



18 Government Center Ln, PO Box 859, Verona, VA 24482 Phone: (540) 245-5670 AugustaWater.com

**REQUEST FOR SEALED BIDS**  
**Verona Sewer Collection System Rehabilitation**

**ITB No. 2309**

**Issue Date: August 31, 2023**

Sealed Bids for the rehabilitation of a portion of the Verona sewer collection system, subject to the conditions and instructions attached hereto, will be received at the above office until, but not later than **2:00 o'clock p.m. local Verizon time, October 5, 2023**, then publicly opened, for furnishing sewer rehabilitation by trenchless CIPP liner and cementitious manhole lining or other approved method to Augusta Water (OWNER).

**Technical Questions:** Jesse Roach, Director of Field Operations  
Phone: 540-490-2423  
Email: jroach@augustawater.com

- Notes: 1. **EMAIL** or **FAX** Bids will **NOT** be accepted.  
2. No pre-bid meeting is currently scheduled. Any requests for site visits should be directed to the technical contact above.

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Terms: \_\_\_\_\_ % \_\_\_\_\_ days

Company: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_

Phone No: \_\_\_\_\_

Official Signature: \_\_\_\_\_

Printed Name: \_\_\_\_\_

Title: \_\_\_\_\_

Date: \_\_\_\_\_

Email Address: \_\_\_\_\_

**\*\*\*THIS COMPLETED PAGE MUST BE INCLUDED WITH YOUR BID SUBMITTAL\*\*\***



### INSTRUCTIONS

- All Bids must be submitted in accordance with the General and Special Conditions. If more space is required to furnish a description of the goods offered, unit prices, or performance terms, the bidder may attach a letter hereto which will be made a part of the bid.

- Bids may be submitted by one of the following methods:

***In person*** – to receptionist: ATTN: ITB #2309  
***or by courier,*** Debbie Hensley  
***UPS, FEDEX, etc.*** Augusta Water  
18 Government Center Lane  
Verona, VA 24482

***or by USPS mail*** – addressed to: ATTN: ITB #2309  
Debbie Hensley  
Augusta Water  
PO Box 859  
Verona, VA 24482-0859

- Bids received after the date and time specified for the opening will not be considered. It will be the responsibility of the bidder to see that their bid is in this office by the specified time and date. There will be no exceptions. Date of postmark will not be considered. Local Verizon time will determine the time of day.
- Where appropriate, prices should be stated in linear feet inclusive of all costs. The prices submitted by the Bidder, shall include all costs of permits, labor, equipment and materials for the various bid items necessary for furnishing and installing, complete in place, CIPP and cementitious manhole lining in accordance with the below specifications. All items of work not specifically mentioned herein which are required, by the Bidder, to make the product perform as intended and deliver the final product as specified herein shall be included in the respective unit prices bid.
- The terms for payment shall be stated in days and reflect any percentage discount for early payment.
- All Bids must include the company name and be signed by a responsible officer or employee. Obligations assumed by such signatory must be fulfilled.
- Successful bidder(s) must be properly licensed to provide and deliver their product in the Commonwealth of Virginia.
- The Bidder shall comply with all laws, ordinances, rules, regulations and lawful orders of any public authority



- bearing on the performance of the work and shall give all notices required thereby.
- The Bidder shall assure all tradesmen who perform work on the project are properly licensed by the Department of Professional and Occupational Regulation as required by the Code of Virginia and applicable regulations.

### GENERAL TERMS AND CONDITIONS

- 1. PRECEDENCE OF TERMS:** In the event there is a conflict between the general terms and conditions and any special terms and conditions which may be included in this solicitation, the special terms and conditions shall apply.
- 2. CLARIFICATION OF TERMS:** If any prospective Bidder has questions about the specifications or other solicitation documents, the prospective Bidder should contact the Technical person whose name appears on the first page of the Invitation to Bid. Any revisions to the solicitation will be made only by addendum, issued by OWNER.
- 3. ADDENDA:** In the event there are any addenda, they will be posted to the OWNER's website at [www.augustawater.com/bids](http://www.augustawater.com/bids). It is the Bidder's responsibility to check the website prior to the submittal deadline to ensure the Bidder has a complete, up-to-date package.
- 4. PAYMENT TERMS:** Payments will be made upon verification of delivery and receipt of materials. All pay requests and supporting documentation must be approved by OWNER and will be submitted for payment in accordance with OWNER's payment policies. Approvals for payment under this procurement will be by the OWNER's designated technical representative, or their designee, as noted on Page 1 of this solicitation.
- 5. QUALIFICATIONS OF BIDDERS:** OWNER may make such reasonable investigations as deemed proper and necessary to determine the ability of the Bidder to perform the work and the Bidder shall furnish to OWNER all such information and data for this purpose as may be requested. OWNER reserves the right to inspect Bidder's physical facilities prior to award to satisfy questions regarding the Bidder's capabilities. OWNER further reserves the right to reject any proposal if the evidence submitted by, or investigations of, such Bidder fails to satisfy OWNER that such Bidder is properly qualified to carry out the obligations of the contract and to complete the work/furnish the item(s) contemplated therein.
- 6. ASSIGNMENT OF CONTRACT:** A contract shall not be assignable by the Bidder in whole or in part without the written consent of OWNER.
- 7. ANTI-DISCRIMINATION:** By submitting their proposals, all Bidders certify to OWNER that they will conform to the provisions of the Presidential Order #11246, the Federal Civil Rights Act of 1964, as amended, as well as the Virginia Fair Employment Act of 1975, as amended, where applicable, and Section 2.2-4311 of the Virginia Public Procurement Act and that during the performance of this contract, the Bidder agrees as follows:



The Bidder will not discriminate against any employee or applicant for employment because of race, religion, color, sex, national origin, age, disability, or any other basis prohibited by the state law relating to discrimination in employment, except when there is bona fide occupational qualification reasonably necessary to the normal operation of the Bidder. The Bidder agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause.

Notices, advertisements and solicitations placed by or on behalf of the Bidder will state that such contractor is an equal opportunity employer. Notices, advertisements and solicitations placed in accordance with federal law, rule or regulation shall be deemed sufficient for the purpose of meeting the requirements of this section.

The Bidder will include the provisions of the foregoing paragraphs in every subcontract or purchase order of over \$10,000, so that the provisions will be binding upon each subcontractor or vendor.

- 8. NONDISCRIMINATION AGAINST FAITH-BASED ORGANIZATION:** In accordance with the Personal Responsibility and Work Opportunity Reconciliation Act of 1996, P.L. 104-193, the OWNER will not discriminate against faith-based organizations. The bidder also agrees to abide by § 2.2-4343.1 of the Virginia Public Procurement Act.
- 9. MINORITY AND WOMEN-OWNED BUSINESSES:** In accordance with Presidential Executive Orders #12138 & #11625 OWNER actively solicits both minority and women-owned businesses to respond to all Invitations to Bid and Requests for Proposal, and if not already on the Authority's mailing list, you may request application for inclusion on the list. Should you be interested, please contact the Authority at (540) 245-5670 and request information.

Disadvantaged business enterprises (DBE), as defined in 49 CFR 23, shall have equal opportunity to compete for and perform subcontracts which the contractor enters into pursuant to this contract. The contractor will use his best efforts to solicit bids from and to utilize DBE subcontractors or subcontractors with meaningful minority group and female representation among their employees.

- 10. DRUG-FREE WORKPLACE:** During the performance of this contract, the Bidder agrees to (i) provide a drug-free workplace for the Bidder's employees; (ii) post in conspicuous places, available to employees and applicants for employment, a statement notifying employees that the unlawful manufacture, sale, distribution, dispensation, possession, or use of a controlled substance or marijuana is prohibited in the contractor's workplace and specifying the actions that will be taken against employees for violation of such prohibition; (iii) state in all solicitations or advertisements for employees placed by or on behalf of the Bidder that the Bidder maintains a drug-free workplace; and (iv) include the provisions of the foregoing clauses in every subcontract or purchase order of over \$10,000, so that the provisions will be binding upon each subcontractor or vendor.

For the purposes of this section, "*drug-free workplace*" means a site for the performance of work done in connection with a specific contract awarded to a Bidder in accordance with this chapter, the employees of whom are prohibited from engaging in the unlawful manufacture, sale, distribution, dispensation, possession or use of any controlled substance or marijuana during the performance of the contract.



- 11. ETHICS IN PUBLIC CONTRACTING:** By submitting their proposals, all Bidders certify that their proposals are made without collusion or fraud and they have not offered or received any kickbacks or inducements from any other Bidder, supplier, manufacturer or subcontractor in connection with their proposal.
- 12. DEBARMENT:** By submitting a proposal the Bidder certifies neither it (nor he or she) nor any person or firm which has an interest in the Bidder's firm is disbarred or suspended from bidding or working on a state or federally funded project. No part of this contract will be subcontracted to any person or firm who has been debarred or suspended from bidding or working on a state or federally funded project.
- 13. PUBLIC INSPECTION OF PROCUREMENT RECORDS:** Proposals submitted shall be subject to public inspection only in accordance with Virginia Code § 2.2-4342.
- 14. COSTS OF PROPOSAL PREPARATION:** Any costs incurred by the Bidders in preparing or submitting proposals are the Bidders' responsibility. OWNER will not reimburse any Bidder for any costs incurred as a result of a response to this Invitation to Bid.
- 15. OWNERSHIP OF MATERIAL:** Ownership of all data, material and documentation originated and prepared for OWNER, including any electronic media, shall belong exclusively to OWNER and be subject to public inspection in accordance with the Virginia Freedom of Information Act. Trade secrets or proprietary information submitted by a Bidder shall not be subject to public disclosure under the Virginia Freedom of Information Act; however, the Bidder must invoke the protection of this section prior to, or upon submission of, the data or other materials, and must identify the data or other materials to be protected and state the reasons why protection is necessary to the extent that such protected material is separately packaged and so identified in the Bid Submittal envelope.
- 16. CANCELLATION OF CONTRACT:** Unless otherwise specified in the ITB, the OWNER may terminate the resulting contract for its convenience upon thirty (30) days written notice to the Bidder. The Bidder shall not be paid for any service rendered or expense incurred after receipt of such notice except such fees and expenses incurred prior to the effective date of termination that are necessary for curtailment of the Bidder's work under this contract.



**17. INSURANCE COVERAGE:** Unless otherwise specified in the ITB, the Bidder shall maintain the following insurance to protect it from claims under the Workmen’s Compensation Act, and from any other claims for personal injury, including death, and for damage to property that may arise from operations under the Contract, whether such operations be by itself or by any subcontractor, or anyone directly or indirectly employed by either of them.

<u>TYPE OF COVERAGE</u>	<u>LIMITS</u>
Workers’ Compensation and Employer’s Liability including coverage under United States Longshoremen’s and Harbor Worker’s Act where applicable	Statutory, including Employer’s Liability of \$100,000.00 Each Accident \$500,000.00 Disease-Policy Limit \$100,000.00 Disease-Each Employee
Comprehensive General Liability endorsement coverage.	Including the Broad Form C.G.L.
Premises – Operations Bodily Injury Liability and Property Damage Liability Combined	\$1,000,000 Each Occurrence \$1,000,000 Aggregate
Automobile Bodily Injury Liability and Property Damage Liability Combined covering all automobiles, trucks, tractors, trailers, or other automobile equipment, whether owned, non-owned, or hired by the Bidder	\$1,000,000 Per Accident
Umbrella/Excess Liability	\$1,000,000 Each Occurrence \$2,000,000 Aggregate

The Bidder shall purchase and/or maintain insurance coverage on his tools, equipment and machinery and shall waive subrogation to the OWNER for damage thereto.

The OWNER reserves the right to require insurance of any Bidder in greater amounts provided notice of such requirements is stated in the Solicitation.

**18. OBLIGATION OF BIDDER:** By submitting a proposal, the Bidder covenants and agrees he has satisfied himself, from his own investigation of the conditions to be met, he fully understands his obligation and he will not make any claim for, or have right to cancellation or relief from the contract because of any misunderstanding or lack of information.



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**19. UNAUTHORIZED ALIENS:** In accordance with Virginia Code § 2.2-4311.1. Compliance with federal, state, and local laws and federal immigration law requires that the Bidder does not, and shall not during the performance of any awarded contract, knowingly employ an unauthorized alien as defined in the federal Immigration Reform and Control Act of 1986.

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## SPECIAL TERMS AND CONDITIONS

- A. AWARD:** OWNER reserves the right to reject any or all bids and to waive informalities in any bid. Award will be made to the lowest responsive and responsible Bidder.
- B. AVAILABILITY OF FUNDS:** It is understood and agreed between the parties herein that OWNER shall be bound hereunder only to the extent of the funds available or which may hereafter become available for the purpose of this agreement. Unless canceled or rejected, a responsive bid from the lowest responsible bidder shall be accepted as submitted, except that, if the bid from the lowest responsible bidder exceeds available funds, the OWNER may negotiate with the apparent low bidder to obtain a contract price within available funds in accordance with Terms and Conditions, Item J, below.
- C. BID BOND:** Each bid in excess of \$500,000 shall be accompanied by a bid bond or guarantee of five percent (5%) of the amount of the bid, which shall be a certified check, cash escrow or a bid bond payable to ACSA. The sureties of all bonds shall be from a surety company or companies as are approved by ACSA and are authorized to transact business in the Commonwealth of Virginia. Such bid bond or check shall be submitted with the understanding that it shall guarantee that the Bidder will not withdraw such bid during the period of 45 days following the opening of bids; that if such bid is accepted, the bidder will accept and perform under the terms of the Invitation to Bid and purchase order or contract. The bid guarantee will be returned upon award of contract.
- D. ESCROW:** In accordance with Virginia Code §2.2-4334, for bids of \$200,000 or more for construction of highways, roads, streets, bridges, parking lots, demolition, clearing, grading, excavating, paving, pile driving, miscellaneous drainage structures, and the installation of water, gas, sewer lines and pumping stations, the Bid Form will include a space for the bidder to indicate an option to use the escrow account procedure in order to have retained funds paid to an escrow agent.
- E. PERFORMANCE & PAYMENT BONDS:** The Bidder agrees that upon written notice of an award of the contract, that they shall execute the contract in the form stipulated in accordance with this bid, and shall provide a Performance Bond and Payment Bond with good and sufficient surety or sureties, as required by the contract documents, at the time the contract is executed.
- F. SPECIFICATION DOCUMENTATION:** (Safety Data Sheets), for the item being bid must be included in the bid submission. Failure to provide such documentation will cause your bid to be rejected as non-responsive.
- G. BID ACCEPTANCE PERIOD:** Any bid in response to this solicitation shall be valid for (60) days. At the end of (60) days the bid may be withdrawn at the written request of the bidder. If the bid is not withdrawn at that time it remains in effect until an award is made or the solicitation is canceled.
- H. EXTRA CHARGES NOT ALLOWED:** By submitting their (bids/proposals), all Bidders certify and warrant that the price offered for *F.O.B. destination* includes only the actual freight rate costs at the lowest and best rate and is based upon the actual weight of the goods to be shipped. Except as otherwise specified herein, standard commercial



packaging, packing and shipping containers shall be used. All shipping containers shall be legibly marked or labeled on the outside with purchase order number, commodity description, and quantity.

- I. IDENTIFICATION OF BID/PROPOSAL ENVELOPE:** The signed bid/proposal should be returned in a separate envelope or package, sealed, and identified as follows:

<b><u>ITB No. 2309</u></b>		
<b><u>Verona Sewer Collection System Rehabilitation</u></b>		
From: _____ Name of Bidder	<u>October 5, 2023</u> Due Date	<u>2:00 PM</u> Time Due
_____ Street or Box Number		
_____ City, State, Zip Code		
ATTN: <u>Debbie Hensley, Purchasing Officer</u>		

The outer (or delivery) envelope should be addressed as directed on Page 2, second bullet of the solicitation.

If a bid/proposal is not contained in an outer (or delivery) envelope, the Bidder takes the risk that the envelope, even if marked as described above, may be inadvertently opened and the information compromised which may cause the bid or proposal to be disqualified. Bids/proposals may be hand delivered to the designated location in the office issuing the solicitation. No other correspondence, other than bid documents, should be placed in the inner envelope.

- J. NEGOTIATION WITH THE LOWEST BIDDER:** Unless all bids are cancelled or rejected, OWNER reserves the right granted by § 2.2-4318 of the *Code of Virginia* to negotiate with the lowest responsive, responsible bidder to obtain a contract price within the funds available to the OWNER whenever such low bid exceeds OWNER’s available funds. For the purpose of determining when such negotiations may take place, the term “available funds” shall mean those funds which were budgeted by OWNER for this contract prior to the issuance of the written Invitation to Bid. Negotiations with the low bidder may include both modifications of the bid price and other items required to be performed. The OWNER shall initiate such negotiations by written notice to the lowest responsive, responsible bidder that its bid exceeds the available funds and that the OWNER wishes to negotiate a lower contract price. The times, places, and manner of negotiating shall be agreed to by OWNER and the lowest responsive, responsible bidder(s).



**SCHEDULE OF EVENTS**

Email ITB to Vendors Post on eVA Bulletin Board Post on Augusta Water Website	August 31, 2023
Pre-submittal questions due by 2:00 PM EST Pre-approval of CIPP system due by 2:00 PM EST	September 14, 2023
Respond to pre-submittal questions	September 21, 2023
Bids due by 2:00 PM EST	October 5, 2023

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**ATTACHMENT A**  
**SCOPE OF WORK**

1. Furnish all labor, materials, equipment, permits, and supervision necessary for the trenchless pipe rehabilitation of 15,954.3 linear feet of 8", 821.2 linear feet of 12", and 652.5 linear feet of 15" sanitary sewer main utilizing cured in place pipe (CIPP) or an acceptable alternative approved by OWNER. Total footage to be lined is 17,428.0 linear feet with 262 lateral reinstatements.
2. Additionally the Bidder must furnish all labor, materials, equipment, permits, and supervision necessary for the rehabilitation of 64 manholes totaling 428.8 vertical feet.
3. All work is located in Verona area. The Bidder shall adhere to all requirements specified in the following attachments. The Bidder shall restore any disturbed land and roadways to ACSA and VDOT standards at no additional cost to the OWNER. No trash shall ever be stored at the site and the Bidder shall consult with OWNER about acceptable locations to store materials, equipment, and vehicles overnight and on weekends.
4. All access and manhole locations issues will be coordinated and resolved by ACSA. Fire hydrants will be available at no charge to the bidder, however proper backflow prevention will be enforced.
5. The Bidder must be able to mobilize within 2 months of Notice of Award.
6. It is expected the Bidder work continuously on this project, not including weekends and holidays, from start until finish without any delays except as approved by OWNER. Failure to work continuously without delays except as acceptable to the OWNER can result in loss of compensation at the rate of \$1,000 per work day until the Bidder resumes work.
7. The contract time for the work to be complete shall be 180 consecutive working days from mobilization. Failure to complete the work within the timeframe can result in loss of compensation at the rate of \$500 per work day. Allowances for weather and other delays will be at the sole discretion of the OWNER.
8. Attached maps give an overview of the project area.
9. The following tables give an overview of the pipe and manhole characteristics. All measurements must be verified by Bidder.



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**Verona GM's to rehab Map # 1**

GM ID #	MH ID#	MH ID#	Segment Length	Pipe Dia.	Laterals	Depth	Material	Map #
<a href="#">GM-1495</a>	<a href="#">MH-1951</a>	<a href="#">MH-1952</a>	241.6	8"	4	11.8	Truss	1
<a href="#">GM-1496</a>	<a href="#">MH-1952</a>	<a href="#">MH-1953</a>	259.0	8"	3	7.0	Truss	1
<a href="#">GM-1500</a>	<a href="#">MH-1954</a>	<a href="#">MH-1955</a>	236.9	8"	6	4.1	Truss	1
<a href="#">GM-1502</a>	<a href="#">MH-1956</a>	<a href="#">MH-1957</a>	408.5	8"	8	7.0	Truss	1
<a href="#">GM-1504</a>	<a href="#">MH-2012</a>	<a href="#">MH-2013</a>	323.8	8"	6	5.2	Truss	1
<a href="#">GM-1508</a>	<a href="#">MH-1949</a>	<a href="#">MH-2312</a>	410.3	8"	12	6.6	Truss	1
<a href="#">GM-1509</a>	<a href="#">MH-2312</a>	<a href="#">MH-2311</a>	401.4	8"	11	6.6	Truss	1

**Verona GM's to rehab Map # 2**

GM ID #	MH ID#	MH ID#	Segment Length	Pipe Dia.	Laterals	Depth	Material	Map #
<a href="#">GM-1561</a>	<a href="#">MH-2483</a>	<a href="#">MH-2174</a>	229.0	8"	4	8.0	Clay	2
<a href="#">GM-1581</a>	<a href="#">MH-2174</a>	<a href="#">MH-2173</a>	300.3	8"	3	8.7	Clay	2
<a href="#">GM-1554</a>	<a href="#">MH-2177</a>	<a href="#">MH-2178</a>	176.6	8"	4	7.0	Clay	2
<a href="#">GM-1558</a>	<a href="#">MH-2502</a>	<a href="#">MH-2178</a>	169.6	8"	4	6.5	Clay	2
<a href="#">GM-1555</a>	<a href="#">MH-2178</a>	<a href="#">MH-2450</a>	192.0	8"	2	12.1	Clay	2

**Verona GM's to rehab Map # 3**

GM ID #	MH ID#	MH ID#	Segment Length	Pipe Dia.	Laterals	Depth	Material	Map #
<a href="#">GM-1698</a>	<a href="#">MH-2383</a>	<a href="#">MH-2382</a>	181.0	8"	0	6.2	Asbestos	3
<a href="#">GM-1583</a>	<a href="#">MH-2377</a>	<a href="#">MH-2376</a>	150.0	8"	2	7.0	Clay	3
<a href="#">GM-3220</a>	<a href="#">MH-2379</a>	<a href="#">MH-2194</a>	229.8	8"	5	8.2	Asbestos	3
<a href="#">GM-1540</a>	<a href="#">MH-2194</a>	<a href="#">MH-2378</a>	383.7	8"	4	7.7	Asbestos	3
<a href="#">GM-1541</a>	<a href="#">MH-2378</a>	<a href="#">MH-2375</a>	285.0	8"	1	8.0	Clay	3
<a href="#">GM-1585</a>	<a href="#">MH-2446</a>	<a href="#">MH-2374</a>	361.3	8"	6	6.0	Clay	3
<a href="#">GM-1543</a>	<a href="#">MH-2374</a>	<a href="#">MH-2373</a>	126.5	8"	1	9.0	Clay	3

### Verona GM's to rehab Map # 4

GM ID #	MH ID#	MH ID#	Segment Length	Pipe Dia. 8"	Laterals	Depth	Material	Map #
<a href="#">GM-1614</a>	<a href="#">MH-1866</a>	<a href="#">MH-1865</a>	299.8	8"	12	7.5	Clay	4
<a href="#">GM-1613</a>	<a href="#">MH-1865</a>	<a href="#">MH-1864</a>	214.0	8"	7	7.3	Clay	4
<a href="#">GM-1612</a>	<a href="#">MH-1864</a>	<a href="#">MH-1899</a>	288.0	8"	9	9.0	Clay	4
<a href="#">GM-1627</a>	<a href="#">MH-1899</a>	<a href="#">MH-1897</a>	117.9	8"	1	9.5	Clay	4
<a href="#">GM-1611</a>	<a href="#">MH-1898</a>	<a href="#">MH-1897</a>	298.9	8"	5	8.0	Clay	4

### Verona GM's to rehab Map # 5

GM ID #	MH ID#	MH ID#	Segment Length	Pipe Dia. 8"	Laterals	Depth	Material	Map #
<a href="#">GM-2582</a>	<a href="#">MH-2116</a>	<a href="#">MH-2115</a>	332.7	8"	6	7.0	Clay	5
<a href="#">GM-1526</a>	<a href="#">MH-2113</a>	<a href="#">MH-2114</a>	156.7	8"	2	5.3	Clay	5
<a href="#">GM-1527</a>	<a href="#">MH-2114</a>	<a href="#">MH-2350</a>	193.3	8"	0	7.6	Clay	5
<a href="#">GM-2585</a>	<a href="#">MH-2349</a>	<a href="#">MH-2350</a>	398.0	8"	8	8.0	Clay	5

### Verona GM's to rehab Map # 6

GM ID #	MH ID#	MH ID#	Segment Length	Pipe Dia. 8"	Laterals	Depth	Material	Map #
<a href="#">GM-3236</a>	<a href="#">MH-5328</a>	<a href="#">MH-2118</a>	354.0	8"	8	6.5	Clay	6
<a href="#">GM-3237</a>	<a href="#">MH-2112</a>	<a href="#">MH-2111</a>	343.5	8"	9	6.2	Asbestos	6



**Verona GM's to rehab Map # 7**

GM ID#	MH ID#	MH ID#	Segment Length	Pipe Dia. 8"	Laterals	Depth	Material	Map #
<a href="#">GM-1575</a>	<a href="#">MH-1996</a>	<a href="#">MH-1997</a>	223.0	8"	4	6.7	Clay	7
<a href="#">GM-1534</a>	<a href="#">MH-2004</a>	<a href="#">MH-1997</a>	277.9	8"	4	6.9	Clay	7
<a href="#">GM-1536</a>	<a href="#">MH-2002</a>	<a href="#">MH-2003</a>	199.8	8"	4	6.4	Clay	7

**Verona GM's to rehab Map # 8**

GM ID#	MH ID#	MH ID#	Segment Length	Pipe Dia.	Laterals	Depth	Material	Map #
<a href="#">GM-1598</a>	<a href="#">MH-2070</a>	<a href="#">MH-1999</a>	269.0	8"	1	8.6	Clay	8
<a href="#">GM-1599</a>	<a href="#">MH-1869</a>	<a href="#">MH-1870</a>	212.7	8"	2	7.3	Clay	8
<a href="#">GM-1600</a>	<a href="#">MH-1870</a>	<a href="#">MH-1871</a>	202.0	8"	0	4.2	Clay	8
<a href="#">GM-1601</a>	<a href="#">MH-1871</a>	<a href="#">MH-1914</a>	271.7	8"	0	6.0	Clay	8
<a href="#">GM-1602</a>	<a href="#">MH-1916</a>	<a href="#">MH-1914</a>	321.0	12"	0	5.9	Clay	8
<a href="#">GM-1609</a>	<a href="#">MH-1924</a>	<a href="#">MH-1923</a>	322.0	8"	4	7.1	Clay	8
<a href="#">GM-1610</a>	<a href="#">MH-1923</a>	<a href="#">MH-2078</a>	200.2	8"	2	7.1	Clay	8
<a href="#">GM-1606</a>	<a href="#">MH-2078</a>	<a href="#">MH-2071</a>	239.9	8"	3	7.4	Clay	8



**Verona GM's to rehab Map # 9**

GM ID#	MH ID#	MH ID#	Segment Length	Pipe Dia.	Laterals	Depth	Material	Map #
<a href="#">GM-1643</a>	<a href="#">MH-2075</a>	<a href="#">MH-2074</a>	339.5	15"	12	5.0	Clay	9
<a href="#">GM-1644</a>	<a href="#">MH-2074</a>	<a href="#">MH-2072</a>	313.0	15"	6	5.7	Clay	9

**Verona GM's to rehab Map # 10**

GM ID #	MH ID#	MH ID#	SEGMENT LENGTH	PIPE DIA.	LATERALS	DEPTH	MATERIAL	MAP #
<a href="#">GM-1587</a>	<a href="#">MH-2171</a>	<a href="#">MH-2258</a>	400.0	8"	5	9.1	Clay	10
<a href="#">GM-1595</a>	<a href="#">MH-2258</a>	<a href="#">MH-2259</a>	188.0	8"	1	9.1	Clay	10
<a href="#">GM-1593</a>	<a href="#">MH-2259</a>	<a href="#">MH-1918</a>	189.5	8"	3	9.0	Clay	10
<a href="#">GM-1591</a>	<a href="#">MH-1943</a>	<a href="#">MH-1944</a>	269.0	8"	2	8.0	Clay	10
<a href="#">GM-1592</a>	<a href="#">MH-1944</a>	<a href="#">MH-1945</a>	232.2	8"	0	8.0	Clay	10
<a href="#">GM-1640</a>	<a href="#">MH-1945</a>	<a href="#">MH-1919</a>	248.0	8"	3	8.0	Clay	10
<a href="#">GM-1631</a>	<a href="#">MH-9121</a>	<a href="#">MH-2461</a>	250.0	12"	1	5.7	Clay	10
<a href="#">GM-1630</a>	<a href="#">MH-2461</a>	<a href="#">MH-2462</a>	252.7	8"	0	5.7	Clay	10
<a href="#">GM-1629</a>	<a href="#">MH-2462</a>	<a href="#">MH-1917</a>	250.2	12"	0	5.4	Clay	10

**Verona GM's to rehab Map # 11**

GM ID #	MH ID#	MH ID#	SEGMENT LENGTH	PIPE DIA.	LATERALS	DEPTH	MATERIAL	MAP #
<a href="#">GM-1616</a>	<a href="#">MH-2169</a>	<a href="#">MH-2168</a>	352.0	8"	4	6.0	Clay	11
<a href="#">GM-1617</a>	<a href="#">MH-2168</a>	<a href="#">MH-2167</a>	185.0	8"	6	5.5	Asbestos	11
<a href="#">GM-1619</a>	<a href="#">MH-2167</a>	<a href="#">MH-2482</a>	170.4	8"	2	7.0	Asbestos	11
<a href="#">GM-2148</a>	<a href="#">MH-2482</a>	<a href="#">MH-2170</a>	232.4	8"	0	6.3	Asbestos	11



**Verona GM's to rehab Map # 12**

GM ID #	MH ID#	MH ID#	SEGMENT LENGTH	PIPE DIA.	LATERALS	DEPTH	MATERIAL	MAP #
<a href="#">GM-3200</a>	<a href="#">MH-2163</a>	<a href="#">MH-488</a>	212.6	8"	2	11.4	Clay	12
<a href="#">GM-1660</a>	<a href="#">MH-2165</a>	<a href="#">MH-2164</a>	340.	8"	5	8.0	Clay	12

**Verona GM's to rehab Map # 13**

GM ID #	MH ID#	MH ID#	SEGMENT LENGTH	PIPE DIA.	LATERALS	DEPTH	MATERIAL	MAP #
<a href="#">GM-1861</a>	<a href="#">MH-1816</a>	<a href="#">MH-2529</a>	52.0	8"	0	5.7	Clay	13
<a href="#">GM-1832</a>	<a href="#">MH-1803</a>	<a href="#">MH-1804</a>	228.3	8"	5	11.0	Clay	13
<a href="#">GM-1850</a>	<a href="#">MH-1804</a>	<a href="#">MH-1805</a>	171.0	8"	1	11.1	Clay	13
<a href="#">GM-1852</a>	<a href="#">MH-1806</a>	<a href="#">MH-1807</a>	198.9	8"	4	9.0	Clay	13

**Verona GM's to rehab Map # 14**

GM ID #	MH ID#	MH ID#	SEGMENT LENGTH	PIPE DIA.	LATERALS	DEPTH	MATERIAL	MAP #
<a href="#">GM-2622</a>	<a href="#">MH-2187</a>	<a href="#">MH-1796</a>	203.0	8"	0	8.0	Clay	14
<a href="#">GM-2565</a>	<a href="#">MH-1796</a>	<a href="#">MH-1797</a>	440.1	8"	3	17.8	Clay	14
<a href="#">GM-6686</a>	<a href="#">MH-1823</a>	<a href="#">MH-5371</a>	139.5	8"	3	10.	Clay	14

**Verona GM's to rehab Map # 15**

GM ID #	MH ID#	MH ID#	SEGMENT LENGTH	PIPE DIA.	LATERALS	DEPTH	MATERIAL	MAP #
<a href="#">GM-1794</a>	<a href="#">MH-1832</a>	<a href="#">MH-2239</a>	247.6	8"	10	4.5	Truss	15
<a href="#">GM-1768</a>	<a href="#">MH-2319</a>	<a href="#">MH-1904</a>	178.	8"	3	5.5	Truss	15
<a href="#">GM-1769</a>	<a href="#">MH-1904</a>	<a href="#">MH-1903</a>	343.0	8"	4	7.5	Truss	15



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**Verona MH To Rehab Map # 1**

MH ID#	MH Depth	MH Leak Rate	Map #
MH-5692	5.0	2	1
MH-2440	8.0	1.5	1
MH-2032	5.0	1.5	1
MH-2035	4.9	1.5	1
MH-2448	5.6	2	1
MH-2055	6.0	1.5	1
MH-2052	7.4	2	1

**Verona MH To Rehab Map # 2**

MH ID#	MH Depth	MH Leak Rate	Map #
MH-1954	4.0	1.5	2
MH-1955	4.5	2	2
MH-2012	5.2	1.5	2
MH-1974	7.0	1.5	2
MH-1973	8.4	1.5	2
MH-1987	5.8	1.5	2
MH-1988	7.0	1.5	2
MH-2476	5.8	1.5	2

**Verona MH To Rehab Map # 3**

MH ID#	MH Depth	MH Leak Rate	Map #
MH-2116	7.0	1.5	3
MH-2745	4.2	4	3
MH-2111	7.0	1.5	3
MH-2351	10.5	1.5	3
MH-2354	8.8	1.5	3
MH-2109	10.0	1.5	3
MH-2177	7.0	1.5	3
MH-2178	6.5	1.5	3
MH-2173	8.7	2	3
MH-2167	5.5	1.5	3
MH-2166	9.3	1.5	3
MH-2390	6.8	1.5	3

**Verona MH To Rehab Map # 4**

MH ID#	MH Depth	MH Leak Rate	Map #
MH-2397	3.2	1.5	4
MH-2398	3.7	1.5	4
MH-2399	4.2	1.5	4
MH-2195	14.0	1.5	4



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<b>Verona MH To Rehab Map # 5</b>			
<b>MH ID#</b>	<b>MH Depth</b>	<b>MH Leak Rate</b>	<b>Map #</b>
MH-1871	4.2	2	5
MH-1879	5.3	2	5
MH-2073	3.9	2	5
MH-2122	4.3	2	5
MH-1817	5.0	1.5	5
MH-1816	5.7	2	5

<b>Verona MH To Rehab Map # 6</b>			
<b>MH ID#</b>	<b>MH Depth</b>	<b>MH Leak Rate</b>	<b>Map #</b>
MH-1802	6.5	1.5	6
MH-1810	4.3	1.5	6
MH-1819	10.0	2	6
MH-5370	9.0	2	6
MH-1820	8.0	2	6

<b>Verona MH To Rehab Map # 7</b>			
<b>MH ID#</b>	<b>MH Depth</b>	<b>MH Leak Rate</b>	<b>Map #</b>
MH-1831	8.5	1.5	7
MH-1826	4.4	2	7
MH-2360	6.5	2	7
MH-1835	5.8	1.5	7
MH-2501	15.9	1.5	7
MH-2240	10.0	1.5	7
MH-2231	10.0	1.5	7
MH-1907	5.4	2	7
MH-2687	5.4	1.5	7
MH-2688	4.6	1.5	7
MH-2237	4.6	1.5	7
MH-2498	4.1	1.5	7

<b>Verona MH To Rehab Map # 8</b>			
<b>MH ID#</b>	<b>MH Depth</b>	<b>MH Leak Rate</b>	<b>Map #</b>
MH-2230	9.0	1.5	8
MH-2313	5.0	1.5	8
MH-2210	7.0	2	8
MH-2095	4.6	1.5	8
MH-2094	12.0	1.5	8



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<b>Verona MH To Rehab Map # 9</b>			
<b>MH ID#</b>	<b>MH Depth</b>	<b>MH Leak Rate</b>	<b>Map #</b>
MH-2196	6.5	2.5	9
MH-2132	8.2	2	9
MH-2252	7.8	2	9
MH-2138	5.3	1.5	9
MH-2540	6.0	3	9



## **ATTACHMENT B**

### **CURED IN PLACE PIPE (CIPP) TECHNICAL SPECIFICATIONS**

#### **Part 1: General**

- A) These technical specifications include the minimum requirements for the rehabilitation of sanitary sewer pipelines by the installation of Cured-In-Place Pipe (CIPP) within the existing, deteriorated pipe as shown on the maps included as part of this solicitation.
- B) The rehabilitation of pipelines shall be done by the installation of a resin-impregnated flexible tube which, when cured, shall be continuous and tight-fitting throughout the entire length of the original pipe. The CIPP shall extend the full length of the original pipe and provide a structurally sound, joint-less and water-tight new pipe within the original pipe. The Bidder is responsible for proper, accurate and complete installation of the CIPP using the system selected by the Bidder.
- C) Neither the CIPP system, nor its installation, shall cause adverse effects to any of the OWNER's processes or facilities. The use of the product shall not result in the formation or production of any detrimental compounds or by-products at the wastewater treatment plant. The Bidder shall notify the OWNER and identify any by-products produced as a result of the installation operations, test and monitor the levels, and comply with any and all local waste discharge requirements. The Bidder shall cleanup, restore existing surface conditions and structures, and repair any of the CIPP system determined to be defective. The Bidder shall conduct installation operations and schedule cleanup in a manner to cause the least possible obstruction and inconvenience to traffic, pedestrians, businesses, and property owners or tenants.

#### **Section 1.1: Description of Work and Product Delivery**

- A) These specifications cover all work necessary to furnish and install the CIPP. The Bidder shall provide all materials, labor, equipment, and services necessary for traffic control, bypass pumping and/or diversion of sewage flows, cleaning and television inspection of sewers to be lined, liner installation, reconnection of service connections, all quality controls, provide samples for performance of required material tests, final television inspection, testing of lined pipe system and warranty work, all as specified herein.
- B) The product furnished shall be a complete CIPP system including all materials, applicable equipment and installation procedures. The CIPP system manufacturer may submit a minimum of 14 calendar days in advance of the bid date, required information to the OWNER to obtain pre-approval status. Those CIPP systems that have been pre-approved will not be required to furnish information as required in the submittal section of these specifications unless specifically requested to do so by the OWNER or if any of the CIPP system components have changed from those preapproved by the OWNER. All other CIPP systems or multi-component products will be required to meet the submittal requirements as contained herein if they are not pre-approved.
- C) The CIPP shall be continuous and joint-less from manhole to manhole or access point to access point and shall be free of all defects that will affect the long term life and operation of the pipe.



- D) The CIPP shall fit sufficiently tight within the existing pipe so as to not leak at the manholes, at the service connections or through the wall of the installed pipe. If leakage occurs through the wall of the pipe the liner shall be repaired or removed as recommended by the CIPP manufacturer at no additional cost to the OWNER. Final approval of the liner installation will be based on a leak tight pipe as determined by the testing specified below.
- E) The CIPP shall be designed for a life of 50 years or greater.
- F) The CIPP shall be designed to resist all external loads independent of the host pipe as a fully structural standalone pipe-within-a-pipe. It shall be assumed in all cases that the host pipe has fully deteriorated. The installed CIPP shall meet or exceed all specified physical properties, fitting tightly within the existing pipe all within the tolerances specified. The installed CIPP shall withstand all applicable surcharge loads (soil overburden, live loads, etc.) and external hydrostatic (groundwater) pressure, if present, for each specific installation location.
- G) The installed CIPP shall have a long term (50 year) corrosion resistance to the typical chemicals found in domestic, industrial, and commercial sewage.
- H) All existing and confirmed active service connections and any other service laterals to be reinstated as directed by the OWNER shall be re-opened robotically or by hand in the case of man-entry size piping, to their original shape and to 90% of their original capacity. All over-cut service connections will be properly repaired to meet the requirements of these specifications at no additional cost to the OWNER.
- I) Testing and warranty inspections shall be executed by the Bidder. Any defects found shall be repaired or replaced by the Bidder.
- J) The Bidder shall furnish all samples for product testing at the request of the OWNER. The Bidder shall deliver the samples to an approved laboratory and pay for all material and product testing performed under this contract.
- K) The Bidder shall restore any disturbed land and roadways to ACSA and VDOT standards at no additional cost to the OWNER. No trash shall ever be stored at the site and the Bidder shall consult with OWNER about acceptable locations to store materials, equipment, and vehicles overnight and on weekends.

## **Section 1.2: References**

- A) The following documents form a part of this specification to the extent stated herein and shall be the latest editions thereof. Where differences exist between codes and standards, the requirements of these specifications shall apply. All references to codes and standards shall be to the latest revised version.
  1. ASTM - F1216 Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube
  2. ASTM - F1743 Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Pulled-in-Place Installation of Cured-in-Place Thermosetting Resin Pip (CIPP)
  3. ASTM - D543 Standard and Practice for Evaluating the Resistance of Plastics to Chemical Reagents
  4. ASTM - D638 Standard Test Method for Tensile Properties of Plastics
  5. ASTM - D790 Standard Test Methods for Flexural Properties of Un-reinforced and Reinforced Plastics and Electrical Insulating Materials
  6. ASTM - D792 Standard Test Methods for Density and Specific Gravity of Plastics by displacement.
  7. ASTM - 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)



8. ASTM - D2122-98(2010) Standard Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings
9. ASTM F2561 - 06 Standard Practice for Rehabilitation of a Sewer Service Lateral and Its Connection to the Main Using a One Piece Main and Lateral Cured-in Place Liner
10. ASTM - D2990 Standard Test Methods for Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics
11. ASTM - D3567-97(2011) Standard Practice for Determining Dimensions of Fiberglass (Glass-Fiber-Reinforced Thermosetting Resin) Pipe and Fittings
12. ASTM - D3681 Standard Test Method for Chemical Resistance of “Fiberglass (Glass Fiber Reinforced Thermosetting Resin) Pipe in a Deflected Condition
13. ASTM - D5813 Standard Specification for Cured-in Place Thermosetting Resin Sewer Pipe
14. ASTM - D618-61 Standard Practice for Conditioning Plastics for Testing
15. ASTM - D2412 Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel Plate Loading

### **Section 1.3: Performance Work Statement Submittal**

The Bidder shall submit, to the OWNER, a Performance Work Statement (PWS) along with his/her unit price bid, which clearly defines the CIPP product delivery in conformance with the requirements of this solicitation. Unless otherwise directed by the OWNER, the PWS shall at a minimum contain the following:

- A) Clearly indicate that the CIPP will conform to the project requirements as outlined in the Description of Work and as delineated in these specifications.
- B) A detailed installation schedule shall be prepared, submitted and conform to the requirements of this solicitation. The plan shall describe all preparation work, cleaning operations, pre-CCTV inspections, by-pass pumping, traffic control, installation procedure, method of curing, service reconnection, quality control, testing to be performed, final CCTV inspection, warranties furnished and all else necessary and appropriate for a complete CIPP liner installation. A detailed installation schedule shall be prepared, submitted and conform to the requirements of this solicitation.
- C) Bidder’s description of the proposed CIPP lining technology, including a detailed plan for identifying all active service connections, maintaining mainline service during installation.
- D) A description of the CIPP materials to be furnished for the project. Materials shall be fully detailed in the submittals and conform to these specifications and/or shall conform to the pre-approved product submission.
- E) A statement of the Bidder’s experience. The Bidder shall have a minimum of three (3) years of continuous experience installing the proposed CIPP in deteriorated pipe of a similar size, length and configuration as contained in this solicitation. The Bidder must have successfully installed a minimum of 100,000 linear feet of liner and completed at least 5 jobs in which over 5,000 linear feet have been installed. The Bidder must submit documentation proving that he/she has successfully installed a minimum of 100,000 linear feet and 5 separate jobs in which at least 5,000 linear feet of liner were installed. The Bidder must also provide contact information of at least three references that have had similar work done by the Bidder using Attachment G. The Bidder and all employees must be certified by the proposed CIPP manufacturer as qualified to perform work using their product. The Bidder shall submit official documentation from the CIPP manufacturer to the OWNER that states that the Bidder is qualified. The lead personnel including the superintendent, the foreman and the lead crew personnel for the CCTV inspection, the CIPP liner installation, liner curing and the robotic service reconnections each must



have a minimum of three (3) years of total experience with the CIPP technology proposed for this project and must have demonstrated competency and experience to perform the scope of work contained in this solicitation. The name and experience of each lead individual performing work on this project shall be submitted with the PWS. Personnel replaced by the Bidder, on this project, shall have similar, verifiable experience as the personnel originally submitted for the project.

- F) Engineering design calculations, in accordance with the Appendix of ASTM F1216, for each length of liner to be installed including the thickness of each proposed CIPP. It will be acceptable for the Bidder to submit a design for the most severe line condition and apply that design to all of the line sections. These calculations shall be performed and certified by a qualified Professional Engineer. All calculations shall include data that conforms to the requirements of these specifications or has been pre-approved by the OWNER.
- G) Proposed manufacturers' technology data shall be submitted for all CIPP products and all associated technologies to be furnished.
- H) Submittals shall include information on the cured-in-place pipe intended for installation and all tools and equipment required for a complete installation. The PWS shall identify which tools and equipment will be redundant on the job site in the event of equipment breakdown. All equipment, to be furnished for the project, including proposed back-up equipment, shall be clearly described. The Bidder shall outline the mitigation procedure to be implemented in the event of key equipment failure during the installation process.
- I) Certify at the time of the bid, that the locations included in the solicitation were visited, inspected and evaluated by the Bidder or Bidder's Representative, prior to submitting a bid.
- J) A detailed description of the Bidder's proposed procedures for removal of any existing blockages in the pipeline that may be encountered during the cleaning process.

#### **Section 1.4: Product Submittals**

- A) Fabric Tube – including the manufacturer and description of product components.
- B) Flexible membrane (coating) material – including recommended repair (patching) procedure if applicable.
- C) Raw Resin Data - including the manufacturer and description of product components.
- D) Manufacturers' shipping, storage and handling recommendations for all components of the CIPP System and Bidder documentation that those recommendations are being followed.
- E) All SDS sheets for all materials to be furnished for the project.
- F) Tube wet-out & cure method including:
  - a. A complete description of the proposed wet-out procedure for the proposed technology.
  - b. Manufacturers recommended cure method for each diameter and thickness of CIPP liner to be installed. Include detailed curing procedures detailing the curing medium and method of the application.

#### **Section 1.5: Safety**

- A) The Bidder shall conform to all work safety requirements of pertinent regulatory agencies, and shall secure the site for the working conditions in compliance with the same. The Bidder shall erect such signs and other devices as necessary for the safety of the work site.
- B) The Bidder shall perform all of the Work in accordance with applicable OSHA standards. Emphasis shall be placed upon the requirements for entering confined spaces and with the equipment being utilized for pipe renewal.



- C) The Bidder shall be responsible for all necessary traffic control when working in VDOT roadways. It shall be the sole responsibility of the Bidder to obtain and to set up any necessary traffic control measures. The cost of traffic control shall be included in the unit price bid.

### **Section 1.6: Quality Control Plan**

- A) A detailed quality control plan (QCP) shall be submitted to the OWNER that fully represents and conforms to the requirements of these specifications. At a minimum the QCP shall include the following:
  - a. A detailed discussion of the proposed quality controls to be performed by the Bidder.
  - b. Defined responsibilities, of the Bidder's personnel, for assuring that all quality requirements, for this contract, are met. These shall be assigned, by the Bidder, to specific personnel.
  - c. Proposed procedures for quality control, product sampling and testing shall be defined and submitted as part of the plan.
  - d. Proposed methods for product performance controls, including method of and frequency of product sampling and testing both in raw material form and cured product form.
  - e. A scheduled performance and product test result review between the Bidder and the OWNER at a regularly scheduled job meeting.
  - f. Inspection forms and guidelines for quality control inspections shall be prepared in accordance with the standards specified in this solicitation and stated by the manufacturer and submitted with the QCP.

### **Section 1.7: CIPP Repair/ Replacement**

- A) The Bidder shall take every precaution to prevent any defects from occurring in the liner. However, the Bidder shall outline specific repair or replacement procedures for potential defects that may occur in the installed CIPP. Repair/replacement procedures shall be as recommended by the CIPP system manufacturer and shall be submitted as part of the PWS.
- B) Defects in the installed CIPP that will not affect the operation and long term life of the product shall be identified and defined.
- C) Repairable defects that may occur in the installed CIPP shall be specifically defined by the Bidder based on manufacturer's recommendations, including a detailed step-by-step repair procedure, resulting in a finished product meeting the requirements of these specifications.
- D) Un-repairable defects that may occur to the CIPP shall be clearly defined by the Bidder based on the manufacturer's recommendations, including a recommended procedure for the removal and replacement of the CIPP.

### **Section 1.8: As Built Information**

- A) As-Built CIPP information shall include actual liner thickness, actual length, and date installed for each segment of CIPP liner. This as-built information shall be submitted to the OWNER in the form of a table. In addition to the as-built information, pre & post inspection CCTV recordings shall be submitted digitally to the OWNER, by the Bidder within 2 weeks of final acceptance of said work or as specified by the OWNER.



- B) As-Built information shall be kept on the project site at all times, shall include all necessary information as outlined in the PWS or as agreed to by the OWNER and the Bidder at the start of the project and shall be updated as the work is being completed, and shall be clearly legible.

**Section 1.9: Warranty**

- A) The materials used for the project shall be certified by the manufacturer for the specified purpose. The Bidder shall warrant the liner material and installation for a period of one (1) year. During the Bidder warranty period, any defect which may materially affect the integrity, strength, function and/or operation of the pipe, shall be repaired at the Bidder's expense in accordance with procedures included in Section 1.7 CIPP Repair/Replacement and as recommended by the manufacturer.
- B) On any work completed by the Bidder that is defective and/or has been repaired, the Bidder shall warrant this work for (1) year in addition to the warranty required by the contract.
- C) After a pipe section has been lined and for a period of time up to one (1) year following completion of the project, the OWNER may inspect all or portions of the lined system. The specific locations will be selected at random by the OWNER and will include all sizes of CIPP from this project. If it is found that any of the CIPP has developed abnormalities since the time of "Post Construction Television Inspection," the abnormalities shall be repaired and/or replaced as defined in Section 1.7 CIPP Repair/Replacement and as recommended by the manufacturer. If, after inspection of a portion of the lined system under the contract, problems are found, the OWNER may perform a CCTV inspection on all the CIPP installed on the contract. All verified defects shall be repaired and/or replaced by the Bidder and shall be performed in accordance with Section 1.7 CIPP Repair/Replacement and per the original specifications, all at no additional cost to the OWNER.

**Part 2: Products**

**Section 2.1: Materials**

- A) The CIPP System must meet the chemical resistance requirements of this specification.
- B) All materials, shipped to the project site, shall be accompanied by test reports certifying that the material conforms to the ASTM standards listed herein. Materials shall be shipped, stored, and handled in a manner consistent with written recommendations of the CIPP system manufacturer to avoid damage. Damage includes, but is not limited to, gouging, abrasion, flattening, cutting, puncturing, or ultra-violet (UV) degradation. On site storage locations, shall be approved by the OWNER. All damaged materials shall be promptly removed from the project site at the Bidder's expense and disposed of in accordance with all current applicable agency regulations.

**Section 2.2: Fabric Tube**

- A) The fabric tube shall consist of one or more layers of absorbent non-woven felt fabric, felt/fiberglass or fiberglass and meet the requirements of ASTM F1216, ASTM F1743, ASTM D5813 & ASTM F2019. The fabric tube shall be capable of absorbing and carrying resins, constructed to withstand installation pressures and curing temperatures and have sufficient strength to bridge missing pipe segments, and stretch to fit irregular pipe sections. The Bidder shall submit certified information from the felt manufacturer on the nominal void volume in the felt fabric that will be filled with resin.



- B) The wet-out fabric tube shall have a uniform thickness and excess resin distribution that when compressed at installation pressures will meet or exceed the design thickness after cure.
- C) The fabric tube shall be manufactured to a size and length that when installed will tightly fit the internal circumference, meeting applicable ASTM standards or better, of the original pipe. Allowance shall be made for circumferential stretching during installation. The tube shall be properly sized to the diameter of the existing pipe and the length to be rehabilitated and be able to stretch to fit irregular pipe sections and negotiate bends. The Bidder shall determine the minimum tube length necessary to effectively span the designated run between manholes. The Bidder shall verify the lengths in the field prior to ordering and prior to impregnation of the tube with resin, to ensure that the tube will have sufficient length to extend the entire length of the run. The Bidder shall also measure the inside diameter of the existing pipelines in the field prior to ordering liner so that the liner can be installed in a tight-fitted condition.
- D) The outside and/or inside layer of the fabric tube (before inversion/pull-in, as applicable) shall be coated with an impermeable, flexible membrane that will contain the resin and facilitate, if applicable, vacuum impregnation and monitoring of the resin saturation during the resin impregnation (wet-out) procedure.
- E) No material shall be included in the fabric tube that may cause de-lamination in the cured CIPP. No dry or unsaturated layers shall be acceptable upon visual inspection as evident by color contrast between the tube fabric and the activated resin containing a colorant.
- F) The wall color of the interior pipe surface of CIPP after installation shall be a light reflective color so that a clear detailed examination with closed circuit television inspection equipment may be made. The hue of the color shall be dark enough to distinguish a contrast between the fully resin saturated felt fabric and dry or resin lean areas.
- G) The outside of the fabric tube shall be marked every 5 feet with the name of the manufacturer or CIPP system, manufacturing lot and production footage.
- H) The minimum length of the fabric tube shall be that deemed necessary by the Bidder to effectively span the distance from the starting manhole to the terminating manhole or access point, plus that amount required to run-in and run-out for the installation process.
- I) The nominal fabric tube wall thickness shall be constructed, as a minimum, to the nearest 0.5 mm increment, rounded up from the design thickness for that section of installed CIPP. Wall thickness transitions, in 0.5 mm increments or greater as appropriate, may be fabricated into the fabric tube between installation entrance and exit access points. The quantity of resin used in the impregnation shall be sufficient to fill all of the felt voids for the nominal felt thickness.

### **Section 2.3: Resin**

- A) The resin shall be a corrosion resistant polyester or vinyl ester resin and catalyst system or epoxy and hardener system that, when properly cured within the tube composite, meets the requirements of ASTM F1216, ASTM F1743 or F2019, ASTM D5813 the physical properties herein, and those, which are to be utilized in the design of the CIPP for this project. The resin shall produce CIPP which will comply with or exceed the structural and chemical resistance requirements of this specification. The Bidder shall submit documentation showing that the resin complies with all standards.
- B) The resin to tube ratio, by volume, shall be furnished as recommended by the manufacturer and given to the OWNER.



**Section 2.4: Structural Requirements**

- A) The physical properties and characteristics of the finished liner can vary considerably, depending on the types and mixing proportions of the materials used, and the degree of cure executed. It shall be the responsibility of the Bidder to control these variables and to provide a CIPP system which meets or exceeds the minimum properties specified herein:
- a. The CIPP shall be designed as per ASTM F1216 Appendixes. The CIPP design shall assume no bonding to the original pipe wall.
  - b. The design engineer shall set the long term (50 year extrapolated) Creep Retention Factor at 50% of the initial design flexural modulus as determined by ASTM D-790 test method. This value shall be used unless the Bidder submits long term test data (ASTM D2990) to substantiate a higher retention factor.
  - c. The cured pipe material (CIPP) shall, at a minimum, meet or exceed the structural properties, as listed below.

**Section 2.5: Minimum Physical Properties**

Property	Test Method	Cured Composite per ASTM F1216	Cured Composite per Design
Flexural Modulus of Elasticity (Short Term) (Felt Tubes) Felt/Fiberglass, Fiberglass as recommended by Manufacturer	ASTM D-790	250,000 psi	Bidder Value
Flexural Strength (Short Term) (Felt Tubes) Felt/Fiberglass, Fiberglass as recommended by Manufacturer	ASTM D-790	4,500 psi	Bidder Value



- A) The required structural CIPP wall thickness shall be based, as a minimum, on the physical properties of the cured composite and per the design of the Professional Engineer (see section 1.3.F) and in accordance with the Design Equations contained in the appendix of the ASTM standards, and the following design parameters:

Design Safety Factor	2.0
Creep Retention Factor	50%
Ovality	2% or as measured by field inspection
Constrained Soil Modulus	Per AASHTO LRFD Section 12 and AWWA Manual M45
Soil Depth (above crown)	As specified in the bid documents and verified by the Bidder
Live Load	Highway, railroad, or airport as applicable
Soil Load (assumed)	120 lb/ft <sup>3</sup>
Minimum Service Life	50 years

- B) The Bidder shall submit, prior to installation of the lining materials, certification of compliance with these specifications and/or the requirements of the pre-approved CIPP system. Certified material test results shall be included that confirm that all materials conform to these specifications and/or the pre-approved system. Materials not complying with these requirements will be rejected.

### **Part 3: Installation**

#### **Section 3.1: Construction Requirements**

- A) The Bidder shall clean the interior of the existing host pipe prior to installation of the CIPP liner. All debris and obstructions, that will affect the installation and the final CIPP product delivery to the OWNER, shall be removed and disposed of.
- B) The CIPP liner shall be constructed of materials and methods, that when installed, shall provide a jointless and continuous structurally sound CIPP able to withstand all imposed static, and dynamic loads on a long-term basis without structural support assistance from the host pipe.
- C) The Bidder may, under the direction of the OWNER, utilize any of the existing manholes in the project area as installation access points. If a street must be closed to traffic because of the location of the sewer, the Bidder shall furnish a detailed traffic control plan and all labor and equipment necessary. The plan shall be in conformance with all VDOT requirements.



- D) Cleaning of Pipe Lines - The Bidder shall remove all internal debris from the pipe line that will interfere with the installation and the final product delivery of the CIPP as required in these specifications. Solid debris and deposits shall be removed from the system and disposed of properly by the Bidder. Moving material from manhole section to manhole section shall not be allowed. As applicable the Bidder shall either plug or install a flow bypass pumping system to properly clean the pipe lines. Precaution shall be taken, by the Bidder in the use of cleaning equipment to avoid damage to the existing pipe. The repair of any damage, caused by the cleaning equipment, shall be the responsibility of the Bidder. Unless otherwise specified by the OWNER, the Bidder shall dispose of all debris at no charge to the OWNER.
- E) By-passing Existing Sewage Flows - The Bidder shall provide bypass pumping up to 300gpm for the flow of existing mainline and service connection effluent around the section or sections of pipe designated for CIPP installation. With most small diameter pipelines, particularly on terminal sewers, plugging will be adequate but must be monitored on a regular basis to prevent backup of sewage into adjacent homes. Service connection effluent may be plugged only after proper notification by the OWNER to the affected residence and may not remain plugged overnight. Installation of the liner shall not begin until the Bidder has installed the required plugs or a sewage by-pass system and all pumping facilities have been installed and tested under full operating conditions including the bypass of mainline and side sewer flows. Once the lining process has begun, existing sewage flows shall be maintained, until the resin/felt tube composite is fully cured, cooled down, fully televised, the CIPP ends finished, laterals reinstated and the pipe is accepted by the OWNER. The Bidder shall coordinate sewer bypass and flow interruptions with the OWNER at least 14 days in advance. The pump and bypass lines shall be of adequate capacity and size to handle peak flows. The Bidder shall submit a detail of the bypass plan and design to the OWNER before proceeding with any CIPP installation. If the bypass pumping rate is to exceed 300gpm, then the OWNER shall provide the Bidder with the necessary pump and piping to handle the pump around. It shall still be the responsibility of the Bidder to setup, operate, and maintain the pump for the duration of the installation. Once the line is operational the Bidder shall return the pump and piping to the OWNER.
- F) The Bidder shall perform post-cleaning video inspections of the pipelines. Only PACP certified personnel trained in locating breaks, obstacles and service connections by closed circuit television shall perform the inspection. The Bidder shall provide the OWNER a copy of the pre-cleaning and post-cleaning video and suitable log, and/or in digital format for review prior to installation of the CIPP and for later reference by the OWNER.
- G) Line Obstructions - It shall be the responsibility of the Bidder to clear the line of obstructions that will interfere with the installation and long-term performance of the CIPP. If pre-installation inspection reveals an obstruction, misalignment, broken or collapsed section or sag that was not identified as part of the original scope of work and will prohibit proper installation of the CIPP, the Bidder shall notify the OWNER. The Bidder can propose a single lump sum price to fix the obstruction(s) in the pipe to the OWNER that is in addition to the unit price quoted in this bid. However, the OWNER may choose to fix the point repair in-house instead so CIPP can be installed.
- H) The Bidder shall be responsible for confirming the locations of all branch service connections prior to installing and curing the CIPP. At OWNER discretion, each connection may be dye tested to determine whether or not the connection is live or abandoned. In the event the status of a service connection cannot be adequately defined, the OWNER will make the final decision, prior to installation and curing of the liner, as to the status. Typically only service connections deemed "active" shall be reopened by the Bidder.
- I) The Bidder shall be allowed use water from an OWNER-approved fire hydrant in the project vicinity at no cost. Use of an approved double check backflow assembly shall be required. Bidder shall provide his own approved



assembly. The Bidder must have the double check assembly inspected by the OWNER and record all water use by the means of a hydrant meter provided by the OWNER. The Bidder shall pay a deposit for the meter, which will be returned once the job is completed and the meter is returned. The Bidder shall only use hydrants as specified by the OWNER.

### **Section 3.2: Installation of Liner**

- A) Prior to mobilizing, a comprehensive construction sequencing plan shall be submitted to the OWNER detailing the following:
  - a. A proposed schedule including sequencing
  - b. Identification of all proposed access routes
  - c. Identification of set-up locations for lining installation
  - d. Lining procedures
  - e. Bypass Pumping Plan
  - f. Traffic Control Plan
- B) The CIPP Liner shall be installed and cured in the host pipe per the manufacturer's specifications as described and submitted in the PWS.
- C) CIPP installation shall be in accordance with the applicable ASTM standards.
- D) A wet-out report shall be submitted to the OWNER with the following information for each section of liner manufactured:
  - a. Certification that actual resin volume/weight for each liner was between 5% to 10% additional from the design volume/weight.
- E) The wet-out tube shall be positioned in the pipeline using the method specified by the manufacturer. Care should be exercised not to damage the tube as a result of installation. The tube should be pulled-in or inverted through an existing manhole or approved access point and fully extend to the next designated manhole or termination point.
- F) Prior to installation and as recommended by the manufacturer, remote temperature gauges or sensors shall be placed inside the host pipe to monitor the temperatures during the cure cycle. Liner and/or host pipe interface temperature shall be monitored and logged during curing of the liner.
- G) To monitor the temperature of the liner wall and to verify correct curing and where specified in this solicitation, temperature sensors can be placed between the host pipe and the liner in the bottom of the host pipe (invert) throughout its length to monitor the temperature on the outside of the liner during the curing process. The temperature sensors shall be placed at intervals as recommended by the sensor manufacturer. Additional sensors shall be placed where significant heat sinks are likely or anticipated. The sensors should be monitored by a computer using a tamper proof data base that is capable of recording temperatures at the interface of the liner and the host pipe. The Bidder shall provide temperature readouts for each cured line to the OWNER to ensure compliance with manufacturer recommendations.
- H) Curing shall be accomplished by utilizing the appropriate medium in accordance with the manufacturer's recommended cure schedule. The curing source or input and output temperatures shall be monitored and logged during the cure cycles if applicable. The manufacturer's recommended cure method & schedule shall be used for each line segment installed, and the liner wall thickness and the existing ground conditions with regard to



temperature, moisture level, and thermal conductivity of soil, per ASTM as applicable, shall be taken into account by the Bidder.

- I) For heat cured liners, if any temperature sensor or multiple sensors do not reach the temperature as specified by the manufacturer to achieve proper curing or cooling, the Bidder can make necessary adjustments to comply with the manufacturer's recommendations. The system computer should have an output report that specifically identifies each installed sensor station in the length of pipe, indicates the maximum temperature achieved and the sustained temperature time. Each sensor should record both the maximum temperature and the minimum cool down temperature and comply with the manufacturer's recommendations. For UV Cured Liners, all light train sensor readings, recorded by the tamper proof computer, shall provide output documenting the cure along the entire length of the installed liner. The cure procedure shall be in accordance with the manufacturer's recommendation as included in the PWS submission by the Bidder. The Bidder shall provide all UV readouts for each cured line to the OWNER to ensure compliance with the manufacturer's recommendations.

### **Section 3.3: Cool Down**

- A) The Bidder shall cool the CIPP in accordance with the approved CIPP manufacturer's recommendations as described and outlined in the PWS.
- B) Temperatures and curing data shall be monitored and recorded, by the Bidder, throughout the installation process to ensure that each phase of the process is achieved as approved in accordance with the CIPP System manufacturer's recommendations. The curing data shall also be made available to the OWNER.

### **Section 3.4: Finish**

- A) The installed CIPP shall be continuous over the entire length of a sewer line section and be free from visual defects such as foreign inclusions, dry spots, pinholes, major wrinkles and de-lamination. The CIPP shall be impervious and free of any leakage from the pipe to the surrounding ground or from the ground to inside the lined pipe.
- B) Any defect, which will or could affect the structural integrity or strength of the linings, shall be repaired at the Bidder's expense, in accordance with the procedures submitted under section 1.7 CIPP Repair/Replacement.
- C) The beginning and end of the CIPP shall be sealed to the existing host pipe. The sealing material shall be compatible with the pipe end and shall provide a watertight seal. A hydrophilic gasket shall be installed at the end of each line as it enters the manhole as well to ensure no future leakage.
- D) If any of the service connections leak water between the host pipe and the installed liner, the connection mainline interface shall be sealed to provide a water tight connection.
- E) If the wall of the CIPP leaks, it shall be repaired or removed and replaced by the Bidder at no additional cost with a watertight pipe as recommended by the manufacture of the CIPP system.
- F) Compensation shall be at the actual length of cured-in-place pipe installed. The length shall be measured from center of manhole to center of manhole. The unit price per linear foot installed shall include all materials, labor, equipment and supplies necessary for the complete CIPP liner installation. Compensation for service connection sealing, shall be at the unit price bid therefore in the Proposal.



**Section 3.5: Manhole Connections and Reconnection of Existing Services**

- A) A seal, consisting of a resin mixture or hydrophilic seal compatible with the installed CIPP shall be applied at manhole/wall interface in accordance with the CIPP System manufacturer’s recommendations.
- B) Prior to reinstating any lateral connections, the CIPP shall be low pressure tested to ensure no pinhole leaks that could be missed by a CCTV inspection exist. The method for the low pressure test is as follows:
  - a. The CIPP shall be plugged at both the upstream and downstream manhole with pneumatic plugs that shall be able to maintain the test pressure without external bracing. One plug shall have three air hose connections, one for plug inflation, one for a pressure gauge (supplied by Bidder with .01 psi increments), and one for introducing air into the sealed line.
  - b. The CIPP section shall be pressurized to 4 psi and held above 3.5 psi for not less than two minutes for stabilization prior to testing. Air shall be added to maintain a minimum of 3.5 psi. Stabilization is complete when the line holds 3.5 psi for at least 2 minutes.
  - c. After stabilization has been completed, record the pressure (must be above 3.5 psi) and begin timing for the low pressure test. The pressure must not drop 0.5 psi or more in the time given in the following table.

Sewer Pipe Diameter (in)	Minimum Test Time (Minutes)
6-8	4
10	5
12	6
15+	7.5

- d. If the line does not pass the pressure test, then the leak must be identified by CCTV inspection, repaired or replaced in accordance with section 1.7: CIPP Repair and Replacement.
- C) Existing services shall be internally or externally reconnected.
- D) Reconnections of existing services shall be made after the CIPP has been installed, fully cured, cooled down and pressure tested for leaks. It is the Bidder’s responsibility to make sure that all active service connections are reconnected.
- E) External reconnections are to be made with a tee fitting in accordance with CIPP System manufacturer’s recommendations. Saddle connections shall be seated and sealed to the new CIPP using grout or resin compatible with the CIPP.
- F) A CCTV camera and remote cutting tool shall be used for internal reconnections. The machined opening shall be at least 90 percent of the service connection opening and the bottom of both openings must match. The opening shall not be more than 100 percent of the service connection opening. The edges of the opening shall not have pipe fragments or liner fragments, which may obstruct flow or snag debris. In all cases the invert of the sewer connection shall be cut flush with the invert entering the mainline.



- G) In the event that service reinstatements result in openings that are greater than 100 percent of the service connection opening, the Bidder shall install a CIPP type repair, sufficiently in size to completely cover the over-cut service connection. No additional compensation will be paid for the repair of over-cut service connections.
- H) Coupons of pipe material resulting from service tap cutting shall be collected at the next manhole downstream of the pipe rehabilitation operation prior to leaving the site. Coupons may not be allowed to pass through the system.
- I) Compensation shall be at the actual number of services re-connected using either internal or external means as contained in the Proposal. The unit price bid per service line re-connected shall include all materials, labor, equipment and supplies necessary to complete the work as required in these specifications.

### **Section 3.6: Testing Installed CIPP**

- A) The physical properties of the installed CIPP shall be verified through field sampling and laboratory testing. All materials for testing shall be furnished by the Bidder. All materials testing shall be performed at the Bidder's expense, by an independent third party laboratory as recommended by the CIPP manufacturer. All tests shall be in accordance with applicable ASTM test methods to confirm compliance with the requirements specified in the solicitation.
- B) The Bidder shall provide samples for testing from the actual installed CIPP liner. Samples shall be provided, at a minimum from one location per 1,000 linear feet of CIPP installed or as required by the OWNER. The sample shall be cut from a section of cured CIPP that has been inverted or pulled through a like diameter pipe which has been held in place by a suitable heat sink, such as sandbags. All curing, cutting and identification of samples will be witnessed by the OWNER and transmitted by the Bidder to the testing laboratory. The Bidder shall label each sample with the Gravity Main and Manhole ID as noted on the maps in the scope of work. The opening produced from the sample shall be repaired in accordance with manufacturer's recommended procedures.
- C) The laboratory results shall identify the test sample location as referenced by the Gravity Main and Manhole ID. Final payment for the project shall be withheld pending receipt and approval of the test results. If properties tested do not meet the minimum physical and thickness requirements, the CIPP shall be repaired or replaced by the Bidder unless the actual physical properties and the thickness of the sample tested meet the design requirements as given in the specification.
- D) Chemical resistance - The CIPP system installed shall meet the chemical resistance requirements of ASTM D5813. CIPP samples tested shall be of fabric tube and the specific resin proposed for actual construction. It is required that CIPP samples without plastic coating meet these chemical testing requirements. A certification shall be submitted, by the Bidder, from the manufacturer, verifying that the chemical resistance of the CIPP meets the specification.
- E) Hydraulic Capacity - Overall, the hydraulic capacity shall be maintained as large as possible. The installed CIPP shall, at a minimum, be equal to the full flow capacity of the original pipe before rehabilitation. In those cases where full capacity cannot be achieved after liner installation, the Bidder shall submit a request to waive this requirement, together with the reasons for the waiver request. Calculated capacities may be derived using a commonly accepted roughness coefficient for the existing pipe material taking into consideration its age and condition.



- F) The installed CIPP thickness shall be measured for each line section installed. If the CIPP thickness does not meet the submitted and approved design by the Bidder then the liner shall be repaired or removed unless the tested physical properties and the thickness of the sample tested meet the design requirements as required in the solicitation. The liner thickness shall have tolerance of minus 5% plus 10%. In man-entry size piping the Bidder shall remove a minimum of one sample or one sample every line section of installed CIPP, not meeting the specified design thickness, to be used to check the liner thickness. The samples shall be taken by core drilling 2-inch diameter test plugs at random locations selected by the OWNER. As an alternative the Bidder may use industry proven, non-destructive methods for confirming the thickness of the installed CIPP.

### **Section 3.7: Final Acceptance**

- A) All CIPP sample testing and repairs to the installed CIPP as applicable, shall be completed, before final acceptance, meeting the requirements of these specifications and documented in written form.
- B) The Bidder shall perform a detailed closed-circuit television inspection in accordance with ASTM and NASSCO standards, in the presence of the OWNER after installation of the CIPP liner and reconnection of the side sewers. A radial view (pan and tilt) TV camera shall be used. The finished liner shall be continuous over the entire length of the installation and shall be free of significant visual defects, damage, deflection, holes, leaks and other defects. Unedited digital documentation of the inspection shall be provided to the OWNER within ten (10) working days of the liner installation. The data shall note the inspection date, location of all reconnected lateral services, debris, as well as any other defects in the liner, including, but not limited to, gouges, cracks, bumps, or bulges. If post installation inspection documentation is not submitted within ten (10) working days of the liner installation, the OWNER may, at its discretion, suspend any further installation of CIPP until the post-installation documentation is submitted. As a result of this suspension, no additional working days will be added to the contract, nor will any adjustment be made for increase in cost. Immediately prior to conducting the closed circuit television inspection, the Bidder shall thoroughly clean the newly installed liner removing all debris and build-up that may have accumulated, at no additional cost to the OWNER.
- C) Bypass pumping or plugging from the upstream manhole shall be utilized to minimize sewage from entering the line during the inspection. In the case of bellies in the line, the pipe shall be cleared of any standing water to provide continuous visibility during the inspection.
- D) Where leakage is observed through the wall of the pipe, the Bidder shall institute additional testing including but not limited to air testing, localized testing and any other testing that will verify that the leakage rate of the installed CIPP does not exceed acceptable tolerances specified in Section 3.5 of this solicitation.

**END OF SECTION**



## ATTACHMENT C

### Structural Cementitious Manhole Liner Specifications

#### **1.1 Scope**

- A) This specification provides minimum standards for materials and methods for waterproofing, sealing, structural reinforcement and corrosion protection of existing manholes.

#### **1.2 References**

1. ASTM C-109 Standard Test Method for Compressive Strength of Hydraulic Cement Mortars
2. ASTM C-157 Modified Standard Test Method for Length Change of Hardened Hydraulic Cement Mortar and Concrete
3. ASTM C-293 Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Center-Point Loading)
4. ASTM C-309 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
5. ASTM C-403 Standard Test Method for Time of Setting of Concrete Mixtures by Penetration Resistance
6. ASTM C-469 Standard Test Method for Static Modulus of Elasticity and Poisson's Ratio of Concrete in Compression
7. ASTM C-496 Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens
8. ASTM C-882 Standard Test Method for Bond Strength of Epoxy Systems Used with Concrete by Slant Shear
9. ASTM C-1090 Standard Test Method for Measuring Changes in Height of Cylindrical Specimens from Hydraulic-Cement Grout
10. ASTM C-1202 (AASHTO T 277 Equivalent) Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration
11. ASTM F-2551 Standard Practices for Installing a Protective Cement Liner System in Sanitary Sewer Manholes

#### **1.3 Infiltration Elimination**

- A) Leak Plugging and Patching Material
1. A quick setting hydraulic cement compound shall be used to stop running water or seepage leaks in masonry and concrete. The plug formulation shall be non-shrinking, nonmetallic, and noncorrosive.
  2. A fast setting, ready-to-use, cement based concrete and masonry patching compound formulated specifically for underwater use shall be used to fill voids and overhangs. After initial set, the patch shall be shaved to conform to the contours of the surrounding surface. The patch shall be properly mixed and applied so as to quickly develop a high strength and a tenacious bond.



B) Base Layer

1. The base layer shall be designed to provide a thick base layer that fills mortar joints, cracks and voids in brick and masonry manholes. The base layer shall provide a sound substrate onto which the structural liner is spun cast at a specified thickness of ½”-2” to reinforce and seal the existing structure.

C) Chemical Grout

1. All chemical sealing materials needed for severe leaks in the performance of work specified shall conform to ASTM F2304.

**1.4 Inflow Control**

- A) Frame-Chimney Seal: See Attachment E for specification.

**1.5 Structural Cementitious Liner**

A) Structural Liner

1. The material shall be an ultrahigh strength, high build, corrosion resistant mortar, based on silica modified Portland cement.
2. The hardened binder shall be dense and highly impermeable.
3. The liner shall have the following physical properties:

Unit Weight	125 pcf
Set Time at 70 degrees F (ASTM C-403)	
Initial Set	min. 120 minutes
Final Set	min. 240 minutes
Modulus of Elasticity (ASTM C-469)	
28 days	min. 1,500,000 psi
Flexural Strength (ASTM C-293)	
24 hours	min. 400 psi
28 days	>1250 psi
Compressive Strength (ASTM C-109)	
24 hours	3,000 psi
28 days	10,000 psi
Split Tensile Strength (ASTM C-496)	>700 psi
Shear Bond (ASTM C-882)	>1,500 psi
Shrinkage (ASTM C-157), RH 90%	None
Shrinkage (ASTM C-1090), RH 90%	None



Chloride Permeability (ASTM C-1202)

<550 Coulombs

B) Structural Liner with a Microbial Induced Corrosion (MIC) prevention additive

1. The material shall be unchanged in physical properties by adding the additive.
2. The Additive shall be a liquid admixture for concrete and mortars for the prevention of MIC common to concrete pipe, manholes and similar structures in municipal sewer environments. The additive shall permeate the structural liner mortar during the mixing phase and molecularly bond to the cement particles to create an environment incompatible to the growth of harmful bacteria.
  - i. The additive shall become an integrated component of the hardened binder. It shall not wash off, delaminate or lose its effectiveness from wear.

C) Mortar

1. The mortar shall be a 100% high grade Calcium Aluminate (CA) cement mortar with fusible fine aggregate. The mortar shall be designed to protect against aggressive elements common to most sanitary sewer systems by retarding the growth of Thiobacillus bacteria. The mortar shall harden quickly without any special curing and be considered mature after 24 hours. The hardened mortar shall be purposely developed to be resistant to aggressive soil conditions, such as low pH and high sulfates, and dilute sulfuric acid resulting from bacteriological oxidation of hydrogen sulfide common to sanitary sewers. The raw materials shall contain no calcium sulfates, tri-calcium aluminates or agents aggressive to reinforcing steel. The mortar shall be designed to resist biogenic corrosion in atmospheres in which Portland cements may reach pH levels as low as 2.
2. The mortar shall have the following physical properties:

Unit Weight	135 pcf
Working Time	40-60 minutes @ 70°F
Final Set Time	90-120 minutes @70°F
Compressive Strength (ASTM C-109)	
24 hours	5,000 psi
28 days	9,000 psi
Flexural Strength (ASTM C-293)	750 psi
Tensile Strength (ASTM C-496)	600 psi
Abrasion Resistance	2% @ 1000 cycles
Freeze/thaw Resistance	No visual damage 300 cycles
Sulfate Resistance	No attack 90 days
Biogenic Sulfide Resistance	Excellent at pH 2 and higher
Shear Bond (ASTM C-882)	2,000 psi
Shrinkage (ASTM C-596)	None



D) Design Criteria

1. The Bidder will apply the appropriate thickness of the cementitious liner based upon the depth of the manhole and the manufacturer's specifications.

E) Cementitious Structural Liner Installation

1. Design Strength/Thickness Ratio: Many factors impact optimum design thickness and these include: the condition of the existing manhole, its material composition, depth, degree of ovality, groundwater pressure, and traffic loads. The design engineer shall determine the most appropriate engineering parameters in each case. Check the manufacturer's design guide for detail.
2. Preparation: The manhole base shall be covered to prevent washed debris from entering the sewer line. The interior surface shall be washed with a high-pressure water blast sufficient to remove all laitance and loose material and flush debris downward to the covered base. Prior to installation, any active leaks shall be plugged with plugging material according to the manufacture's recommendations, and voids and overhangs filled with patching material. The surface should be rinsed with an additive to kill bacteria. Precautions must be taken to prevent additive runoff from entering the sewer treatment plant.
3. Mixing
  - i. Mix as specified by manufacture.
  - ii. Admixture: The liner material is mixed with just the addition of clean water and the admixture, in the prescribed amounts for Microbiologically Induced Corrosion (MIC) protection. No other additives shall be used at the site without prior approval.
4. Clean up
  - i. Upon completion, the base covering shall be removed and any debris disposed of properly. Additional material shall be hand applied to bench surfaces at a thickness of 3" tapering from the wall to the edge of the channel. Flows at bottom channels may remain active during the procedure.



5. Hot or Cold Weather Application
  - i. Application shall be in accordance with manufacturer's specification.
6. Curing/Finishing
  - i. Curing/Finishing shall be in accordance with manufacturer's specification.

#### **1.6 Submittals**

- A) The Bidder may be required to submit the following items to the OWNER at the sole discretion of the OWNER.
  1. Reference submittals
    - i. Contractor certification
    - ii. Material certification
  2. Product data
    - i. Patching and plugging material
    - ii. Cementitious lining material
    - iii. Cementitious lining with admixture

#### **1.7 Quality Assurance and Acceptance**

- A) Two test cubes of the mortar material shall be taken randomly as directed by the Owner at the bidder's expense to verify strengths. Thickness can be verified with a wet gauge at any random point of the new interior surface. Any areas found to be thinner than the minimum design specified thickness shall immediately receive additional material. Visual inspection should verify a leak-free, uniform appearance.

**END OF SECTION**



**ATTACHMENT D  
BID TALLY SHEET**

Bid Item	Proposed Liner Thickness	Unit	Unit Cost	Quantity	Total Cost
8" CIPP		FT		15,954.3	
12" CIPP		FT		821.2	
15" CIPP		FT		652.5	

Bid Item	Unit	Unit Cost	Quantity	Total Cost
Lateral Reinstatements	Each		262.0	

Bid Item	Liner Type	Unit	Unit Cost	Quantity	Total Cost
Manhole Rehab		FT		428.8	

Total Project Cost: \$ \_\_\_\_\_

**\*\*Quantities listed are approximate and are assumed solely for the comparison of bids. Compensation will be based upon the unit price and actual quantities.\*\***

**\*\*\*THIS COMPLETED PAGE MUST BE INCLUDED WITH YOUR BID SUBMITTAL\*\*\***



**ATTACHMENT E**  
**QUALIFICATIONS & REFERENCES**  
**(this completed page must be included with your bid submittal)**

The bidder must have the capability and capacity in all respects to fully satisfy all of the contractual requirements. To that end, please provide the following information:

1. **YEARS IN BUSINESS:** Indicate the length of time you have been in business providing this type of construction service.

\_\_\_\_\_ years \_\_\_\_\_ months.

2. **REFERENCES:** Indicate below, at a minimum, three (3) recent references for whom you have provided this type of construction service. Include the date service was furnished and the name and address of the person the OWNER has your permission to contact.

<b>Date Service Provided</b>	<b>Contact Person and Phone Number</b>
_____	_____
_____	_____
_____	_____
_____	_____



**ATTACHMENT F**

**SUBMITTAL SUMMARY**

**CIPP Submittals**

*Performance Work Statement*

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• CIPP Manufacturer &amp; Info</li> <li>• CIPP 50 yr Design Life</li> <li>• Chemical Resistance</li> <li>• Structurally Sound</li> <li>• Installation Plan/Schedule (Detailed Below)</li> <li>• Active Service Identification Plan</li> <li>• Bidder Experience</li> <li>• References</li> </ul> | <ul style="list-style-type: none"> <li>• Manufacturer Certification to Install</li> <li>• Worker Experience Profiles</li> <li>• PE Design Calculations</li> <li>• CIPP Manufacturer Technology Data</li> <li>• Equipment Requirements</li> <li>• Recommended Manufacturer Repair Methods</li> <li>• Site Visit</li> <li>• Procedure for Removal of Blockage</li> </ul> |
|---|--|

*Installation Plan*

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• Prep Work</li> <li>• Cleaning</li> <li>• Pre-TV Inspection</li> <li>• Bypass Pumping</li> <li>• Traffic Control</li> <li>• Installation Procedure</li> </ul> | <ul style="list-style-type: none"> <li>• Cure Method</li> <li>• Service Reconnection</li> <li>• Quality Control</li> <li>• Final CCTV Inspection</li> <li>• Warranty Information</li> </ul> |
|---|---|

*Product Submittals*

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• Fabric Tube Manufacturer &amp; Info</li> <li>• Flexible Membrane Material &amp; Info</li> <li>• Raw Resin Data</li> <li>• CIPP Storage Info and Bidder Compliance</li> </ul> | <ul style="list-style-type: none"> <li>• SDS Sheets</li> <li>• Wet Out Procedure</li> <li>• Manufacturer Recommended Cure Method</li> </ul> |
|---|---|

*Quality Control Plan*

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• List of QC methods</li> <li>• Worker Responsibilities</li> <li>• Product Sampling/Testing Methods</li> </ul> | <ul style="list-style-type: none"> <li>• Product Performance Control Methods</li> <li>• QC Inspection Forms from Manufacturer</li> </ul> |
|---|--|

*Materials*

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>• Fabric Tube ASTM Standards</li> <li>• Felt Manufacturer Nominal Void Volume</li> <li>• Resin ASTM Standards</li> <li>• Resin to tube Ratio from Manufacturer</li> <li>• Bidder Design Value for Min. Physical Properties</li> </ul> | <ul style="list-style-type: none"> <li>• Material Test Results Conforming to Design Specs</li> <li>• Chemical Resistance Certification from Manufacturer</li> </ul> |
|--|---|



**Manhole Lining Submittals**

*Performance Work Statement*

- Installation Plan
- Installation Schedule
- Material Certification
- Contractor Certification
- Site Visit

*Product Submittals*

- Frame Seal Test Report
- Frame Seal Certification (Affidavit of Compliance)
- Manhole Patching/Plugging Material
- Manhole Cementitious Lining Material
- Manhole Cementitious Lining with Admixture Material



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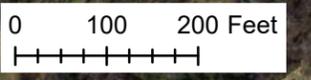
18 Government Center Ln, PO Box 859, Verona, VA 24482    Phone: (540) 245-5670    [AugustaWater.com](http://AugustaWater.com)

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Verona GM Map 1  
GM Rehab  
06/28/2023



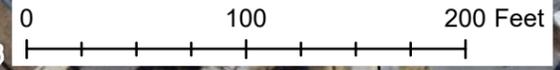
- Manholes
- GMs for Rehab
- Gravity Mains



Verona GM Map 2  
GM Rehab  
06/28/2023

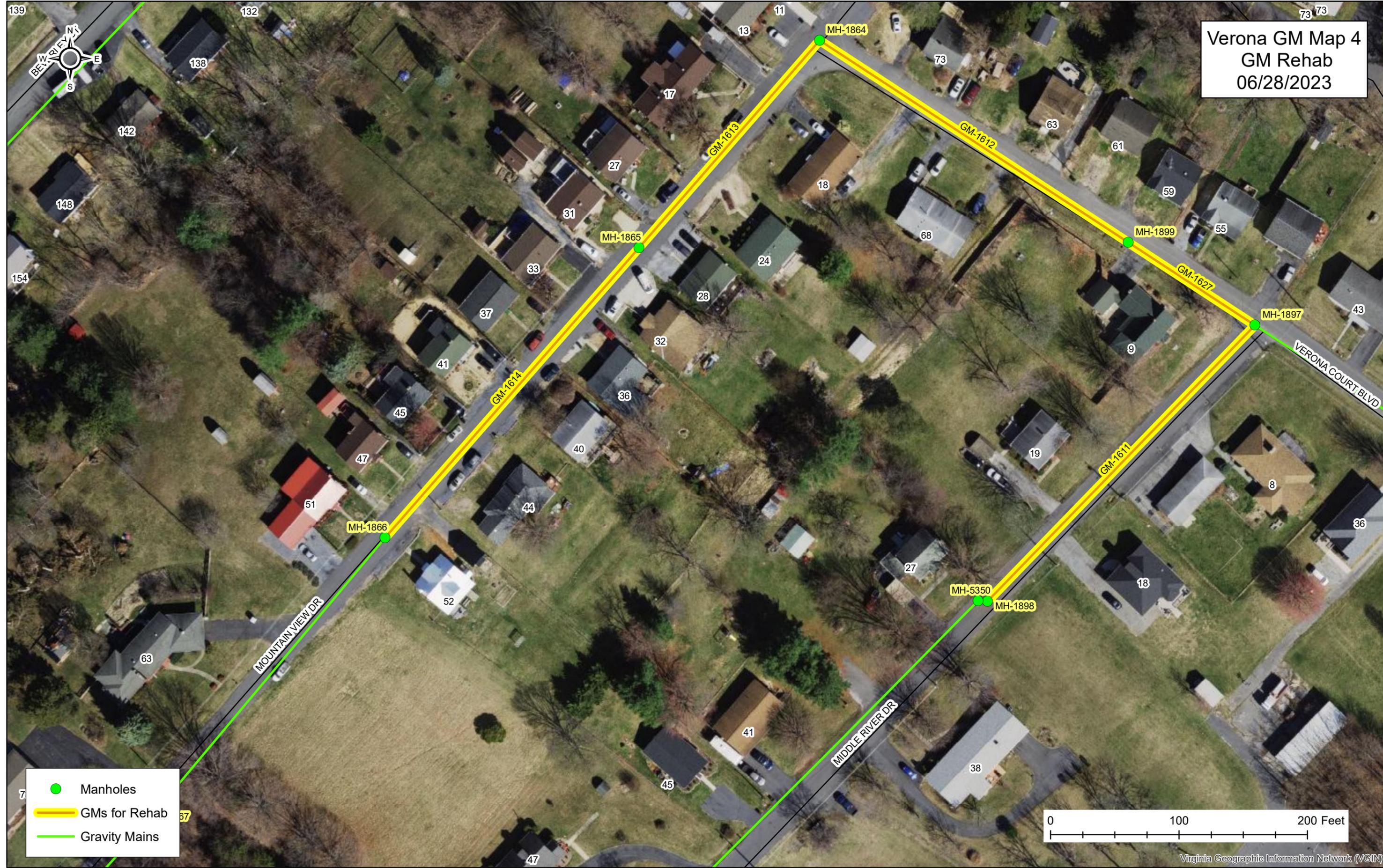


- Manholes
- GMs for Rehab
- Gravity Mains

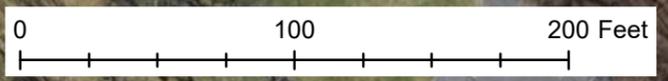


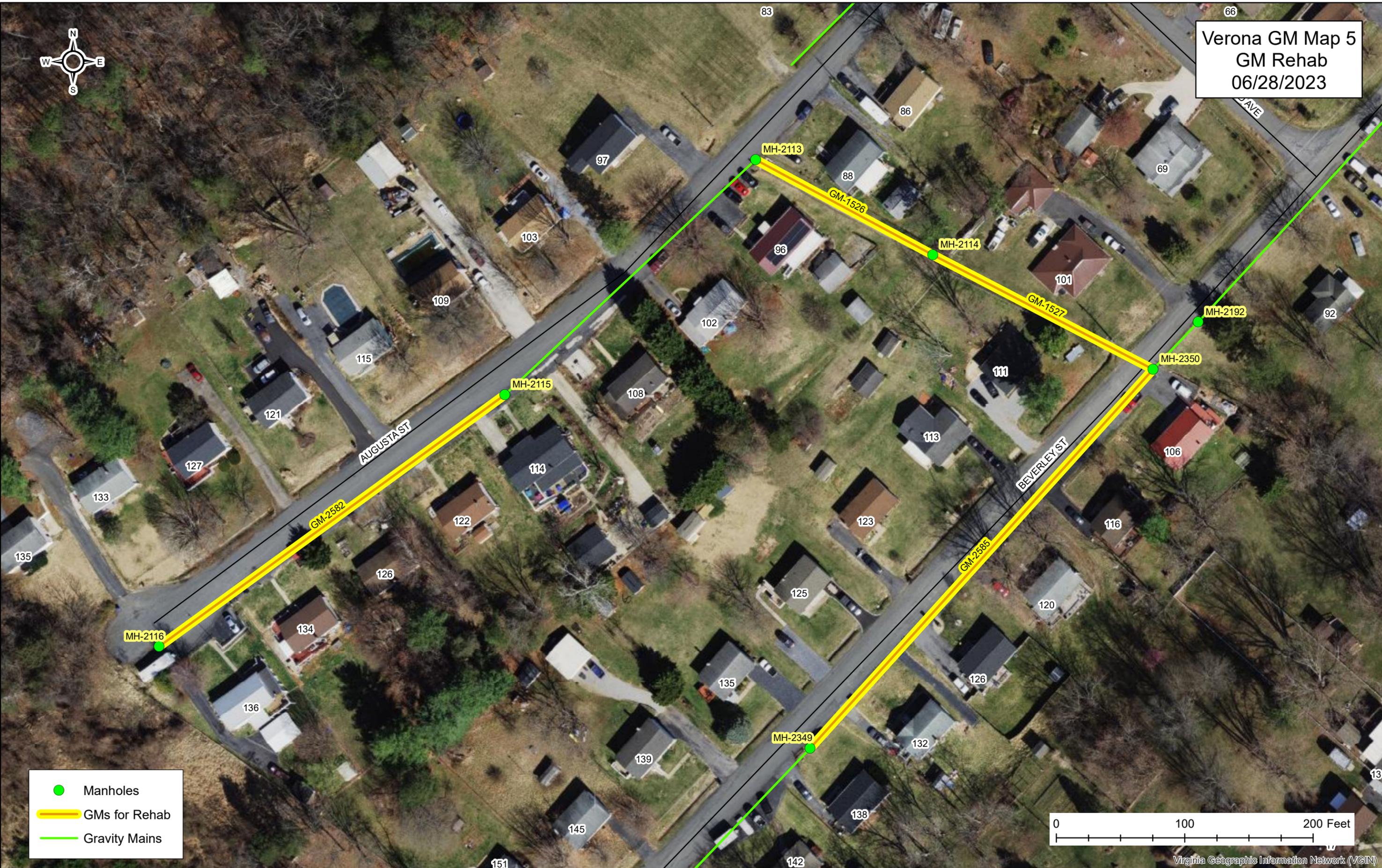


Verona GM Map 4  
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06/28/2023

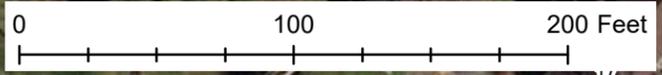


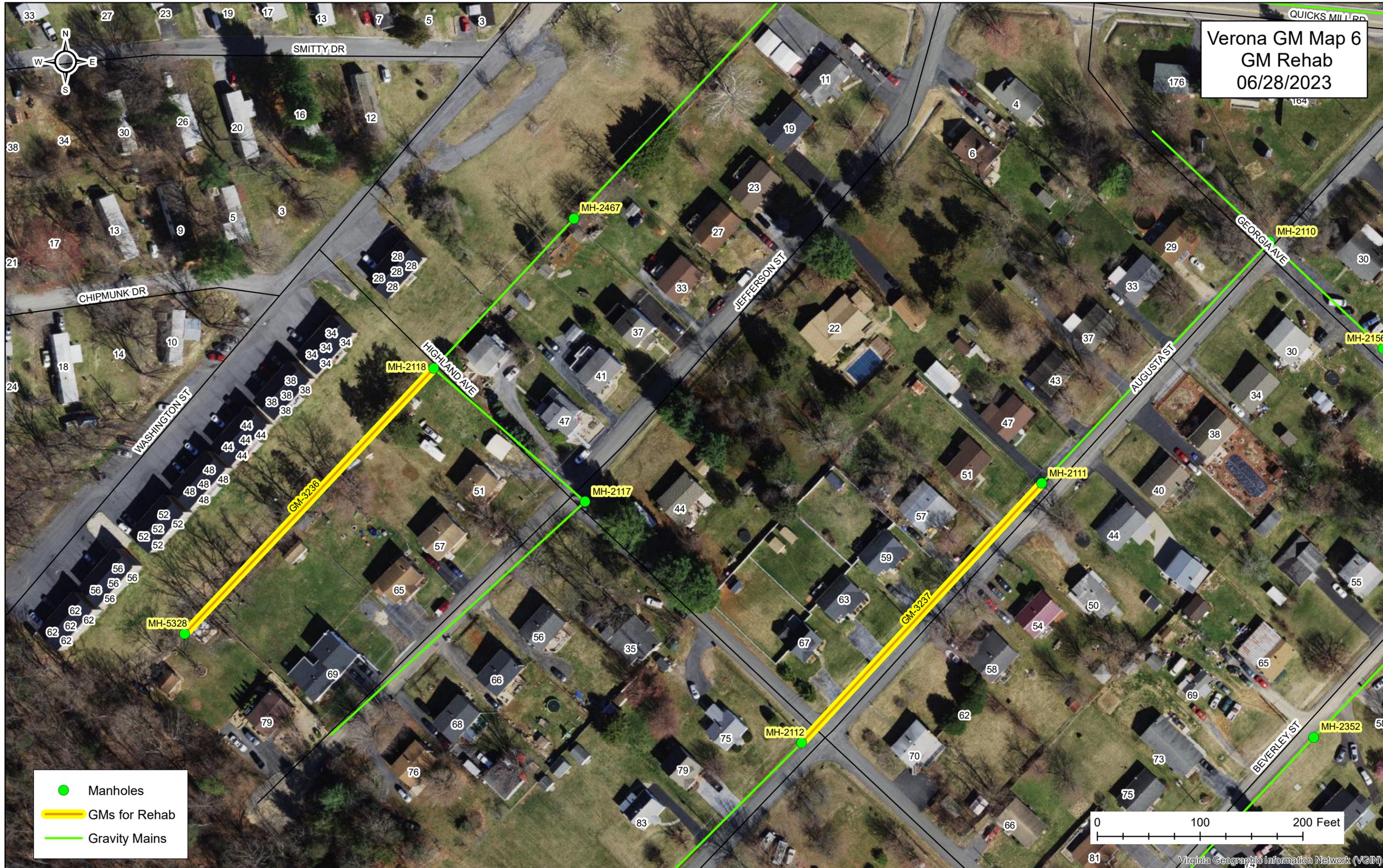
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- ▬ GMs for Rehab
- ▬ Gravity Mains



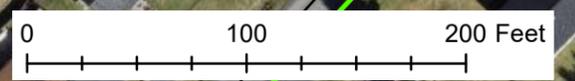


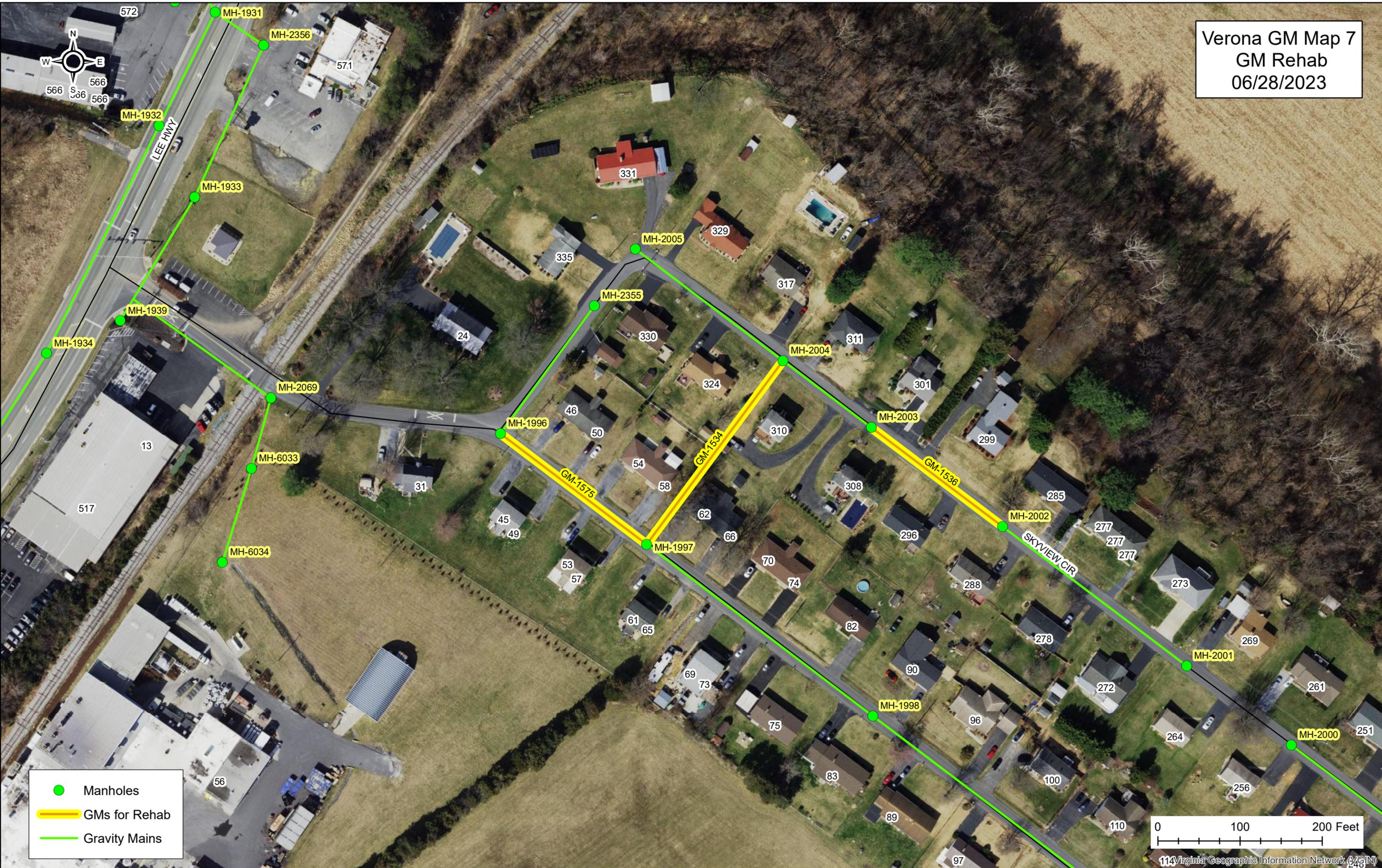
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- ▬ GMs for Rehab
- ▬ Gravity Mains





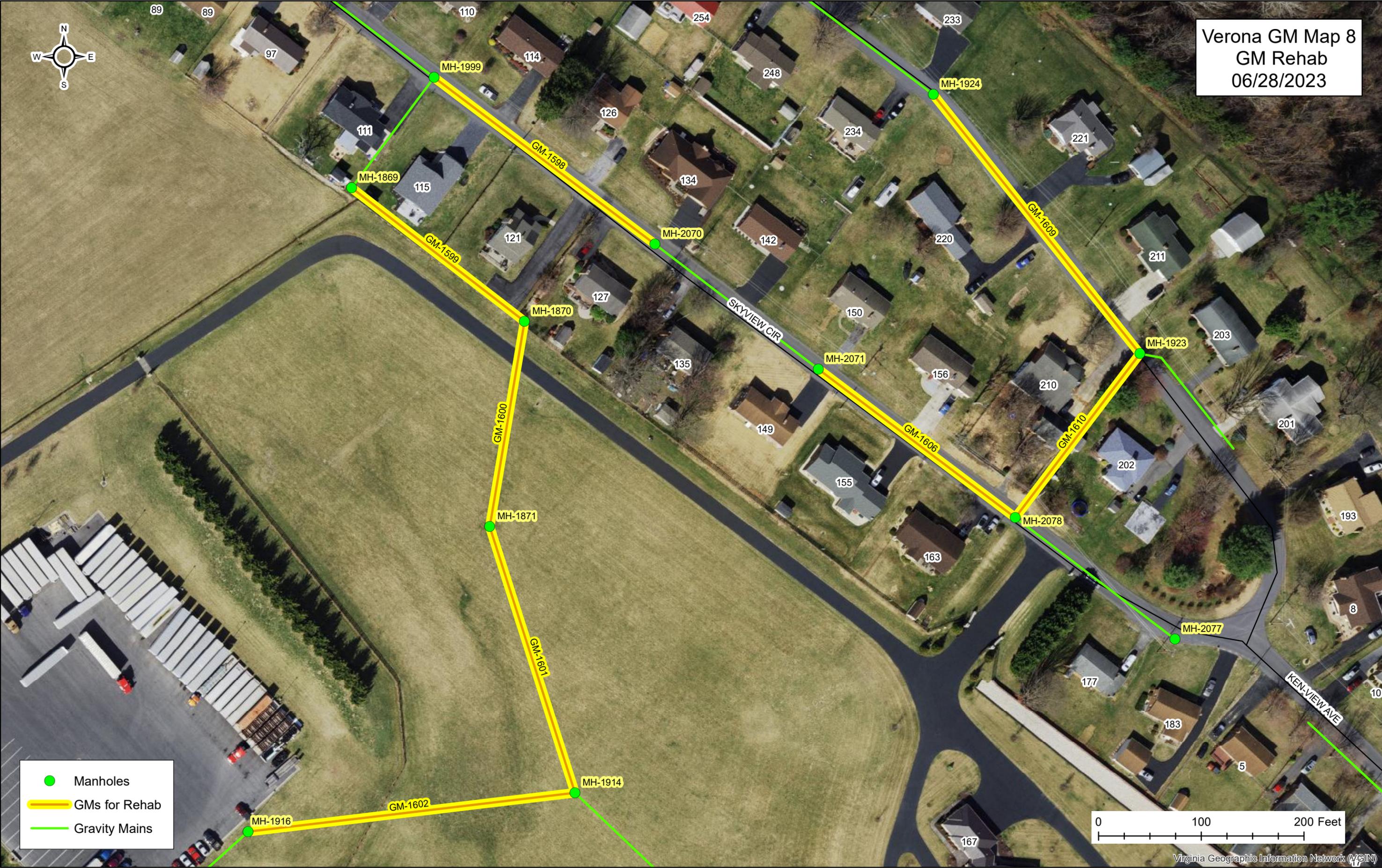
- Manholes
- ▬ GMs for Rehab
- ▬ Gravity Mains



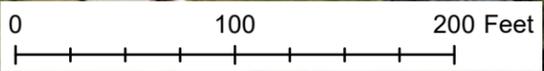


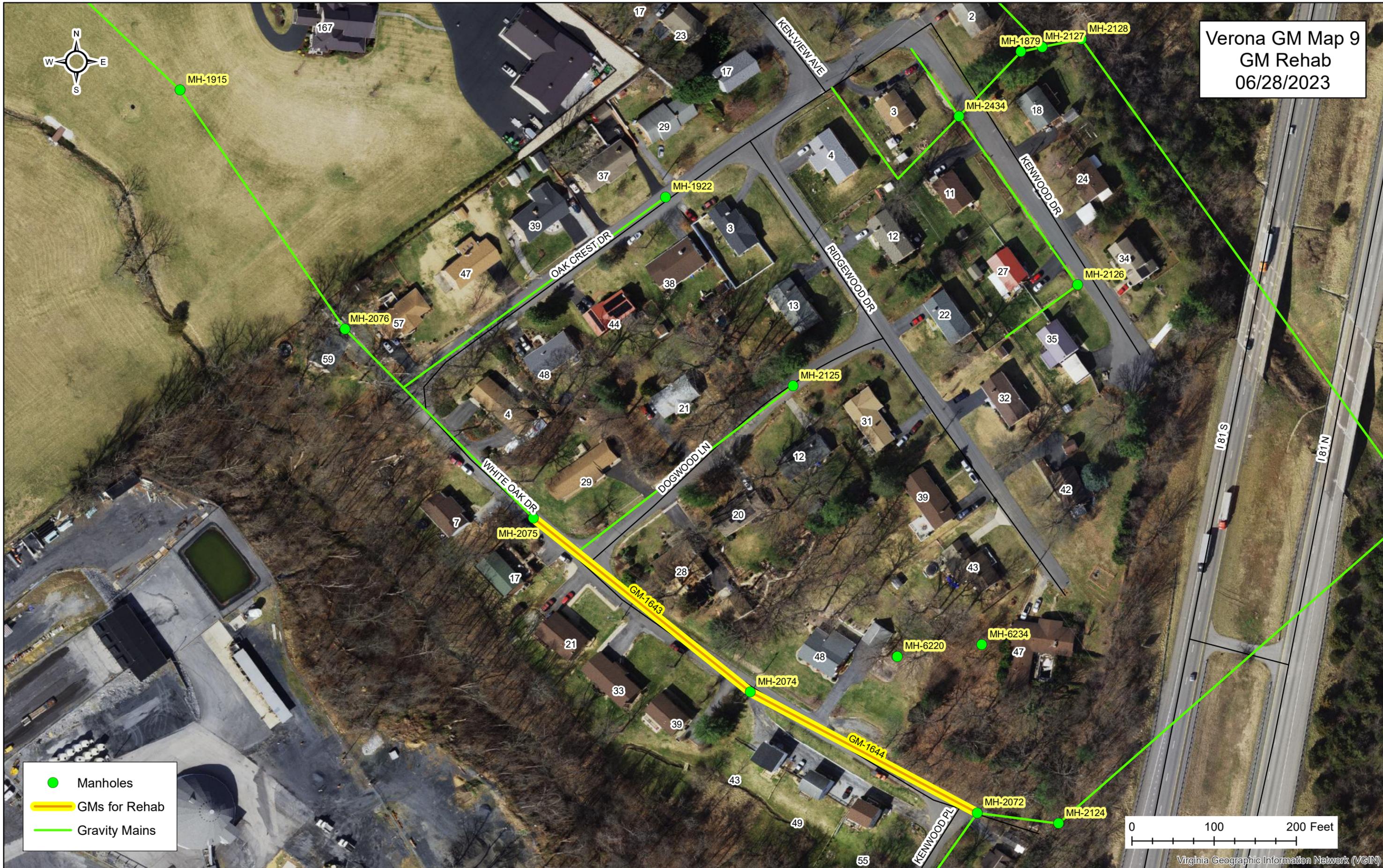
- Manholes
- ▬ GMs for Rehab
- ▬ Gravity Mains

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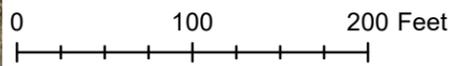


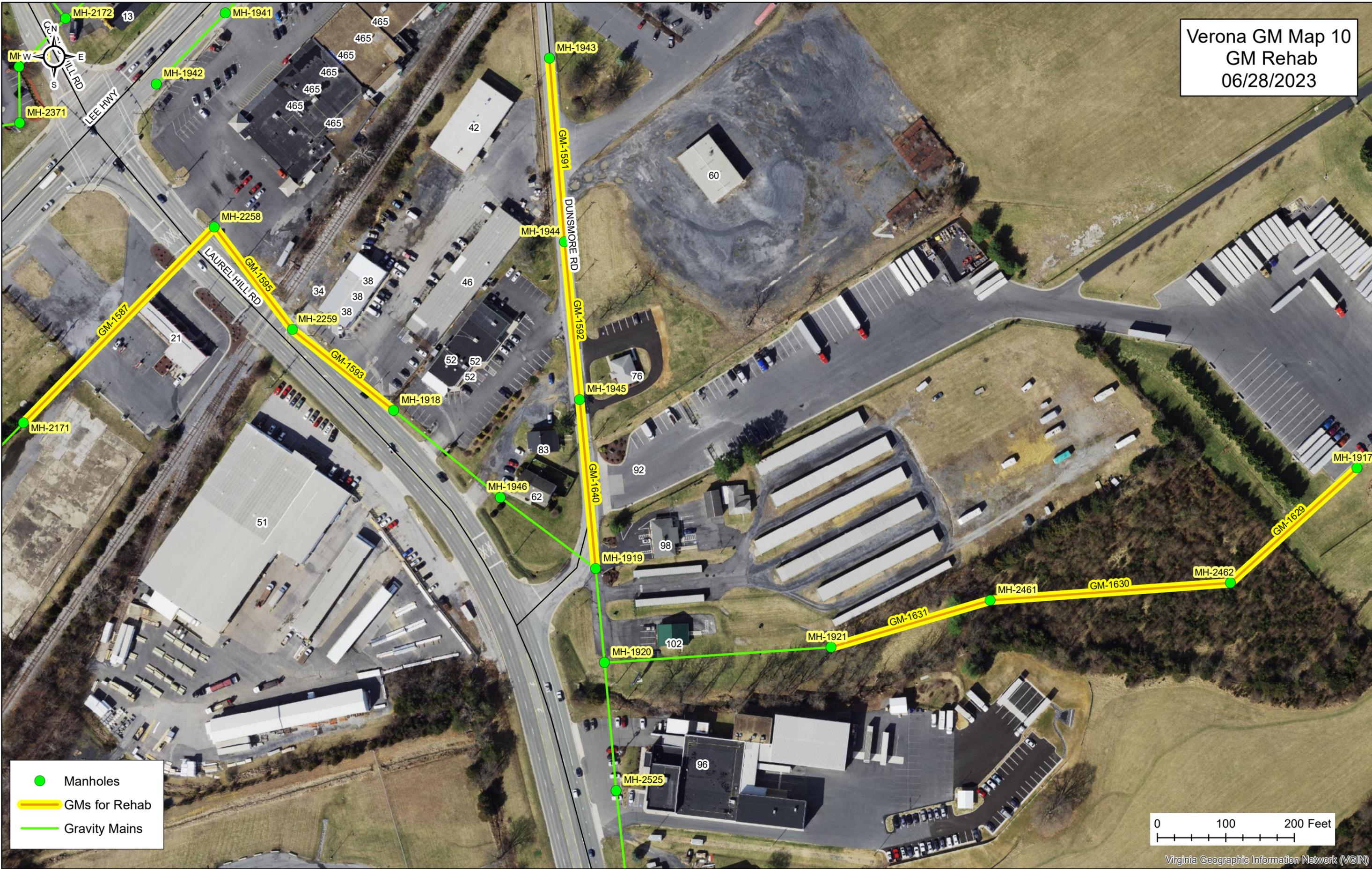
- Manholes
- ▬ GMs for Rehab
- ▬ Gravity Mains





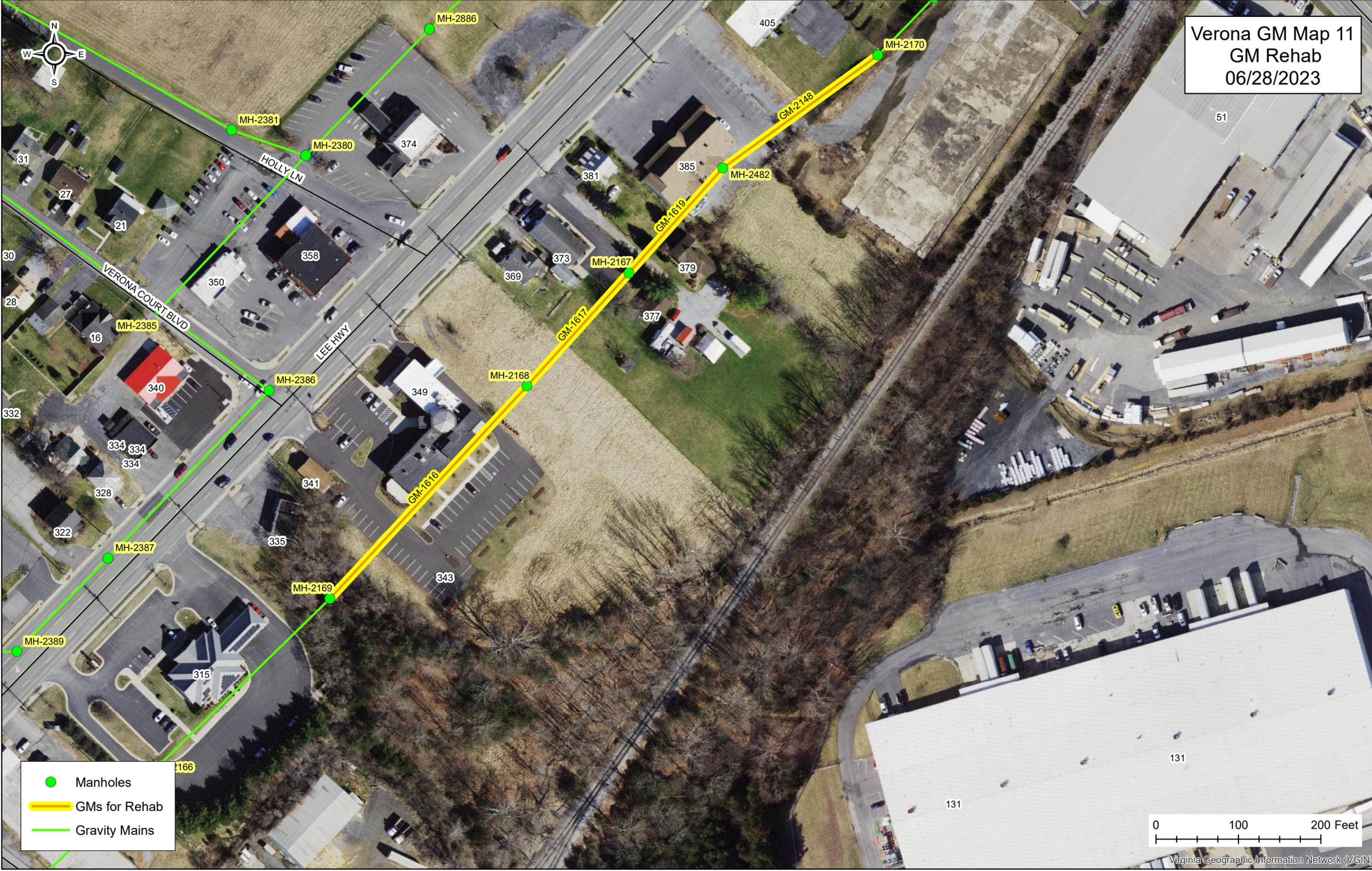
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- ▬ GMs for Rehab
- ▬ Gravity Mains



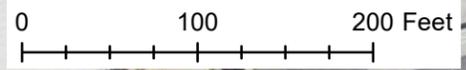


- Manholes
- GMs for Rehab
- Gravity Mains

0 100 200 Feet



- Manholes
- GMs for Rehab
- Gravity Mains







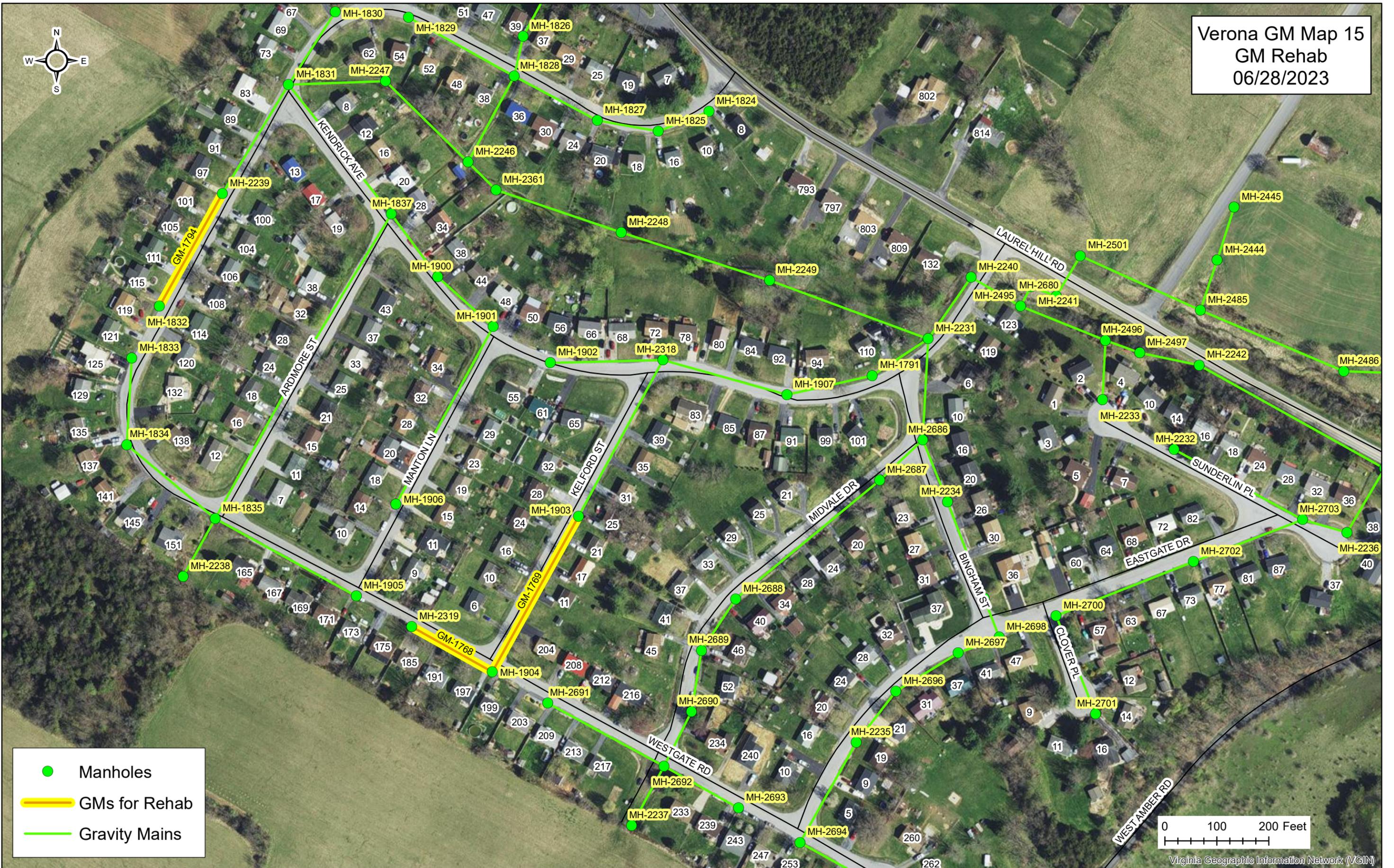
Verona GM Map 14  
GM Rehab  
06/28/2023



- Manholes
- ▬ GMs for Rehab
- ▬ Gravity Mains

0 100 200 Feet

Verona GM Map 15  
GM Rehab  
06/28/2023



- Manholes
- GMs for Rehab
- Gravity Mains

0 100 200 Feet

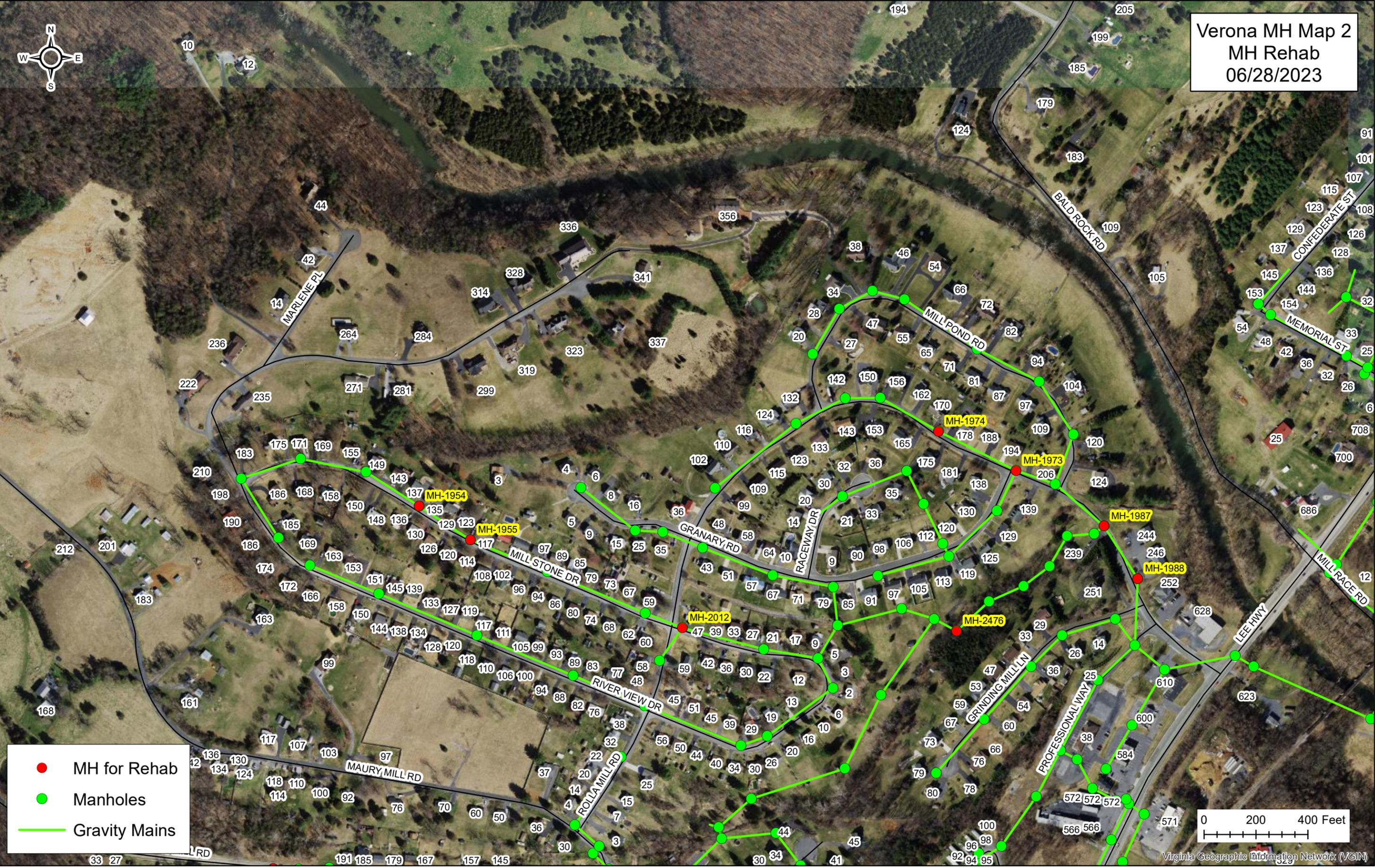
Verona MH Map 1  
MH Rehab  
06/28/2023



- MH for Rehab
- Manholes
- Gravity Mains

0 200 400 Feet

Verona MH Map 2  
MH Rehab  
06/28/2023



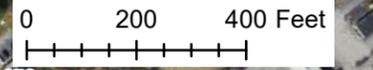
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- Manholes
- Gravity Mains

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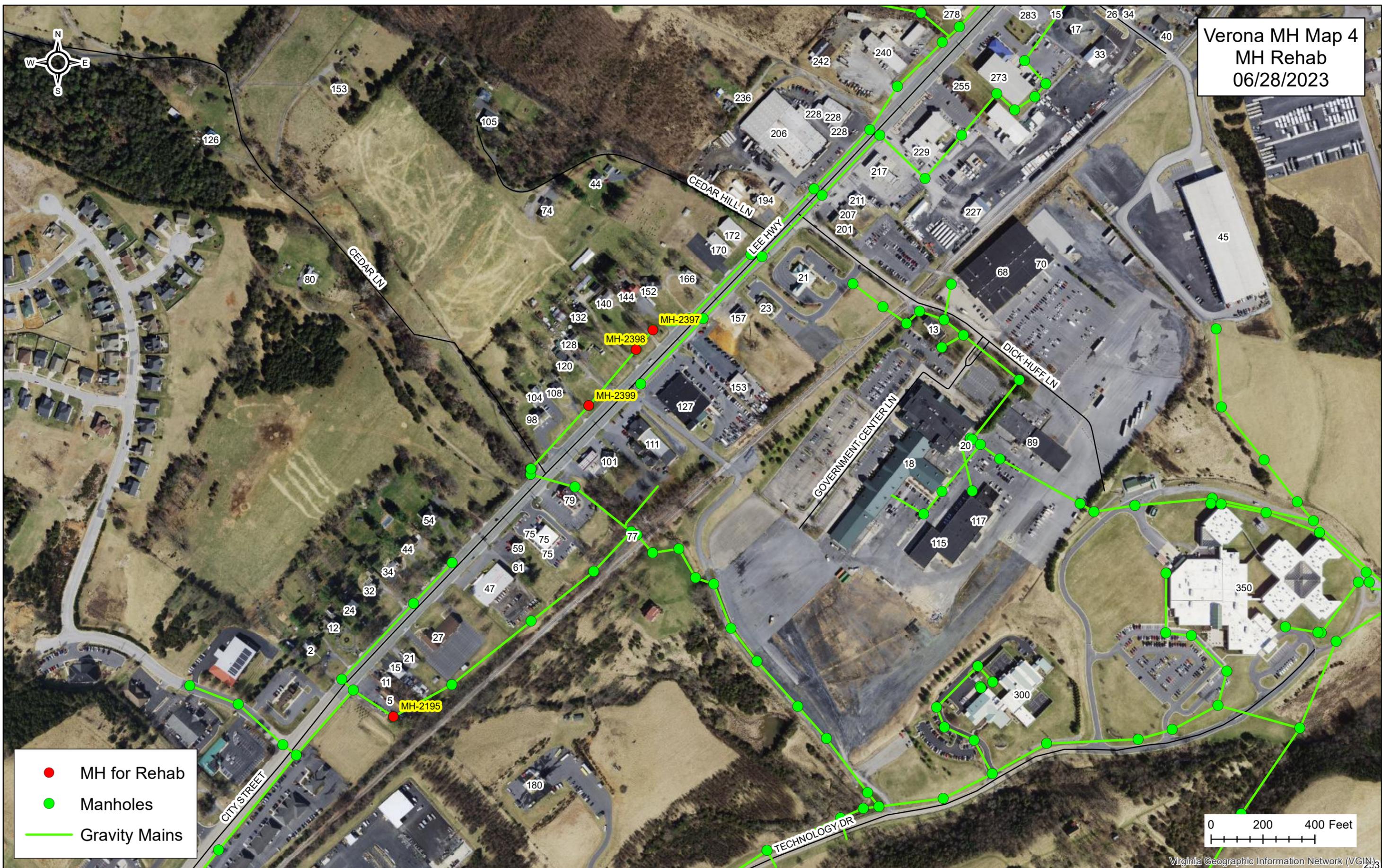
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06/28/2023



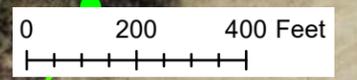
- MH for Rehab
- Manholes
- Gravity Mains



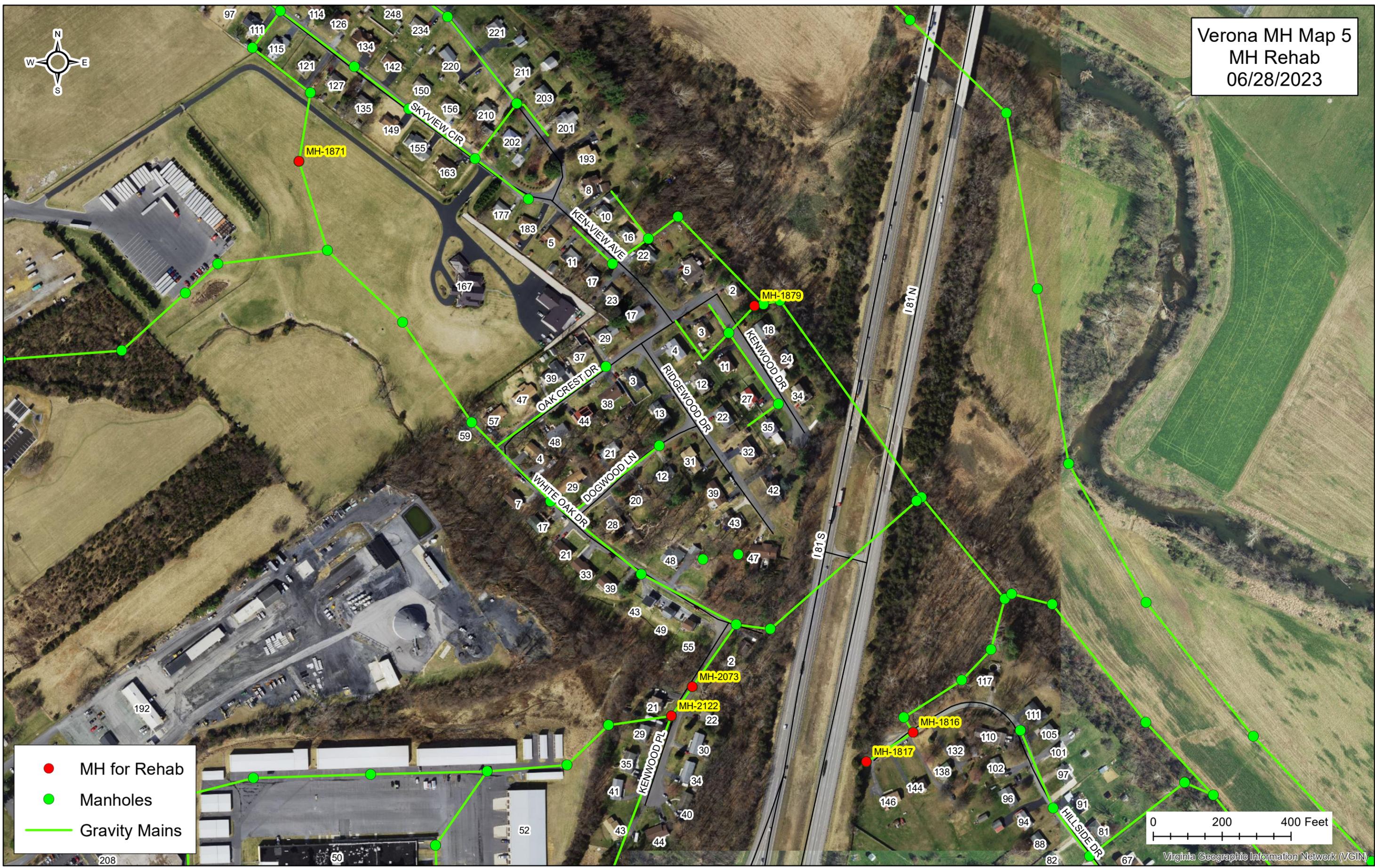
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MH Rehab  
06/28/2023



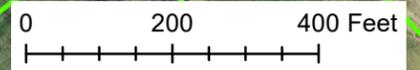
- MH for Rehab
- Manholes
- Gravity Mains



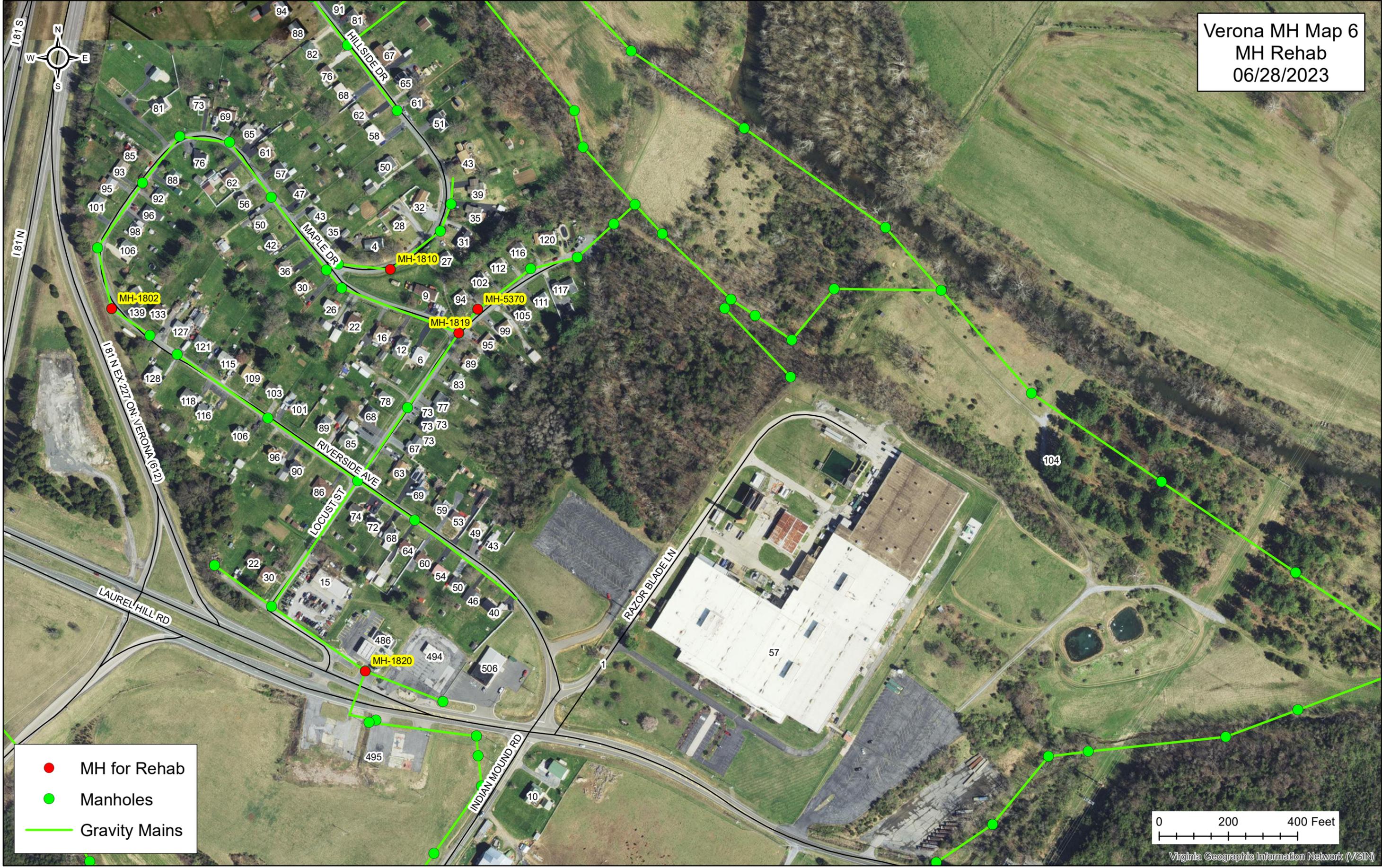
Verona MH Map 5  
MH Rehab  
06/28/2023



- MH for Rehab
- Manholes
- Gravity Mains



Verona MH Map 6  
MH Rehab  
06/28/2023



- MH for Rehab
- Manholes
- Gravity Mains

0 200 400 Feet

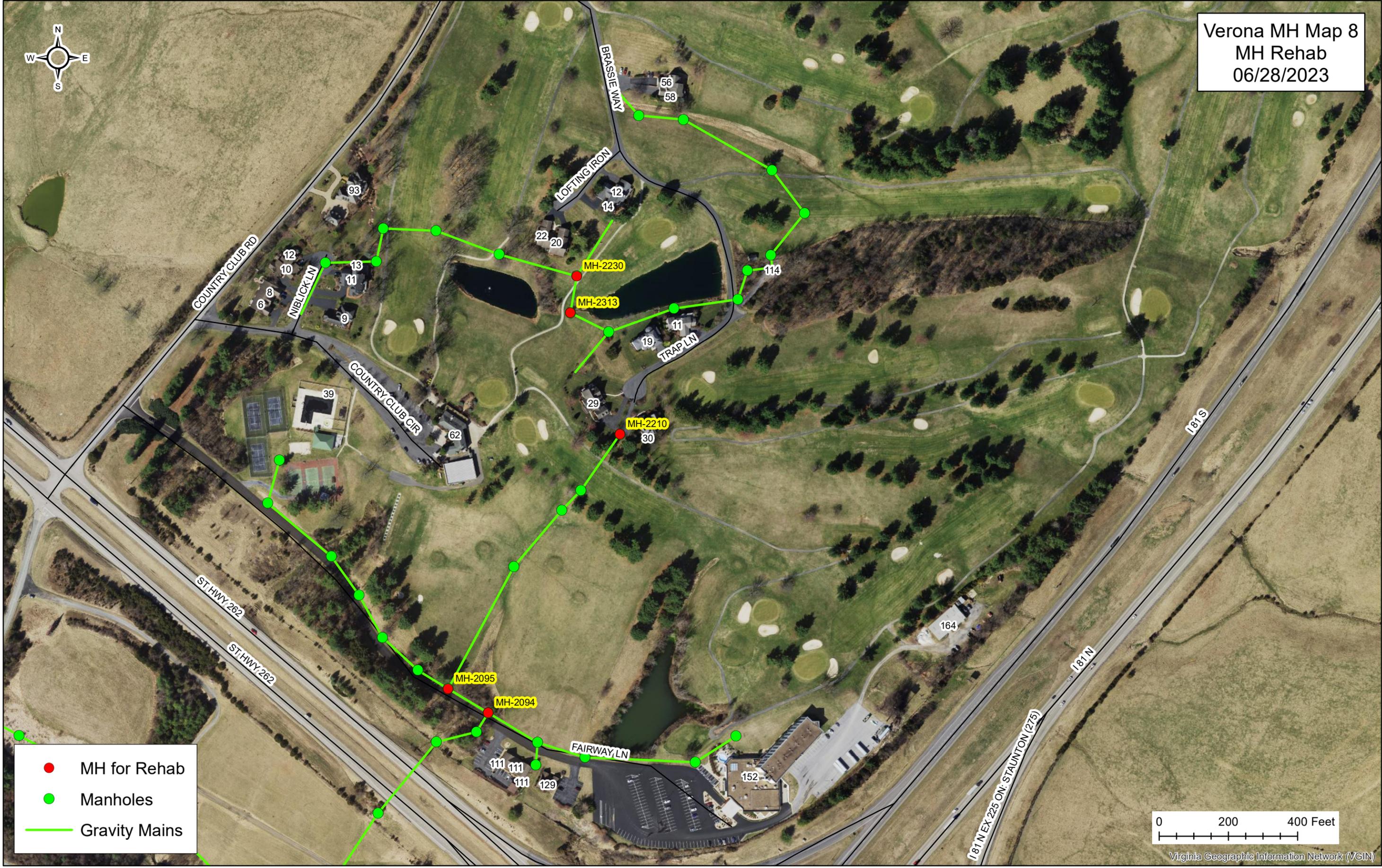
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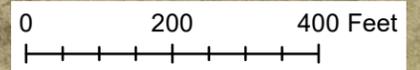
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- Manholes
- Gravity Mains

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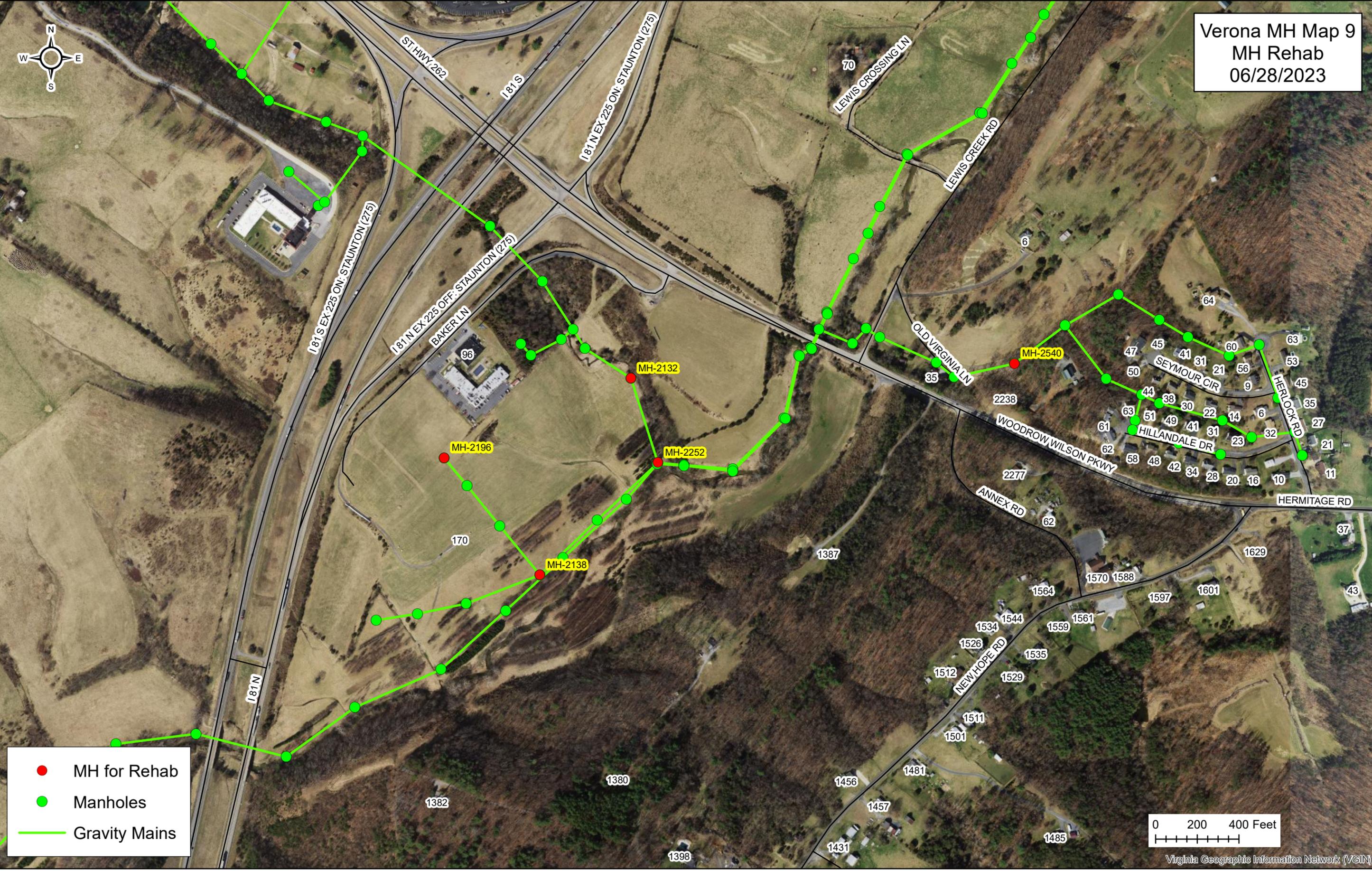
Verona MH Map 8  
MH Rehab  
06/28/2023



- MH for Rehab
- Manholes
- Gravity Mains



Verona MH Map 9  
MH Rehab  
06/28/2023



- MH for Rehab
- Manholes
- Gravity Mains

