

**ADDENDUM NO. 3
TO
CONTRACT DOCUMENTS AND SPECIFICATIONS
FOR
ROCKY RIVER INTERCEPTOR REHABILITATION PROJECT
CONTRACT NO. SRP-W-ARP-0053.3 - WSACC**

Issued: February 6th, 2026

To: All Official Plan Holders

The following revisions, additions, and clarifications are hereby made part of the Contract Documents for the above-referenced project and shall be taken into account in the preparation of all Bids and the execution of all Work. All items in conflict with the Addenda are hereby deleted. This addendum is made part of the Contract Documents and shall be acknowledged on Page 2 of the Bid Form.

I. CONTRACT DOCUMENTS

- Ad-3-1. Section 00020 Invitation to Bid. **REPLACE** in its entirety with attached, Invitation to Bid, revised. “Sealed Bids will be received by the Water and Sewer Authority of Cabarrus County (WSACC) (Owner) at the Water & Sewer Authority of Cabarrus County, 232 Davidson Highway Concord, North Carolina 28027 until 2:00 p.m., local time, Tuesday, February 17th, 2026.”

II. TECHNICAL SPECIFICATIONS

- Ad-3-2. Section 33 01 33 – Temporary Bypass Pumping. **REPLACE** in its entirety with attached, Temporary Bypass Pumping, revised. Added Section 3.6 Projected Flow Rates, adding table for Peak Dry Weather Flows and revised Section 3.2 “Portions of the bypass system will be within areas prone to flooding. If any bypass system is operational for more than (5) five consecutive days, it should be adequately protected. Bypass systems in operation for less than (5) five consecutive days shall remain unprotected at the discretion of the Owner / Engineer and based on forecasted weather.”
- Ad-3-3. Section 01 22 00 – Measurement and Payment. **REPLACE** in its entirety with attached, Measurement and Payment, revised. Revised Comprehensive Manhole Rehabilitation to state “manhole lining including manhole invert” and Standard Manhole Rehabilitation to state “manhole lining to top of manhole bench only, unless otherwise noted on the plans”
- Ad-3-4. Section 33 01 36 – Manhole Rehabilitation. **REPLACE** in its entirety with attached, Manhole Rehabilitation, revised. Revised Comprehensive Manhole Rehabilitation to state “manhole lining including manhole invert” and Standard Manhole Rehabilitation to state “manhole lining to top of manhole bench only, unless otherwise noted on the plans”

III. PROJECT PERMITS

- Ad-3-5. None.

IV. PROJECT PLAN SET

Ad-3-6. **REPLACE** in its entirety Sheets 00G-003 and 00G-004, with Revised Sheets 00G-003 and 00G-004. Added table columns for Wall Dimension 1, Dimension 1 Approximate Depth, Wall Dimension 2, Dimension 2 Approximate Depth, and Lining Parameter.

Respectfully submitted,

HDR Engineering, Inc. of the Carolinas



Channin H. Bennett, PE
Project Manager

Attachments:

- Section 00020 – Invitation to Bid, Revised
- Section 33 01 33 – Temporary Bypass Pumping, Revised
- Section 01 22 00 – Measurement and Payment, Revised
- Section 33 01 36 – Manhole Rehabilitation, Revised
- Plan Sheet 00G-003, Revised
- Plan Sheet 00G-004, Revised

INVITATION TO BID

Date: _____

ROCKY RIVER INTERCEPTOR REHABILITATION PROJECT

Sealed Bids will be received by the Water and Sewer Authority of Cabarrus County (WSACC) (OWNER) at the Water & Sewer Authority of Cabarrus County 232 Davidson Highway Concord, North Carolina 28027 until **2:00 p.m., local time, Tuesday, February 17th, 2026.**

For Contract No. **SRP-W-ARP-0053.3 - WSACC**

At said place and time, and promptly thereafter, all Bids that have been duly received will be publicly opened and read aloud.

The proposed Work is generally described as follows:

Rehabilitation of 138 sewer manholes, Cured In Place pipe lining of 430 LF of 30-inch pipe, 409 LF of 36-inch pipe, 1,212 LF of 48-inch, and 36 LF of Cured In Place pipe patches ranging in size from 30 inches diameter to 54 inches diameter. The work is generally located adjacent to the Rocky River commencing behind the Rocky River Golf Club at Concord and terminating near the Mecklenburg County line. The project generally includes but is not limited to all pipe and manhole internal inspections and cleaning, temporary flow by-pass pumping, pipe and manhole rehabilitations, manhole component replacements, site restorations, and all other work necessary to furnish, rehabilitate, test and place back into service the gravity sewer interceptor. Work to be performed within the limits of existing WSACC easements.

All Bids must be in accordance with the Bidding Documents on file with the Water and Sewer Authority of Cabarrus County (WSACC) (Owner) and at the Issuing Office of HDR Engineering, Inc. of the Carolinas 555 Fayetteville Street Suite 900 Raleigh, NC 27601 C/O Susan Faith at phone: 919-900-1632 and email: susan.faith@hdrinc.com.

Electronic copies of the Bidding Documents may be obtained from the Issuing Office at no charge. The date that the Bidding Documents are transmitted by the Issuing Office will be considered as the Bidder's date of receipt of the Bidding Documents. Partial sets of Bidding Documents will not be available from the Issuing Office. Neither Owner nor Engineer will be responsible for full or partial sets of Bidding Documents, including Addenda, if any, obtained from sources other than the Issuing Office.

Section 00020 – Invitation to Bid

Copies of the Bidding Documents have also been provided to plan rooms of Associated General Contractors and F. W. Dodge Corporation in Charlotte, North Carolina.

Bidding Documents may be examined at 232 Davidson Highway Concord, North Carolina 28027, by appointment only. Arrangements shall be made by calling Trent Gobble, WSACC Engineering Technician, at 704-786-1783 ext. 217.

Bidders are encouraged to attend a non-mandatory Pre-Bid Conference located at the Rocky River Regional Waste Water Treatment Plant Conference Room, 6400 Breezy Lane Concord, NC 28025. The conference will be held on Wednesday January 21st, 2026 at 2:00 pm.

Bidders must be licensed contractors in the State of North Carolina. All Subcontractors must also be licensed contractors in the State of North Carolina.

Bids will be received on a unit price basis.

Bid security in an amount of 5 percent of the Bidder's maximum Bid must accompany each Bid.

The Successful Bidder will be required to furnish a Construction Performance Bond and a Construction Payment Bond as security for the faithful performance and the payment of all bills and obligations arising from the performance of the Contract.

Contractor and all Subcontractors will be required to conform to the labor standards employment requirements set forth in the Contract Documents.

The Bidder is required to make positive efforts for minority business participation in accordance with State G.S. 143-128.2. The Bidder shall identify efforts made in this regard and list minority business enterprises that will be used on the project as required in the bidding documents.

If the Contract is to be awarded, Owner will give the Successful Bidder a Notice of Award within the number of days set forth in the Bid Form for acceptance of the Bid.

The contract requires compliance with State and Federal Funding requirements.

Water and Sewer Authority of Cabarrus County

By: Thomas Hahn, Engineering Director

SECTION 33 01 33
TEMPORARY BYPASS PUMPING

PART 1 - GENERAL

1.1 REQUIREMENTS

- A. This section describes the requirements for temporary bypass pumping sewage flows.
- B. Contractor shall provide labor, materials, and supervision to temporarily provide bypass pumping around the Contractor's work in accordance with the specific needs of the work.
- C. No interruption of sewage flow shall be permitted throughout the duration of the project.
- D. Bypass Operation: 24 hours per day during the period of Work. The bypassed flow shall be continuously monitored.

1.2 SUBMITTALS

- A. Shop Drawings:
 - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
 - 2. Bypass Pumping Plan. Provide for each bypass pumping scenario for the project. Bypass pumping plan shall include at least the following:
 - a. Staging areas for pumps.
 - b. Sewer plugging method and types of plugs.
 - c. Size and location of manholes or access points for suction and discharge hose or piping.
 - d. Size of pipeline or conveyance system to be bypassed.
 - e. Number, size, material, location and method of installation of suction piping.
 - f. Number, size, material, location and method of installation of discharge piping.
 - g. Bypass pump sizes, capacities, and number of each size to be provided on-site including all primary, secondary, and spare pumping units.
 - h. Calculations of static lift, friction losses, and flow velocity (pump curves showing pump, operating range shall be submitted).
 - i. System pressure for calculation of hydrostatic testing requirements.
 - j. Downstream discharge plan.
 - k. Method of protecting discharge manholes or structures from erosion and damage.
 - l. Thrust and restraint block sizes and locations. Provide the details necessary to demonstrate the integrity of all suction and discharge piping including piping and fittings associated with all primary and secondary pumping units.
 - m. Sections showing suction and discharge pipe depth, embedment, select fill and special backfill.
 - n. Method of noise control for each pump and any additional equipment that is included in the Bypass Pumping Plan.
 - o. Any temporary pipe supports and anchoring requirements.
 - p. Access plans to all bypass pumping locations indicated on the drawings.
 - q. Calculations for selection of bypass pumping pipe size.
 - r. Schedule for installation of and maintenance of bypass pumping lines.
 - s. Plan indicating location of bypass pumping pipe locations.
 - t. Emergency plan for adverse weather and flooding for various phases of the Work.
 - u. Contractor's plan for providing continuous monitoring of the bypass pumping operation as well as the monitoring persons' qualifications.

3. Emergency Contact List: Provide list of three emergency contacts who are able to respond and be on site within two hours of contact. Provide name, cell phone, and email addresses. List shall be posted in a conspicuous location at the bypass pump location.

PART 2 - PRODUCTS

2.1 NOISE RESTRICTIONS

- A. Pumps and generators shall keep the noise level below 70 dBA at 30 feet.

2.2 CAPACITY

- A. Pumps and bypass lines shall be of adequate capacity and size to handle the required capacity. Bypass lines, fittings and all accessories shall withstand twice the maximum pressure required for bypassing.

PART 3 - EXECUTION

3.1 GENERAL

- A. The Contractor shall notify the Engineer 48 hours prior to bypassing or diverting flow in any of the pipelines or laterals. Notification shall include location of bypass, when bypass will be activated, and length of time bypass will be in place. Include copy of emergency contact list.
- B. Contractor shall maintain on site, sufficient equipment and materials to ensure continuous and successful operation of the bypass systems. The Contractor shall maintain on site a sufficient number of valves, spare pumps, tees, elbows, connections, tools, sewer plugs, piping, fuel and/or back-up generator, and other parts or system hardware to ensure immediate repair or modification of any part of the system as necessary.

3.2 PROTECTION

- A. Contractor shall mark and protect suction and discharge pipes.
- B. The Contractor shall be responsible for all bypass flows. The Contractor shall inspect the entire bypass pumping and piping system for leaks or spills on an hourly basis. No bypassing to the ground surface, receiving waters, storm drains, or bypassing which results in soil or groundwater contamination or any potential health hazards shall be permitted. In the event of any sewage spill the Contractor shall notify Owner immediately and be responsible for the prompt cleanup and disinfecting of the spill per local and state requirements. The Contractor shall compensate the Owner for the cost of any fines levied as the result of a spill or unauthorized discharge.
- C. Portions of the bypass system will be within areas prone to flooding. If any bypass system is operational for more than (5) five consecutive days, it should be adequately protected. Bypass systems in operation for less than (5) five consecutive days shall remain unprotected at the discretion of the Owner / Engineer and based on forecasted weather.

3.3 FIELD QUALITY CONTROL

- A. Hydrostatic Pressure Test:
 1. Prior to operation, test each section of discharge piping with maximum pressure equal to 2.0 times the maximum operating pressure of system or 50 psi, whichever is greater.
 2. The test shall run for a period of two hours.
 3. The Contractor shall fill the line with water.
 4. The line shall be sealed on the discharge end.
 5. The line may be put in service if after the two-hour period the pressure has been maintained and there are no observable leaks.
 6. Notify Engineer 24 hours prior to testing.
- B. Inspection:

1. Operator shall inspect temporary bypass pumping and piping system at a minimum of every hour.
 2. Inspection log: Keep written inspection log at each pumping location.
- C. A float and dialer monitoring system is acceptable in place of a trained and qualified attendant.
1. Float and dialer monitoring system shall have dual power source.
 2. Float and dialer monitoring system shall have redundant system to send alarms.
 3. Bypass system shall be physically checked at least on a daily basis.
 4. Contractor shall provide an on-site response team from an alarm of less than two hours.

3.4 CLEAN-UP

- A. The bypass pumping system shall be cleaned and drained prior to being dismantled and moved to the next location.
- B. Disturbed Areas: Upon completion of bypass pumping operation, clean disturbed areas, restoring to original condition, including pavement restoration, at least equal to that which existing prior to start of Work.

3.5 SCHEDULING

- A. The bypassing system shall not be shut down between shifts, on holidays or weekends, or during work stoppages.
- B. The bypass system shall have a trained and qualified attendant on site 24 hours per day, 7 days per week to maintain the bypass pumping system from the start of bypass until the bypassing of the specific pipeline is no longer required.
1. A float and dialer monitoring system is acceptable in place of a trained and qualified attendant.
 2. Float and dialer system shall have a dual power source.
 3. Float and dialer monitoring system shall have redundant system to send alarms.
 4. Bypass system shall be physically checked at least on a daily basis.

3.6 PROJECTED FLOW RATES

- A. The following flow rates are provided to the Contractor based on projected 2030 sewershed build-out for each of the storm events listed, and dry weather peak flows. It is the Contractor's responsibility to size the bypass pumps and pipe sizes for the given work and duration of required bypass operation.

WSACC Manhole Number	011757	011773	012252	012271	014060	014082	018875	018878
	Peak flow (mgd) for Year 2030 Improvements							
1-inch storm	9.8085	6.8991	0.0024	1.5163	12.3817	9.803	1.1074	1.0729
2-inch storm	15.5528	11.4557	0.0044	2.047	18.2534	15.3894	1.4612	1.4528
10-year storm	25.1202	17.2954	0.4102	3.401	27.7571	24.4134	2.5533	2.4696

WSACC Manhole Number	011757	011773	012252	012271	014060	014082	018875	018878
	Peak Flow (mgd) for Year 2030 Improvements							
Dry Weather	6.734	4.393	0.001	1.312	9.202	6.768	0.950	0.923

END OF SECTION

SECTION 01 22 00
MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. General requirements applicable to all bid/pay items.
 - 2. General provisions on unit prices and quantities.
 - 3. Listing of the various bid/pay items in the Project, together with criteria for measuring Unit Price Work for payment.
- B. Related Requirements: Include, but are not necessarily limited to:
 - 1. Section 01 26 00 - Contract Modification Procedures.

1.2 REQUIREMENTS APPLICABLE TO ALL BID/PAY ITEMS

- A. In this Section and elsewhere in the Contract Documents, the terms “bid item”, “pay item”, “bid/pay item”, “Item” followed by a number designation, “this item”, and the like all have the same meaning, and refer to one or more specific elements of the Contract, established for pricing and payment, as indicated in the Bid Form and in the Agreement (or exhibit to the Agreement) at the time the Contract was signed by the parties.
- B. This Article applies to all bid/pay items in the Contract.
- C. Prices – General:
 - 1. The bid/pay items listed starting with Article [1.5] of this Section refer to and are the same bid items listed in the Bid Form and included in the Contract and constitute all bid/pay items for the Work at the time the Contract was signed by the parties.
 - 2. No direct or separate payment will be made, outside of the bid/pay items in the Contract, for the following: providing miscellaneous temporary or accessory materials or equipment, temporary works, temporary construction facilities, Contractor’s project management, superintendence, and similar costs for Subcontractors or Suppliers; bonds and insurance; schedules and schedule updates; coordination with: Owner’s operations (including, but not limited to, lockout/tag-out procedures), other contractors, utility owners, owners of transportation facilities, adjacent property owners and occupants, authorities having jurisdiction, Subcontractors and Suppliers, and others with whom Contractor is to coordinate the Work; information technology systems required by the Contract Documents; Submittals; photographic documentation; Project meetings; Contractor’s hazard communication program; Contractor’s compliance with environmental procedures for Constituents of Concern (including spill control and countermeasures plans and implementation); professional services (required for Contractor’s means and methods of construction, and for delegated designs required by the Contract Documents); obtaining and complying with permits and licenses; temporary utilities (including electric power, water supply and disposal, fuel, and communications); temporary lighting; temporary fire protection; temporary enclosures and HVAC; temporary sanitary facilities; temporary first-aid facilities and services; Contractor’s field offices and sheds, Engineer’s field offices (when required elsewhere in the Contract Documents); temporary vehicular access and parking (including access to the Site, temporary access roads and parking, onsite traffic controls for construction traffic, and offsite haul routes); traffic control of non-construction vehicular and pedestrian traffic; temporary controls (including temporary erosion and sediment controls, noise control, control of storm water, surface water, and groundwater, pollution controls (including solid waste control, water pollution control, and control of atmospheric pollution), dust control, pest and rodent controls, odor controls, and other temporary controls required by the Contract Documents); temporary security for the Work; temporary barriers; Project signage (when required elsewhere in the Contract Documents);

delivering, handling, and storing materials and equipment to be incorporated into the Work; layouts and surveys for the Work; construction equipment, machinery, tools, and vehicles; safety and protection; Site maintenance during construction; cleaning and removal and disposal of waste and debris; checkout and startup; testing and other quality control activities required by the Contract Documents; record documents, operation and maintenance data; warranties; spare parts and extra materials required by the Contract Documents; instruction of facility personnel as required by the Contract Documents; commissioning (when required elsewhere in the Contract Documents); Contractor's correction period, Contractor's general warranty and guarantee; Contractor's indemnification obligations; other labor, cost, or effort required by the General Conditions and Supplementary Conditions, Division 01 Specifications, and other requirements of the Contract Documents.

3. Price Escalation:

- a. Unless expressly indicated otherwise in the Contract Documents, Owner is not obligated to change the stipulated prices (including lump sums, unit prices, and allowances) that are all or part of the Contract Price because of escalation of costs when there is no corresponding change in the Contract Times.
- b. Changes in the Contract Times do not necessarily entitle Contractor to a change in Contract Price due to escalation.
- c. Should Contractor claim a change in Contract Price for one or more stipulated price pay items without a corresponding change in scope, extent, or quality in the associated Work, prior to receiving any such change in Contract Price, Contractor shall submit with Contractor's associated Change Proposal, documentation satisfactory to Engineer supporting and documenting that Contractor's costs have increased because of delays beyond Contractor's control within the associated change in Contract Times included in such Change Proposal.

4. Compensation for all services, labor, materials, and equipment shall be included in prices stipulated for the unit price bid/pay items in the Contract.

5. Each unit price in the Contract shall include an amount considered by Contractor as sufficient for all overhead and profit for each separately identified bid/pay item.

D. Contract Price, Payment Procedures, and Related Matters:

1. Contract Price: The Contract Price, as apportioned among bid/pay items in the Contract, is indicated in the Agreement [and any associated exhibits thereto] and may be modified by Change Order.

2. Payments to Contractor: Refer to the General Conditions (as may be modified by the Supplementary Conditions), and the Agreement (including provisions on retainage, if any), among other applicable Contract Documents.

3. Procedures for Changes in Contract Price: Refer to the General Conditions (as may be modified by the Supplementary Conditions) and Section 01 26 00 - Contract Modification Procedures.

4. Defective Work is not eligible for payment.

1.3 GENERAL PROVISIONS ON UNIT PRICES AND QUANTITIES

A. Quantities:

1. Quantities of Unit Price Work indicated in the Bid Form and in the Contract (at the time the Agreement was signed by the parties) are estimates for purposes of pricing and comparison of Bids.

2. Owner does not represent, either expressly or by implication, or agree that the nature of materials encountered below ground surface or in concealed areas, or actual quantities of Unit Price Work required, will correspond with the quantities in the Contract at the time the Agreement was signed by the parties. Owner reserves the right to increase or decrease quantities, and to eliminate quantities, as Owner may deem necessary or as may be necessary due to Site conditions encountered.

3. Adjustment of Unit Prices Due to Variation in Quantities:
 - a. Provisions, if any, regarding adjustment of unit prices due to variations in actual quantities (eligible for payment) from the estimated quantities in the Contract (including quantities at the time the Agreement was signed by the parties and as subsequently modified by Change Order) are in the General Conditions, as may be modified by the Supplementary Conditions.
 - 1) Engineer's review for possible unit price adjustment, when provision for such adjustment is expressly indicated in the Contract, will be at a time Engineer deems reasonable and proper.
 - 2) When the Supplementary Conditions establish that, to be eligible for an adjustment in the unit price, a pay item of Unit Price Work must have a total computed, extended price (at the time the Agreement was signed by the parties) equal to or greater than a specified percentage (stipulated in the Supplementary Conditions) of the total Contract Price (at the time the Agreement was signed by the parties), and the total extended price of such pay item does not exceed the stipulated percentage of the Contract Price, then the associated pay item will be paid at the unit price in the Contract without adjustment for variations in actual quantity.
 4. Quantities eligible for payment will be actual quantities furnished and installed (as applicable) in accordance with the Contract Documents, within the pay limits shown or indicated, as measured by Engineer (or other entity so empowered in the Contract Documents) and recommended for payment by Engineer.
 5. At Contractor's expense, Contractor may independently verify quantities measured by Engineer for payment. Should Contractor disagree with quantities measured and recommended for payment by Engineer, submit appropriate Change Proposal (appealing Engineer's measurements) indicating the specific reasons for Contractor's appeal, with detailed reasons therefor and associated calculations and estimates, in accordance with the Contract Documents.
 6. Quantity Overruns:
 - a. When the quantity of a pay item of Unit Price Work eligible for payment exceeds the pay item's quantity included in the Contract, Owner will pay for quantities that exceed those in the Contract only while the estimated total payments to Contractor under the Contract will not exceed the Contract Price. Otherwise, a Change Order is required to modify the associated quantity in the Contract, thus changing the Contract Price.
 7. Except as may be established elsewhere in the Contract Documents, make no claim for anticipated profit, loss of profit, damages, or additional compensation arising from difference between quantities of Unit Price Work eligible for payment and the estimated quantities in the Contract.
- B. Measuring for Payment:
1. At Engineer's option, Engineer may delegate to Resident Project Representative (RPR) (if any), some or all of Engineer's responsibilities for measuring Unit Price Work eligible for payment.
 2. Unless expressly indicated otherwise in the Contract Documents, measurements will be in United States standard measurements.
 3. Unless indicated otherwise elsewhere in the Contract Documents, quantities of Unit Price Work eligible for payment will be rounded to the nearest whole number.
 4. Assistance with Measurements:
 - a. Assist Engineer and Resident Project Representative (RPR) (if any), by providing measuring equipment, labor, and survey personnel necessary to measure quantities eligible for payment.
 5. Quantities eligible for payment can be adjusted by Engineer to correct quantities included in Contractor's prior payment requests, and for incomplete or defective Unit Price Work. Such corrections are at Engineer's sole discretion.

1.4 GENERAL PROVISIONS ON LUMP SUM ITEMS – (NOT USED)

1.5 BID/PAY ITEMS - GENERAL CONTRACT

A. Items 1, 4, 7, 10, 13 – Comprehensive Manhole Rehabilitation:

1. **Measurement:** Measurement for Comprehensive Manhole Rehabilitation performed on existing manholes shall be a count of the number of manholes rehabilitated described in the Contract Documents and approved by the Engineer.
2. **Payment:** Payment of the bid price for each manhole rehabilitation shall be full compensation for all labor, equipment, and materials required for or incidental to the work, including manhole inspection and cleaning, by-pass pumping, all measures to control infiltration or repair defective areas of manhole (patching and plugging), manhole lining including manhole invert, inside drop structure removal and replacement, frame and cover removal and replacement, frame / chimney seal replacement, testing, and site restoration.

B. Items 2, 5, 8, 11, 14 – Standard Manhole Rehabilitation:

1. **Measurement:** Measurement for Standard Manhole Rehabilitation performed on existing manholes shall be a count of the number of manholes rehabilitated described in the Contract Documents and approved by the Engineer.
2. **Payment:** Payment of the bid price for each manhole rehabilitation shall be full compensation for all labor, equipment, and materials required for or incidental to the work, including manhole inspection and cleaning, by-pass pumping, all measures to control infiltration or repair defective areas of manhole (patching and plugging), manhole lining to top of manhole bench only unless otherwise noted on the plans, inside drop structure removal and replacement, frame / chimney seal replacement, testing, and site restoration.

C. Items 3, 6, 9, 12, 15 – Minor Manhole Rehabilitation:

1. **Measurement:** Measurement for Minor Manhole Rehabilitation performed on existing manholes shall be a count of the number of manholes rehabilitated described in the Contract Documents and approved by the Engineer.
2. **Payment:** Payment of the bid price for each manhole rehabilitation shall be full compensation for all labor, equipment, and materials required for or incidental to the work, including manhole inspection and cleaning, by-pass pumping, all measures to control infiltration or repair defective areas of manhole (patching and plugging), frame / chimney seal replacement, testing, and site restoration.

D. Item 16 – Additional Frame and Cover Replacement:

1. **Measurement:** Measurement for Additional Frame and Cover Replacement performed on existing manholes shall be a count of the number of manholes rehabilitated not previously described in the Contract Documents within the manhole rehabilitation categories and approved by the Engineer.
2. **Payment:** Payment of the bid price for each manhole frame and cover replacement shall be full compensation for all labor, equipment, and materials required for or incidental to the work, including removal of existing frames and covers, installation of new manhole frames and covers, and site restoration.

E. Item 17 – Additional Frame and Seal Replacement:

1. **Measurement:** Measurement for Additional Frame and Cover Replacement performed on existing manholes shall be a count of the number of manholes rehabilitated not previously described in the Contract Documents within the manhole rehabilitation categories and approved by the Engineer.
2. **Payment:** Payment of the bid price for each manhole frame and seal replacement shall be full compensation for all labor, equipment, and materials required for or incidental to the work, including resetting of existing frames and covers, seal replacement and site restoration.

F. Item 18 – Additional Manhole Lining:

1. Measurement: Measurement for Additional Manhole Lining performed on existing manholes shall be on a vertical foot basis made from the top of the manhole rim to the lowest pipe invert for manholes rehabilitated not previously described in the Contract Documents within the manhole rehabilitation categories and approved by the Engineer.
 2. Payment: Payment of the bid price for each vertical foot shall be full compensation for lining of each manhole, including furnishing and mixing chemicals, injecting grout sealant, by-pass pumping, invert sealing, grout patching and plugging, manhole lining, testing and furnishing of all labor, tools, equipment and materials required for or incidental to the work.
- G. Item 19 – Additional Pipe Connection Grouting:
1. Measurement: Measurement for Additional Pipe Connection Grouting performed on existing manholes shall be a count of the number of manholes rehabilitated not previously described in the Contract Documents within the manhole rehabilitation categories and approved by the Engineer.
 2. Payment: Payment of the bid price for each pipe connection grouting including furnishing and mixing chemicals, injecting grout sealant, by-pass pumping, grout patching or plugging, and furnishing of all labor, tools, equipment and materials required for or incidental to the work.
- H. Item 20 – Additional Manhole Wall Grouting:
1. Measurement: Measurement for Additional Manhole Wall Grouting performed on existing manholes shall be per gallon of grout required for manholes rehabilitated not previously described in the Contract Documents within the manhole rehabilitation categories and approved by the Engineer.
 2. Payment: Payment of the bid price for each manhole wall grouting shall be full compensation for manhole wall grouting including furnishing and mixing chemicals, injecting grout sealant, by-pass pumping, grout patching or plugging, and furnishing of all labor, tools, equipment and materials required for or incidental to the work.
- I. Item 21 – Additional Manhole Bench Rehabilitation:
1. Measurement: Measurement for Additional Manhole Bench Rehabilitation performed on existing manholes shall be a count of the number of manholes rehabilitated not previously described in the Contract Documents within the manhole rehabilitation categories and approved by the Engineer.
 2. Payment: Payment of the bid price for each manhole bench rehabilitation shall be full compensation for manhole bench rehabilitation including by-pass pumping, and furnishing of all labor, tools, equipment and materials required for or incidental to the work.
- J. Item 22 – Additional Manhole Vent Pipe Replacement:
1. Measurement: Measurement for Additional Manhole Vent Pipe Replacement performed on existing manholes shall be a count of the number of manholes rehabilitated not previously described in the Contract Documents within the manhole rehabilitation categories and approved by the Engineer.
 2. Payment: Payment of the bid price for each manhole vent pipe replacement shall be full compensation for manhole vent pipe replacement including furnishing of all labor, tools, equipment and materials required for or incidental to the work.
- K. Items 23, 25, 26, 27, 29, 32 – Cured In Place Pipe Patching:
1. Measurement: Measurement for Cured In Place Pipe Patching shall be on a linear foot basis and shall be along the ground surface above and parallel to the pipeline. By-pass pumping of the main line sewer flow required in order to maintain sanitary sewer service while the pipe is being patched shall be included as part of the patching cost. Cleaning and inspection of the sewer segments within the project area before and after pipe lining shall be included as part of the pipe patching cost.

2. Payment: Payment of the bid price for mainline pipe patching shall be full compensation for cleaning, by-pass pumping, inspections, and all labor, equipment, and materials required for or incidental to the work.
- L. Items 24, 28, 30, 34, 35, 37, 38 – Cured In Place Pipe Lining:
1. Measurement: Measurement for Cured In Place Pipe Lining shall be on a linear foot basis and shall be along the ground surface above and parallel to the pipeline from and to the inside face of structures. No deductions will be made for the length of fittings. By-pass pumping of the main line sewer flow required in order to maintain sanitary sewer service while the pipe is being lined shall be included as part of the lining cost. Cleaning and inspection of the sewer segments within the project area before and after pipe lining shall be included as part of the pipe lining cost.
 2. Payment: Payment of the bid price for mainline pipe lining shall be full compensation for cleaning, by-pass pumping, providing and testing of the lining, inspections, and all labor, equipment, and materials required for or incidental to the work.
- M. Items 31, 33, 36 – Pipe Cleaning and CCTV Inspection:
1. Measurement: Measurement for Pipe Cleaning and CCTV Inspection shall be on a linear foot basis and shall be along the ground surface above and parallel to the pipeline from and to the inside face of structures.
 2. Payment: Payment of the bid price for mainline pipe cleaning and inspection shall be full compensation for any required preparatory light or heavy cleaning of the mainline, inspection, and video recording of the pipelines, and all labor, equipment and materials required for or incidental to the work.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 33 01 36
MANHOLE REHABILITATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Requirements for rehabilitating existing manholes, including inspection of manholes, structure cleaning, infiltration control, manhole lining, bench and invert rehabilitation, resetting manhole frames and covers, and replacing manhole frames and/or covers.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 - General Requirements.
3. Section 01 22 00 – Measurement and Payment (Reference for “Comprehensive”, “Standard”, and “Minor” descriptions of manhole rehabilitation materials, methods, and / or component installations).
4. Section 33 01 32 - Sewer Pipe and Structure Cleaning.
5. Section 33 01 33 - Temporary Bypass Pumping.

C. Manhole Rehabilitation Category Descriptions:

1. Comprehensive Manhole Rehabilitation: Full compensation for all labor, equipment, and materials required for or incidental to the work, including manhole inspection and cleaning, by-pass pumping, all measures to control infiltration or repair defective areas of manhole (patching and plugging), manhole lining including manhole invert, inside drop structure removal and replacement, frame and cover removal and replacement, frame / chimney seal replacement, testing, and site restoration.
2. Standard Manhole Rehabilitation: Full compensation for all labor, equipment, and materials required for or incidental to the work, including manhole inspection and cleaning, by-pass pumping, all measures to control infiltration or repair defective areas of manhole (patching and plugging), manhole lining to top of manhole bench only unless otherwise noted on the plans, inside drop structure removal and replacement, frame / chimney seal replacement, testing, and site restoration.
3. Minor Manhole Rehabilitation: Full compensation for all labor, equipment, and materials required for or incidental to the work, including manhole inspection and cleaning, by-pass pumping, all measures to control infiltration or repair defective areas of manhole (patching and plugging), frame / chimney seal replacement, testing, and site restoration.

1.2 QUALITY ASSURANCE

A. Qualifications:

1. Contractor or Subcontractor to perform manhole rehabilitation and manhole lining:
 - a. Prepared to complete the work.
 - 1) In a manner:
 - a) Timely.
 - b) Satisfactory.

- 2) Fully:
 - a) Qualified.
 - b) Experienced.
 - c) Equipped.
- 2. Applicator/subcontractor:
 - a. For each product:
 - 1) Licensed, certified and/or approved.
 - a) In writing.
 - b) By Manufacturer.
 - b. Minimum experience:
 - 1) Successfully installed and completed:
 - a) Five projects:
 - (1) In last five years
 - (2) With similar scope and products.
 - b) 500 manholes:
 - (1) With proposed manhole rehabilitation system.
 - c. Capable of providing crews as needed.
 - 1) To complete work without undue delay.

B. Referenced Standards:

- 1. ASTM International (ASTM), latest revision of each:
 - a. C109 – Compressive Strength of Hydraulic Cement Mortars.
 - b. C150 – Portland Cement.
 - c. C177 – Thermal Conductivity.
 - d. C191 – Time of Setting of Hydraulic Cement by Vicat Needle.
 - e. C234 – Comparing Concrete on the Basis of the Bond Developed with Reinforcing Steel.
 - f. C267 – Chemical Resistance of Mortars, Grouts, and Monolithic Surfacing and Polymer Concretes.
 - g. C293 – Flexural Strength of Concrete.
 - h. C309 – Liquid Membrane Forming Compounds for Curing Concrete.
 - i. C321 – Bond Strength of Chemical-Resistant Mortars.
 - j. C457 – Microscopical Determination of Parameters of the Air-Void System in Hardened Concrete.
 - k. C496 – Splitting Tensile Strength of Cylindrical Concrete Specimens.
 - l. C596 – Drying Shrinkage of Mortar Containing Portland Cement.
 - m. C579B – Compressive Strength of Chemical-Resistant Mortars, Grouts and Monolithic Surfacing.
 - n. C642 – Density, Absorption, and Voids in Hardened Concrete.
 - o. C666 – Resistance of Concrete to Rapid Freezing and Thawing.

- p. C882 – Bond Strength of Epoxy-Resin Systems Used with Concrete by Shear Slant.
- q. C900 – Pullout Strength of Hardened Concrete.
- r. C1072 – Measurement of Masonry Flexural Bond Strength.
- s. C1244 – Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill.
- t. D368 – Tensile Properties of Plastics.
- u. D412 – Vulcanized Rubbers and Thermoplastic Elastomers-Tension.
- v. D638 – Tensile Properties of Plastics.
- w. D790 – Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
- x. D903 – Peel or Stripping Strength of Adhesive Bonds.
- y. D1004 – Tear Resistance (Graves Tear) or Plastic Film and Sheeting.
- z. D1737 – Flexibility.
- aa. D2240 – Rubber Property – Durometer Hardness.
- bb. D4060 – Abrasion Resistance.
- cc. D4414 – Plain and Steel-Laminated Elastomeric Bearings for Bridges.
- dd. D4541 – Adhesion.
- ee. D4787 – Continuity Verification of Liquid or Sheet Lining Applied to Concrete Substrates.
- ff. E96 – Permeability.
- gg. F1869 – Measuring Moisture Vapor Emission Rate of Concrete.
- hh. F2414-04 – Sealing Sewer Manholes Using Chemical Grouting.
- ii. G14 – Impact.

C. Occupational Safety and Health Administration (OSHA).

1.3 SUBMITTALS

A. Shop Drawings:

1. See Section 01 33 00 – Submittals.

B. Existing manhole condition:

1. Photographs and/or videos.
 - a. Digital.
2. After cleaning.
3. After final product installation.

C. Product technical data:

1. Acknowledgement that products submitted meet requirements of standards referenced.
2. Manufacturer's installation instructions.
3. Complete characteristics:
 - a. Physical.
 - b. Chemical.

4. Chemical resistance information.
 5. Manufacturer's recommendations for:
 - a. Coating.
 - b. Adhesives.
 - c. Primer.
 - d. Grout.
 - e. Patch material.
 - f. Crack fillers.
 - g. Thinners.
 6. Warranty documentation.
- D. Applicator's qualifications.
- E. References:
1. Document experience required in paragraph 1.2A.2.b above.
 2. Include:
 - a. Type of installation.
 - b. Square footage of material installed.
 - c. Client contact:
 - 1) Name.
 - 2) Telephone number.

1.4 MATERIAL SUBSTITUTION

- A. Materials specified are for specific service indicated.
- B. Substitute products or manufacturers will be accepted if:
1. They are standard manhole or collection system products.
 2. Engineer is satisfied that they are equal:
 - a. In:
 - 1) Composition.
 - 2) Durability.
 - 3) Usefulness.
 - 4) Convenience.
 - b. For intended purpose.
 3. The following minimum conditions are met:
 - a. Proposed coating system:
 - 1) Has dry film thickness equal to or greater than that of specified system.
 - 2) Employs a multi-coat system equal to number of coats specified.
 - 3) Employ coating of same generic type.
 - 4) Has been used in at least ten (10) similar projects:
 - a) All at least three (3) years old.

- b) Where coating has been applied to similar:
 - (1) Exposure.
 - (2) Application.
 - b. Request for substitution includes:
 - 1) Full information from manufacturer for application:
 - a) Descriptive literature.
 - b) Directions.
 - c) Copy of warranty.
 - 2) Complete information:
 - a) Generic type.
 - b) Non-volatile content by volume.
 - c. If above data appears to be in order:
 - 1) Engineer may require Contractor to provide certified laboratory data sheets showing test results:
 - a) Complete:
 - (1) Spectrographic.
 - (2) Durability.
 - b) Performed:
 - (1) On proposed substitute.
 - (2) By testing laboratory:
 - (a) Independent.
 - (b) Approved by Engineer.
 - c) All testing costs borne by Contractor.
 - d. Engineer shall be sole and final judge of any proposed substitution's acceptability.
- C. Requests for substitution must be approved in writing.

1.5 WARRANTY

- A. For cementitious liner and epoxy liner:
 - 1. Provide three-year warranty:
 - a. For defects in:
 - 1) Material.
 - 2) Installation.
 - b. From:
 - 1) Coating Manufacturer, and
 - 2) Applicator.
 - 2. Warrant product from:
 - a. Delaminating from substrate.
 - b. Degradation of finish.
 - c. Cracking.

- d. Spalling.
- e. Corrosion of substrate due to defects in finish.
- 3. During warranty period, either:
 - a. Repair all lining defects.
 - 1) In manner satisfactory to Engineer.
 - b. Re-apply lining
 - 1) At no cost to Owner.
- 4. Two years following substantial completion of manhole rehabilitation work:
 - a. Owner/Engineer will inspect work to ensure proper performance.
 - b. If any deficiencies are found:
 - 1) Repair at no additional cost to Owner.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Avoid damaging materials:
 - 1. Including:
 - a. Chemical grouts.
 - b. Cementitious materials.
 - c. Any other manhole rehabilitation products.
 - 2. During:
 - a. Shipping.
 - b. Handling.
 - c. Placement.
- B. Store materials:
 - 1. In manner recommended by Manufacturer.
- C. Damaged materials:
 - 1. Any materials that:
 - a. Show deterioration, or
 - b. Have been exposed to any adverse storage condition that may have caused damage.
 - 1) Even though no such damage can be seen.
 - 2. Shall be:
 - a. Marked as rejected
 - b. Removed at once from the work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with Contract Documents, the following manufacturers are acceptable:
 - 1. Hydrophilic polyurethane chemical grout:

- a. Avanti.
 - b. Approved equal.
 - 2. Cementitious liner:
 - a. Quadex Aluminaliner, by Quadex, Inc.
 - b. SewperCoat, by LaFarge Aluminates.
 - c. High Performance Mix, by StrongSeal Systems.
 - d. Cemtec Silatec CAM, by A.W. Cook Cement, Inc.
 - e. Permaform, by AP/M.
 - f. Approved equal.
 - 3. Epoxy liner:
 - a. Raven 405, by Raven Lining Systems.
 - b. SprayRoq.
 - c. Approved equal.
 - 4. Frame/Cone seal:
 - a. Flex Seal Utility Sealant, by Sealing Systems, Inc.
 - b. Approved equal.
- B. Submit request for substitution in accordance with Section 01 25 13.

2.2 MATERIALS

- A. Infiltration Control Material (Chemical Grout)
 - 1. Stop active leaks and infiltration by injecting:
 - a. Chemical grout.
 - b. Through source.
 - c. To outside of manhole.
 - 2. Grout material:
 - a. Shall be one of the following gels:
 - 1) Acrylamide
 - a) Acrylamide base gel chemical sealing materials shall have the following characteristics:
 - (1) A minimum of 10% acrylamide base material by weight in the total sealant mix. A higher concentration (%) of acrylamide base material may be used to increase strength or offset dilution injection.
 - (2) The ability to tolerate some dilution and react in moving water during injection.
 - (3) A viscosity of approximately 2 centipoise, which can be increased with additives.
 - (4) A constant viscosity during the reaction period.
 - (5) A controllable reaction time from 10 seconds to 1 hour.
 - (6) The ability to increase mix viscosity, density, gel strength and resistance to shrinkage by the use of additives to the water.
 - 2) Acrylic

- a) Acrylic base gel chemical sealing material shall have the following characteristics:
 - (1) A minimum of 10% acrylic base material by weight in the total sealant mix. A higher concentration (%) of acrylic base material may be used to increase strength of offset dilution during injection.
 - (2) The ability to tolerate some dilution and react in moving water during injection.
 - (3) A viscosity of approximately 2 centipoise, which can be increased with additives.
 - (4) A constant viscosity during the reaction period.
 - (5) A controllable reaction time from 5 seconds to 6 hours.
 - (6) The ability to increase the mix viscosity, density, and gel strength by the use of additives.
- 3) Urethane
 - a) Urethane gel chemical sealing material shall have the following characteristics:
 - (1) One part urethane prepolymer thoroughly mixed with between 5 and 10 parts of water weight. The recommended mix ratio is one part urethane prepolymer to 8 parts of water (11% prepolymer).
 - (2) A liquid prepolymer having a solids content of 77% to 83%, specific gravity of 1.04 (8.65 lbs./gal.) and a flash point of 20 degrees F.
 - (3) A liquid prepolymer having a viscosity of 600 to 1,200 centipoise at 70 degrees F that can be pumped through 500 feet of 1/2 -inch hose with a 1,000-psi head at a flow rate of 1 ounce per second.
 - (4) Water used to react the prepolymer shall have a pH between 5 and 9.
 - (5) A cure time of 80 seconds at 40 degrees F, 55 seconds at 60 degrees F, and 30 seconds at 80 degrees F, when 1 part prepolymer is reacted with 8 parts of water only. Cure time shall be adjustable by the use of additives.
 - (6) A relatively rapid viscosity to increase of the prepolymer / water mix. Viscosity shall increase from about 10 to 60 centipoise in the first minute for a 1 to 8 prepolymer / water ratio at 50 degrees F.
 - (7) The ability to increase mix viscosity, density, gel strength and resistance to shrinkage by the use of additives to the water.
 - b. Chemical additives:
 - 1) Grouts injected into near-surface and chimney-corbels areas may require the addition of shrink control agents, gel reinforcing agents and accelerators as listed below:
 - a) Acrylamide Gel – Suggested Additive: Ethylene Glycol
 - b) Acrylic Gel - Suggested Additive: Ethylene Glycol
 - c) Urethane Gel - Suggested Additive: Gel Reinforcing Agent
 - 2) Additives shall be included in the chemical mixes in accordance with the manufacturer's recommendations.
 - c. Required properties:
 - 1) Volume stable.
 - 2) Minimum compressive strength:
 - a) One-day: 50 psi.

- b) 28-day: 250 psi.
- d. Suitable for specific application:
 - 1) Per Manufacturer's recommendation.
 - 2) Formula suitable for frost exposure.
 - a) If applicable for regional climate.
 - 3) Use hydrophilic polyurethane chemical grout for:
 - a) Drilling and injection method.
 - b) Exterior chemical curtain grouting method.

B. Patching Material:

- 1. The materials used shall be designed, manufactured, and intended for sewer manhole rehabilitation and the specific application in which they are used. The materials shall have a proven history of performance in sewer manhole rehabilitation. The materials shall be delivered to the job site in original unopened packages and clearly labeled with the manufacturer's identification and printed instructions. All material shall be stored and handled in accordance with recommendations of the manufacturer and the American Concrete Institute.
- 2. Cement plugging materials (for stopping active leaks in concrete and masonry manholes)
 - a. The plugging material shall be premixed fast-setting, volume-stable waterproof cement consisting of hydraulic cement, graded silica aggregates, and special plasticizing and accelerating agents. It shall not contain chlorides, gypsums, plasters, iron particles, aluminum powder or gas-forming agents, or promote the corrosion of steel it may come in contact with. Set time shall be approximately 1 minute. Ten-minute compressive strength shall be approximately 500 psi and the 28-day compressive strength shall be a minimum of 5,000 psi when tested in accordance with ASTM C109.
- 3. Cement patching, repointing, filling, and repairing materials (for nonleaking holes, cracks, and spalls in concrete and masonry manholes)
 - a. The patching material shall be premixed nonshrink cement-based material consisting of hydraulic cement, graded silica aggregates, and special plasticizing and accelerating agents, which has been formulated for vertical or overhead use. It shall not contain chlorides, gypsums, plasters, iron particles, aluminum powder, or gas-forming agents or promote corrosion of steel it may come into contact with. Set time shall be less than 30 minutes, when tested in accordance with ASTM C191. One-hour compressive strength shall be a minimum of 200 psi and the 28-day compressive strength shall be a minimum of 5,000 psi, when tested in accordance with ASTM C109. Bond strength when tested in accordance with ASTM C882, shall be a minimum of 1,700 psi.

C. Cementitious Liner:

- 1. Calcium aluminate mortar.
- 2. Designed to:
 - a. Stop infiltration.
 - b. Restore structural integrity.
 - c. Protect against microbiologically-induced corrosion.
- 3. Spray applied to:
 - a. Form a structurally-enhanced monolithic liner.
 - b. Cover all interior substrate surfaces.
- 4. Minimum requirements:

Compressive Strength	ASTM C109	>3,000 psi (28 days)
Tensile Strength	ASTM C900	>800 psi
Flexural Strength	ASTM C293	>1,200 psi (28 days)
Shrinkage @ 90% R.H.	ASTM C596	<0.08% (28 days)
Freeze/Thaw	ASTM C666	No damage after 300 cycles
Air Void Content	ASTM C457	2-4% (7 days)
Specific Gravity/Absorption Test	ASTM C642	3-5% (7 days)
Bond Strength	ASTM C882	>1,600 psi (28 days)

D. Epoxy Liner:

1. Two-component epoxy resin system.
 - a. 100% solids.
 - b. Solvent-free.
 - c. With select fillers to:
 - 1) Minimize permeability
 - 2) Provide sag resistance.
2. Minimum requirements:

Hardness, Shore D	ASTM D2240	88
Tensile Strength	ASTM D638	>7,000 psi
Flexural Strength	ASTM D790	>10,000 psi

E. Frame/Cone Seal:

1. Applied seals
 - a. Achieved by applying a urethane resin compound:
 - 1) To internal surface between:
 - a) Manhole frame.
 - b) Cone section.
 - 2) To stop inflow under manhole frame.
 - b. Seal to remain flexible.
 - 1) Allow for repeated frame movements:
 - a) Vertical or horizontal.
 - b) Due to:
 - (1) Frost lift.
 - (2) Ground movement.
 - (3) Thermal movement of pavement.
 - c. Minimum thickness: 120 mils.
 - d. Requirements.

Hardness	ASTM D2240	75
Tensile Strength	ASTM D412	1,150 psi
Elongation	ASTM D412	800%
Adhesive Strength	ASTM D903	175 lb. l/inch
Tear Resistance	ASTM D1004	155 lb. l/ inch

F. Water:

1. All water used on project:
 - a. Clean.
 - b. Potable.

PART 3 - EXECUTION

3.1 GENERAL

- A. Perform manhole rehabilitation after other improvements are complete.
- B. Prepare surface and install liner system:
 1. Per Manufacturer's recommended procedures.
 2. Each manhole to be rehabilitated:
 - a. Clean thoroughly.
 - b. Then inspect for and repair:
 - 1) Loose or missing bricks.
 - 2) Loose mortar.
 - 3) Holes.
 - c. Remove any protrusions or obstructions into manhole.
 - d. Eliminate any observed infiltration leaks.
 - 1) Prior to applying manhole lining system
- C. Material application:
 1. Only by technicians:
 - a. Factory trained.
 - b. Fully qualified.

3.2 SURFACE PREPARATION

- A. Clean manholes per Section 33 01 332.
 1. Before and after cleaning:
 - a. Visually inspect.
 - b. Take digital photographs.
- B. Notify Engineer immediately if:
 1. Due to existing conditions, a manhole is determined not to be:
 - a. Structurally sound, or
 - b. Capable of coating.
- C. Surface preparation work to be inspected and approved:
 1. By:
 - a. Engineer.
 - b. Contractor.
 2. Prior to installing coating.

- D. Notify Engineer when manholes are ready for inspection.
1. Stop Infiltration:
 - a. After surface cleaning, stop infiltration by chemical grout sealing or plugging in accordance with this Section.
 2. Patching
 - a. After surface cleaning, patch all holes or voids, spalled areas, and cavities caused by missing or broken brick or damaged precast concrete in accordance with this Section.
 3. Remove:
 - a. Completely.
 - b. From inside manhole.
 - c. All:
 - 1) Roots.
 - 2) Organic matter.
 - 3) Loose mortar and rubble of existing:
 - a) Chimney (corbelling).
 - b) Cone.
 - c) Walls.
 - d) Benches.
 - e) Inverts.
 - d. Remove existing manhole rungs/steps.
 - 1) Fill voids.
 - e. Reconstruction of channels and benches
 - 1) Construct channels and benches of brick and concrete. The brick lined channels shall correspond in shape with the lower half of pipe.
 - 2) Set the top of the bench to the elevation of the crown of the highest pipe and slope 1 inch per foot to drain toward the channel.
 - 3) At changes in directions, lay the invert out in curves of the longest possible radii, tangent to the centerline of the sewer pipes.
 - 4) Construct brick surfaces exposed to surface flow with the nominal 2-inch by 8-inch face exposed (i.e. bricks on edge).
 - f. Prepare all surfaces suitably:
 - 1) For approved coating's required bond.
 - 2) As recommended by Manufacturer.
 - g. Allow invert and bench to cure:
 - 1) 30 minutes minimum.
 - 2) Before being subject to active flow.

3.3 INSTALLATION OF MANHOLE LINING

- A. Control sewage flows per Section 33 01 33 – Temporary Bypass Pumping.
- B. Ensure proper preparation and installation conditions:

1. Including:
 - a. Temperature.
 - b. Moisture.
2. Per ASTM F1869.
3. Apply manhole lining immediately after initial inspection.
 - a. Otherwise manhole may need to be re-cleaned:
 - 1) Prior to lining application.
 - 2) To remove accumulated debris on:
 - a) Benches.
 - b) Walls.

C. Manhole Liner Application:

1. First Cementitious Application:
 - a. Surface condition prior to spraying:
 - 1) Damp.
 - 2) Without noticeable free water.
 - 3) Totally saturated.
 - b. Spray-apply materials.
 - 1) From bottom of wall to top.
 - 2) To a minimum uniform thickness to ensure that:
 - a) All cracks, crevices, and voids are filled.
 - b) A relatively smooth surface remains after light trowelling.
 - c. Perform light trowelling to:
 - 1) Compact material into voids.
 - 2) Set the bond.
2. Second Cementitious Application:
 - a. Apply after first application has begun to take an initial set:
 - 1) Disappearance of surface sheen:
 - a) 15 minutes to 1 hour depending on ambient conditions.
 - b. Assure a minimum total finished thickness of 1 IN.
 - c. Again apply from bottom up.
 - d. Finishing
 - 1) Finish surface with wood float, sponge float, broom or brush to produce a smooth but textured surface
3. Epoxy Liner Application:
 - a. Apply Epoxy Liner in accordance with manufacturer's instructions.
 - b. Apply liner as soon as possible after cementitious application.
 - c. Do not allow surface contamination to the Cementitious Liner prior to Epoxy Liner application.
 - d. Minimum thickness of application shall be 100 mils.

4. Curing:
 - a. Minimize applied product's exposure to:
 - 1) Sunlight.
 - 2) Air movement.
 - b. Set manhole cover back in place if:
 - 1) Second application will begin more than 15 minutes after completing first application.
 - 2) Finished product will be exposed to sunlight or air movement for more than 15 minutes at any time.
 - c. Allow final application to cure:
 - 1) Before being subjected to active flow.
 - 2) Minimum cure time: 4 hours.
 - d. Do not allow traffic over manholes:
 - 1) Minimum 12 hours.
 - 2) After application is complete.
- D. Provide complete watertight seal.
 1. At connections:
 - a. Pipe.
 - b. Manhole wall.
 2. Submit details of how watertight connections will be made:
 - a. To Engineer.
 - b. For review and approval.
- E. Do not install manhole lining until:
 1. All other manhole rehabilitation preparation is complete.
- F. In manholes containing lines to be abandoned:
 1. Plug abandoned line with:
 - a. Brick.
 - b. Grout.
 2. Patch material:
 - a. Minimum thickness: 6 IN.
- G. Resetting manhole frames and covers:
 1. Utilize bricks and/or precast concrete grade rings, a maximum of 12-inches thick for conical tops and flat top sections, to assure frame and cover are set to existing grade.
 2. Set manhole frames in a full mortar bed. The 28-day compressive strength of the mortar shall be 4,000 psi. The mix shall provide an entrained air content by volume of 5%.
 3. Reusing existing frame and cover shall be approved by Engineer and Owner for each manhole requested.
- H. Replacing manholes frames and covers:

1. Manhole frames and covers shall be per WSACC standards and specifications, as shown in the Contract Drawings.
 2. Set manhole frames in a full mortar bed. The 28-day compressive strength of the mortar shall be 4,000 psi. The mix shall provide an entrained air content by volume of 5%.
 3. Manholes selected for frame and cover replacement are shown in the Contract Drawings, or as directed by Engineer and Owner.
- I. Frame/Chimney Seal Installation:
1. Applied Seal:
 - a. Remove from area to be coated:
 - 1) All:
 - a) Foreign material.
 - b) Bituminous coating.
 - c) Rust or scale build-up.
 - d) Etc.
 - 2) By sandblasting.
 - 3) Per Manufacturer's requirements.
 - b. Dry area completely:
 - 1) After cleaning.
 - 2) Before applying seal material.
 - c. Then apply urethane resin compound:
 - 1) From bottom 3 inches of frame.
 - 2) To top 3 inches of cone.
 - a) Including grade adjustment area.
 - 3) Minimum thickness: 120 mils.
 - d. Apply per Manufacturer's written instructions.

3.4 FIELD QUALITY CONTROL

- A. Inspect the work:
1. After rehabilitation and repair has been completed:
 - a. Visually.
 - b. In Engineer's presence.
 - c. For compliance with:
 - 1) These specifications.
 - 2) Manufacturer's recommendations.
 2. During warranty period.
 - a. Engineer and Owner will inspect.
 3. Correct:
 - a. Any:
 - 1) Infiltration.

- 2) Defects in work.
- b. At no additional cost to Owner.

B. Vacuum test manholes:

1. That are completely rehabilitated using cementitious liner.
2. Prior to final acceptance.
3. No earlier than 72 hours after liner application.
4. Procedure:
 - a. Draw a vacuum of 10 inches of mercury.
 - b. Shut off vacuum pump.
 - c. With valves closed:
 - 1) Measure time it takes vacuum to drop to 9 inches of mercury.
 - 2) Manhole passes test if time is greater than values shown below:

MANHOLE DIAMETER					
48 IN	60 IN	72 IN	84 IN	96 IN	120 IN
60 sec	75 sec	90 sec	105 sec	120 sec	150 sec

5. If manhole fails initial test:
 - a. Make necessary repairs with an approved non-shrink grout.
 - b. Re-test until manhole passes.
6. Perform all tests in presence of:
 - a. Owner, and/or
 - b. Engineer.
7. Furnish everything necessary to conduct testing:
 - a. Personnel.
 - b. Facilities.
 - c. Equipment.

C. Manhole Lining:

1. Test for continuity per:
 - a. ASTM D4787.
 - b. Approved submittals.
2. Test spray-on liners for:
 - a. Holidays.
 - b. Gauge depth.
3. Photograph manholes.
4. Conduct pull test with embedded bolt or tab.
5. Repair holes and discontinuities per Manufacturer's recommendations.

D. During material application:

1. Maintain daily record of:
 - a. Substrate temperature.
 - b. Substrate moisture content.
 - c. Ambient air temperature.
 - d. Humidity.
 - e. Wind conditions.
 2. Daily record shall be:
 - a. Authenticated by Manufacturer's authorized representative.
 - b. Accessible to Engineer anytime during normal project working hours.
 3. Provide certified copy of daily record:
 - a. To Engineer.
 - b. As part of project close-out documents.
- E. Defective Work:
1. Coating will be considered defective if any of the following conditions exist in final product:
 - a. Dry film thickness not met.
 - b. Debris embedded in:
 - 1) Primer, or
 - 2) Coating material.
 - c. Loss of adhesion.
 - d. Discoloration.
 - e. Surface exhibits any defect identified in application section.
 2. Repair all defective primer or coating:
 - a. Per Manufacturer's recommendations.
 - b. At no additional cost to Owner.

END OF SECTION

**ROCKY RIVER MANHOLE REHAB - DOWNSTREAM OF WEDDINGTON ROAD TO PROJECT LIMITS
MANHOLE REHABILITATIONS SHOWN ON SHEETS 01CU101 AND 01CU102**

**ROCKY RIVER MANHOLE REHAB - DOWNSTREAM OF MH 011750 TO WEDDINGTON ROAD
MANHOLE REHABILITATIONS SHOWN ON SHEETS 01CU102 AND 01CU103**

MH Rehab Area	WSACC Manhole Number	Rim to Invert (ft)	I/I Present	MH Rehab Category	Wall Dimension 1 (ft)	Dimension 1 Approximate Depth (ft)	Wall Dimension 2 (ft)	Dimension 2 Approximate Depth (ft)	Lining Parameter
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	012244	16.1	Yes	Comprehensive MH Rehab	4	5	6	8	Line to Invert
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	012247	15.7	Yes	Comprehensive MH Rehab	4	5	6	9	Line to Invert
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	012248	15.7	Yes	Comprehensive MH Rehab	4	6	6	8	Line to Invert
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	014074	17.1	Yes	Comprehensive MH Rehab	4	9	9	4	Line to Invert
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	014060	17.5	Yes	Comprehensive MH Rehab	4	8	9	5	Line to Invert
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	014072	21.3	Yes	Comprehensive MH Rehab	4	8	6	10	Line to Invert
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	014076	18.1	Yes	Comprehensive MH Rehab	4	12	8	4	Line to Invert
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	014071	18.2	Yes	Comprehensive MH Rehab	4	9	6	8	Line to Invert
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	014070	18.5	Yes	Comprehensive MH Rehab	4	8	6	8	Line to Invert
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	014069	25.2	Yes	Comprehensive MH Rehab	4	11	6	9	Line to Invert
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	014068	23.9	Yes	Comprehensive MH Rehab	4	16	6	7	Line to Invert
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	014061	17.2	Yes	Comprehensive MH Rehab	4	10	6	5	Line to Invert
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	014058	21.5	Yes	Comprehensive MH Rehab	4	14	8	5	Line to Invert
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	014057	21	Yes	Comprehensive MH Rehab	4	14	10	5	Line to Invert
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	014056	22.2	Yes	Comprehensive MH Rehab	4	13	8	5	Line to Invert
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	014055	21.9	Yes	Comprehensive MH Rehab	4	14	8	4	Line to Invert
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	014054	23.4	Yes	Comprehensive MH Rehab	4	15	8	4	Line to Invert
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	014053	20.6	Yes	Comprehensive MH Rehab	4	13	8	5	Line to Invert
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	014065	16.7	Yes	Comprehensive MH Rehab	4	10	6	5	Line to Invert
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	014066	17.7	Yes	Comprehensive MH Rehab	4	8	6	5	Line to Invert
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	012250	22.3	Yes	Standard MH Rehab	4	11	6	9	Line to Bench
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	012253	16.1	Yes	Standard MH Rehab	4	4	6	10	Line to Bench
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	012245	18.5	Yes	Standard MH Rehab	4	8	6	8	Line to Bench
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	012249	16.1	Yes	Standard MH Rehab	4	6	6	8	Line to Bench
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	012254	16.4	Yes	Standard MH Rehab	4	9	6	6	Line to Bench
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	014075	18.1	Yes	Standard MH Rehab	4	11	8	4	Line to Bench
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	014077	18.2	Yes	Standard MH Rehab	4	11	8	4	Line to Bench
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	014078	21.7	Yes	Standard MH Rehab	4	13	5	6	Line to Bench
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	014079	19.1	Yes	Comprehensive MH Rehab	4	13	6	5	Line to Invert
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	014082	18.6	Yes	Comprehensive MH Rehab	4	5	6	12	Line to Invert
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	014088	20.2	Yes	Comprehensive MH Rehab	4	14	6	5	Line to Invert
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	014087	20.7	Yes	Comprehensive MH Rehab	4	14	6	5	Line to Invert
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	014086	27.4	Yes	Comprehensive MH Rehab	4	20	6	5	Line to Invert
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	014081	19.6	Yes	Minor MH Rehab	4	5	6	12	N/A
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	014089	29.3	Yes	Minor MH Rehab	4	22	10	5	N/A
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	012258	22.1	Yes	Comprehensive MH Rehab	4	13	6	8	Line to Invert
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	012259	17.8	Yes	Comprehensive MH Rehab	4	6	6	9	Line to Invert
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	012260	17.5	Yes	Comprehensive MH Rehab	4	12	7	7	Line to Invert
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	012262	17.5	Yes	Comprehensive MH Rehab	4	5	6	9	Line to Invert
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	012264	17.2	Yes	Comprehensive MH Rehab	4	8	6	7	Line to Invert
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	012265	16.7	Yes	Standard MH Rehab	4	6	6	8	Line to Bench
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	012261	19.4	Yes	Standard MH Rehab	4	8	6	8	Line to Bench
D/S of Weddington Road to Project Limit on 014052 on 30", 48" or 54"	012266	15.8	Yes	Comprehensive MH Rehab	4	6	6	9	Line to Invert

MH Rehab Area	WSACC Manhole Number	Rim to Invert (ft)	I/I Present	MH Rehab Category	Wall Dimension 1 (ft)	Dimension 1 Approximate Depth (ft)	Wall Dimension 2 (ft)	Dimension 2 Approximate Depth (ft)	Lining Parameter
D/S of 011750 to Weddington Road—on 30" or 48"	012267	16.4	Yes	Comprehensive MH Rehab	4	6	6	8	Line to Invert
D/S of 011750 to Weddington Road—on 30" or 48"	012271	16.4	Yes	Comprehensive MH Rehab	4	6	6	8	Line to Invert
D/S of 011750 to Weddington Road—on 30" or 48"	012272	17.2	Yes	Comprehensive MH Rehab	4	6	6	8	Line to Invert
D/S of 011750 to Weddington Road—on 30" or 48"	012274	16.3	Yes	Comprehensive MH Rehab	4	6	6	8	Line to Invert
D/S of 011750 to Weddington Road—on 30" or 48"	012270A	13.6	Yes	Comprehensive MH Rehab	4	5	6	8	Line to Invert
D/S of 011750 to Weddington Road—on 30" or 48"	014100	17.5	Yes	Minor MH Rehab	4	9	6	6	N/A
D/S of 011750 to Weddington Road—on 30" or 48"	014101	17.6	Yes	Minor MH Rehab	4	9	6	6	N/A
D/S of 011750 to Weddington Road—on 30" or 48"	014102	20.1	Yes	Minor MH Rehab	4	12	6	6	N/A
D/S of 011750 to Weddington Road—on 30" or 48"	012275	16.6	Yes	Standard MH Rehab	4	6	6	9	Line to Bench
D/S of 011750 to Weddington Road—on 30" or 48"	012270	16.3	Yes	Standard MH Rehab	4	5	7	8	Line to Invert
D/S of 011750 to Weddington Road—on 30" or 48"	012273	16.6	Yes	Standard MH Rehab	4	5	6	9	Line to Bench
D/S of 011750 to Weddington Road—on 30" or 48"	012276	18.8	Yes	Standard MH Rehab	4	8	6	8	Line to Bench
D/S of 011750 to Weddington Road—on 30" or 48"	012277	20.1	Yes	Standard MH Rehab	4	8	6	9	Line to Bench
D/S of 011750 to Weddington Road—on 30" or 48"	012278	19	Yes	Standard MH Rehab	4	9	6	8	Line to Bench
D/S of 011750 to Weddington Road—on 30" or 48"	012279	19.1	Yes	Standard MH Rehab	4	10	6	7	Line to Bench
D/S of 011750 to Weddington Road—on 30" or 48"	012280	18.8	Yes	Standard MH Rehab	4	8	6	7	Line to Bench
D/S of 011750 to Weddington Road—on 30" or 48"	014090	32	Yes	Standard MH Rehab	4	23	10	9	Line to Bench
D/S of 011750 to Weddington Road—on 30" or 48"	014091	26.7	Yes	Standard MH Rehab	4	18	6	6	Line to Bench

**ROCKY RIVER MANHOLE REHAB - DOWNSTREAM OF POPLAR TENT ROAD TO MH 011750
MANHOLE REHABILITATIONS SHOWN ON SHEETS 01CU103, 01CU104, AND 01CU105**

MH Rehab Area	WSACC Manhole Number	Rim to Invert (ft)	I/I Present	MH Rehab Category	Wall Dimension 1 (ft)	Dimension 1 Approximate Depth (ft)	Wall Dimension 2 (ft)	Dimension 2 Approximate Depth (ft)	Lining Parameter
D/S of PT Road to D/S of Derita Road at 011750 Split of 48" and 30"	011762	17.1	Yes	Comprehensive MH Rehab	4	9	6	6	Line to Invert
D/S of PT Road to D/S of Derita Road at 011750 Split of 48" and 30"	011751	19.3	Yes	Minor MH Rehab	4	10	6	6	N/A
D/S of PT Road to D/S of Derita Road at 011750 Split of 48" and 30"	011754B	21.1	Yes	Minor MH Rehab	4	11	8	7	N/A
D/S of PT Road to D/S of Derita Road at 011750 Split of 48" and 30"	011760	15.9	Yes	Minor MH Rehab	4	6	8	7	N/A
D/S of PT Road to D/S of Derita Road at 011750 Split of 48" and 30"	011770	18.4	Yes	Standard MH Rehab	4	10	6	7	Line to Bench
D/S of PT Road to D/S of Derita Road at 011750 Split of 48" and 30"	011774	19.4	Yes	Standard MH Rehab	4	11	6	7	Line to Bench
D/S of PT Road to D/S of Derita Road at 011750 Split of 48" and 30"	011761	16.8	Yes	Standard MH Rehab	4	8	6	6	Line to Bench
D/S of PT Road to D/S of Derita Road at 011750 Split of 48" and 30"	011763	16.9	Yes	Standard MH Rehab	4	8	6	7	Line to Bench
D/S of PT Road to D/S of Derita Road at 011750 Split of 48" and 30"	011765	17.4	Yes	Standard MH Rehab	4	8	6	7	Line to Bench
D/S of PT Road to D/S of Derita Road at 011750 Split of 48" and 30"	011754	17.9	Yes	Standard MH Rehab	4	9	7	7	Line to Bench
D/S of PT Road to D/S of Derita Road at 011750 Split of 48" and 30"	011757	22.9	Yes	Standard MH Rehab	4	15	8	7	Line to Bench
D/S of PT Road to D/S of Derita Road at 011750 Split of 48" and 30"	011758	13.9	Yes	Standard MH Rehab	4	5	8	6	Line to Bench
D/S of PT Road to D/S of Derita Road at 011750 Split of 48" and 30"	011766A	17.2	Yes	Standard MH Rehab	4	8	6	7	Line to Bench
D/S of PT Road to D/S of Derita Road at 011750 Split of 48" and 30"	011768	18.7	Yes	Standard MH Rehab	4	10	6	7	Line to Bench
D/S of PT Road to D/S of Derita Road at 011750 Split of 48" and 30"	011767	22.3	Yes	Standard MH Rehab	4	15	6	7	Line to Bench
D/S of PT Road to D/S of Derita Road at 011750 Split of 48" and 30"	011772	25.2	Yes	Standard MH Rehab	4	18	6	7	Line to Bench
D/S of PT Road to D/S of Derita Road at 011750 Split of 48" and 30"	011771	17	Yes	Standard MH Rehab	4	8	6	7	Line to Bench
D/S of PT Road to D/S of Derita Road at 011750 Split of 48" and 30"	011769	19.3	Yes	Standard MH Rehab	4	8	6	7	Line to Bench
D/S of PT Road to D/S of Derita Road at 011750 Split of 48" and 30"	011776	18.2	Yes	Standard MH Rehab	4	9	6	7	Line to Bench
D/S of PT Road to D/S of Derita Road at 011750 Split of 48" and 30"	011780	21.5	Yes	Standard MH Rehab	4	12	6	7	Line to Bench
D/S of PT Road to D/S of Derita Road at 011750 Split of 48" and 30"	011779	22.5	Yes	Standard MH Rehab	4	15	6	7	Line to Bench
D/S of PT Road to D/S of Derita Road at 011750 Split of 48" and 30"	011778	18.2	Yes	Standard MH Rehab	4	10	6	8	Line to Bench
D/S of PT Road to D/S of Derita Road at 011750 Split of 48" and 30"	011777	18.2	Yes	Standard MH Rehab	4	9	6	7	Line to Bench
D/S of PT Road to D/S of Derita Road at 011750 Split of 48" and 30"	011766	18.8	Yes	Standard MH Rehab	4	10	6	7	Line to Bench
D/S of PT Road to D/S of Derita Road at 011750 Split of 48" and 30"	011764	18.4	Yes	Standard MH Rehab	4	10	6	6	Line to Bench
D/S of PT Road to D/S of Derita Road at 011750 Split of 48" and 30"	011752	16.1	Yes	Standard MH Rehab	4	8	7	6	Line to Bench
D/S of PT Road to D/S of Derita Road at 011750 Split of 48" and 30"	011755	20.6	Yes	Standard MH Rehab	4	14	7	3	Line to Invert
D/S of PT Road to D/S of Derita Road at 011750 Split of 48" and 30"	011759	16.4	Yes	Standard MH Rehab	4	7	8	6	Line to Invert
D/S of PT Road to D/S of Derita Road at 011750 Split of 48" and 30"	011780A	21.2	Yes	Standard MH Rehab	5	18	N/A	N/A	Line to Bench
D/S of PT Road to D/S of Derita Road at 011750 Split of 48" and 30"	011754A	19	Yes	Standard MH Rehab	4	13	9	7	Line to Invert

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N.C.E.L.S. License No. F-0116
440 S CHURCH STREET SUITE 1200
CHARLOTTE, NC 28202
704-338-6700

ISSUE	DATE	DESCRIPTION
2	02-06-2026	UPDATED MANHOLE TABLES

PROJECT MANAGER	CHIP SMITH, P.E.
DESIGN	KATHERINE TRAWEEK
QA/QC	WILL BECK, P.E.
PROJECT NUMBER	10431154



WATER AND SEWER AUTHORITY
OF CABARRUS COUNTY
ROCKY RIVER INTERCEPTOR
REHABILITATION

ROCKY RIVER MANHOLE REHABILITATION TABLES

FILE NAME 10431154-01C-01CU101.DWG
SCALE NOT TO SCALE



SHEET
00G-003

**ROCKY RIVER MANHOLE REHAB - DOWNSTREAM OF NC-73 TO POPLAR TENT ROAD
MANHOLE REHABILITATIONS SHOWN ON SHEETS 01CU105, 01CU106, 01CU107, AND 01CU108**

**ROCKY RIVER MANHOLE REHAB - UPPER ROCKY RIVER TO NC-73
MANHOLE REHABILITATIONS SHOWN ON SHEETS 01CU108, 01CU109, AND 01CU110**

MH Rehab Area	WSACC Manhole Number	Rim to Invert (ft)	I/I Present	MH Rehab Category	Wall Dimension 1 (ft)	Dimension 1 Approximate Depth (ft)	Wall Dimension 2 (ft)	Dimension 2 Approximate Depth (ft)	Lining Parameter
D/S of NC-73 to Poplar Tent Road	011788	18.7	Yes	Standard MH Rehab	4	10	5	7	Line to Bench
D/S of NC-73 to Poplar Tent Road	011785	18.9	Yes	Standard MH Rehab	4	10	6	6	Line to Bench
D/S of NC-73 to Poplar Tent Road	011787	19.5	Yes	Standard MH Rehab	4	10	6	6	Line to Bench
D/S of NC-73 to Poplar Tent Road	011786	17	Yes	Standard MH Rehab	4	9	6	6	Line to Bench
D/S of NC-73 to Poplar Tent Road	011784	18.8	Yes	Standard MH Rehab	4	9	6	7	Line to Bench
D/S of NC-73 to Poplar Tent Road	011790	17.2	Yes	Standard MH Rehab	4	11	6	5	Line to Bench
D/S of NC-73 to Poplar Tent Road	011793	18.1	Yes	Standard MH Rehab	4	9	6	8	Line to Bench
D/S of NC-73 to Poplar Tent Road	011792	18.7	Yes	Standard MH Rehab	4	11	6	7	Line to Bench
D/S of NC-73 to Poplar Tent Road	011808	19.3	Yes	Standard MH Rehab	4	15	N/A	N/A	Line to Invert
D/S of NC-73 to Poplar Tent Road	011797	15.3	Yes	Standard MH Rehab	4	6	6	7	Line to Bench
D/S of NC-73 to Poplar Tent Road	011796	15.3	Yes	Standard MH Rehab	4	7	6	8	Line to Bench
D/S of NC-73 to Poplar Tent Road	011794	17.2	Yes	Standard MH Rehab	4	9	6	9	Line to Bench
D/S of NC-73 to Poplar Tent Road	011789	18.6	Yes	Standard MH Rehab	4	11	6	9	Line to Bench
D/S of NC-73 to Poplar Tent Road	011781	20.1	Yes	Standard MH Rehab	4	11	6	7	Line to Bench
D/S of NC-73 to Poplar Tent Road	011783	18.4	Yes	Standard MH Rehab	4	10	6	7	Line to Bench
D/S of NC-73 to Poplar Tent Road	011782	17.2	Yes	Standard MH Rehab	4	8	6	7	Line to Bench
D/S of NC-73 to Poplar Tent Road	011791	18.6	Yes	Standard MH Rehab	4	9	6	7	Line to Bench
D/S of NC-73 to Poplar Tent Road	011805	17.8	Yes	Standard MH Rehab	4	14	N/A	N/A	Line to Invert
D/S of NC-73 to Poplar Tent Road	011807	20.6	Yes	Standard MH Rehab	4	16	N/A	N/A	Line to Invert
D/S of NC-73 to Poplar Tent Road	011809	23.4	Yes	Standard MH Rehab	4	20	N/A	N/A	Line to Invert
D/S of NC-73 to Poplar Tent Road	011802	17.5	Yes	Standard MH Rehab	4	13	N/A	N/A	Line to Invert
D/S of NC-73 to Poplar Tent Road	011803	17.9	Yes	Standard MH Rehab	4	14	N/A	N/A	Line to Invert
D/S of NC-73 to Poplar Tent Road	011795	16.9	Yes	Standard MH Rehab	4	7	6	8	Line to Bench
D/S of NC-73 to Poplar Tent Road	011798	16.7	Yes	Standard MH Rehab	4	14	6	0	Line to Invert
D/S of NC-73 to Poplar Tent Road	011799	18	Yes	Standard MH Rehab	4	13	N/A	N/A	Line to Bench
D/S of NC-73 to Poplar Tent Road	011841	19.5	Yes	Standard MH Rehab	4	8	6	9	Line to Invert
D/S of NC-73 to Poplar Tent Road	011834	19.2	Yes	Standard MH Rehab	4	16	N/A	N/A	Line to Invert

MH Rehab Area	WSACC Manhole Number	Rim to Invert (ft)	I/I Present	MH Rehab Category	Wall Dimension 1 (ft)	Dimension 1 Approximate Depth (ft)	Wall Dimension 2 (ft)	Dimension 2 Approximate Depth (ft)	Lining Parameter
Upper Rocky River - U/S of NC 73	011816	21.8	Yes	Comprehensive MH Rehab	4	18	N/A	N/A	Line to Invert
Upper Rocky River - U/S of NC 73	011817	23.2	Yes	Comprehensive MH Rehab	4	18	N/A	N/A	Line to Invert
Upper Rocky River - U/S of NC 73	011826	24.7	Yes	Comprehensive MH Rehab	4	20	N/A	N/A	Line to Invert
Upper Rocky River - U/S of NC 73	011812	21.8	Yes	Standard MH Rehab	4	17	N/A	N/A	Line to Bench
Upper Rocky River - U/S of NC 73	011820	22.9	Yes	Standard MH Rehab	4	19	N/A	N/A	Line to Bench
Upper Rocky River - U/S of NC 73	011822	23.7	Yes	Standard MH Rehab	4	20	N/A	N/A	Line to Bench
Upper Rocky River - U/S of NC 73	011833	23.9	Yes	Standard MH Rehab	4	20	N/A	N/A	Line to Bench
Upper Rocky River - U/S of NC 73	011830	23	Yes	Standard MH Rehab	4	19	N/A	N/A	Line to Bench
Upper Rocky River - U/S of NC 73	011810	21.2	Yes	Standard MH Rehab	4	19	N/A	N/A	Line to Invert
Upper Rocky River - U/S of NC 73	011813	21.1	Yes	Standard MH Rehab	4	18	N/A	N/A	Line to Bench
Upper Rocky River - U/S of NC 73	011814	22.7	Yes	Standard MH Rehab	4	18	N/A	N/A	Line to Bench
Upper Rocky River - U/S of NC 73	011815	21.7	Yes	Standard MH Rehab	4	19	N/A	N/A	Line to Bench
Upper Rocky River - U/S of NC 73	011818	24.9	Yes	Standard MH Rehab	4	21	N/A	N/A	Line to Bench
Upper Rocky River - U/S of NC 73	011819	23.5	Yes	Standard MH Rehab	4	20	N/A	N/A	Line to Bench
Upper Rocky River - U/S of NC 73	011821	21.7	Yes	Standard MH Rehab	5	20	N/A	N/A	Line to Bench
Upper Rocky River - U/S of NC 73	011823	19.7	Yes	Standard MH Rehab	4	16	N/A	N/A	Line to Bench
Upper Rocky River - U/S of NC 73	011824	20.8	Yes	Standard MH Rehab	4	21	N/A	N/A	Line to Bench
Upper Rocky River - U/S of NC 73	011832	21.1	Yes	Standard MH Rehab	4	16	N/A	N/A	Line to Bench
Upper Rocky River - U/S of NC 73	011825	20.4	Yes	Standard MH Rehab	4	16	N/A	N/A	Line to Bench
Upper Rocky River - U/S of NC 73	011827	22.7	Yes	Standard MH Rehab	4	17	N/A	N/A	Line to Bench

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ROCKY RIVER INTERCEPTOR
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ROCKY RIVER MANHOLE REHABILITATION TABLES

FILE NAME	10431154-01C-01CU101.DWG
SCALE	NOT TO SCALE

SHEET
00G-004