Jacobs

Macon Water Authority

Addendum No.3

Lower Rocky Creek WRF 42" & 24" Gravity Sewer Rehabilitation

Macon, Georgia,

Date: September 26, 2025

This addendum forms a part of the Contract Documents and modifies the original Specifications and Contract Documents as noted below. Acknowledge receipt of this addendum in the space provided on the Bid Form. Failure to do so may result in disqualification of the bidder.

The following additions/changes modify the Request for Proposal for the referenced project, dated August 21, 2025.

Clarifications

C11. Specification 01 29 00 (1.06) (C) Items 10-13 delete "Pre-installation cleaning, pre-installation and post-installation CCTV inspections," and "manhole rehabilitation and preparation".

C12. Specification 01 57 28 (3.07) delete bullet (C).

C13. Specification 33 01 30.70 (2.01)(B)(3) between numbers (2) and (3) please add bullet (b.) labelled as "Secondary Catalyst:" and renumber (3) and (4) as (1) and (2) respectively.

C14. Specification 33 01 30.70 (2.01)(C)(16) add bullet "e. United Felts"

C15. Specification 33 01 30.70 (3.10)(C) Gravity Pipe Leakage Testing: remove this section in its entirety and relabel subsequent sections (D) and (E)

Questions

Q31. Referring to Spec Section 33 01 30.70 (CIPP) – Section 3.1C regarding the gravity pipe leakage testing. Will it be acceptable to start the Hydrostatic Exfiltration Test during a hydrostatic inversion/cure for each CIPP installation? Recommendation would be to eliminate the hydrostatic or pneumatic testing requirement from the specifications for gravity sewer pipe since there are also CIPP sample testing requirements. This requirement will cause additional time added to each installation, additional cost, and extended construction time.

A31. Refer to attached revised Specification 33 01 30.70, Cured-in-place Pipe Liner (Gravity Pipe).

Q32. Referring to Spec Section 33 01 30.70 (CIPP) – Section 3.1C, 2, 3c regarding the Length of gravity pipe leakage testing. Length of pipe tested has a limit of 700 LF. We will need to have much longer CIPP installations lengths due to limited access conditions within the easements. Can this length of test have no limitation. Recommendation would be to eliminate the hydrostatic or pneumatic testing requirement from the specifications for gravity sewer pipe since there are also CIPP sample testing requirements. This requirement will cause additional time added to each installation, additional cost, and extended construction time.

A32. Refer to attached revised Specification 33 01 30.70, Cured-in-place Pipe Liner (Gravity Pipe).

Q33. Referring to Spec Section 33 01 30.70 (CIPP) – Section 3.1C regarding acceptance of UV Cure Lining per ASTM F2019. The UV Cure Lining installations are pull-in-place liner applications with air inflation during the UV cure. Will it still be required to Hydrostatic Exfiltration Test or Pneumatic Test the UV liner installations? This requirement will cause additional time added to each installation, additional cost, and extended construction time. Recommendation would be to eliminate the hydrostatic or pneumatic testing from the specifications for gravity sewer pipe since there are also other forms of testing the product/installation.

A33. Refer to attached revised Specification 33 01 30.70, Cured-in-place Pipe Liner (Gravity Pipe).

Q34. Could you please provide the latest plan holder's list?

A34. Yes, updated plan holders list will be updated on the MWA website.

Q35. CIPP specification section 33 01 30.70, Paragraph 1.06.A.3 for CIPP design criteria states a minimum 2% ovality or as determined in the field by the Contractor with a max of 10%. For bidding purposes to keep all bids otherwise consistent, could you please confirm 2% ovality should be used in thickness design on all segments? And if a greater ovality is field verified during construction requiring a thicker liner, that the contractor will be compensated for such?

A35. Yes, 2% ovality should be used for liner thickness design. If greater ovality is verified in the field, the contractor must notify the engineer, and any design adjustments will be reviewed with the Owner. Compensation for changes due to field conditions will be evaluated in accordance with contract provisions.

Q36. CIPP specification section 33 01 30.70, Paragraph 1.06.A.5 for CIPP design criteria states groundwater elevation at surface or 100-year flood elevation. Is it correct to assume contractors are to use the greater (higher) of the surface or 100-year flood elevation in design calculations? Do you have a designated 100-year flood elevation to use, or should the floodplain elevation shown on the drawings (which varies throughout the project) be used?

If using the higher of the two, could you please confirm the floodplain elevation on drawings 05-C-213 and 214 is lower than the surface elevation?

A36. It is correct to assume contractors are to use the greater (higher) of the groundwater elevation at surface or 100-year flood elevation in design calculations. The approximate 100-yr floodplain elevations shown in the drawings can be used for this purpose.

Groundwater elevation at surface can be used for other instances including Edna Pl and Shurling Dr.

Q37. CIPP specification section 33 01 30.70, Paragraph 1.08.C mentions a Warrantee Inspection in the 11th month following final acceptance. Please confirm the Owner is responsible for this inspection and any associated CCTV, access, bypass, etc.

A37. Per specification section 33 01 30.70, Paragraph 1.08.C Inspection shall be conducted by the Owner or designated representative of the Owner.

Q38. CIPP specification section 33 01 30.70, Paragraph 2.01.A.5 states only neat resins are acceptable. Enhanced resins have become the industry norm while also providing increased strength and ultimately a more cost effective CIPP end product for the Owner. Will enhanced resins be allowed?

A38. No, enhanced resins will not be accepted.

Q39. CIPP specification section 33 01 30.70, Paragraph 3.08.C.2 states service lateral connections to new 10" CIPP and larger to be made with an Inserta-Tee. From the pipe rehab schedule in the drawings, there are only two lateral connections on these mains, both on 42" diameter. Will these laterals require an Inserta-Tee, or will standard internal reinstatements be allowed in lieu of open-cut? Could you also please confirm there are only two laterals coming into the mains on this project?

A39. The Contractor is responsible for identifying all existing lateral connections and determining the appropriate method of reconnection in accordance with the specifications. Inserta-Tees shall be used where applicable, as specified in Section 33 01 30.70, Paragraph 3.08.C.2. The pipe rehabilitation schedule is based on record drawings and inspections performed by CES and documented in the WINCAN reports. The Contractor shall conduct their own investigations to verify the number and location of lateral connections and confirm field conditions prior to installation.

Q40. CIPP specification section 33 01 30.70, Paragraph 3.10.C.2 lists the procedures for performing a hydrostatic exfiltration test on CIPP greater than 18 inches. The hydrostatic head portion states to set the water level at least 6 feet above max groundwater level, but no less than 6 feet above inside top of highest section of pipe in test section, and not to exceed 16 feet of water column (almost 7 psi). It also states to determine water table by exploratory holes or other methods. Could you please elaborate on the intent and requirements of this hydrostatic pressure test?

i. Would you consider removing this pressure test on pipe sizes larger than 18" diameter as CCTV inspections will reveal a vast majority of potential leaks or quality issues?

ii. If the hydrostatic pressure test remains a requirement, what is the test duration and allowable leakage? This section mentions minimum 2 hours but while adding make-up water as necessary to restore test pressure (potentially 6.9 psi for 2 hours)?

iii. Will ASTM F1216 section 8.2 (Gravity Pipe Leakage Testing) apply, as this test is limited to pipe diameters up to 36" diameter?

A40. i. The hydrostatic pressure test will remain a requirement for CIPP installations greater than 18 inches in diameter.

ii. The minimum test duration is 2 hours, and leakage observed will need to be reported to the Engineer and Owner for review and further determination on actions required.

iii. ASTM F1216 Section 8.2 applies to gravity pipe leakage testing up to 24 inches in diameter. For pipe diameters greater than 24 inches, including 42-inch installations, the contractor must follow the hydrostatic exfiltration test procedures outlined in the project specifications. If additional clarification is needed for larger diameters, the Engineer will provide supplemental criteria consistent with industry standards and project requirements.

Q41. CIPP specification section 33 01 30.70, Paragraph 3.10.D.1 mentions restrained samples as well as flat plates for testing. Restrained samples are not typically used on larger diameters. Would you please confirm flat plate samples will be allowed for the 21"-42" diameters in lieu of restrained samples?

A41. Flat plate samples will be acceptable for CIPP installations in pipes greater than 18 inches in diameter.

Q42. CIPP specification section 33 01 30.70, Will only one test be required for physical properties of modulus of elasticity and flexural strength per paragraph 3.10.D.3?

A42. Testing for physical properties shall be performed once per resin batch and once per installation, in accordance with Specification Section 33 01 30.70.

Q43. Regarding the bid form, please confirm the "ADDITIVE ALTERNATE #1" should not be included in the total bid amount. Also, will the basis of award be on Base Bid only, or combination of Base Bid plus Additive Alternate #1?

A43. Additive Alternate #1 should not be included in the Total Bid Amount. The Total Bid should reflect the Base Bid only, as outlined in the bid documents.

The basis of award will be determined solely on the Base Bid amount, not a combination of the Base Bid and Additive Alternate #1. The alternate may be considered separately at the Owner's discretion, but it will not factor into the evaluation of the lowest responsive bidder.

Additionally, bidders shall price Additive Alternate #1 for the full scope of work associated with the 24-inch pipe rehabilitation, not the cost differential between the 21-inch and 24-inch diameters.

Q44. What is the Additive Alternate #1 for 3,400 LF of 24" sewer rehab at Edna Place? Is this the same scope as the 21" Edna Place (also 3,400 LF) in case the diameter is actually 24" vs base bid 21"? There is no description otherwise. Please advise.

A44. Yes, the scope of Additive Alternate #1 is identical to the base bid scope for the 21-inch sewer rehabilitation at Edna Place. The alternate is included to account for the possibility that the actual pipe diameter is 24 inches, as the size could not be definitively verified during design.

Q45. Measurement and Payment Section 01 29 00 states cleaning is included in the CCTV Inspection bid items. However, there are light cleaning and heavy cleaning bid items. The CIPP description also states cleaning and CCTV is included in these bid items. How will cleaning be paid?

A45. Cleaning will be paid under the designated bid items for light cleaning and heavy cleaning, as applicable. Do not include cleaning costs within the CIPP rehabilitation bid item.

Q46. Measurement and Payment Section 01 29 00 for Light Cleaning states it "includes light cleaning and root cutting". However, there are Heavy Cleaning/Root Cleaning bid items. Could you please clarify how root cutting will be paid?

A46. Root cutting will be paid based on the extent of root intrusion and the method required for removal, as defined in Specification Section 33 01 30.51:

- **Light Cleaning, which includes root cutting, applies when the pipe is less than 25% full of debris and roots can be removed using normal high-pressure jetting equipment.**
- **Heavy Cleaning/Root Cleaning applies when the pipe is more than 25% full of debris or when root removal requires the use of specialized apparatus beyond standard jetting equipment.**

Prior consent from the Owner is required before performing and billing for Heavy Cleaning. The Owner will make the final determination based on field conditions and the equipment used.

Q47. Please confirm Heavy Cleaning/Root Cutting will be paid in lieu of Light Cleaning, and not in addition to Light Cleaning.

A47. Correct—Heavy Cleaning/Root Cutting will be paid in lieu of Light Cleaning, not in addition to it for the same segment of pipe.

Q48. Measurement and Payment Section 01 29 00 for CIPP states "manhole rehabilitation and preparation" is included in the CIPP pay item. Please confirm that is incorrect and manhole rehab is not incidental to CIPP LF price.

A48. Refer to attached revised Specification 01 29 00, Measurement and Payment. Manhole rehabilitation is not incidental to the CIPP linear foot price and will be paid under separate bid items specifically designated for manhole rehabilitation.

Q49. The bid form currently has two bid items 2h and 2i for Point Repairs at various depths with 1 LS. Could you please confirm these are undefined point repairs? Could you also please revise the unit to Each instead of Lump Sum in case there are more than one point repair? Could you please provide a measurement and payment description for these point repairs that includes the repair length?

A49. The depth of the point repair is undefined to address an observed obstruction in the pipe. CCTV has been provided for the bidders to review and estimate point repair length accordingly. Bidders are responsible for evaluating the available inspection data and determining the appropriate scope and pricing for the repair. Any additional point repairs will be evaluated individually by the Owner.

Q50. Could you please provide locations of nearby hydrants that are available for use?

A50. GIS maps are provided for reference as part of this addendum. These maps will include the locations of public hydrants available for use during construction.

Q51. Does the Owner have a location for debris disposal collected during the sewer cleaning phase and if so, what are the associated fees, if any?

A51. Please refer to the response to Q8.

Q52. The drawings include a General Note for "Contractor to replace frame and cover for all manholes receiving work." Will this be required and if so, how will this be paid since there is no bid item for this? What type and size frame and cover are to be assumed for bidding purposes?

A52. Replacement of manhole frames and covers for all manholes receiving work is required, as noted in the drawings. This work shall be paid under the Manhole Rehabilitation bid item.

Q53. The drawings include a note for "2. ALL MANHOLES RECEIVING WORK AND LOCATED OUTSIDE PAVED AREAS AND FEMA 100-YR FLOODPLAIN SHALL BE RAISED TO AT LEAST 2 FT ABOVE EXISTING GRADE IN ACCORDANCE WITH THE DRAWINGS." And "3. ALL MANHOLES LOCATED WITHIN FEMA 100-YR FLOODPLAIN SHALL BE RAISED TO A MINIMUM OF 1.0-FT ABOVE THE BASE FLOOD ELEVATION IN ACCORDANCE WITH THE DRAWINGS." Will this be required and if so, how will it be paid since there are no bid items for this? Could you please delineate which manholes will require raising and to what elevation so all bidders are otherwise equal?

A53. Profiles call out the manholes that need to be raised. Payment for manhole raising shall be included in the Manhole Rehabilitation bid item.

Q54. What are the dimensions of the Diversion Vault (MH ID 54102 at STA 1+52 on sheet 05-C-201)? Please confirm this vault will be lined with SewperCoat. If so, will it be paid by the Manhole Rehabilitation bid item per VLF?

A54. An exhibit has been included in Addendum 03 providing the approximate dimensions of the Diversion Vault (MH ID 54102) based on available record drawings. The vault will be lined with SewperCoat in accordance with the manhole rehabilitation specifications.

Payment for lining the vault shall be included in the Manhole Rehabilitation bid item and will be compensated per vertical linear foot (VLF) as defined in the bid form.

Q55. Due to the 42" CIPP rehab being within close proximity of the Rocky Creek WRF, will any styrene mitigation be required via carbon filtration, styrene-free resin, etc.?

A55. Styrene mitigation measures such as carbon filtration or the use of styrene-free resin are not required for this project.

Q56. Bypass spec section 01 57 28 paragraphs 1.04 and 1.05 mention obtaining approval and special permits for placement of bypass. What is the approval process and what are the "Special permits"?

A56. Contractor is responsible for obtaining required permits for work located within ROW (GDOT, Norfolk Southern, or other) which may include bypass pumping operations.

Q57. Bypass spec section 01 57 28 paragraph 3.07.C states "Installation of bypass pipelines is prohibited in salt marsh/wetland areas." Are any of the existing sewer easements located in "salt marsh/wetland areas" and if so, could you please delineate which segments or areas are

considered wetland areas? If the entire Lower Rocky Creek portion is considered wetland, will bypass piping be allowed along the sewer easement since access with heavy equipment will be required regardless to perform the work?

A57. Refer to attached revised Specification 01 57 28, Temporary Flow Control.

Q58. Please confirm contractors are allowed to utilize stormwater conduits and/or bridge underpasses for bypass pipe routing as necessary under roadways or railroad.

A58. Contractor is responsible for obtaining required approvals for work located within ROW (GDOT, Norfolk Southern, or other).

Q59. Are there any specific GDOT permits required and if so, how will they be paid?

A59. Per Specification Section 00700, Article 26(b): Permits and licenses of a temporary nature necessary for the prosecution of the Work shall be obtained and paid for by the Contractor.

Q60. Due to the limited access on a majority of this project, access via private property will likely be necessary in areas. Will private property agreements and associated costs be paid via change order or an allowance due to this potentially large cost (risk) variable that may escalate bids and ultimately increase cost for the Owner?

A60. Per Specification Section 00700, Article 17(c): Should additional temporary easements for ingress or egress be required by the Contractor for access to the Work, these easements shall be obtained by the Contractor, at no additional cost to the Owner.

Q61. The revised manhole rehabilitation spec 33 01 30.80 requires a vacuum test on all rehabilitated manholes. Vacuum testing may not be possible on a majority of the manholes due to both pipe size and manhole size (pipe plug may not fit through casting), possible safety concerns, elevated manholes, etc. Will you please consider removing the vacuum testing requirement on this project (at a minimum on the 42" mains) and accept other methods of testing in lieu of vacuum testing?

A61. Vacuum test should be performed to validate water tightness in accordance with ASTM C1244. When/where the contactor has documented evidence that vacuum test is not possible due to sealing problems with the plugs, the contractor should seek approval from the Engineer for testing with hydrostatic exfiltration testing following ASTM C969-24.

Q62. CIPP spec section 33 01 30.70, paragraph 2.01.C.16 list four Manufacturers for CIPP. However, paragraph 1.04.A mentions the listed manufacturers are not all encompassing and alternate manufacturers are allowed provided they meet specifications and are approved prior to bid

date. Please accept SAK Construction, LLC as Installer and Pipenology, LLC as Manufacturer of CIPP Liners per qualification requirements in paragraph 1.04.A.

A62. The Engineer was unable to confirm whether the proposed manufacturer (Pipenology, LLC) meets the specification requirements based on the information submitted. The installer and manufacturer may be considered if both the felt and resin materials meet the specification requirements.

To proceed with evaluation, complete product data must be submitted for review and approval by MWA.

Q63. Would MWA consider extending the bid deadline due to the extensive nature of the project.

A63. MWA is unable to grant a request to extend the bid opening deadline. Since this is a Bond-funded project, MWA has a predetermined date requirement to satisfy.

Q64. Does the Owner have any current access agreements with Al Sihah Shrine RV Park property, which will likely be needed to gain access to the sewer easement?

A64. It will be the responsibility of the contractor to coordinate access with the property owner. If any issues arise, the contractor should contact MWA for assistance; only after making contact with the property owner. Exhibits showing current access points are included in this addendum for reference.

Q65. Are either manhole 53344 or 53343A on Drawing 05-C-202 located within the railroad right-of-way? What is the railroad right-of-way distance?

A65. As noted in General Note 6 of the contract drawings, property lines and rights-of-way (ROWs) shown are approximate and not guaranteed to be exact. The Contractor is responsible for verifying the precise location of the railroad right-of-way and determining whether Manholes 53344 or 53343A fall within it.

Q66. Will the use of matting be permitted in protected wetland or marshy areas to facilitate access and equipment staging during construction?

A66. Yes, the use of swamp mats, composite or timber, or similar temporary matting systems is permitted to facilitate access and equipment staging in protected wetland or marshy areas.

All matting must be installed in a manner that complies with applicable environmental regulations and permit conditions, and the Contractor shall be responsible for ensuring proper installation, maintenance, and removal of mats following completion of work.

Q67. For the required manhole rehabilitation, will the invert need to be rehabbed using approved manhole rehab materials, or only up to the spring line/flow line? If full invert rehab is required, bypass pumping will need to remain in place until materials are installed and fully cured—please confirm.

A67. Yes, full invert rehabilitation is required as part of the manhole rehabilitation scope. The Contractor shall maintain bypass pumping as needed until rehabilitation materials are properly installed and fully cured.

Q68. On the Edna area maps, a couple of sections appear to be skipped over for lining. If both sections are already being bypassed, would MWA consider adding these segments to the lining scope?

A68. Some sections of gravity sewer near Edna Place have been previously rehabilitated and are therefore excluded from the current scope of work. These segments were intentionally omitted based on prior improvements. No additional sewer segments will be added to the lining scope as part of this contract.

Q69. GCU would like to submit the following products for approval regarding the Rocky Creek Gravity Sewer Rehabilitation project: CIPP Liner: We submit United Felts for CIPP liner.

A69. Refer to attached revised Specification 33 01 30.70, Cured-in-place Pipe Liner (Gravity Pipe).

Q70. Could bidders receive access to the GIS portal so that we can look at the adjacent sewer system for bypass purposes, water system to find out where hydrants are located, property parcel information for access, etc.?

A70. MWA will not provide direct access to its GIS portal. However, exhibits containing the requested information—including adjacent sewer system layout, public hydrant locations, and property parcel data—will be included in this addendum for bidder reference.

No fee adjustment shall be made for a failure to understand, or for a misinterpretation of the contract documents.

REQUIRED CONFIRMATION OF RECEIPT:

Acknowledge receipt of this addendum by return e-mail and as required on the Bid form *"Section 00300-3" of the contract documents.

SECTION 01 29 00
PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SUBMITTALS

A. Informational Submittals:

1. Schedule of Values: Submit on the Owner’s form.
2. Schedule of Estimated Progress Payments:
   a. Submit with initially acceptable Schedule of Values.
   b. Submit adjustments thereto with Application for Payment.
3. Application for Payment.
4. Final Application for Payment.

1.02 SCHEDULE OF VALUES

A. Prepare a separate Schedule of Values for each schedule of the Work under the Agreement.

B. Upon request of the Engineer, provide documentation to support the accuracy of the Schedule of Values.

C. Unit Price Work: Reflect unit price quantity and price breakdown from conformed Bid Form.

D. Lump Sum Work:

1. Reflect specified contingency allowances and alternates, as applicable.
2. List mobilization separately as noted in the bid form.
   a. Mobilization includes, at minimum, items identified in Section 01 50 00, Temporary Facilities and Controls.
   b. Include item(s) for monthly progress schedule update.
3. Break down by Division 02 through 49 with appropriate subdivision of each specification.

E. An unbalanced or front-end loaded schedule will not be acceptable.

F. Summation of the complete Schedule of Values representing all the Work shall equal the Contract Price.

G. Submit Schedule of Values electronically in a spreadsheet format compatible with latest version of MS Excel.

1.03 SCHEDULE OF ESTIMATED PROGRESS PAYMENTS

A. Show estimated payment requests throughout Contract Times aggregating initial Contract Price.

B. Base estimated progress payments on initially acceptable progress schedule. Adjust to reflect subsequent adjustments in progress schedule and Contract Price as reflected by modifications to the Contract Documents.

1.04 APPLICATION FOR PAYMENT

A. Transmittal Summary Form: Attach one Summary Form with each detailed Application for Payment for each schedule and include Request for Payment of Materials and Equipment on Hand as applicable. Execute certification by authorized officer of the Contractor.

B. Use detailed Application for Payment Form suitable to the Engineer and the Owner.

C. Provide separate form for each schedule as applicable.

D. Include accepted Schedule of Values for each schedule or portion of lump sum Work and the unit price breakdown for the Work to be paid on a unit priced basis.

E. Include separate line item for each Change Order and Work Change Directive executed prior to date of submission. Provide further breakdown of such as requested by the Engineer.

F. Preparation:

1. Round values to nearest dollar.
2. Submit Application for Payment to the Engineer, including a Transmittal Summary Form and detailed Application for Payment Form(s) for each schedule as applicable, a listing of materials on hand for each schedule as applicable, and such supporting data as may be requested by the Engineer.

1.05 MEASUREMENT—GENERAL

A. Lump-Sum Measurement will be for the entire item, unit of work, structure or combination thereof, as specified.

1. The Contractor shall show each applicable lump-sum item a fixed definable and measurable quantities where possible and unit prices therefor as developed and assigned by the Contractor to the different features of the work. The summation of extensions of quantities and unit prices and related costs shall equal the amount of the lump-sum Contract Price or lump sum bid item indicated in the Bid Schedule of Values.
2. Measure includes all associated work, whether stipulated of incidental to complete the Work described.
3. Progress payments will be made in accordance with the Contractor’s approved schedule of values and from the approved progress schedule, reflecting the progress which occurred during the payment period.

B. Weighing, measuring, and metering devices used to measure quantity of materials for Work shall be suitable for purpose intended and conform to tolerances and specifications as specified in National Institute of Standards and Technology, Handbook 44.

C. Whenever pay quantities of material are determined by weight, weigh material on scales furnished by the Contractor and certified accurate by state agency responsible. Obtain weight or load slip from weigher and deliver to the Owner’s representative at point of delivery of material.

D. If material is shipped by rail, car weights will be accepted provided that actual weight of material only will be paid for and not minimum car weight used for assessing freight tariff, and provided further that car weights will not be acceptable for material to be passed through mixing plants.

E. Vehicles used to haul material being paid for by weight shall be weighed empty daily and at such additional times as required by the Engineer. Each vehicle shall bear a plainly legible identification mark.

F. Haul materials that are specified for measurement by the cubic yard measured in the vehicle in transport vehicles of such type and size that actual contents may be readily and accurately determined. Unless all vehicles are of uniform capacity, each vehicle must bear a plainly legible identification mark indicating its water level capacity. Load vehicles to at least their water level capacity. Loads hauled in vehicles not meeting above requirements or loads of a quantity less than the capacity of the vehicle, measured after being leveled off as above provided, will be subject to rejection, and no compensation will be allowed for such material.

G. Quantities shall be determined from the record drawings prepared by the Contractor or measured distance. The record lengths, dimensions, quantities, etc. shall be determined from the records and/or Drawings after the completion of all required work.

H. Units of measure shown on Bid Form shall be as follows, unless specified otherwise.

Item	Method of Measurement
AC	Acre—Field Measure by the Engineer
CY	Cubic Yard—Field Measure by the Engineer within limits specified or shown
EA	Each—Field Count by the Engineer
GAL	Gallon—Field Measure by the Engineer
HR	Hour
LB	Pound(s)—Weight Measure by Scale
LF	Linear Foot—Field Measure by the Engineer
SF	Square Foot
SY	Square Yard
TON	Ton – Weight Measure by Scale (2,000 pounds)
VLF	Vertical Linear Foot – Field Measure by the Engineer

1.06 PAYMENT

A. Payment for all Lump Sum Work shown or specified in Contract Documents is included in the Contract Price. Payment will be based on a percentage complete basis for each line item of the accepted Schedule of Values.

B. Payment for Lump Sum Work covers all Work specified or shown within the limits or specification sections as follows:

1. All Work shown on the Drawings and in specifications.

C. Payment for unit price items covers all the labor, materials, and services necessary to furnish and install the following items.

Item	Description
1. Mobilization	Principal items listed in the Contract Documents. Includes Bonds, Insurance, and Project Signs.
2. Traffic control plans and implementation	Preparation of necessary traffic control plans and permits to satisfy requirements of Macon Water Authority and implementation and maintenance of traffic control measures throughout the project, in accordance with City requirements and permits.
3. Temporary sanitary sewer flow control	Includes preparation of sewer flow control submittal and provision and maintenance of all necessary flow control equipment (plugs, piping, and pumps) for the duration of the project when necessary to perform work (inspections and installation of piping improvements), including for maintenance of flows for private service laterals. Payment for this lump sum pay item will be on a percentage complete as determined by Macon Water Authority.
4. CCTV Inspection	CCTV Inspection to include pre-cleaning and flow control for lines indicated on plans in accordance with Section 33 01 30.16.
5. Heavy Cleaning/Root Cutting	A. The Contractor shall be measured and paid for heavy cleaning on the basis of the distance loosened debris is moved to the nearest point of extrication from the sewer at the unit and unit price bid. Includes heavy cleaning and root cutting in accordance with Section 33 01 30.51.
6. 8-inch Light cleaning	A. Normal cleaning will be measured at the unit in the bid and paid at the unit price bid. Includes light cleaning and root cutting in accordance with Section 33 01 30.51.
7. 24-inch Light cleaning	A. Normal cleaning will be measured at the unit in the bid and paid at the unit price bid. Includes light cleaning and root cutting in accordance with Section 33 01 30.51.
8. 42-inch Light cleaning	A. Normal cleaning will be measured at the unit in the bid and paid at the unit price bid. Includes light cleaning and root cutting in accordance with Section 33 01 30.51.

9. Trench excavation and backfill	A. No separate or additional payment will be made for any special or unique method, means, techniques or equipment necessary for the Contractor's compliance with these specifications, regulatory requirements, permits, laws or regulations which govern this Project. B. Trench Excavation: No separate payment will be made for trench excavation. All costs shall be included in the unit price bid for the item to which it pertains at the appropriate depth. C. Sheeting, Bracing and Shoring: No separate payment will be made for providing any sheeting, bracing and shoring. D. Dewatering Excavations: All costs of equipment, labor and materials required for dewatering shall be included in the price bid for the item to which it pertains. E. Trench Foundation and Stabilization: No separate payment will be made for providing any trench foundation and/or stabilization. F. Initial Backfill: 1. No separate payment shall be made for initial backfill. 2. No separate payment shall be made for drying out the initial backfill material in order to meet the compaction requirements. 3. No separate payment shall be made for the adding of moisture to the initial backfill materials in order to meet the compaction requirements. 4. Payment for providing select material for backfilling will be made only if ordered by the Engineer. Select backfill will be ordered by the Engineer only if the insitu material does not meet the requirements for initial backfill for reasons other than moisture content, i.e., the backfill material contains rock larger than that specified, organics, cinders, stumps, limbs, frozen earth or mud, man-made wastes or other unsuitable materials. No payment will be made for select backfill acquired from the Project site. Payment will be made only for Select Backfill which is imported to the Project site measured at the unit and paid at the unit price bid. 5. No payment will be made for bedding and haunching of the pipe as detailed in the Macon Water Authority Standard Specifications.

Item	Description
	G. Final Backfilling: 1. No additional payment will be made for additional material when excavated materials are used. 2. No separate payment shall be made for drying out the final backfill material in order to meet the compaction requirements. 3. No separate payment shall be made for the adding of moisture to the final backfill materials in order to meet the compaction requirements. 4. Payment for providing select material for backfilling will be made only if ordered by the Engineer. Select backfill will be ordered by the Engineer only if the insitu material does not meet the requirements for final backfill for reasons other than moisture content, i.e., the backfill material contains rock larger than that specified, organics, cinders, stumps, limbs, frozen earth or mud, man-made wastes or other unsuitable materials. No payment will be made for select backfill acquired from the Project site. Payment will be made only for Select Backfill which is imported to the Project site measured at the unit and paid at the unit price bid. H. Additional Material: No separate payment will be made for additional earth or fill materials imported to the Project site unless approved by the Engineer.

Item	Description
10. 21-inch sanitary sewer rehabilitation	Installation of CIPP lining. Includes ~~pre-installation cleaning, pre-installation and post-installation CCTV inspection,~~ excavation of pits, ~~manhole rehabilitation and preparation,~~ installation of CIPP lining, bedding and backfill of pipe and pits (Class 7 stone in all paved areas), installation of permanent grouted sand collar connections for manholes, ~~installation of permanent grouted sand collar connections for manholes,~~ and pipe testing ~~(pressure test)~~, and related appurtenances. Measured from edge of manhole to edge of manhole. CIPP of existing sewer mains will be measured at the unit in the bid and paid at the unit price bid. No additional payment will be made for mechanized cutting/removal of protruding lateral services, or the reinstatement of laterals or service connections. No additional payment will be made for testing requirements. Includes surface restoration for non-paved areas. Restoration and maintenance of non-paved areas in accordance with the specifications. Includes all labor, equipment, and materials necessary to restore non-paved surfaces equal to or better than pre-construction conditions. Includes but is not limited to ground preparation, topsoil preparation and placement, seeding, and maintenance. Includes replacement of landscaping items removed or damaged as part of the construction effort and objects removed or disturbed by the construction effort. No separate payment will be made for removal and replacement of fencing with like kind.

Item	Description
11. 24-inch sanitary sewer rehabilitation	Installation of CIPP lining. Includes ~~pre-installation cleaning, pre-installation and post-installation CCTV inspection,~~ excavation of pits~~, manhole rehabilitation and preparation~~, installation of CIPP lining, bedding and backfill of pipe and pits (Class 7 stone in all paved areas), installation of permanent grouted sand collar connections for manholes, ~~installation of permanent grouted sand collar connections for manholes,~~ and pipe testing ~~(pressure test)~~, and related appurtenances. Measured from edge of manhole to edge of manhole. CIPP of existing sewer mains will be measured at the unit in the bid and paid at the unit price bid. No additional payment will be made for mechanized cutting/removal of protruding lateral services, or the reinstatement of laterals or service connections. No additional payment will be made for testing requirements. Includes surface restoration for non-paved areas. Restoration and maintenance of non-paved areas in accordance with the specifications. Includes all labor, equipment, and materials necessary to restore non-paved surfaces equal to or better than pre-construction conditions. Includes but is not limited to ground preparation, topsoil preparation and placement, seeding, and maintenance. Includes replacement of landscaping items removed or damaged as part of the construction effort and objects removed or disturbed by the construction effort. No separate payment will be made for removal and replacement of fencing with like kind.

Item	Description
12. 42-inch sanitary sewer rehabilitation	Installation of CIPP lining. Includes ~~pre-installation cleaning, pre-installation and post-installation CCTV inspection,~~ excavation of pits~~, manhole rehabilitation and preparation~~, installation of CIPP lining, bedding and backfill of pits (Class 7 stone in all paved areas), installation of permanent grouted sand collar connections for manholes, and pipe testing (pressure test), and related appurtenances. Measured from edge of manhole to edge of manhole. CIPP of existing sewer mains will be measured at the unit in the bid and paid at the unit price bid. No additional payment will be made for mechanized cutting/removal of protruding lateral services, or the reinstatement of laterals or service connections. No additional payment will be made for testing requirements. Includes surface restoration for non-paved areas. Restoration and maintenance of non-paved areas in accordance with the specifications. Includes all labor, equipment, and materials necessary to restore non-paved surfaces equal to or better than pre-construction conditions. Includes but is not limited to ground preparation, topsoil preparation and placement, seeding, and maintenance. Includes replacement of landscaping items removed or damaged as part of the construction effort and objects removed or disturbed by the construction effort. No separate payment will be made for removal and replacement of fencing with like kind.

Item	Description
13. 8-inch sanitary sewer rehabilitation	Installation of CIPP lining. Includes ~~pre-installation cleaning, pre-installation and post-installation CCTV inspection,~~ excavation of pits~~, manhole rehabilitation and preparation~~, installation of CIPP lining, bedding and backfill of pipe and pits (Class 7 stone in all paved areas), installation of permanent grouted sand collar connections for manholes, and pipe testing (pressure test), and related appurtenances. Measured from edge of manhole to edge of manhole. CIPP of existing sewer mains will be measured at the unit in the bid and paid at the unit price bid. No additional payment will be made for mechanized cutting/removal of protruding lateral services, or the reinstatement of laterals or service connections. No additional payment will be made for testing requirements. Includes surface restoration for non-paved areas. Restoration and maintenance of non-paved areas in accordance with the specifications. Includes all labor, equipment, and materials necessary to restore non-paved surfaces equal to or better than pre-construction conditions. Includes but is not limited to ground preparation, topsoil preparation and placement, seeding, and maintenance. Includes replacement of landscaping items removed or damaged as part of the construction effort and objects removed or disturbed by the construction effort. No separate payment will be made for removal and replacement of fencing with like kind.
14. Manhole rehabilitation	Installation of grouting and manhole lining system for manhole rehabilitation. Includes all labor, equipment, and materials necessary to install manhole lining. Manhole restoration will be measured on a vertical foot basis as in the bid and paid at the unit price in the bid. The restoration of tables and inverts of existing manholes will be measured at the unit in the bid. Payment will be made at the unit price bid for the item.
15. Install new 48-inch and 60-inch diameter pre-cast concrete manhole watertight frame and cover	Installation of new precast concrete manhole watertight frame and cover to include demolition and disposal of existing manholes frame and cover, excavation, dewatering, bedding material, connection to existing sewers, backfill (Class 7 stone in all paved areas), and testing. Includes all labor, equipment, and materials necessary to install manhole frame and cover.

Item	Description
16. Erosion and sedimentation control	A. Erosion Control will be measured and paid on a lump sum basis per the work location. Erosion Control includes: 1. Providing the ESC Lead. 2. Developing, revising, and documenting TESC Plan. 3. Mobilization. 4. Monitoring activities. 5. Furnishing, stockpiling, protecting, restocking, and removing emergency materials. 6. Inspecting, maintaining, and removing erosion control devices. 7. Restoring, mulching, tacking, and seeding all disturbed ground, work, and storage areas not otherwise covered. B. No separate or additional payment will be made for: 1. Removing and disposing of sediment build-up behind sediment fences and sediment barriers. 2. Removing and reinstalling required appurtenances to modify temporary slope drains as the embankment slopes are changed. 3. Constructing and removing temporary slope berms. 4. Applying dust control. 5. Erosion control for work outside construction limits including, but not limited to, borrow pits, haul roads, disposal sites, and equipment storage sites. 6. Any portion of the Project for which temporary erosion and sedimentation controls are not properly maintained.

1.07 NONPAYMENT FOR REJECTED OR UNUSED PRODUCTS

A. Payment will not be made for following:

1. Loading, hauling, and disposing of rejected material.
2. Quantities of material wasted or disposed of in manner not called for under Contract Documents.
3. Rejected loads of material, including material rejected after it has been placed by reason of failure of the Contractor to conform to provisions of Contract Documents.
4. Material not unloaded from transporting vehicle.

5. Defective Work not accepted by the Owner.
6. Material remaining on hand after completion of the Work.

1.08 PARTIAL PAYMENT FOR STORED MATERIALS AND EQUIPMENT

A. Partial Payment: No partial payments will be made for materials and equipment delivered or stored.

B. Final Payment: Will be made only for products incorporated in Work; remaining products, for which partial payments have been made, shall revert to the Contractor unless otherwise agreed, and partial payments made for those items will be deducted from final payment.

1.09 PARTIAL PAYMENT FOR UNDELIVERED, PROJECT-SPECIFIC MANUFACTURED OR FABRICATED EQUIPMENT

A. Not withstanding above provisions, partial payments for undelivered (not yet delivered to Site or not stored in the vicinity of Site) products specifically manufactured for this Project, excluding off the shelf or catalog items, will be made for products listed below when all following conditions exist:

1. Partial payment request is supported by written acknowledgment from Suppliers that invoice requirements have been met.
2. Equipment is adequately insured, maintained, stored, and protected by appropriate security measures.
3. Each equipment item is clearly marked and segregated from other items to permit inventory and accountability.
4. Authorization has been provided for access to storage Site for the Engineer and the Owner.
5. Equipment meets applicable specifications of these Contract Documents.

B. Failure of the Contractor to continue compliance with above requirements shall give cause for the Owner to withhold payments made for such equipment from future partial payments.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 57 28
TEMPORARY FLOW CONTROL

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. Institute of Inspection, Cleaning, and Restoration Certification (IICRC): S500, Standard and Reference Guide for Professional Water Damage Restoration.

1.02 DEFINITIONS

A. Bypass Pumping: Temporary flow control accomplished by diverting flow away from the Work area using one or more pumps.

B. Temporary Flow Control: Reducing, limiting, or excluding flow in or to a sanitary sewer, storm sewer, pump station, force main, or other facility as required for performing the Work under the Contract. Draining, handling, and disposal of sanitary sewage and stormwater from pipelines and other facilities as required for performing the Work under the Contract is also part of temporary flow control.

C. Temporary Flow Control Plan: Plan prepared by the Contractor containing complete information on how the Contractor proposes to perform temporary flow control in accordance with specified requirements.

1.03 SYSTEM DESCRIPTION

A. Provide facilities and controls required to intercept, convey, and discharge flow to be controlled; include standby and emergency equipment.

B. Conform to regulatory requirements.

C. Protect water resources, wetlands, and other natural resources.

D. Temporary flow control shall be done in a manner that will not damage private or public property, or create a nuisance or public menace. Flow shall be conveyed in enclosed pipes that are adequately protected from traffic or other hazards.

E. Discharge:

1. To sanitary sewer system or wastewater treatment plant.
2. Dumping or free flow on private or public property, gutters, streets, or sidewalks is prohibited.
3. Discharge of sanitary sewage to storm sewers, to surface waters or wetlands, or into the ground, is prohibited.

1.04 SITE CONDITIONS

A. Obtain approval and secure permits for placement of temporary flow control facilities within public and private right-of-ways.

B. Existing facilities in vicinity of Rocky Creek WRF are shown on the Drawings.

1.05 SUBMITTALS

A. Informational Submittals:

1. Temporary Flow Control Plan.
2. Emergency Cleanup Plan.
3. Special permits required for temporary flow control.
4. Information describing equipment and materials to be used and showing conformance with specified requirements.

B. Action Submittals: Bypass piping plan.

1.06 QUALITY ASSURANCE

A. Qualifications:

1. Temporary Flow Control System Designer: Professional Engineer who has at least 5 years’ experience in design of such systems and who is registered in the State of Georgia.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. Install temporary flow control facilities only within public right-of-way, Owner’s property, temporary construction easement, permanent easement, or easement obtained by the Contractor.

B. Operate and maintain temporary flow control 24 hours per day, 7 days per week, including without limitation, holidays, as required to control flows.

C. Promptly remove temporary flow control facilities as soon as they are no longer needed.

3.02 REQUIRED TEMPORARY FLOW CONTROL

A. Except at pipe sags, depth of flow during television inspection shall not exceed that shown below for respective pipe sizes:

Maximum Depth of Flow in Inches	
Pipe Size (Inches)	**Television Inspection**
6	1.20
8	1.60
10	2.00
12	3.00
15	3.75
18	4.50
21	5.25
24	6.00
27	8.00
30	9.00
33 and up	30% of Pipe Diameter

B. Eliminate flow from sewer manhole to manhole segments during spot repair, and sewer pipe replacement or lining within that segment.

3.03 EQUIPMENT AND MATERIALS

A. General:

1. Provide materials and equipment that will ensure continuous and successful operation of temporary flow control systems.
2. Repair or modify systems as necessary.
3. Unless otherwise shown or specified, materials and equipment may be new or used at the Contractor’s option.

B. Plugs:

1. Provide with taps for connection of pressure gauges and air hoses, and flow-through capability.
2. Pipe Diameters 24 Inches and Smaller: Use mechanical plugs with rubber gaskets or pneumatic plugs with rubber boots.
3. Pipe Diameters Larger than 24 Inches:
   a. Use inflatable bag stoppers made in two or more pieces.
   b. Manufacturers:
      1) Lansas.
      2) Cherne Industries.

C. Pumps:

1. Fully automatic, self-priming units that do not require use of foot valves or vacuum pumps in priming system.
2. Solids handling design with ability to pump minimum 3-inch diameter sphere.
3. Able to run dry for long periods of time to accommodate cyclical nature of flows.
4. Engine: Equipped to minimize noise. Noise levels shall not exceed 86 dBA at a distance of 50 feet from source.

D. Electric Power Generators:

1. Be able to simultaneously start and run electric powered pumps required for flow to be controlled.
2. Equipped to minimize noise. Noise levels shall not exceed 86 dBA at a distance of 50 feet from source.
3. Include automatic transfer switch if flow control system is to operate unattended.

E. Standby Equipment:

1. Standby Pump: One of each size to be available onsite.
2. Electric Power Generators: Minimum of one if temporary flow control system contains electric powered pump. Able to simultaneously start and run electric powered pumps required for flow to be controlled.

3.04 TEMPORARY FLOW CONTROL PLAN

A. Prepare and submit Temporary Flow Control Plan at least 14 days before starting the Work requiring temporary flow control; include following information:

1. Drawings indicating location of temporary sewer plugs and bypass discharge lines.
2. Traffic Control Plan specifically applicable to temporary flow control adhering to requirements of applicable agencies and as may be specified in Contract Documents.
3. Locations where flow will be intercepted and discharged.
4. If trucks are to be employed include the following:
    a. Numbers and sizes of trucks.
    b. Configuration of facilities to be used to load trucks at each interception location.
    c. Locations where trucks will unload.
    d. Time for loading, unloading, and travel.
5. Complete descriptions and performance characteristics of pumps, electric power generators, and standby equipment.
6. Acoustical information for equipment to be used showing compliance with noise control requirements of Section 01 50 00, Temporary Facilities and Control.
7. Details of temporary force mains, including horizontal and vertical alignments, pipe materials, protection of existing buried and aboveground facilities and improvements, maintenance of traffic and access to properties.
8. Design calculations proving adequacy of temporary system and selected equipment to convey all flows.
9. Drawings showing layouts and configurations of temporary flow control facilities and also showing locations relative to right-of-way easement, and property boundaries.
10. Drawings and design calculations of temporary bulkheads and plugs.
11. Drawings and design calculations for thrust restraint of temporary piping.
12. Details of system controls and control logic; include diagrams and narrative.
13. Anticipated schedule for the Work.
14. Other information to completely describe temporary flow control facilities and conformance to specified requirements.
15. Anticipate coordination needs with Norfolk Southern and Georgia Department of Transportation.

3.05 EMERGENCY CLEANUP PLAN

A. Prepare and submit not less than 60 days before scheduled date of temporary flow control activities. As a minimum plan shall include the following:

1. Procedures for removal of water.
2. Procedures for determining nature and extent of damage and required restoration where restoration is possible.
3. Provide for industrial hygienist and standby Subcontractor for cleanup of exterior and building interior spaces that might be affected by a spill, backup, or overflow. Industrial hygienist and cleanup Subcontractor shall be certified by IICRC and follow IICRC S500 for cleanup of Category 3 water.

B. Implement for Full Scale Test and during temporary flow control.

3.06 BLOCKING FLOW

A. Flow control may consist of blocking flow with mechanical or pneumatic plugs if only small amount of flow needs to be controlled and adequate storage is available.

B. Use primary and secondary plugs for each flow control location.

C. When blocking flow is no longer needed for performance and acceptance of the Work, remove plugs in a manner that permits sewage flow to slowly return to normal without surcharging or causing other major disturbances downstream.

D. Remove temporary plugs at end of each working day and restore normal flow. If downstream work is not or cannot be completed during workday provide, operate, and maintain bypass pumping system or other method of flow control to accommodate flows.

3.07 PIPING

A. Minimize disturbance of existing utilities.

B. Where temporary flow control pipelines cross streets and private driveways, install pipeline in trench and cover with temporary pavement.

~~C. Installation of bypass pipelines is prohibited in salt marsh/wetland areas.~~

3.08 TEMPORARY SANITARY SEWAGE FLOW REDUCTION

A. The Contractor may request sewer service customers upstream of the Work area to reduce or curtail sewer flow.

1. First Notice: Not less than 1 week nor more than 2 weeks prior to when sewer flow deduction or curtailment is requested.
2. Second Notice: Not more than 24 hours nor less than 12 hours prior to when sewer flow deduction or curtailment is requested.

B. When service lateral must be disconnected from main for more than 1 day, lateral shall be positively drained or pumped a minimum of once every 24 hours. Monitor status of flow and storage. Pump lateral more frequently where flows exceed storage capacity of lateral or temporary storage as may be provided by the Contractor.

C. Temporarily restore full flow services in uncompleted sections during nonwork hours.

D. Promptly notify sewer service customers that were requested to reduce or curtail sewer flow when the Work is complete and full uninterrupted service restored.

E. The Contractor shall be responsible for control of sewage flows and under no circumstances be entitled to rely on flow reduction or curtailment by upstream sewer service customers.

3.09 DRAINING EXISTING PIPELINE

A. Before initiating shutdown, ensure required materials, equipment, and labor are available onsite. Excavate and expose portions of existing pipeline to be removed.

B. Provide tap and piping in place to drain sewage from existing pipeline before it is cut and to capture contents that may drain out when pipe is cut.

C. Be prepared to drain at least 2.19 million gallons of sewage at 33.9 cfs and 5.16 million gallons of sewage at 7.99 cfs from each pipeline.

3.10 FIELD QUALITY CONTROL

A. Hydrostatic Pressure Test for Pump Bypass Systems:

1. Prior to operation, test each section of discharge piping with maximum pressure equal to 1.5 times maximum operating pressure of system.
2. Notify the Engineer and the Owner 24 hours prior to testing.

END OF SECTION

SECTION 33 01 30.70
CURED-IN-PLACE PIPE LINER (GRAVITY PIPE)

PART 1 GENERAL

1.01 SCOPE

A. This section of the specifications describes work, equipment, and products to be included into the sanitary sewer cure-in-place project and requirements for the installation and use of these items. The Contractor shall furnish all labor, equipment, and materials required to install cured in place pipe liner as described in these specifications. The section includes, but is not limited to the following items.

1. Sewer Main Point Repair.
2. Manhole Rehabilitation.
3. Lateral Reinstatement.
4. Liner Material.
5. Resin Type.
6. All necessary appurtenances to collect the wastewater and deliver it to the existing system.

B. Reconstruction includes the installation of a resin-impregnated flexible tube, which is formed to the original sewer pipe by use of hydrostatic or air-pressure, and the resin cured using hot water under hydrostatic pressure or by controlled steam within the tube. The Cure-In-Place Pipe will be continuous and tight fitting between access points.

1.02 REFERENCES

A. The following is a list of standards that may be referenced in this section:

1. American Association of State Highway and Transportation Officials (AASHTO), HS-20.
2. American Railway Engineering and Maintenance-of-way Association (AREMA).
   a. Manual for Railway Engineering (MRE).
3. ASTM International (ASTM):
   a. D543, Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents.
   b. D2122, Standard Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings.

c. F1216, Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube.
d. F1743, Standard Practice for Rehabilitation of Existing Pipelines and Conduits by Pulled-in-Place Installation of Cured-in-Place Thermosetting Resins Pipe (CIPP).
e. F2019, Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Pulled-in-Place Installation of Glass Reinforced Plastic (GRP) Cured-in-Place Thermosetting Resin Pipe (CIPP).
f. F2599, Standard Practice for the Sectional Repair of Damaged Pipe by Means of an Inverted Cured-In-Place Liner.

4. Occupational Safety and Health Administration (OSHA):
   a. Part 1926 of Section 107 of the Contract Work Hours and Safety Standards Act.

1.03 SUBMITTALS

A. Action Submittals:

1. Manufacturer’s technical literature on proposed internal grout, pre-lining and lining systems.
2. Resin:
   a. Specifications.
   b. Characteristics.
   c. Properties.
   d. Itemize exceptions and deviations to specification.
3. Annular space sealant.
4. Service connection fittings.

B. Informational Submittals:

1. Liner Thickness Design Calculations:
   a. Signed and sealed by Professional Engineer in the State of Georgia.
   b. Manufacturer certification of material to values used in calculations.
2. Qualifications:
   a. Installer:
      1) List of past projects, including references for selected curing method.
      2) Manufacturer’s written certification of approval.

b. Superintendent:
   1) List of past projects, including references.
   2) Manufacturer’s written certification of approval.
c. Testing Laboratory: Qualifications, experience history, and references.

3. Manufacturer’s Certificate of Compliance, in accordance with Section 01 61 00, Common Product Requirements, that resin material is appropriate for intended application and in conformance with specification.
4. Certified test reports on physical properties and chemical resistance of proposed resin.
5. Manufacturer’s instructions for materials requiring special shipping, storage, or handling requirements.
6. For CIPP 36 inches in diameter or greater, submit still pictures or videos of examples of installed CIPP showing what is acceptable as a final product. Images will be used to help determine acceptance of final product per this specification.
7. Manufacturer’s printed installation instructions. Installation method statement shall include but not be limited to the following:
   a. Details concerning curing methods.
   b. Inversion pressures necessary for proper installation.
   c. Minimum pressure required to hold tube tight against existing host pipe, and maximum allowable pressure that will not damage tube.
   d. Type of insertion.
   e. Defect Repair:
      1) Methods of repairing in conjunction with manholes, joints, laterals, and active infiltration. Pre-liner must prevent active infiltration from diluting resin.
      2) Quality control/quality assurance plan.
      3) Repair material test results.
8. “Wet-out” Plan: For each proposed lining section, method for “wet-out” of flexible tube together with specific insertion and curing schedule.
9. Field Report, After Completion of Each Section:
   a. Process control sheet; include temperature/time log information, tap cut information, and curing cycle.
   b. Pre-CCTV and post-CCTV inspection video in electronic format (USB drive or via cloud service).
   c. Certified test reports of CIPP samples obtained during installation.

1.04 OPTIONS

A. The specifications allow several materials. Where manufacturers and models of equipment are named in the specification, it is intended that these are to describe the quality and function required. The Contractor may use equipment or materials of other manufacturers provided they are reviewed and accepted by the Engineer and the Owner as meeting the specifications prior to the bid date.

B. The Contractor will furnish the Engineer and the Owner a description of all materials before ordering. The Engineer and the Owner will review the Contractor’s submittals and provide in writing an acceptance or rejection of material. However, an acceptance of any material by the Engineer does not relieve the Contractor of his responsibility to meet the requirements of the construction plans or these specifications. Pre-liners must prevent active infiltration from diluting resin.

1.05 QUALITY ASSURANCE

A. Material and equipment shall be the standard product of a manufacturer who has manufactured them for a minimum of 2 years and who provides published data on the quality and performance of the project.

B. A Subcontractor for any part of the work must have experience on similar work and if required, furnish the Engineer with a list of projects and the Owners or the Engineers who are familiar with his competence.

C. Devices, equipment, structures, and systems not designated by the Engineer that the Contractor wishes to furnish shall be designed either by a registered professional engineer or by someone the Engineer approved as qualified. If required, complete design calculations and assumptions shall be furnished to the Engineer or the Owner before acceptance.

D. All testing of the piping and point repairs shall be made by the Contractor with equipment qualified by the Owner, the Engineer, or utility company and in the presence of the Engineer, the Owner and utility company. The Engineer or his representative reserves the right to accept or reject testing equipment.

E. Liner testing shall be done by a testing laboratory regularly engaged in such testing, and shall be approved by the Engineer prior to engagement. Mill certificates of test on materials made by manufacturers will be accepted provided the manufacturer maintains an adequate testing laboratory, makes regularly scheduled tests that are spot checked by an outside laboratory, and furnishes satisfactory certificates with the name of the one making the test.

F. Qualifications:

1. Installer:
   a. Employees of CIPP manufacturer, or installers trained and approved by manufacturer for installation of liner and pre-liner.
   b. Projects completed within past 5 years that total each of the following criteria.

Diameter Range (inches)	Total Installed Footage	Contractor’s Onsite Construction Manager
Up to 15	500,000	5 years
15 - 21	100,000	5 years
24 - 36	75,000	4 years
Greater than 36	50,000	3 years

2. Superintendent shall have minimum experience as shown above.
3. If required, the Contractor shall demonstrate experience for selected method of curing in a mockup before actual lining of pipe.

1.06 DESIGN CRITERIA

A. Design liner thickness using the following criteria:

1. Design Life: 50 years.
2. Pipe Diameters: Per Contract Drawings.
3. Ovality: 2 percent minimum, or as determined in the field by the Contractor. Maximum of 10 percent.
4. Pipe Design Condition: Fully deteriorated.
5. External Water: Ground surface or 100-year flood elevation.
6. Flexural Strength: 4,500 psi.
7. Minimum Short-Term Flexural Modulus: 250,000 psi.
8. Flexural Modulus Reduction Factor: 50 percent.
9. Long-Term Flexural Modulus: 125,000 psi.
10. k Enhancement Factor: 7.
11. Modulus of Soil Reaction: 1,000 psi.
12. Soil Density: 120 pcf.
13. Highway Live Load: AASHTO HS20.
14. Railway Live Load: AREMA E-80.

15. Safety Factor: 2 minimum.
16. Poisson’s Ratio: 0.3.
17. Liner shall be watertight.
18. The liner thickness shall be the greater of the calculated thickness to meet the design requirements in accordance with ASTM F1216 Appendix X1 “Design Considerations.” If calculations require a thicker wall, round to the next higher multiple of 1.5 mm currently in manufacture.
19. All references to liner thickness shall be defined as total thickness after installation and after curing is complete.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Resin: Shipped directly to wet-out facility from resin manufacturer.

B. Store water cured or steam cured resin-impregnated tubes in refrigerated truck trailers at a temperature below 45 degrees F to prevent premature curing.

C. If liner tube is impregnated with resin at factory, transport, install, and cure the liner before expiration of the resin’s shelf life.

D. No cuts, tears, or abrasions shall occur to liner tube during handling.

E. Prior to beginning installation, do not subject resin-impregnated liner to sunlight or ultraviolet radiation.

1. Remove resin-impregnated tubes with signs of premature curing from Site.
2. The impregnated liner shall be stored, transported, and installed inside maximum and mini-mum temperatures not less than 45 degrees F (7 degrees C) or higher than 95 degrees F (35 degrees C) when being installed on site.

1.08 SPECIAL GUARANTEE

A. Material Warranty: A written guarantee of 1 year shall be provided by manufacturer against breakdown of material effectiveness of structural repair elements.

B. Workmanship Warranty: A written guarantee of 1 year minimum shall be provided by the Contractor against defects of workmanship.

C. Warrantee Inspection: A warranty inspection shall be conducted in the 11th month following final acceptance of the Work. The Contractor and liner manufacturer representative shall participate in inspection. Deficiencies related to material and workmanship shall be repaired by the Contractor to satisfaction of the Owner at no cost to the Owner. Inspection shall be conducted by the Owner or designated representative of the Owner.

1.09 WARRANTY

A. The Contractor shall guarantee the quality of the materials, equipment, and workmanship for 12 months after acceptance of the completed Project. Defects discovered during that period shall be repaired by the Contractor, at no cost to the Owner. The Performance bond shall reflect this guarantee.

1.10 ALTERNATIVES

A. The intention of these specifications is to produce the best system for the Owner. If the Contractor suggests that alternate material, equipment or procedures will improve the results at no additional costs, the Engineer and the Owner will examine the suggestion and if it is accepted, it may be used. The basis upon which acceptance of an alternate will be given is its value to the Owner, and not for the convenience of the Contractor.

1.11 EXISTING UTILITIES

A. “Existing Utilities Facilities” means any utility that exists on the projects in its original, relocated or newly installed position. The Contractor will be held responsible for the cost of repairs to damaged underground and aboveground facilities: even when such facilities are not shown on the plans. The Contractor shall contact all utility companies prior to beginning work and request an accurate any underground field location of their respective utility lines. Call Before You Dig (800) 282-7411or 811 (Utilities Protection Center) at least 72 Hours Prior to Digging.

B. Damage to any part of the existing utility system facilities by the Contractor or Subcontractors, that is repaired by the user’s and the Owner’s forces, shall be charged to the Contractor on the basis of time and material, plus 30 percent for overhead and administration.

1.12 SEQUENCING AND SCHEDULING

A. The Contractor shall arrange his work to maintain project schedule and completion date.

1.13 ACCEPTANCE OF PORTIONS OF WORK

A. The Owner reserves the right to accept and use any portion of the work whenever it is considered in the public interest to do so.

1.14 RECORD DATA

A. It will be required of the Contractor to keep accurate, legible records of the location of any deviations from the construction drawings, any additional items or structures to the construction drawings. These records will be made available to the Engineer before his inspection for incorporation into the Engineer’s Record Drawings.

B. Submittals for CIPP tubes shall be stamped by a Professional Engineer licensed in the State of Georgia.

1.15 FACILITY OPERATIONS

A. The Contractor shall not discharge heat in such quantities which will inhibit biological activity in the POTW resulting in interference, such that the temperature at the POTW influent exceeds 40 degrees C (104 degrees F). The Contractor shall not discharge into a sewer line or other appurtenance of the POTW, wastewater with a temperature exceeding 65.5 degrees C (150 degrees F).

PART 2 PRODUCTS

2.01 PRODUCTS AND MATERIALS USED IN THE WORK SHALL CONFORM TO THE FOLLOWING:

A. Resin:

1. General purpose, unsaturated, polyester, isophthalic neopentyl glycol, epoxy or thermosetting vinyl ester resin, catalyst system, initiators, or hardeners that provide specified cured physical strengths and properties, and compatible with the liner installation process.
2. Resistant to municipal wastewater environment; immersion in septic sewage at temperatures up to 75 degrees F.
3. Curing:
   a. Designed to cure properly within selected curing method.
   b. Initiation Temperature: 180 degrees F, maximum.
4. Resistant to ultra-violet light (sunlight) prior to installation.

5. PET resins, resin filters, resin additives, and resin enhancement agents are prohibited. Only neat resins are acceptable. Old resins and reworked resins are prohibited, regardless of whether or not they are mixed with new resin.
6. Chemical resistance of resin system shall have been tested by resin manufacturer in accordance with ASTM D543. Exposure to chemical solutions listed below at temperatures of up to 75 degrees F shall be conducted for a minimum period of 1 month and shall result in a loss of not more than 20 percent of initial structural properties.
    a. Minimum Chemical Solution Concentration, ASTM F1216:
    b. Tap Water, pH 6 to 9: 100 percent.
    c. Nitric Acid: 5 percent.
    d. Phosphoric Acid: 10 percent.
    e. Sulfuric Acid: 10 percent.
    f. Gasoline: 100 percent.
    g. Vegetable Oil: 100 percent.
    h. Detergent or Soap: 0.1 percent.
7. The resin system shall be a corrosion resistant catalyst system that when properly cured within the tube shall meet ASTM F1216 or ASTM F1743 or latest revision requirements.
8. The resin system shall contain no more that 5 percent of any filler (e.g. Fumed silica, ATH, talc, sand). The resin shall be as environmentally safe as possible.
9. The resin must have an elongation factor of at least 2.5 percent at 250,000 psi flexural modulus and shall not decrease as the flexural modulus increases.
10. The resin to produce the CIPP shall comply with the structural and chemical resistance requirements of this specification.
11. The Contractor shall deliver the wet-out uncured resin liner bag to the site. The liner shall have been wet-out no more than 4 weeks before the proposed time of installation and stored out of direct sunlight.
12. The wet-out liner shall be transported to the site providing all appropriate transport, handling and protection equipment including refrigerated or otherwise suitably cooled, transport equipment as required.
13. All personnel coming in contact with, or exposed to styrene, in a confined environment shall follow all the safety requirements specified by local, stat, and federal regulatory agencies. Failure to comply shall result in loss of contract.

14. All fabricating and contractor testing shall be carried out under cover and no materials shall be exposed to the weather until they are ready to be inserted into the pipe. All materials should be protected from the weather and exposure to UV light as practicable during the manufacture and installation process.
15. Each liner shall be accompanied by suitable documentation indication time and date of manufacture, felt thickness, number of layers, length of liner, resin type, resin content, catalyst, and relevant batch numbers.
16. Produce cured tube resistant to shrinkage, not corrode or oxidize, and resistant to abrasion from solids, grit, and sand in wastewater.
17. Bond between tube layers shall be strong and uniform.
18. Layers, after cure, shall be saturated with resin.
19. Manufacturers:
    a. Reichhold; Polylite.
    b. Interplastic Corporation.
    c. Ashland Specialty Chemical Company HETRON.
    d. AOC.
    e. Vipel.

B. Catalyst:

1. Primary: 1 percent maximum of resin by volume.
2. Secondary: 1/2 percent of resin by volume.
3. Manufacturers and Products:
    a. Primary Catalyst:
        1) Akzo; Perkadox 16, Perkadox BTW-50, or Norox 600.
        2) “Or-equal.”
    ~~2)~~b. Secondary Catalyst:
        ~~3)~~1) 5YU.
        ~~4)~~2) “Or-equal.”

C. Flexible Liner Tube:

1. Shall conform to ASTM F1216 Section 5 or ASTM F1743 Section 5 or latest revision, and shall consist of one or more layers of absorbent non-woven felt fabric and /or composite combination. The tube should consist of one or more layers of flexible needled felt or an equivalent non-woven material capable of carrying resin, withstanding installation pressures and curing temperature, and should be compatible with the resin system used. The material should be able to stretch to fit irregular pipe sections and negotiate bends. The outside layer of the tube should be plastic coated with a material that is compatible with the resin system used. The tube should be fabricated to a size that, when installed, will

tightly fit the internal circumference and the length of the original conduit. Allowance should be made for circumferential stretching during installation. The liner thickness shall be designed in accordance with ASTM F1216. Design calculations shall be provided to the Owner and approved prior to fabrication of the tube system.

2. Construct the tube to withstand installation pressures, to have sufficient strength to bridge issuing pipe, and to stretch to fit irregular pipe sections.
3. The wet-out tube must have a uniform thickness so when compressed during installation pressures the resulting thickness will meet or exceed the design.
4. Sew the tube to a size that when installed it will tightly fit the internal circumference and length of the original pipe, with no wrinkles or fins.
5. Make allowance for circumferential and longitudinal stretching or shrinkage during inversion and installation.
6. Coat the outside layer of the tube (before wet-out) with an impermeable, flexible membrane that will contain the resin and facilitate monitoring of resin saturation during the resin wet-out procedure.
7. The tube shall be homogeneous across the entire wall thickness containing no intermediate or encapsulated elastomeric layers.
8. Contain no intermediate layers that may delaminate after resin curing. Not capable of separating layers with a probe or knife blade such that layers separate cleanly or probe or knife blade moves freely between layers.
9. Maximum Stretching Allowance: In accordance with ASTM F1216.
10. No dry or unsaturated layers are to be evident.
11. Seams in the tube are to be stronger than the non-seamed felt.
12. Where several layers of felt are required, inner layer shall be stitched to form a tube.
    a. Each successive layer shall be individually wrapped around previous one and stitched together.
    b. Outer layer of felt shall have an installation tube prebonded to it, or a sheet of this material shall be wrapped around completed felt tube.
    c. Where a prebonded material is used, bond a covering strip over seam to form airtight joint.
13. Fabricated from materials which when cured will be chemically resistant to reagents as defined in ASTM D543.
14. External Films: The external films shall consist of one or more layers of tube-shaped plastic films which are resistant and impermeable to moisture, UV-Light and styrene or equivalent.
15. Interior Pipe Wall Color: Shall not be a dark or nonreflective nature that could inhibit proper closed circuit television (CCTV) inspection.

16. Manufacturers:
    a. Applied Felts.
    b. Insituform Technologies.
    c. Liner Products.
    d. National Liner.
    ~~d.~~e. United Felts.

D. Preliner:

1. If required by the Engineer for inverted liners, apply to tube on what will become the exterior wall of finished CIPP.
2. Shall be continuous from access point to access point.
3. Polyethylene-based compatible with resin system and shall not adversely affect adhesive properties of resin used in mainline or lateral liners.

E. Annular Space Sealant, Hydrophilic Rubber Joint Seal:

1. Manufacturers:
    a. Greenstreak, Sika, Inc.; Hydrotite.

F. Interface Seal (Connection Seal) for existing lateral connections as described in Section 33 01 30.70, Cured in Place Pipe Liner.

G. Tees:

1. Install Wyes or Tees in locations as on the Drawings or designated by the Engineer for connection or future connection of services laterals with proper grade and alignment to the property line. They shall be the same diameter as the run of pipe in which they are installed. Service laterals shall be plugged until put into service using plugs specifically designed for the size and type of pipe. The services laterals shall include provision for cleaning out the line in case of an obstruction.
2. The location of each stub-out shall be clearly shown on the As-Built Drawings. A cleanout embedded in concrete shall be installed at the property line and shall be marked on the curb where a curb exists.

2.02 INTERNAL GROUT REPAIRS

A. All grout repairs shall be performed/installed in accordance with Section 03 62 00, Grouting.

2.03 PRE-LINING POINT REPAIRS

A. All pre-lining point repairs shall be done in accordance with Section 33 01 30.70, Cured in Place Pipe Liner.

2.04 LATERALS

A. Laterals shall be reinstated per Section 33 01 30.70, 3.09, Cured in Place Liner, Service Reinstatements.

B. Installed sanitary sewer laterals shall be Schedule 40 PVC or SDR 26 and a minimum of 4-inch diameter.

2.05 STONE BACKFILL

A. Shall be graded crushed granite No. 57 or No. 78 stone as detailed in MWA Standard Specifications.

2.06 SAND BACKFILL

A. Shall be clean sand free of clay and organic material. Not more than 10 percent shall pass the No. 100 sieve.

2.07 SOURCE QUALITY CONTROL

A. At the time of manufacture, each lot of liner shall be inspected and certified to be free of defects.

B. Mark inside of tube in at least one location per setup. Mark shall include manufacturer of liner at regular intervals, not to exceed 10 feet, along full length.

PART 3 EXECUTION

3.01 GENERAL

A. All activities should be in strict accordance with the manufacturer’s recommendations and as described in the specifications.

B. The Engineer shall have the right to require that any portion of the work be done in his presence and if any work is covered up after such instruction, it shall be exposed by the Contractor for observation. However, if the Contractor notifies the Engineer that such work is scheduled and the Engineer fails to appear within 48 hours, the Contractor may proceed without him. All work done and materials furnished shall be subject to review by the Engineer or Project Representative. All improper work shall be reconstructed and all materials which do not conform to the requirements of the specifications shall be removed from the work upon notice being received from the Engineer for the rejection of such materials. The Engineer shall have the right to mark rejected materials so as to distinguish them as such.

3.02 TEMPORARY FLOW BYPASS AND DIVERSION PUMPING

A. In accordance with Section 01 57 28, Temporary Flow Control.

3.03 OVERFLOWS OR SPILLS

A. Schedule and perform the Work in a manner that does not cause or contribute to incidence of overflows or spills of sewage from sewer system.

B. In the event Contractor’s work activities contribute to overflows or spills, take appropriate action to contain and stop overflow, clean up spillage, disinfect area affected by spill and notify the Owner immediately.

3.04 PRIVATE SERVICE LATERAL SHUTDOWN

A. Notify the Engineer at least 1 week prior to shutdown.

B. Notify building occupants regarding service lateral disconnection by placing a door hanger approved by the Owner and the Engineer. Place door hangers between 1 day and 3 days prior to disconnection.

C. When service lateral will be disconnected from main for more than 8 hours, lateral shall be positively drained or pumped down.

1. Monitor status of flow and storage.
2. Pump lateral more frequently where flows exceed storage capacity of lateral or Contractor-provided temporary storage.

D. If service lateral cannot be positively drained or pumped down or disconnection of service lateral is anticipated to be 48 hours or longer, the Contractor shall provide temporary living accommodations for resident at no additional cost to the Owner or the resident. Temporary living quarters accommodations shall be approved by the Engineer and coordinated through resident and the Owner’s Customer Support Representative.

E. Temporarily restore services in uncompleted sections during nonwork hours.

F. Notify building occupants when Work is complete and uninterrupted service restored.

G. Maintain uninterrupted commercial sewer services while businesses are open. No sewage from the services or main line shall be allowed to be discharged on the ground or in waterways. Holding pits or tanks are not allowed unless permitted by governing agency.

3.05 PREINSTALLATION PROCEDURES

A. Complete the following activities, unless approved otherwise by the Engineer:

1. Perform operations in accordance with OSHA Standards.
2. Before Work commences, required preinstallation submittals shall be approved by the Engineer, including traffic management measures, safe pedestrian passage, provision of vehicular access to property, bypass/diversion pumping, and emergency measures.
3. Notify the Engineer prior to beginning preinstallation activities.
4. Preinsertion Cleaning:
    a. The sewer main shall be cleaned by the Contractor in accordance with Section 33 01 30.51, Gravity Sewer Pipeline Cleaning. Any conditions that would prevent proper installation of the wet-out tube should be noted and brought to the attention of the Owner.
    b. Debris removed from sewer during cleaning shall be transported in watertight containers and disposed of in accordance with local, State, and Federal Regulations.
5. Preinsertion CCTV Inspection:
    a. In accordance with Section 33 01 30.16, Television Inspection of Sewer Pipelines.
    b. Inspect sewer pipe before insertion of resin impregnated tube to ensure pipe is clean and existing pipe conditions are acceptable for lining.

6. Active leaks shall be stopped using products specifically for that purpose and according to manufacturer's recommendations. Per Design Drawings, Engineer’s request or Contractor’s discretion preliners or grouting may be required to stop inflow or infiltration.
7. Dye Testing: Where sewer line segments may contain abandoned services, the Contractor may be directed by the Engineer to perform dye testing to determine if services are live and require reinstatement.
8. Line Obstructions: If preinsertion video CCTV inspection reveals obstruction in existing pipe that cannot be removed by sewer cleaning equipment, with approval of the Engineer, perform point repair using internal grout repair, flexible coupling or a short section of resin adhered lining.
9. Repairs to an Existing Sewer Main: Where repairs are required, Contractor shall employ a trenchless spot repair option and provide all materials and labor necessary to make the repair to the existing pipeline.
10. Ensure proper sequence of work occurs between mainline and lateral lining activities.
11. Service connections should be noted and brought to the attention of the Owner. Confirm accurate location and serviceability of existing lateral or service connections (taps) at sewer main pipes or manholes (including drop connections). Serviceability shall be confirmed by flowing water, dye testing, or visually with CCTV inspection. Any services which are not to be reconnected after lining shall be identified by the Owner.
12. When service connections protrude into existing pipe more than 1/2 inch, as measured from inside pipe wall, remove protruding portion of service connection to be even or flush with the inside wall of the existing host pipe.

3.06 INSTALLATION

A. Verify lengths in field before cutting liner to length.

B. Wet-Out:

1. Tube shall be vacuum impregnated with resin (wet-out) under controlled conditions.
    a. Designate vacuum-impregnated location prior to CIPP installation.
    b. If requested, allow the Engineer to inspect materials and procedures used to vacuum impregnate tube.

c. If Contactor uses an alternative method of resin impregnation, method shall produce the equivalent results of a roller system. An alternative resin impregnation method shall be documented to the Engineer and the Owner’s satisfaction that saturation of CIPP is sufficient.
d. Handle resin impregnated tube to retard or prevent settling until it is ready for insertion.

2. Use roller system to uniformly distribute resin throughout tube.
3. Volume:
   a. Resin shall fill voids in tube material at nominal thickness and diameter; no air spaces or pockets allowed.
   b. Adjust by adding excess resin to change resin volume because of polymerization and to allow for migration of resin into cracks and joints in original pipe.
4. Complete wet-out process control sheet for every lining completed. Control sheet shall provide the following information:
   a. Liner manufacturer.
   b. Liner diameter.
   c. Number of layers.
   d. Resin manufacturer.
   e. Resin amount.
   f. Resin type.
   g. Batch number.
   h. Catalyst and accelerator name/type.
   i. Hardener name/type.
   j. Filler name/type, if any.
   k. Percent of filler, if any.
   l. Mixing ratios.
   m. Vacuum pressure of impregnation process.
   n. Wet-out start time and date.

C. Insertion:

1. Install CIPP in accordance with practices outlined in ASTM F1216 for direct inversion installations and ASTM F1743 for pull in installations.
2. Dewater existing host pipe for CIPP installation that does not use an inversion method to expand tube against pipe wall.
3. If vacuum impregnation process is used, point of vacuum shall be no further than 25 feet from point of initial resin introduction. After vacuum in tube is established, vacuum point shall be no further than 75 feet from leading edge of resin. Leading edge of resin slug shall be as near to perpendicular to longitudinal axis of tube as possible.

4. Insert wet-out tube through existing manhole or approved access point by means of an inversion process or pulled in method and application of hydrostatic head sufficient to extend tube to next designated manhole or termination point.
5. Alternately, tube may be pulled into place and expanded with inflation bladder. Insertion method shall not result in abrasion or scuffing of the tube.
6. Once installation has begun, maintain pressure between minimum and maximum pressures until installation has been completed. Pressure shall be sufficient to hold tube tight against host sewer pipe.
7. Place temperature gauges between tube and host pipe’s invert position to monitor temperature during cure cycle.
8. CIPP shall be continuous over entire length from manhole to manhole.
9. Complete installation process control sheet for every lining completed. Control sheet shall provide the following information:
    a. Liner length.
    b. Hydrostatic head at point of inversion.
    c. Hydrostatic head at termination point.
    d. Time inversion process started.
    e. Time cutting ends started.
    f. Time cutting laterals started.
    g. Number of laterals cut.

D. Inflation Bladder Removal: For pulled-in-place installation techniques where inflation bladder is designed not to bond to CIPP, remove bladder material from CIPP.

E. Curing:

1. Complete curing process control sheet for every lining completed.
2. Control sheets shall provide required temperatures and time for the different steps of curing process; initial cure, post cure, and cooling as outlined in ASTM F1216.
    a. Initial cure may be considered completed when exposed portions of flexible tube pipe take a hard set and temperature is adequate, as recommended by manufacturer.
3. After installation, apply steam, or hot water as recommended by liner manufacturer.
    a. Steam:
        1) Provide safety system specifically structured for use of steam.
        2) Thermoset Resin: Designed to cure properly when using steam.

3) CIPP Tube Thermoplastic Coating:
   a) Formulated from material designed specifically to withstand high temperature curing process utilizing steam.
   b) Polypropylene/polyethylene blend “Or-equal.”
4) Equipment:
   a) Heat source shall be capable of delivering steam throughout section and uniformly raising steam temperature above temperature required to affect cure of resin.
   b) Install temperature gauges in the following areas:
      (1) Incoming steam supply.
      (2) Outgoing steam supply.
      (3) Between impregnated tube and pipe invert at lining termination point.
5) Steam Temperature: 230 degrees F, minimum.
6) Minimum Interface Temperature between Liner and Tube: 120 degrees F.
7) Pressure Required to Keep Tube Inflated: Per manufacturer’s instructions.
8) Time: Per manufacturer’s instructions.
9) Cool Down:
   a) Send air through steam cured CIPP liner until liner cools down to 120 degrees F interface temperature.
   b) Once 120 degrees F has been reached, water may be introduced to finish cooling line down to 90 degrees F.
   c) During release of water, prevent vacuum that could damage newly installed CIPP.

b. Hot Water:
1) Equipment:
   a) Heat source shall be capable of delivering hot water throughout section and uniformly raising water temperature above temperature required to affect cure of resin.
   b) Install temperature gauges in the following areas:
      (1) Incoming water supply.
      (2) Outgoing water supply.
      (3) Between impregnated tube and pipe invert at lining termination point.
2) Minimum Interface Temperature between Liner and Tube: 120 degrees F.
3) Time: 3 hours, minimum.

4) Cool Down:
   a) Introduce cool water into CIPP to replace water being drained from small hole made in downstream end.
   b) Cool liner to temperature below 90 degrees F before relieving hydrostatic head.
   c) During release of water, prevent vacuum that could damage newly installed CIPP.

F. The finished pipe should be continuous over the entire length of installation and be free of dry spots, lifts, and delaminations. If these conditions are present, the liner should be removed and replaced in these areas. If the liner does not fit tightly against the original pipe at its termination point(s), the space between the pipes should be sealed by filling with a resin mixture compatible with the cured pipe.

3.07 MANHOLES

A. CIPP terminating in manhole shall be cut in shape and manner approved by the Engineer.

B. Seal pipe openings and fill in annular space using products specified in Part 2 Products.

1. CIPP connections at manhole opening shall be watertight seal.
2. Install seal per manufacturer’s instructions.
3. Recheck seal repair after 48 hours. If seal does not hold, continue to repair until there are no leaks.

C. Channels: When CIPP is installed continuous through manhole, create per the Engineer’s instructions. Do not break or shear pipe.

D. Inverts:

1. Finish manhole inverts to provide smooth transition between connections.
2. Use CIPP liner material, an approved epoxy, or similar material to form smooth transition to eliminate sharp edges of CIPP, within host pipe, and in manholes at concrete bench and channel invert.
3. Invert rehabilitation shall be compatible with manhole rehabilitation activities.

3.08 SERVICE REINSTATEMENTS

A. General:

1. After liner has been cured in placed, reconnect service connections.
2. Using CCTV, field locate existing and determine number of service connections.
3. Service interruptions shall not exceed 24 hours.
4. Do not reconnect services from abandoned or vacant lots, unless directed otherwise by the Owner.
5. Do not reactivate reconnected services until accepted by the Engineer. This process shall be completed prior to the work described in Paragraph, Liner Cutting, below and before installation of lateral liner.
6. Show distance from nearest downstream manhole to reconnected service on record drawings.

B. Liner Cutting:

1. Cut liner pipe from interior of pipeline using a robotic cutter.
2. Holes cut through liner shall be neat and smooth in order to prevent blockage at service connections.
3. Cut-in service connections shall be opened to a minimum of 95 percent of building’s sewer flow capacity.
4. Recover coupons at downstream manhole and remove.

C. External Reconnection:

1. Service connections to new 8-inch CIPP shall be reinstated by excavation and reconnecting service with a PVC full saddle tee.
    a. Remove appropriate amount of carrier pipe to allow saddle to be directly connected to outside wall of CIPP.
    b. Apply epoxy, meeting manufacturer’s recommendations, to saddle to ensure watertight seal between saddle and CIPP.
    c. Secure saddle with stainless steel bands.
    d. After epoxy has set and prior to backfilling, seal open annular space between existing sewer and new liner pipe with nonshrink grout.
2. Service lateral connections to new 10-inch CIPP and larger to be made with an Inserta-Tee” (Inserta Fittings Company).
    a. Remove appropriate amount of carrier pipe to allow Inserta-Tee to be installed.

3.09 PARTIAL (SPOT REPAIR) CIPP LINERS

A. Install partial CIPP liner in accordance with ASTM F2599 and same requirements as for full liner.

B. Dimensions of liner shall be fabricated to size, that when installed, will neatly fit circumference of existing pipe.

C. Tube shall be vacuum impregnated with thermo-set resin. Remove air in tube by vacuum allowing resin to thoroughly impregnate tube. Retain a resin-impregnated sample for each installation to provide verification of curing process taking place in host pipe. Hang sample in entry manhole to simulate ambient conditions of host pipe.

D. Insert saturated tube and inversion bladder into carrying device and pull into host pipe. Pull shall be complete when end of launching device is aligned with beginning of section to be repaired. Protect resin and tube during pull to ensure no resin is lost by contact with manhole walls or pipe. Resin that provides structural seal shall not contact pipe until positioned at point of repair.

E. Installer shall be capable of viewing the beginning of liner contacting host pipe; verifying exact placement of liner. No measuring from a CCTV counter or estimating will be allowed.

F. Extract tube from carrying device by controlled air or water pressure. Hold tube in place against wall of host pipe by pressure until cure is complete.

G. Once sample piece in manhole has cured and inflation bladder is deflated, remove bladder and launching device from host pipe. Remove materials used in installation other than CIPP liner from host pipe. Recover sample piece and label with upstream and downstream manhole numbers and footage from downstream manhole to service connection. Test sample in accordance with specification.

H. Restore service reinstatements covered by sectional repair in accordance with specification.

3.10 FIELD QUALITY CONTROL

A. General:

1. CIPP installation shall be free from visual defects such as foreign inclusions, dry spots, keel, boat hull, pinholes, wrinkles, and other deformities.
   a. Defects and deformities may, at discretion of the Owner, be cause for rejection of entire liner.
   b. Correct failed CIPP and defective CIPP from post-installation television inspection or test reports for structural values or thickness as determined by the Engineer.
   c. Method of repair, which may require field or workshop demonstration, shall be approved by the Engineer prior to commencement of the Work.
   d. Remove and replace pipe identified with defects or deformities.

B. CCTV Visual Inspection:

1. After completion of the lining process and reinstatement of appropriate service connections, the installation shall be television inspected per NASSCO standards and Section 33 01 30.16, Television Inspection of Sewer Pipelines. All service entrances should be accounted for. No infiltration should be apparent. The finished pipe should be continuous over the entire length of the installation and be free of dry spots, lifts, and delaminations. If the pipe is not acceptable to the Owner, remedies shall be accomplished at the Contractor’s expense and to the Owner’s satisfaction.
2. Conduct finished inspections continuous over entire length of sewer between manholes (access points).

~~C. Gravity Pipe Leakage Testing:~~

~~1. Pneumatic Testing for 18-inch and Smaller Diameter Pipe:~~
~~a. Equipment:~~
~~1) Calibrate gauges with standardized test gauge provided by the Contractor at start of each testing day, the Engineer will witness calibration.~~
~~2) Install compressor, air piping manifolds, gauges, and valves at ground surface.~~
~~3) Provide pressure release device, such as rupture disc or pressure relief valve, to relieve pressure at 6 psi or less.~~
~~4) Restrain plugs used to close sewer lines to prevent blowoff.~~

b. Procedure:
1) No person shall enter manhole or structure, or occupy area above opening of manhole or structure where pipe is under pressure.
2) Determine height of groundwater table at time of test.
3) Slowly introduce air into pipe section until internal air pressure reaches 4 psi greater than average backpressure of groundwater submerging pipe.
4) Allow 2 minutes minimum for air temperature to stabilize.
5) Allowable leakage for sewers constructed of air-permeable materials, such a concrete or clay:
a) When pressure is decreased to 3.5 psig, air pressure test shall begin.
b) Test shall consist of measuring time in seconds for pressure in pipe to drop from 3.5 psig to 2.5 psig.
c) Pipe leakage shall be considered acceptable if time in seconds for pressure drop is equal to or greater than required time as calculated below:

$K = 0.0111d^2L$
$C = 0.000392dL$

If C_t is less than or equal to 1.0, then time = K_t
If C_t is between 1.0 and 1.75, then time = K_t/C_t
If C_t is greater than or equal to 1.75, then time = $K_t/1.75$

Where: d = pipe diameter in inches
L = pipe length in feet
K = value for each length of pipe of a specific diameter
C = value for each length of pipe of a specific diameter
K_t = Sum of all K values
C_t = Sum of all C values

c. This method is based on allowable air loss rate of 0.003 cfm per square foot of internal pipe surface, with total air loss rate not less than 2.0 cfm or greater than 3.5 cfm.

2. Pipe Greater than 18 Inches:
a. Hydrostatic Exfiltration Test:
1) Procedure:
a) Maximum filling velocity shall not exceed 0.25 foot per second, calculated based on full area of pipe.
b) Expel air from piping system during filling.

~~c) Apply and maintain specified test pressure with hydraulic force pump. Valve off piping system when test pressure is reached.~~

~~d) Maintain hydrostatic test pressure continuously for 2 hours minimum, adding additional make-up water only as necessary to restore test pressure.~~

~~e) Determine actual leakage by measuring quantity of water necessary to maintain specified test pressure for duration of test.~~

~~2) Measurement Accuracy: Plus or minus 1/8 gallon of water leakage under specified conditions.~~

~~3) Hydrostatic Head:~~

~~a) At least 6 feet above maximum estimated groundwater level in section being tested, but no less than 6 feet above inside top of highest section of pipe in test section, including service connections.~~

~~b) In every case, determine height of water table at time of test by exploratory holes or such other methods approved by the Engineer. The Engineer will make final decision regarding test height for water in pipe section being tested.~~

~~c) If hydrostatic head is other than 6 feet, allowable leakage as computed by criteria above shall be adjusted by the square root of actual head divided by square root of 6.~~

~~4) Length of Pipe Tested: Limit length such that pressure on invert of lower end of section does not exceed 16 feet of water column. In no case shall length be greater than 700 feet or distance between manholes when greater than 700 feet.~~

~~5) Dispose of test water in a manner that will not damage or interfere with adjacent property and in a manner acceptable with the Engineer and regulatory agencies.~~

~~D.~~C. Properties Testing:

1. Sampling and Measuring:
   a. Cut two minimum 12-inch long restrained pipe section from cured liner. A section of cured pipe cut from the installation at an intermediate or terminal manhole and which has been inserted through a like diameter pipe held in place by a suitable heat sink (such as sandbags); and a sample fabricate from material taken from the tube and the resin/catalyst system used and cured in a clamped mold placed in the down tube. Each sample should be

large enough to provide a minimum of three specimens for tensile testing and five specimens for flexural properties testing.

b. Prepare samples in accordance with restrained sample method referenced in ASTM F1216.

2. Field Thickness Testing:
   a. Perform prior to conducting laboratory tests.
   b. Take wall thickness measurements in accordance with ASTM D2122.
   c. Make a minimum of four measurements, evenly spaced, on each test specimen.
   d. Calculate average thickness using measured values.
   e. Average thickness shall be equal or greater than required design thickness.
   f. Failure of thickness test shall be grounds for rejection for CIPP liner.
3. Laboratory Testing:
   a. No separate or additional payments will be made for testing requirements. Test documentation results to be provided to the Owner at no additional cost.
   b. Send one sample to independent laboratory and test for modulus of elasticity and flexural strength.
   c. Preparation and testing standards shall be performed in accordance with approved submittals.
   d. Failure of a test may be grounds for rejection of CIPP liner. Test second sample at direction of the Owner.
4. Resin Sampling:
   a. Wet-out facility resin mixing equipment shall have a valve downstream of the mixing function and immediately upstream of application of mixed resin to tube where resin samples may be drawn.
   b. Batch mix facilities, if any, shall provide for sampling of mixed batch.
   c. Submitted “wet-out” schedule cannot be modified without 24-hour notice to the Engineer.
   d. Resin samples shall be drawn at times determined by the Engineer.
5. Physical samples removed for testing as requested by the Engineer shall be individually labeled and logged to record the following:
   a. The Owner’s Project number and title.
   b. Sample number.
   c. Segment number of line as noted on plans.
   d. Date and time of sample.
   e. Name of the Contractor.
   f. Location and by whom tested.

g. Results of test.
h. Street name and address.
i. Starting and ending manhole identification number for each length of pipe lined.
j. Label as follows:
   1) Sample A: Restrain Sample.
   2) Sample B: Restrain Sample.

~~E.~~D. CIPP Correction:

1. Pipe failing to meet these requirements is subject to rejection and replacement at the Contractor’s cost.
2. Correct failed liner or liner deemed unacceptable by the Owner as a result of CCTV inspection, leakage test results, laboratory testing, or thickness test.
3. Remedy for failed laboratory and thickness test shall be as shown in the following table:

Pipe Correction			
Test	**Required Value**	**Test Result**	**Remedy**
Flexural Strength	4,500 psi	4,300 to 4,490 psi	10% unit price reduction
	4,500 psi	4,100 to 4,290 psi	30% unit price reduction
	4,500 psi	Less than 4,100 psi	Pipe replacement
Flexural Modulus	250,000 psi	238,000 to 249,000 psi	10% unit price reduction
	250,000 psi	225,000 to 237,900 psi	30% unit price reduction
	250,000 psi	Less than 225,000 psi	Pipe replacement

Pipe Correction			
Test	**Required Value**	**Test Result**	**Remedy**
Thickness	Minimum or design, whichever is greater	≥90% to 100%	No unit price reduction
	Minimum or design, whichever is greater	≥80%, but less than 90%	15% unit price reduction
	Minimum or design, whichever is greater	<80%	Pipe replacement

4. Where pipe removal and replacement is required, remove and replace entire segment length from manhole to manhole and payment shall be made in full for CIPP.

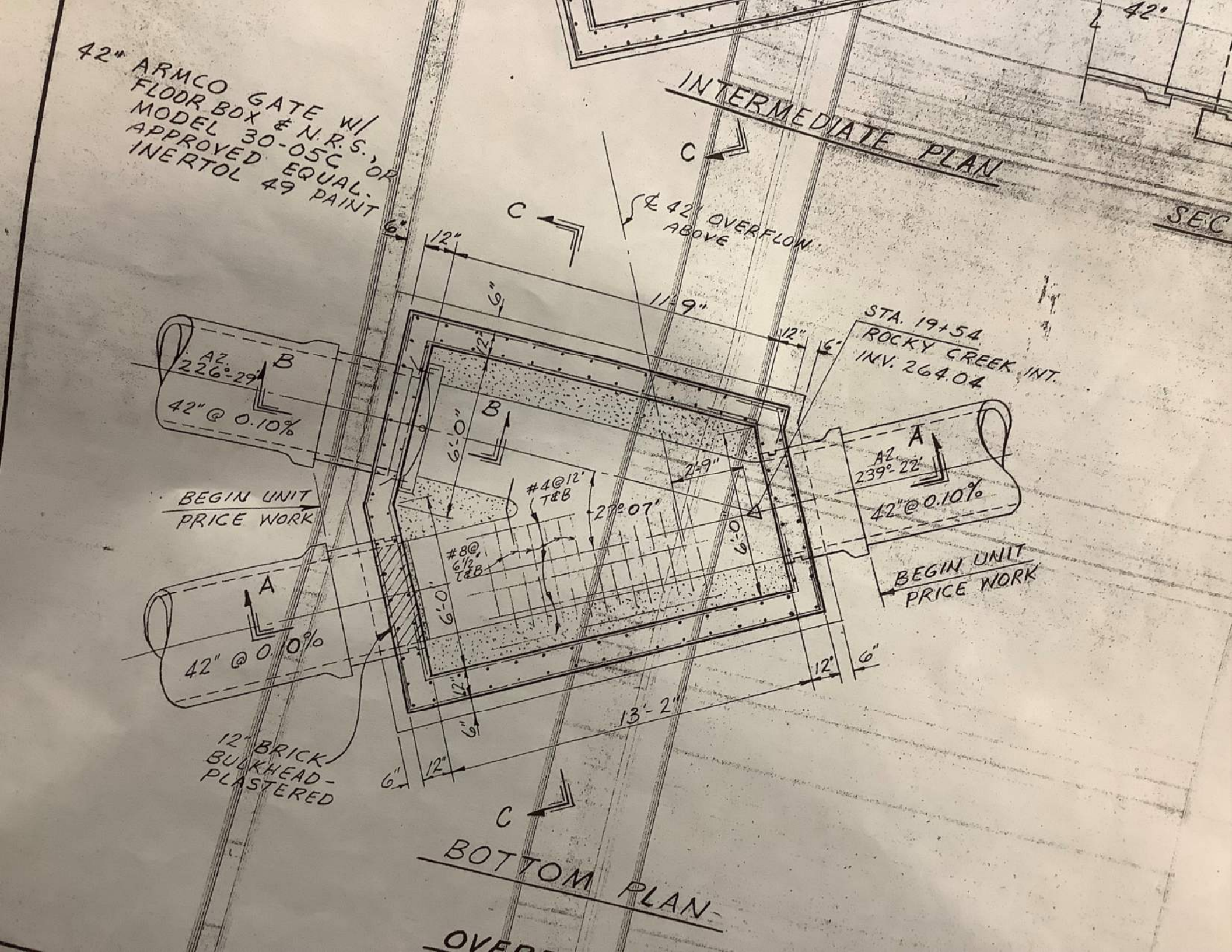
3.11 CLEANING

A. After liner installation has been completed and accepted by the Owner, clean entire Project area and restore Site to original condition.

END OF SECTION


Jennifer Dr
ACCESS POINT (GATE TO THE RIGHT OF THE CUL DE SAC)
Jennifer Dr
Jennifer Dr
Colvin Pl
Colvin Pl


75
75
75
ACCESS POINT (GATE)
Mecca Dr
Mecca Dr
Al Sihah Shrine Temple


42" ARMCO GATE W/ FLOOR BOX & N.R.S. OR MODEL 30-05C APPROVED EQUAL. INERTOL 49 PAINT
INTERMEDIATE PLAN
SEC
42"
C
℄ 42" OVERFLOW ABOVE
6"
12"
9"
11'-9"
12"
6"
STA. 19+54
ROCKY CREEK INT.
INV. 264.04
AZ. 226°-29'
B
42" @ 0.10%
6'-0"
#4@12" T&B
2'-9"
AZ. 239°-22'
A
42" @ 0.10%
BEGIN UNIT PRICE WORK
#8@ 6½" T&B
27°-07"
6'-0"
BEGIN UNIT PRICE WORK
42" @ 0.10%
12"
6"
13'-2"
12" BRICK BULKHEAD - PLASTERED
BOTTOM PLAN