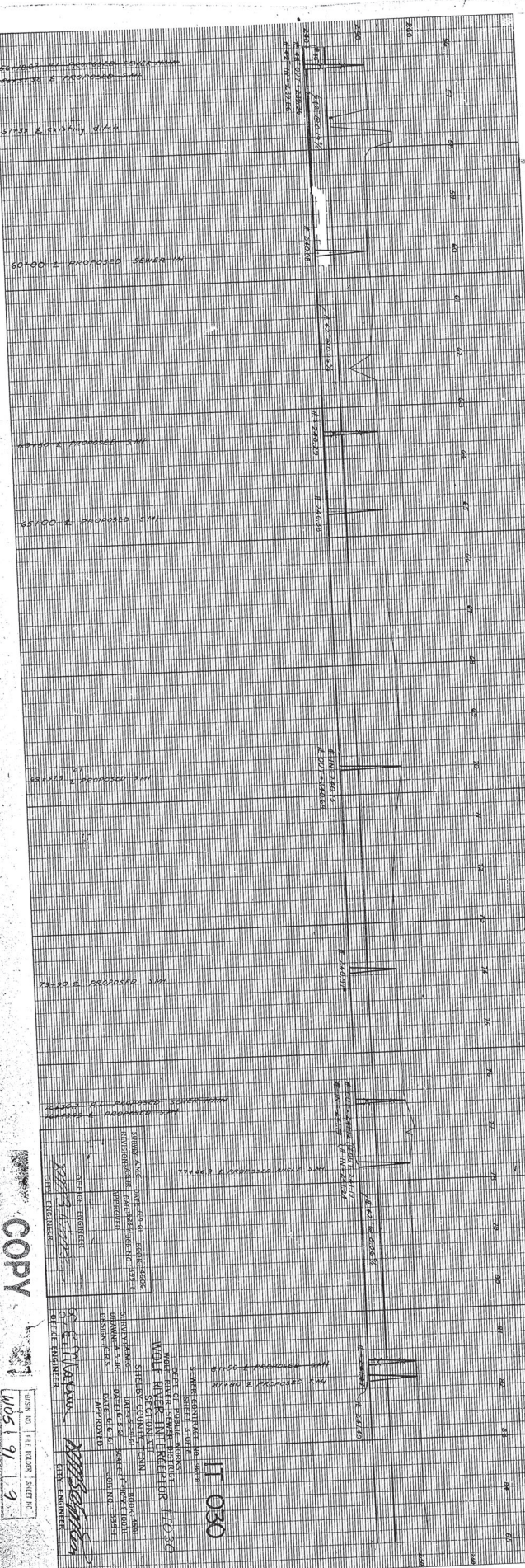
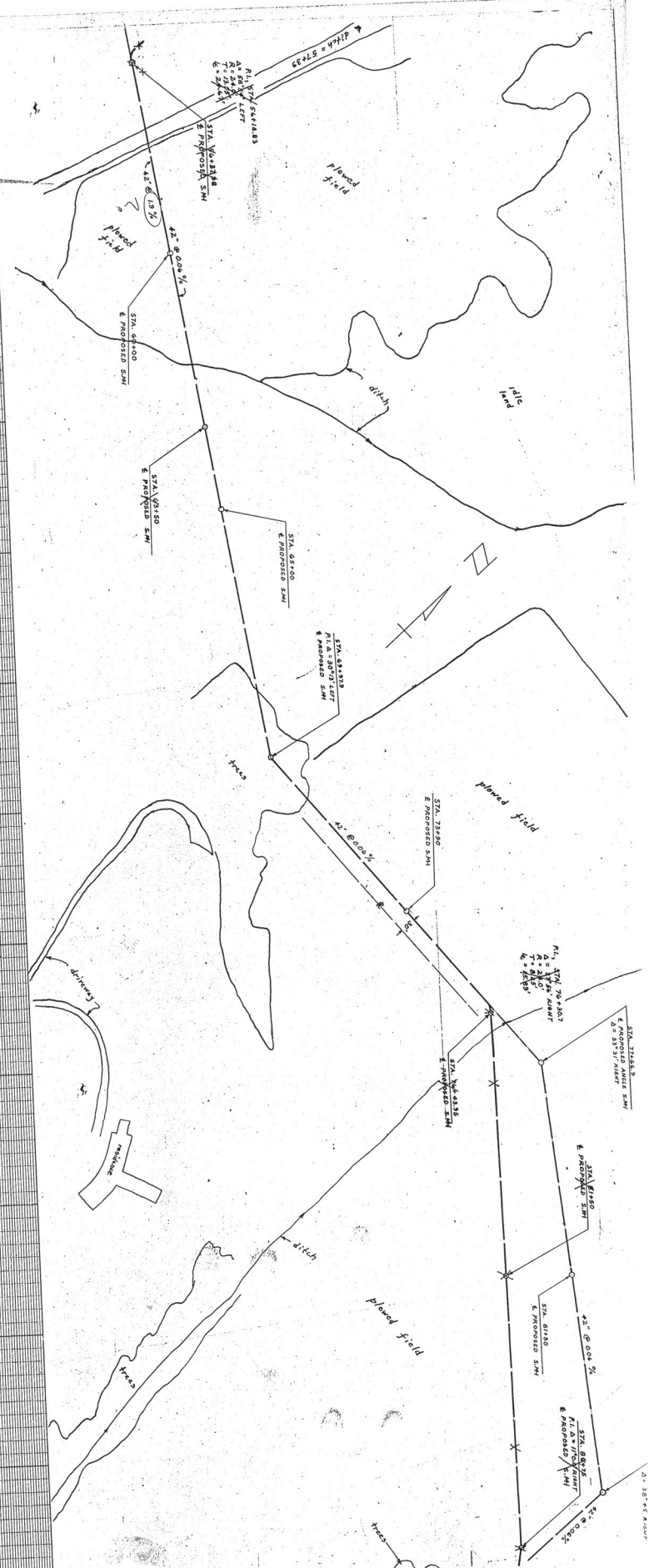
Current Grid: 3

Page 3 of 3



SARP10 Rehabilitation Project

Humphreys Blvd CIPP - Group 6 CIPP



PROJECT INFORMATION

PROJECT NO. 17030
 SHEET NO. 17030
 DATE 10/1/81
 DRAWN BY J. C. B. 10/1/81
 CHECKED BY J. C. B. 10/1/81
 APPROVED BY J. C. B. 10/1/81

ENGINEER INFORMATION

ENGINEER J. C. B.
 FIRM J. C. B. & ASSOCIATES
 ADDRESS 1000 N. 10th St., Suite 100, Lincoln, NE 68502
 PHONE (402) 441-1111

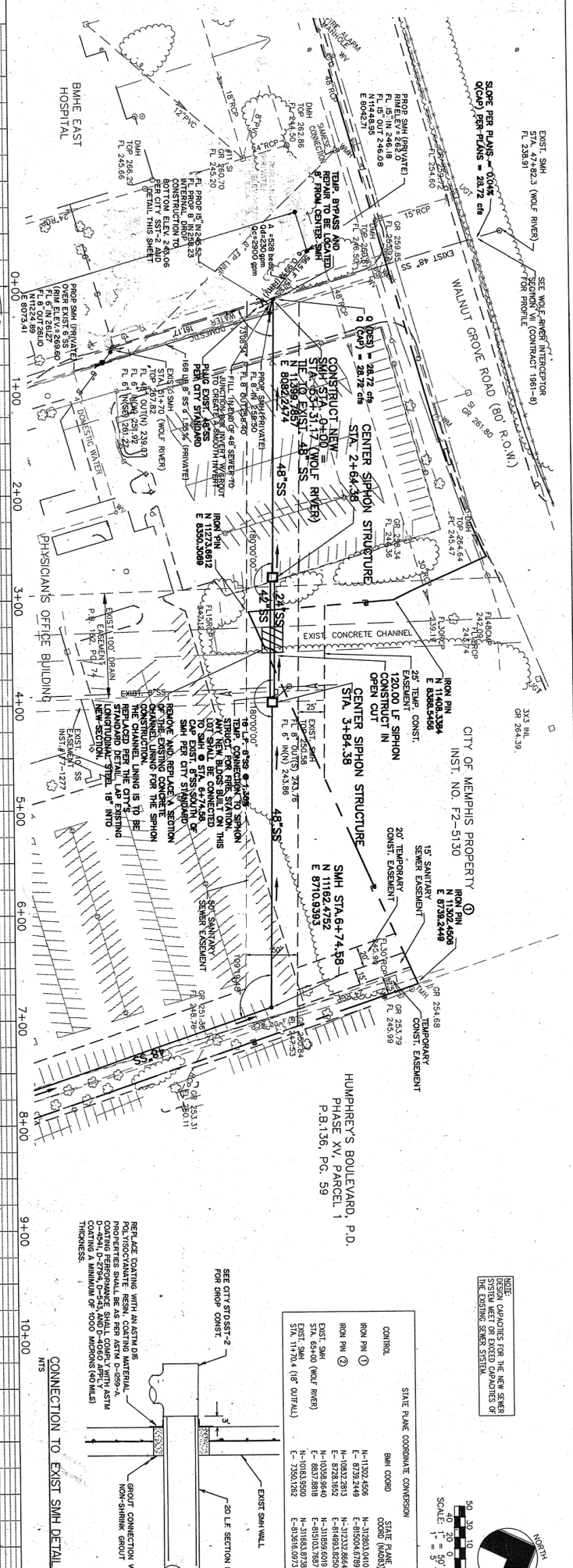
CLIENT INFORMATION

CLIENT CITY OF LINCOLN
 PROJECT SEWER MAIN
 LOCATION 17030

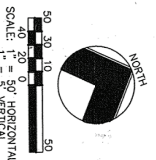
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ORIGINAL ARCHITECT DRAFTER

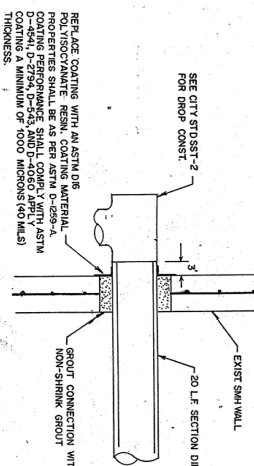
SEE MEETING # 21-23



NOTE: CAPACITIES FOR THE NEW SEWER SYSTEM MEET OR EXCEED CAPACITIES OF THE EXISTING SEWER SYSTEM.



CONTROL	STATE PLANE COORDINATE CONVERSION
BMH C080	BMH C080
BMH C081	BMH C081
BMH C082	BMH C082
BMH C083	BMH C083
BMH C084	BMH C084
BMH C085	BMH C085
BMH C086	BMH C086
BMH C087	BMH C087
BMH C088	BMH C088
BMH C089	BMH C089
BMH C090	BMH C090
BMH C091	BMH C091
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BMH C096	BMH C096
BMH C097	BMH C097
BMH C098	BMH C098
BMH C099	BMH C099
BMH C100	BMH C100



CONNECTION TO EXIST SMH DETAIL

BMH - CITY OF MEMPHIS
 1.B.M. - BASE OF N.W. CORNER OF CONCRETE BASE OF LIGHT POLE NO. 253.23

APPROVED FOR CONSTRUCTION

THE UNDERSIGNED, BEING A duly qualified and experienced civil engineer, and being duly sworn, depose and say that the foregoing is a true and correct copy of the plans and specifications for the above described project, and that the same have been approved by me for construction.

APPROVED BY THE CITY ENGINEER
 THIS APPROVAL SHALL BE IN FULL FORCE AND EFFECT ONLY WHEN THE CITY ENGINEER HAS REVIEWED THE PROJECT AND HAS DETERMINED THAT THE PROJECT MEETS ALL CITY REQUIREMENTS.

DATE	DESCRIPTION	APPROVED
3/14/00	Revised to reflect As-Built Conditions	BMH

DATE	DESCRIPTION	APPROVED
3/14/00	Revised to reflect As-Built Conditions	BMH

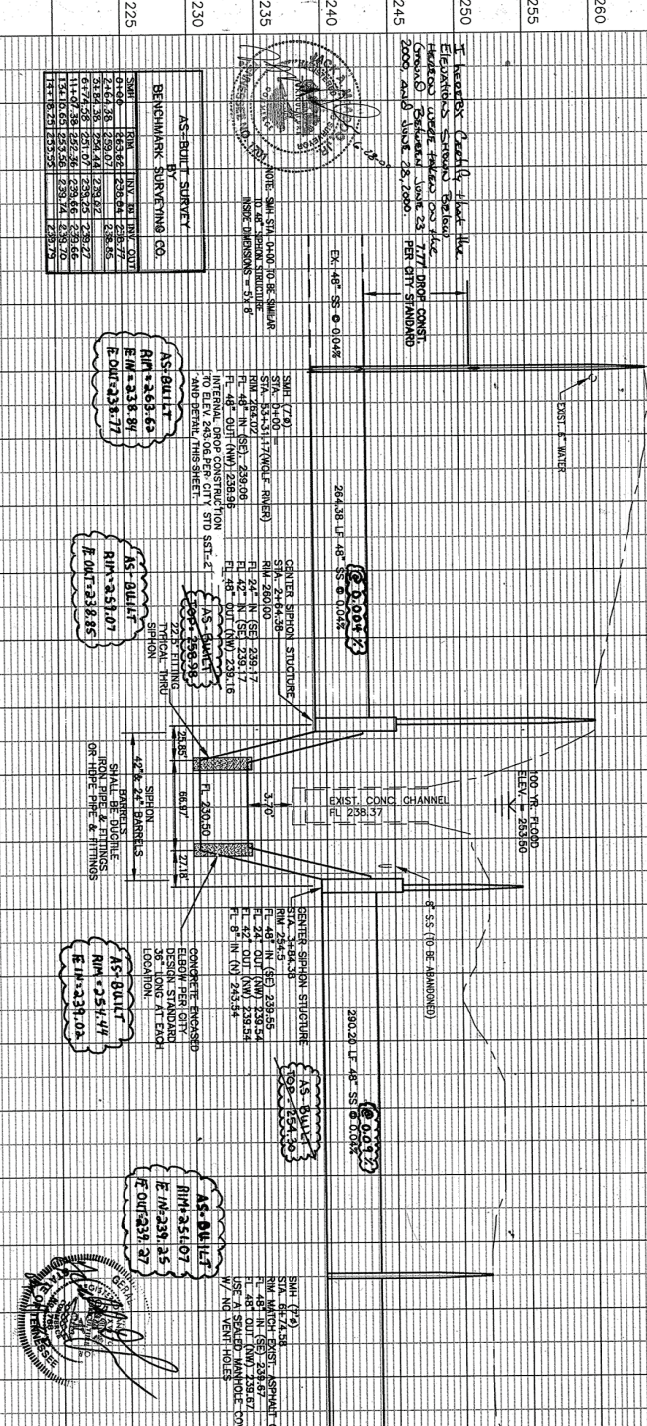
BMH EAST SEWER RELOCATION
 DETENTION BASIN, MEMPHIS HEALTH CARE
 ENGINEER: ETI Corporation

48" WOLF RIVER INTERCEPTOR RELIEF
 MEMPHIS, TENNESSEE
 DIVISION OF PUBLIC WORKS
 SHEET NO. 2

ETI Drawing No. C7.01

H-23, 30
 687

MAIN NO. FILE FOLDER SHEET NO.
 W05 PP 30



DATE	DESCRIPTION	APPROVED
3/14/00	Revised to reflect As-Built Conditions	BMH

DATE	DESCRIPTION	APPROVED
3/14/00	Revised to reflect As-Built Conditions	BMH

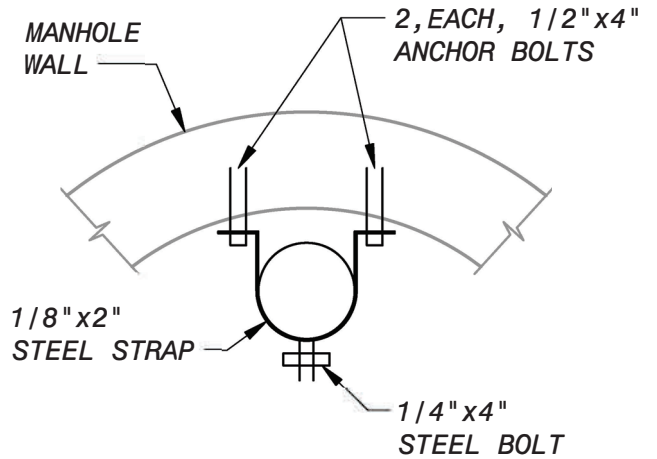
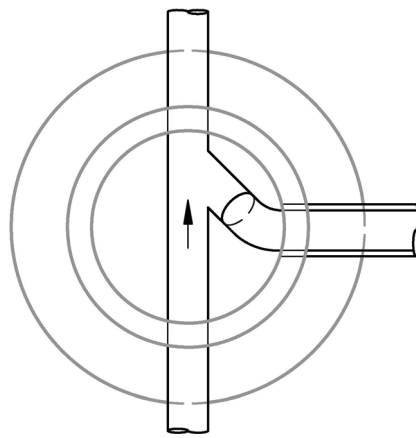
BMH EAST SEWER RELOCATION
 DETENTION BASIN, MEMPHIS HEALTH CARE
 ENGINEER: ETI Corporation

48" WOLF RIVER INTERCEPTOR RELIEF
 MEMPHIS, TENNESSEE
 DIVISION OF PUBLIC WORKS
 SHEET NO. 2

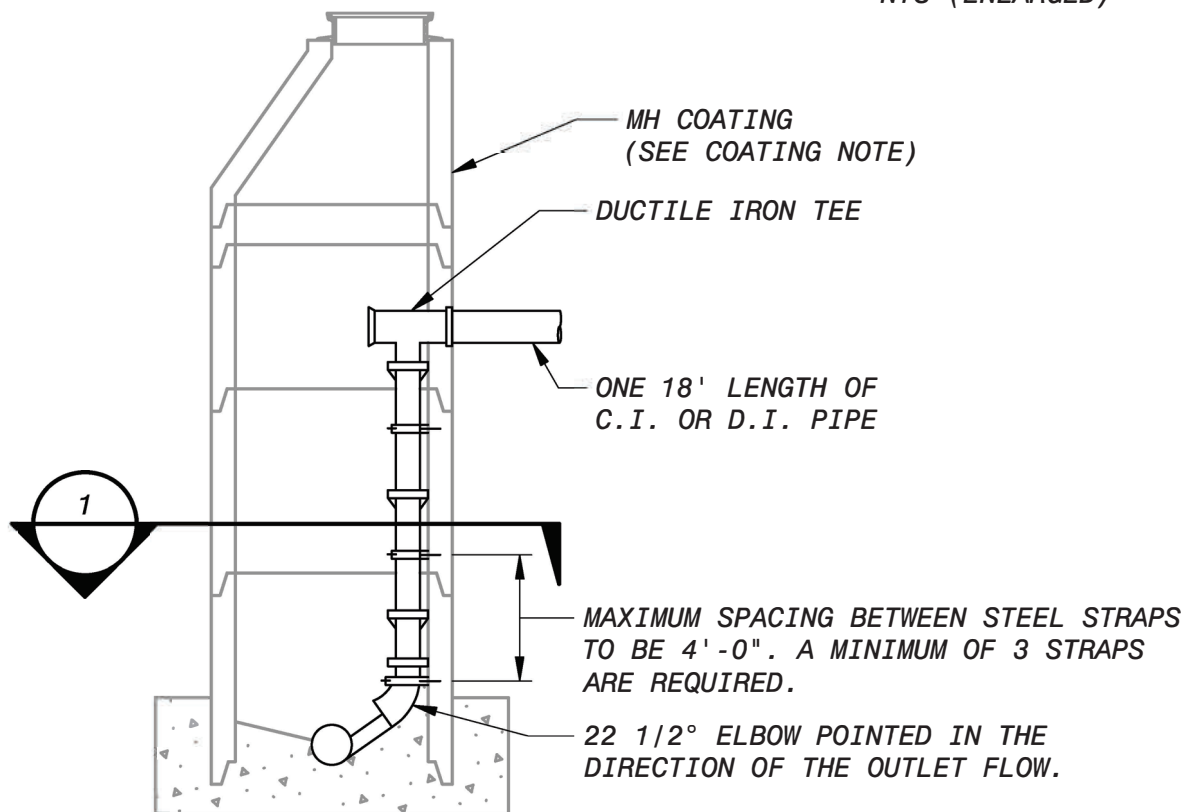
ETI Drawing No. C7.01

H-23, 30
 687

MAIN NO. FILE FOLDER SHEET NO.
 W05 PP 30



1 **SECTION**
NTS (ENLARGED)



INSIDE DROP
(SEE NOTE 2)

* OPENING IN MH WALL TO BE GROUTED WITH HIGH STRENGTH, QUICK SETTING, NON-SHRINKING CEMENT GROUT.

NOTES:

1. TO BE USED, WHERE REQUIRED, ON NEW MANHOLES.
2. TO BE USED ON ALL EXISTING MH'S, WHERE REQUIRED.
3. SDR 26 SOLID WALL PVC CAN BE USED FROM THE BOTTOM OF THE TEE THROUGH THE 22.5° ELBOW



BLACK & VEATCH
Building a world of difference.®

SARP10

**SANITARY MANHOLE DROP
CONSTRUCTION SST-2**

