



REQUEST FOR PROPOSALS
Cass Road Sanitary Sewer Rehabilitation
Charter Township of Garfield, Grand Traverse County

Proposals Due:

9:00 AM Wednesday, October 7, 2026

Address Proposals to (Signed and Sealed: Mailed and/or Delivered):

Sealed Bids will be received by the Charter Township of Garfield at the Township Offices located at 3848 Veterans Drive, Traverse City, MI 49684, until 9:00 AM local time on October 7, 2026. Envelopes shall be clearly marked "*Cass Road Sanitary Sewer Rehabilitation*" and at such time will be publicly opened and read aloud.

Attention: Mr. Chris Barsheff, Township Manager
Charter Township of Garfield
3848 Veterans Drive, Traverse City, MI 49684

Address Proposals Questions to:

Engineer: Jennifer Graham, P.E.
Gourdie-Fraser, Inc.
1820 Oak Hollow Drive
Traverse City, MI 49686
Phone: 231-946-5874
Facsimile: 231-946-3703
Email: jennifer@gfa.tc

Scope of Services:

We have been asked by our client, the Charter Township of Garfield, to solicit this request to qualified contractors to perform rehabilitation of the existing sanitary sewer along Cass Road, north of South Airport Road. A portion of this sanitary sewer has recently experienced failures and temporary corrective repairs were implemented, however, the sewer is at risk of future failure due to the brittle nature of the material.

This proposal will include rehabilitation of the following sanitary sewer sections:

- Approximately 650 LF of 12" vitrified clay (VC) by method of cured in place pipe (CIPP) technology, including repair and reinstatement of existing service laterals.
- Approximately 400 LF of 10" truss pipe by method of cured in place pipe (CIPP) technology, including repair and reinstatement of existing service laterals.
- Approximately 50 LF of 12" VC to be replaced with 14" HDPE DR 17 (IPS) by method of pneumatic pipe burst technology.

This portion of sanitary sewer that was installed in the 1970's and provides service to approximately 8 customers along Cass Road. The scope of work will include pipe rehabilitation and/or replacement, repair and reinstatement of sanitary sewer laterals (for CIPP sections), manhole repairs and rehabilitation, and restoration and cleanup required to complete the project as specified. See attached plans, specifications and televising documentation of existing conditions.



Requirements - General:

- Work must comply with all applicable laws, regulations and specifications as identified in this RFP and on the plans.
- Contractor is responsible for permitting, including bonding and insurance requirements for Grand Traverse County Road Commission (GTCRC) permitting.
- Due to high priority of this project and preference to have work completed as soon as feasible, two alternate completion dates are offered. Project shall be substantially complete (ready for its' intended use) by December 15, 2026 or May 1, 2027. Final completion shall be within 10 days thereafter.
 - o This project is a priority for the Township and there is a preference to have work completed as soon as feasible. In addition to qualifications and bid price submission, the Township will take into consideration availability as part of their bid evaluation process.
- All work shall be coordinated with Township and their Engineer (GFA).
- Prospective bidders are strongly encouraged to conduct a site visit prior to bidding.
- Contractor shall demonstrate similar past work experience and provide three (3) references along with bid submittal. References to include scope of work completed, date and contact person.

Terms of Agreement:

General:

- To hold bid open for 30 consecutive calendar days from the bid due date
- To enter into and execute a contract with the Charter Township of Garfield.
- One (1) year warranty, from date of substantial completion against material defect and/or workmanship.

Insurance:

- Contractor will have Worker's Compensation Insurance in limits required by state law and Comprehensive General Liability Insurance coverage in force for all of its operations under this contract.

Bonds:

- The Contractor shall include in the proposal price the cost to provide the following:
 - Performance and Payment Bonds in the amount of 100% of the project
 - Maintenance and Guarantee Bond in the amount of 50% of the proposal amount, guaranteeing for a period of one (1) year from final acceptance of the project work
 - Letter of Surety, licensed to do business in the State of Michigan, stating ability to obtain a Performance Bond, and Labor and Material Bond for 100% of the project amount.

Shop Drawing Submittals:

- Provide one (1) pdf of material specification sheets and warranty information to Engineer. Do not proceed until written approval is received.
- Coordinate all work with the Engineer.

Services / materials to be Provided:

Contractor shall provide all equipment and materials as necessary to complete the work outlined below and as identified in the attached drawings and specifications.

They shall include, but are not limited to, the following not stated previously:

- Mobilization, demobilization, equipment, labor and materials to perform work.



- Contractor shall be responsible to obtain local permits including fees for Grand Traverse County Road Commission (GTCRC), Garfield Township Soil Erosion and Sedimentation Control Permit.
- Traffic Control subject to GTCRC and contractor is responsible for all coordination with the road commission including, but not limited to, traffic control plan, as applicable.
- Scope of work to include:
 - o Rehabilitation of existing 10" truss pipe and 12" VC pipe by method of CIPP technology and replacement of 12" VC pipe by method of pneumatic pipe bursting as indicated on plans, including repair of pipe penetrations as necessary to provide a complete, watertight sanitary sewer system.
 - o Existing sewer service laterals are located along portions of CIPP installation; work to include CIPP lining of all service lateral wyes and reinstatement.
 - o Removal and clearing of any obstructions such as solids and roots that prevent proper installation of CIPP.
 - o Manhole rehabilitation to include flow channel repair, cement and grout seal interior, chimney seal, raise manhole lid and interior waterproof liner as indicated on plans.
- Dewatering is not anticipated to be necessary to complete work as specified, in the event groundwater is encountered, contractor shall submit dewatering plan for review and approval, as applicable.
- Bypass pumping will be required, contractor responsible to provide bypass pumping plans including backup method (pump / haul) for review and approval by engineer and shall be implemented as coordinated with the Grand Traverse Department of Public Works.
- Contractor is responsible to provide temporary power supply as necessary to complete all work.
- Contractor responsible to clean sanitary sewer before and after completion of work to allow for televising of empty pipes to be completed by Owner. Contractor to provide 48 hour notice.
- Owner to provide pre and post televising inspection and records.
- Restoration and site cleanup (including site grading, seeding, and mulch) of any disturbed areas.

Township Services / materials to be Provided:

- EGLE Permit obtained by Owner – contractor responsible for all coordination and communication in compliance with permits.
- Material Testing and Inspection – 24 hour advance notice shall be provided
- Initial Televising efforts of sanitary sewer have been completed and utilized to determine extents of repairs necessary. All televising reports available as attachment to this proposal.
- Televising sanitary sewer after completion of CIPP and pipe bursting for records to be completed by owner. Contractor responsible to clean sanitary sewer prior to televising.
- Water supply is available on Sybrandt Road and is available for use as coordinated with Grand Traverse County Department of Public Works (GTC DPW). Contractor responsible to obtain permit including meter and backflow prevention device from DPW.



Contractors Proposal Form:

Bidders are instructed to submit bids for this project on a unit price basis and are tax inclusive. Proposal shall also include past projects / references.

All work shall be performed in compliance with specifications and drawings and terms identified in the RFP and applicable laws.

ALTERNATE NO. 1 – SUBSTANTIAL COMPLETION DECEMBER 1, 2026					
No.	Item	Est. Quantity	Unit	Unit Price	Item Cost
1	Mobilization, max 5%	1	LS		
2	Traffic Control	1	LS		
3	Bypass Pumping	1	LS		
4	12" Sanitary Sewer, Cured in Place Pipe (CIPP)	650	LF		
5	10" Sanitary Sewer, Cured in Place Pipe (CIPP)	400	LF		
6	Pipe Burst Ex. 12" Sanitary Sewer & Replace w/ 14" HDPE DR 17	50	LF		
7	Connect to Existing Sewer Manhole	2	EA		
8	Sanitary Lead, Repair & Reinstatement	8	EA		
9	Manhole Rehabilitation, Flow Channel Repair	5	EA		
10	Manhole Rehabilitation, Cement / Grout Seal, Interior	5	EA		
11	Manhole Rehabilitation, Liner, Interior	5	EA		
12	Manhole Rehabilitation, Chimney Seal, 48" Dia.	5	EA		
13	Manhole Rehabilitation, Lid Adjustment	1	EA		
14	Restoration and Clean-up	1	LS		
TOTAL BID ALTERNATE NO. 1					\$

ALTERNATE NO. 2 – SUBSTANTIAL COMPLETION MAY 1, 2027					
No.	Item	Est. Quantity	Unit	Unit Price	Item Cost
1	Mobilization, max 5%	1	LS		
2	Traffic Control	1	LS		
3	Bypass Pumping	1	LS		
4	12" Sanitary Sewer, Cured in Place Pipe (CIPP)	650	LF		
5	10" Sanitary Sewer, Cured in Place Pipe (CIPP)	400	LF		
6	Pipe Burst Ex. 12" Sanitary Sewer & Replace w/ 14" HDPE DR 17	50	LF		
7	Connect to Existing Sewer Manhole	2	EA		
8	Sanitary Lead, Repair & Reinstatement	8	EA		



9	Manhole Rehabilitation, Flow Channel Repair	5	EA		
10	Manhole Rehabilitation, Cement / Grout Seal, Interior	5	EA		
11	Manhole Rehabilitation, Liner, Interior	5	EA		
12	Manhole Rehabilitation, Chimney Seal, 48" Dia.	5	EA		
13	Manhole Rehabilitation, Lid Adjustment	1	EA		
14	Restoration and Clean-up	1	LS		
TOTAL BID ALTERNATE NO. 2					\$

Bidders Signature

Printed Name:

Business Name:

Address:

MI Contractor License No.:

Telephone:

Email:

The Township reserves the right to reject any or all bids in whole or in part, if it is determined that the best interest of the Township will be served by doing so. In determining an award, qualifications and availability of the bidder, conformity with the scope of services to be supplied, cost, quality, delivery terms and past performance on Township contracts will be considered.

PLANS PREPARED FOR: CHARTER TOWNSHIP OF GARFIELD CASS ROAD SANITARY SEWER REHABILITATION

CLIENT / AGENCY

CHARTER TOWNSHIP OF GARFIELD
3848 VETERANS DRIVE
TRAVERSE CITY, MI 49684
231.941.1620



ENGINEER

ENGINEERING
SURVEYING
TESTING & OPERATIONS

1820 Oak Hollow Drive
Traverse City, MI 49686

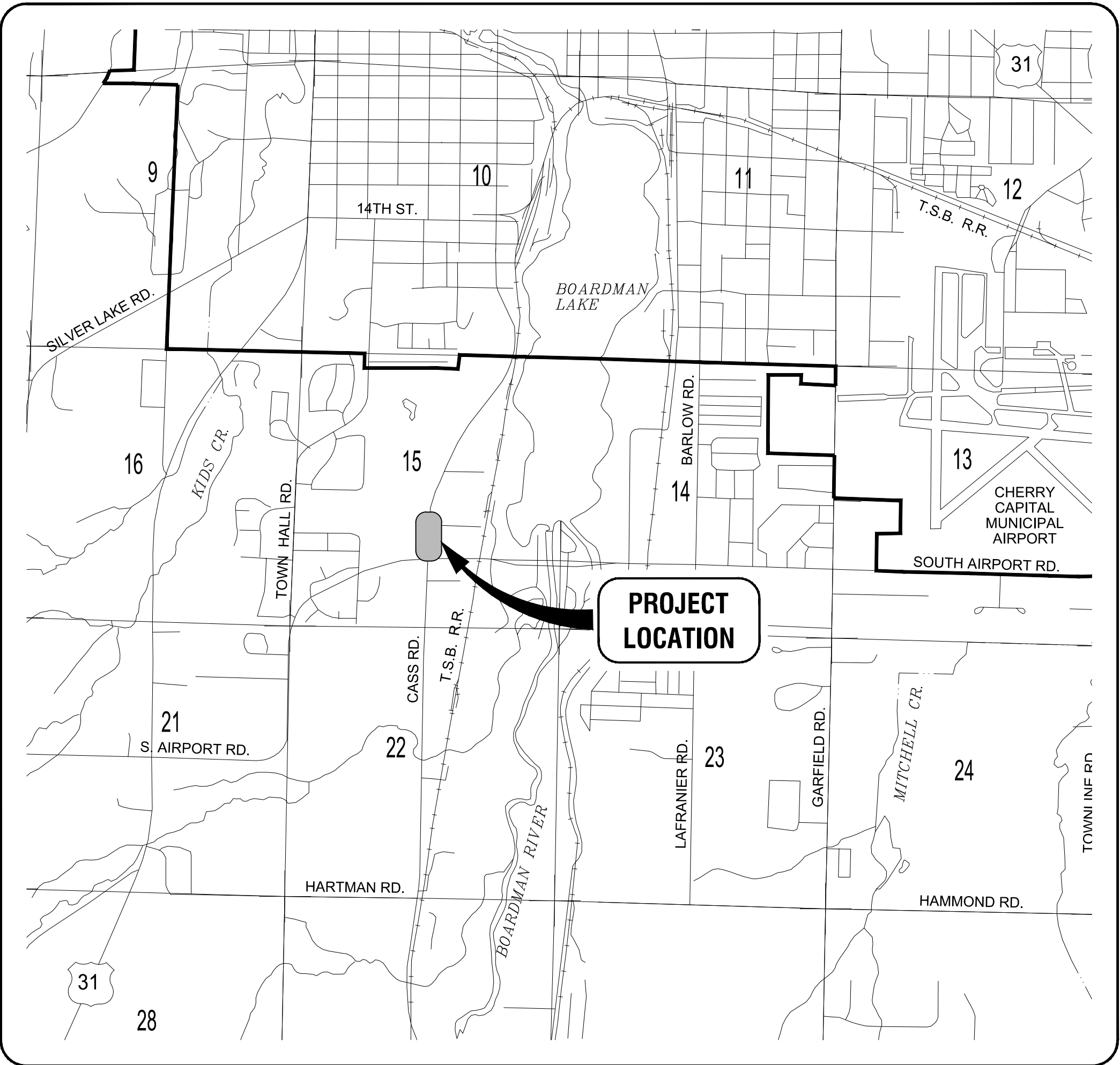


231.946.5874 (p)

<http://gfa.tc>

SHEET INDEX

- C1.1 COVER SHEET
- C1.2 GENERAL NOTES & DETAILS
- C2.1 PLAN AND PROFILE SHEET



LOCATION MAP

GARFIELD TOWNSHIP, GRAND TRAVERSE COUNTY, MICHIGAN
SCALE: 1" = 2,000'

PUBLIC AGENCIES AND UTILITIES

PUBLIC AGENCIES

CHARTER TOWNSHIP OF GARFIELD Telephone: 231.941.1620	GRAND TRAVERSE COUNTY DRAIN COMMISSION Telephone: 231.922.4807
GRAND TRAVERSE COUNTY D.P.W. Telephone: 231.922.4896	MICHIGAN DEPARTMENT OF TRANSPORTATION (M.D.O.T.) Telephone: 231.941.1986
GRAND TRAVERSE COUNTY ROAD COMMISSION Telephone: 231.922.4848	MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, & ENGERY (E.G.L.E.) Telephone: 231.775.3960
GRAND TRAVERSE COUNTY ENVIRONMENTAL HEALTH Telephone: 231.995.6051	

UTILITY AGENCIES

CHERRYLAND ELECTRIC COOPERATIVE Telephone: 231.943.8377	CHARTER COMMUNICATIONS Telephone: 231.929.7012
CONSUMERS ENERGY Telephone: 231.929.6242	AT&T MICHIGAN Telephone: 231.941.2707
TRAVERSE CITY LIGHT & POWER Telephone: 231.922.4942	
DTE ENERGY Telephone: 231.592.3244	

EMERGENCY SERVICES

EMERGENCY CALLS 911	FIRE DEPARTMENTS EMERGENCY SERVICE: 911
EMERGENCY AMBULANCE SERVICE 911	City of Traverse City: Telephone: 231.941.2340 Grand Traverse County: Telephone: 231.941.2238
POLICE AGENCIES EMERGENCY SERVICE: 911	MISS DIG Telephone: 1.800.482.7171
City of Traverse City: Telephone: 231.941.2300 Grand Traverse County Sheriff: Telephone: 231.941.2225 Michigan State Police: Telephone: 231.946.4646	



CHARTER TOWNSHIP OF GARFIELD:
CASS ROAD SANITARY SEWER REHABILITATION

These documents are prepared in accordance with the contractual terms and conditions for this project.

GENERAL NOTES

1. ALL ELEVATIONS ARE BASED ON RECORD DRAWINGS.

2. SPECIAL CARE SHALL BE TAKEN IN EXCAVATING IN THE PROXIMITY OF UNDERGROUND UTILITIES. THE CONTRACTOR SHALL SECURE ASSISTANCE FROM THE APPROPRIATE UTILITY COMPANY IN LOCATING ITS LINES. THE CONTRACTOR SHALL ALSO: PROVIDE SUPPORT FOR ANY UTILITY WITHIN THE EXCAVATION, PROVIDE PROPER COMPACTION UNDER ANY UNDERMINED UTILITY STRUCTURE AND, IF NECESSARY, INSTALL TEMPORARY SHEETING OR USE A TRENCH BOX TO MINIMIZE THE EXCAVATION. THE CONTRACTOR SHALL PROTECT AND SAVE HARMLESS FROM DAMAGE ALL UTILITIES, WHETHER PRIVATELY OR PUBLICLY OWNED, ABOVE OR BELOW GROUND SURFACE, WHICH MAY BE ENCOUNTERED DURING CONSTRUCTION, AT NO ADDITIONAL COST TO THE OWNER.

3. THE LOCATION OF EXISTING PUBLIC UTILITIES AND UNDERGROUND STRUCTURES SUCH AS PIPE LINES, ELECTRIC CONDUITS, SEWERS AND WATER LINES, OF RECORD ARE SHOWN ON THE PLANS. THE INFORMATION SHOWN IS BELIEVED TO BE REASONABLY CORRECT AND COMPLETE. HOWEVER, NEITHER THE CORRECTNESS NOR THE COMPLETENESS OF SUCH INFORMATION IS GUARANTEED. PRIOR TO THE START OF ANY OPERATIONS IN THE VICINITY OF ANY UTILITIES, THE CONTRACTOR SHALL NOTIFY THE UTILITY COMPANIES AND MISS DIG AND REQUEST THAT THEY STAKE OUT THE LOCATIONS OF THE UTILITIES IN QUESTION. THE CONTRACTOR SHALL COORDINATE THE RELOCATION OF ANY UTILITIES WITH THE UTILITY PROVIDER. COST OF REPAIR FOR ANY DAMAGED UTILITY LINES THAT IS PROPERLY STAKED SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

4. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE LAWS AND REGULATIONS GOVERNING THE FURNISHING AND USE OF SAFEGUARDS, SAFETY DEVICES AND PROTECTION EQUIPMENT. THE CONTRACTOR SHALL TAKE ANY NECESSARY PRECAUTIONS TO PROTECT THE LIFE AND HEALTH OF EMPLOYEES AND THE PUBLIC IN THE PERFORMANCE OF THE WORK.

5. FOR PROTECTION OF UNDERGROUND UTILITIES AND IN CONFORMANCE WITH PUBLIC ACT 53, 1974, THE CONTRACTOR SHALL DIAL 1-800-482-7171 A MINIMUM OF THREE FULL WORKING DAYS, EXCLUDING SATURDAYS, SUNDAYS, AND HOLIDAYS PRIOR TO BEGINNING EACH EXCAVATION IN AREAS WHERE PUBLIC UTILITIES HAVE NOT BEEN PREVIOUSLY LOCATED. MEMBERS WILL THUS BE ROUTINELY NOTIFIED. THIS DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY OF NOTIFYING UTILITY OWNERS WHO MAY NOT BE PART OF THE "MISS DIG" ALERT SYSTEM.
6. CONTRACTOR IS RESPONSIBLE TO FIELD VERIFY EXISTING CONDITIONS PRIOR TO PERFORMING ANY WORK.

7. ALL WORK IS TO BE PERFORMED WITHIN THE PUBLIC RIGHT-OF WAY AND/OR ESTABLISHED EASEMENTS. ANY WORK OUTSIDE OF THESE LIMITS SHALL BE APPROVED AND COORDINATED WITH THE PROPERTY OWNER. DOCUMENTATION OF THIS ARRANGEMENT TO BE PROVIDED TO THE TOWNSHIP.

8. EXISTING PROPERTY CORNERS ARE IDENTIFIED ON THE PLANS. IF A PROPERTY CORNER IS DISTURBED DURING CONSTRUCTION IT SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE BY A PROFESSIONAL LAND SURVEYOR.

9. CONTRACTOR SHALL PROVIDE TEMPORARY SUPPORT TO ANY MAILBOXES DISTURBED DURING CONSTRUCTION AND SHALL NOT INTERFERE WITH MAIL SERVICE. ALL DISTURBED MAILBOXES SHALL BE PLACED IN ORIGINAL LOCATION AND AT AN ELEVATION DETERMINED BY THE POSTAL SERVICE.

10. CONTRACTOR SHALL RESTORE ALL LAWNS, LANDSCAPE PLANTINGS, SIDEWALKS, COMMERCIAL SIGNS, ETC., AS REQUIRED AT NO ADDITIONAL COST TO THE OWNER.

11. CONTRACTOR SHALL PROVIDE ADEQUATE SUPPORT FOR UTILITY POLES AS NECESSARY. CONTRACTOR SHALL CONSULT WITH THE UTILITY COMPANY PRIOR TO ANY DISTURBANCE OF UTILITY POLE OR ANCHORING SYSTEM.

12. ANY INFRASTRUCTURE OUTSIDE THE SCOPE OF WORK TO BE REPLACED SUCH AS CONCRETE, ASPHALT, GRAVEL SURFACES, UTILITY STRUCTURES, ETC. ARE INCIDENTAL AND REPLACED AT NO ADDITIONAL COST TO THE PROJECT.

SOIL EROSION AND STORM WATER CONTROL NOTES

1. THE CONTRACTOR SHALL PROVIDE TEMPORARY SOIL EROSION CONTROL MEASURES PER P.A. 451 AS AMENDED. WITH THE USE OF SILT FENCE AND OTHER TEMPORARY MEASURES THE CONTRACTOR SHALL PROTECT THE ADJACENT AREA FROM ACCELERATED EROSION AND SEDIMENTATION FLOWS RESULTING FROM CONSTRUCTION. THE CONTRACTOR SHALL INSTALL ADDITIONAL TEMPORARY AND PERMANENT SOIL EROSION CONTROL MEASURES, IF DIRECTED BY THE ENGINEER OR SOIL EROSION CONTROL OFFICER, AT NO ADDITIONAL COST TO THE PROJECT.

2. INSTALLATION AND MAINTENANCE OF TEMPORARY SOIL EROSION CONTROL MEASURES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

3. SHOULD ADDITIONAL SOIL EROSION CONTROL MEASURES BE DETERMINED TO BE NECESSARY BY EITHER THE SOIL EROSION CONTROL OFFICER OR THE OWNER'S ENGINEER THEY SHALL BE IN PLACE NO LATER THAN 24 HOURS FROM THE TIME OF NOTIFICATION TO THE GENERAL CONTRACTOR FOR THE PROJECT. IF NOT PLACED IN 24 HOURS OR LESS ALL ON SITE CONSTRUCTION WILL BE HALTED UNTIL SUCH MEASURES ARE INSTALLED AND APPROVED BY EITHER THE SOIL EROSION CONTROL OFFICER OR THE OWNER'S ENGINEER.

4. ALL DISTURBED NON-HARD SURFACE AREAS TO BE STABILIZED WITH TOPSOIL, SEEDED, FERTILIZED AND MULCHED. DISTURBED AREAS SHALL BE TOPSOILED TO A DEPTH NOT LESS THAN FOUR (4) INCHES. SLOPES BETWEEN 1 ON 3 AND 1 ON 2 SHALL BE SODDED AND STAKED OR RECEIVE SEED WITH MULCH BLANKET.

5. IF REQUESTED BY THE ENGINEER OR SOIL EROSION CONTROL OFFICER, A WATER TRUCK SHALL BE KEPT ON STAND-BY ON SITE DURING THE CONSTRUCTION PHASE OF THE PROJECT. THE WATER TRUCK SHALL BE USED AS DIRECTED BY THE ENGINEER OR SOIL EROSION CONTROL OFFICER TO CONTROL WIND EROSION.

6. ALL NEW STORM DRAINAGE PIPE SHALL BE CORRUGATED GALVANIZED STEEL PIPE, HDPE OR APPROVED EQUAL.

7. A MINIMUM OF TWO (2) FEET OF COVER FROM FINISHED ELEVATIONS SHALL BE MAINTAINED OVER ALL STORM DRAIN PIPES.
8. ALL DRAINAGE PIPES THAT OUTLET AT GROUND SURFACE SHALL INCLUDE END SECTIONS.

9. ALL EXISTING STORM DRAINS WITHIN THE CONSTRUCTION ZONE TO BE INSTALLED/MONITORED WITH SILT SACKS. SACKS TO BE PULLED AS NEEDED TO KEEP SEDIMENT OUT.

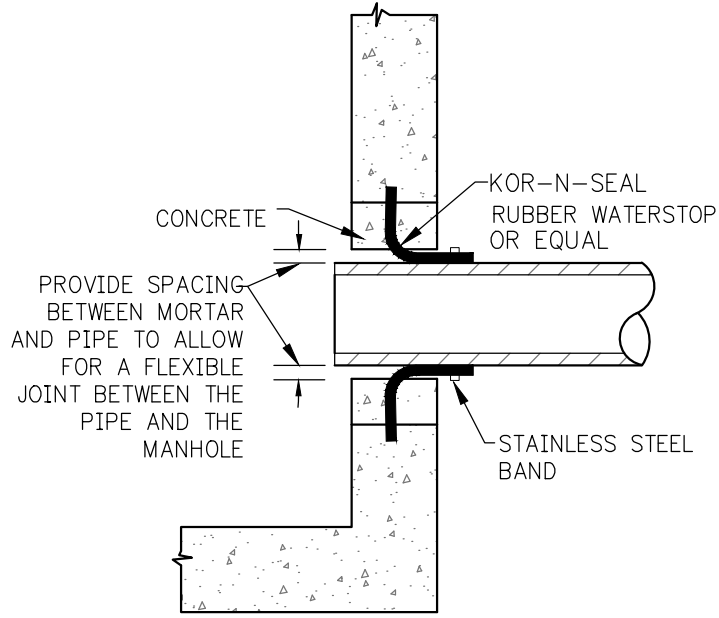
11. IF CULVERTS ARE ENCOUNTERED DURING EXCAVATION THEY SHALL BE REUSED IF NOT DAMAGED. IF DAMAGED, THE CULVERT SHALL BE REPLACED WITH NEW. ALL CULVERTS IDENTIFIED HAVE BEEN PLACED ON THE DRAWINGS. SOME CULVERTS MIGHT BE ENCOUNTERED THAT ARE NOT DISCLOSED ON THE PLANS. ALL COSTS ASSOCIATED WITH LOCATING AND REPAIRING/REPLACING ARE INCLUDED IN THE COST OF THE PROJECT.

12. THE CONTRACTOR SHALL REMOVE ALL SEDIMENT OR SOILS THAT HAVE BEEN DROPPED, WASHED ONTO OR TRACKED OUT ONTO PUBLIC RIGHT-OF-WAY OR PRIVATE ROADS AT THE END OF EACH WORKING DAY OR AFTER EACH RAIN EVENT ON NON-WORK DAYS.

13. ALL REMOVED TOPSOIL WILL BE STOCKPILED WITHIN THE PROJECT AREA. IF ADDITIONAL TOPSOIL IS AVAILABLE AFTER TOPSOILING THE CONSTRUCTION AREA, IT WILL BE STOCKPILED WITHIN 1000 FEET OF THE CONSTRUCTION AREA AS DIRECTED BY THE OWNER OR ENGINEER.

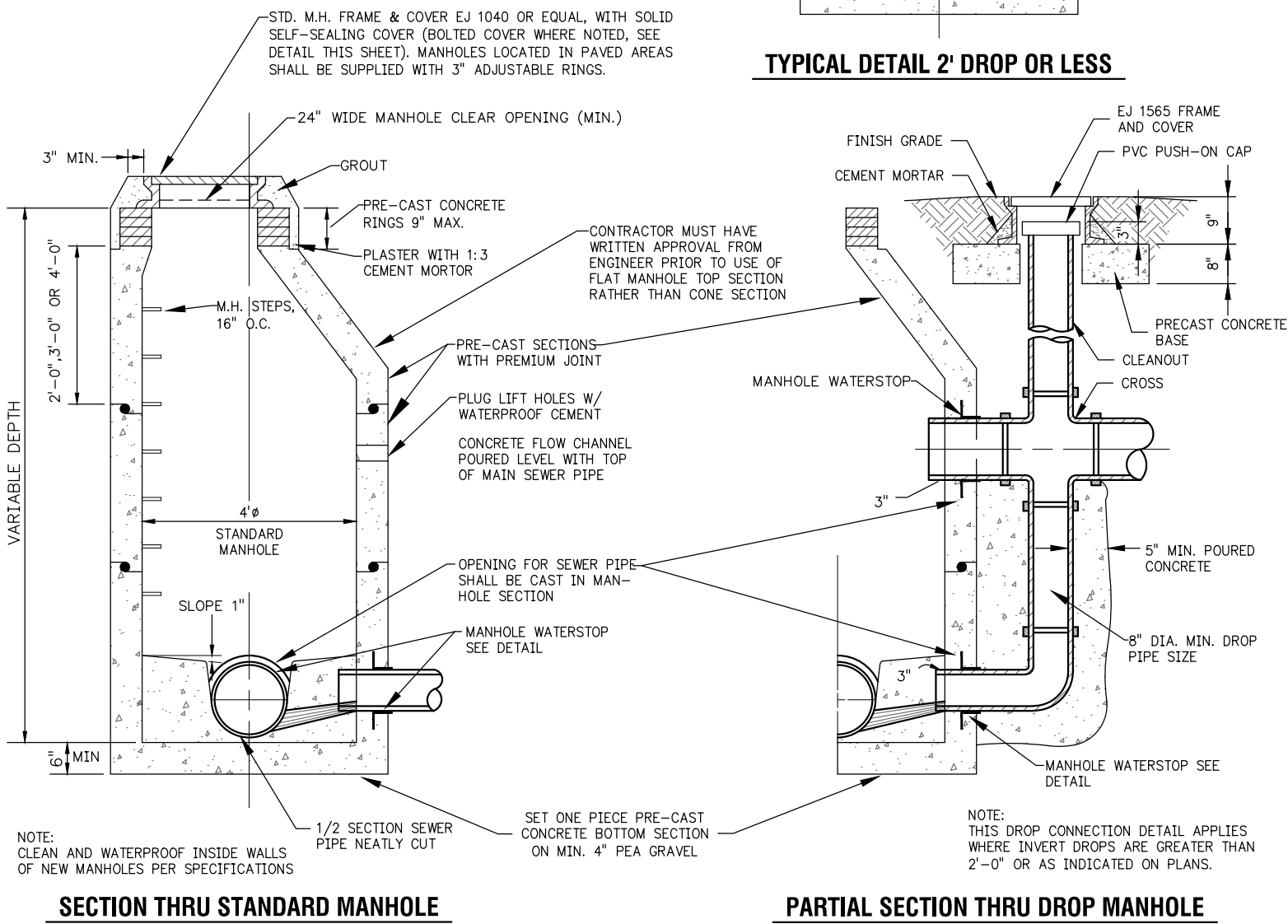
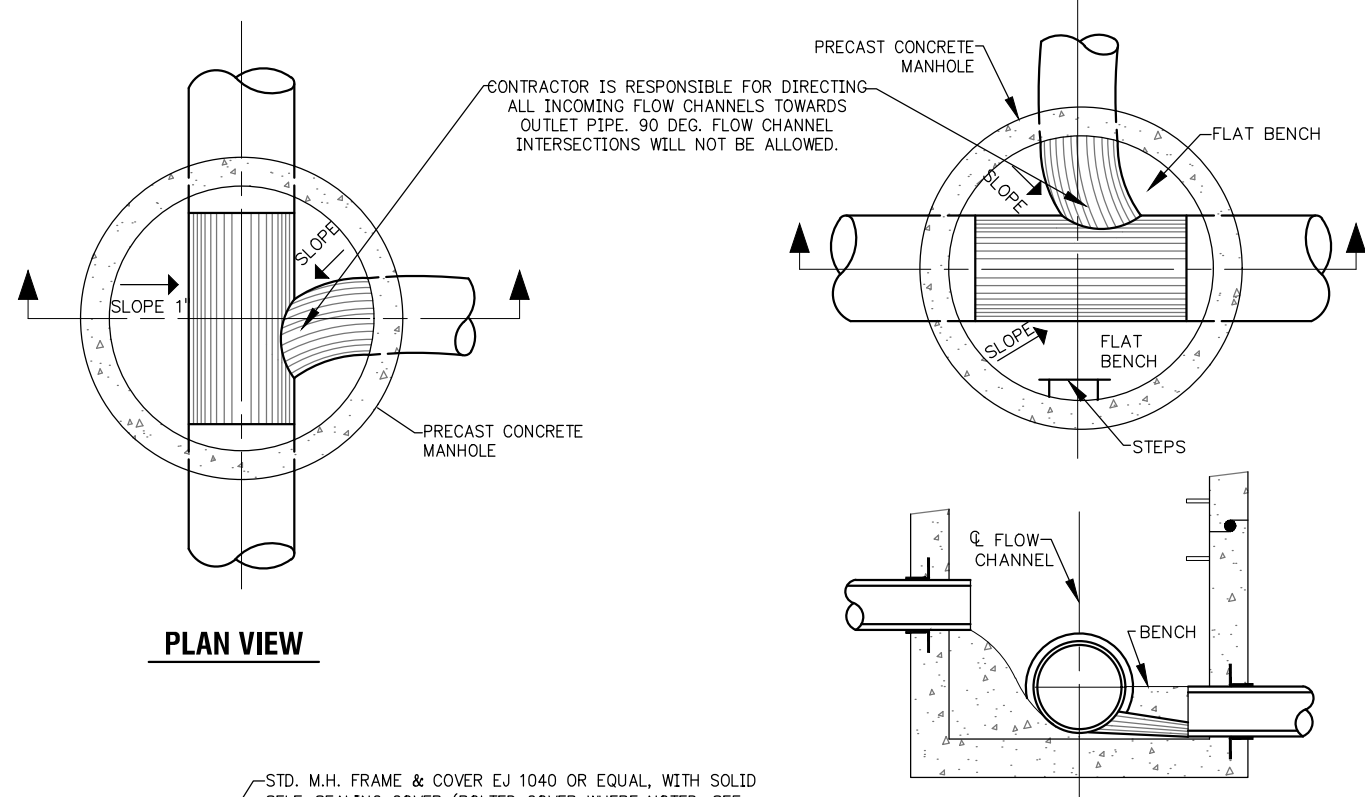
14. THE CONTRACTOR SHALL REPAIR ALL WASHOUTS AND EROSION DURING THE GUARANTEE PERIOD OF ONE (1) YEAR AT NO ADDITIONAL COST TO THE OWNER.

15. ALL RESTORATION SHALL OCCUR WITHIN FIVE (5) DAYS OF FINAL GRADE.



MANHOLE/WETWELL WATERSTOP DETAIL

NO SCALE



DETAIL - STANDARD MANHOLE

NO SCALE

PROJECT SUMMARY

- THIS PROJECT CONSISTS OF THE FOLLOWING MAJOR ITEMS AND ALL MINOR ACTIVITIES:
1. REHABILITATION OF VITRIFIED CLAY PIPE (VC) SANITARY SEWER MAIN WITH CIPP (CURED IN PLACE PIPE) TECHNOLOGY FOR THE FOLLOWING SECTIONS:

a. 1000 LF OF 10 INCH & 12 INCH VC AND TRUSS PIPE ALONG THE EAST SIDE OF CASS ROAD BETWEEN MH #A-20 TO MH #A-23.

2. REPLACEMENT OF 12 INCH VC PIPE SANITARY SEWER MAIN WITH 14 INCH HDPE DR 17 (IPS) UTILIZING PNEUMATIC PIPE BURSTING TECHNOLOGY FOR THE FOLLOWING SECTION:

a. APPROXIMATELY 50 LF VC PIPE AT THE NE CORNER CASS ROAD AND SOUTH AIRPORT ROAD FROM MH #A-14 TO MH #A-20.

3. MANHOLE REHABILITATION INCLUDING LINING AND FLOW CHANNEL RECONSTRUCTION TO BE PERFORMED TO ALL MANHOLE STRUCTURES AS INDICATED ON THE PLANS.

4. CLEANING OF SANITARY SEWER SYSTEM BEFORE AND AFTER COMPLETION OF IMPROVEMENTS TO BE THE RESPONSIBILITY OF THE CONTRACTOR AND INCLUDED IN THE COST OF THE PROJECT. PRE AND POST TELEVIEWING PROVIDED BY OWNER.

SANITARY SEWER NOTES

1. ALL CONSTRUCTION MATERIALS AND PROCEDURES MUST CONFORM WITH CURRENT GRAND TRAVERSE COUNTY D.P.W. STANDARDS, SPECIFICATIONS AND DETAILS.

2. ALL WATER USED FOR THIS PROCEDURE MUST BE APPROVED BY GRAND TRAVERSE COUNTY DPW PRIOR TO USE. CONTRACTOR RESPONSIBLE FOR COORDINATION FOR METER/BACKFLOW PREVENTION DEVICE.

3. THE CONTRACTOR SHALL NOTIFY THE ENGINEER 48 HOURS PRIOR TO START OF CONSTRUCTION OF THE SANITARY SEWER. CONTRACTOR SHALL ISSUE WORK SCHEDULE TO ENGINEER PRIOR TO THE START OF SANITARY SEWER CONSTRUCTION.

4. NO CONNECTION RECEIVING STORM WATER OR GROUND WATER SHALL BE MADE TO SANITARY SEWERS.

5. SEWER WILL NOT BE ALLOWED TO BE PLACED ONLINE UNTIL TESTED, INSPECTED, TELEVIEWED, AND APPROVED BY THE ENGINEER AND THE DPW.

6. ALL SANITARY SEWER MANHOLES IDENTIFIED SHALL BE CLEANED AND PREPARED FOR INSTALLATION OF WATERPROOFING PRODUCTS. ANY EXISTING INFILTRATION MUST BE REPAIRED (ELIMINATED) AT NO ADDITIONAL COST TO THE PROJECT.

7. CONTRACTOR IS RESPONSIBLE TO CLEAN SEWER LINE PRIOR TO PERFORMING WORK.

8. CONTRACTOR IS RESPONSIBLE TO PROVIDE ALL BYPASS PUMPING DURING CONSTRUCTION. BYPASS PUMPING PLAN SHALL BE PROVIDED TO ENGINEER FOR REVIEW AND APPROVAL PRIOR TO IMPLEMENTATION AND INCLUDE BACKUP PROTOCOL (PUMP & HAUL) AT NO ADDITIONAL COST TO THE PROJECT.

9. MANHOLE FLOW CHANNELS DAMAGED OR NOT EXISTING MUST BE INSTALLED IN ACCORDANCE WITH STANDARD DPW DETAILS.

10. PRE AND POST TELEVIEWING WILL BE PROVIDED BY THE TOWNSHIP REPRESENTATIVE. CONTRACTOR RESPONSIBLE TO PROVIDE MINIMUM 48 HOURS NOTICE PRIOR TO COMPLETION OF WORK FOR FINAL TELEVIEWING INSPECTION. FINAL INSPECTION TO BE COMPLETED AND ENGINEER APPROVAL GIVEN PRIOR TO SYSTEM START UP/CONNECTION OF EXISTING SEWERS AND PRIOR TO DECOMMISSIONING OF BYPASS PUMPING SYSTEM.

11. SANITARY SEWER LEADS SHALL BE IDENTIFIED AND DOCUMENTED BY THE CONTRACTOR PRIOR TO REINSTATEMENT FOLLOWING CIPP INSTALLATION.

ROAD CONSTRUCTION NOTES

1. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE 2020 M.D.O.T. STANDARD SPECIFICATIONS AND CURRENT GRAND TRAVERSE COUNTY ROAD COMMISSION STANDARDS AND SPECIFICATIONS UNLESS OTHERWISE INDICATED ON THE PLANS AND CONTRACT DOCUMENTS. THE CONTRACTOR IS REQUIRED TO FAMILIARIZE HIMSELF/HERSELF WITH THESE SPECIFICATIONS. ALL CONSTRUCTION MATERIALS SHALL CONFORM TO THE GRAND TRAVERSE COUNTY ROAD COMMISSION, GARFIELD TOWNSHIP, SPECIFICATIONS AND DETAILS.

2. THE ENGINEER SHALL BE NOTIFIED AT LEAST 24 HOURS PRIOR TO BITUMINOUS PAVING.

3. ALL CONSTRUCTION SIGNING SHALL MEET M.M.U.T.C.D. STANDARDS.

4. THROUGH TRAFFIC ON CASS ROAD AND SOUTH AIRPORT ROAD MUST BE MAINTAINED AT ALL TIMES. ANY LANE CLOSURE MUST BE APPROVED BY THE GRAND TRAVERSE COUNTY ROAD COMMISSION AT NO ADDITIONAL COST TO THE PROJECT.

5. MAIL SERVICE SHALL BE MAINTAIN AT ALL TIMES. TEMPORARY MAILBOXES OR SUPPORTS MAY BE REQUIRED. ADDITIONAL COSTS ARE CONSIDERED INCLUDED TO THE COST OF THE PROJECT.

6. THE CONTRACTOR SHALL NOTIFY RESIDENTS/BUSINESS OWNERS 24 HOURS (EXCLUDING SATURDAYS AND SUNDAYS) IN ADVANCE OF DISRUPTION TO SERVICE, SUCH AS DRIVEWAY OBSTRUCTION/CLOSING.

CHARTER TOWNSHIP OF GARFIELD
CASS ROAD SANITARY SEWER REHABILITATION
GENERAL NOTES & DETAILS
SECTION 15, T-27 N., R-11 W.
GARFIELD TOWNSHIP, GRAND TRAVERSE COUNTY, MICHIGAN

ENGINEERING
SURVEYING
TESTING & OPERATIONS

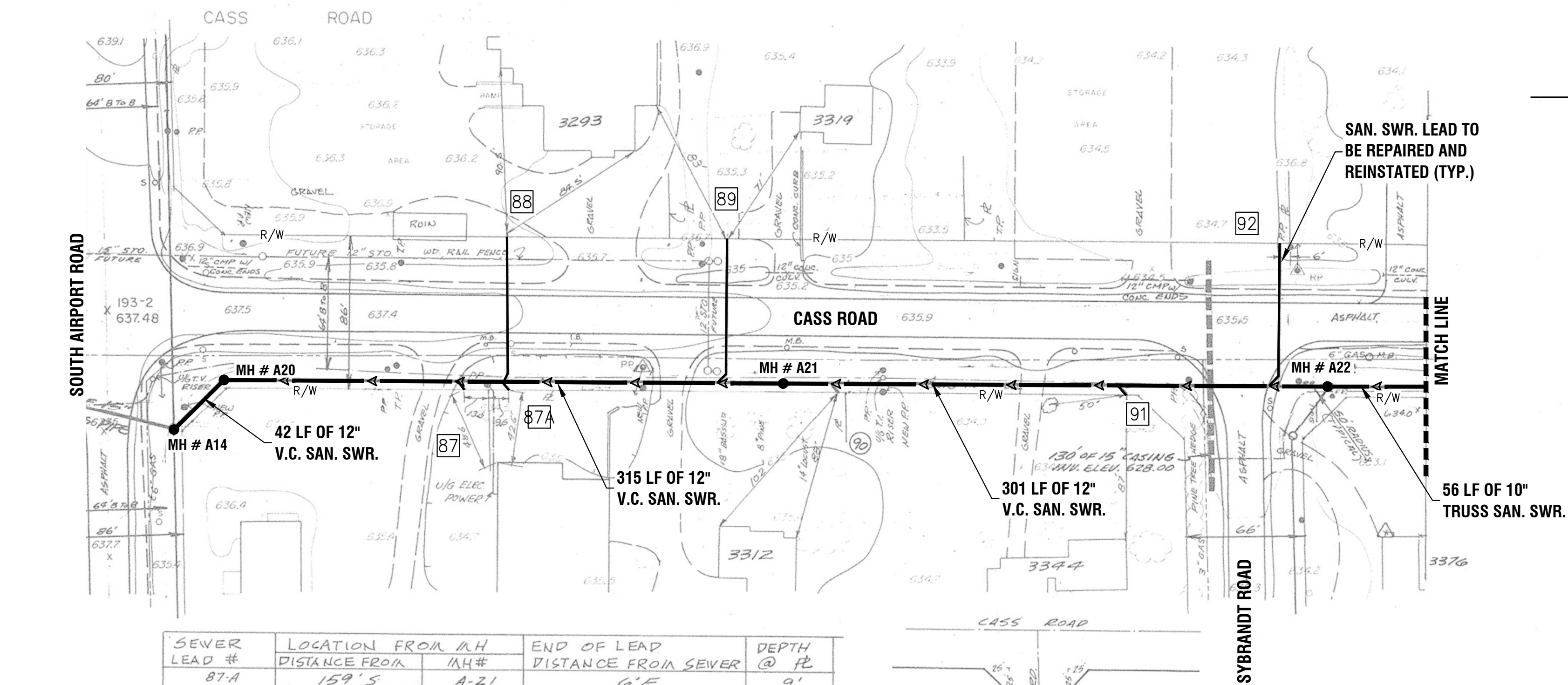
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1820 Oak Hollow Drive
Traverse City, MI 49686

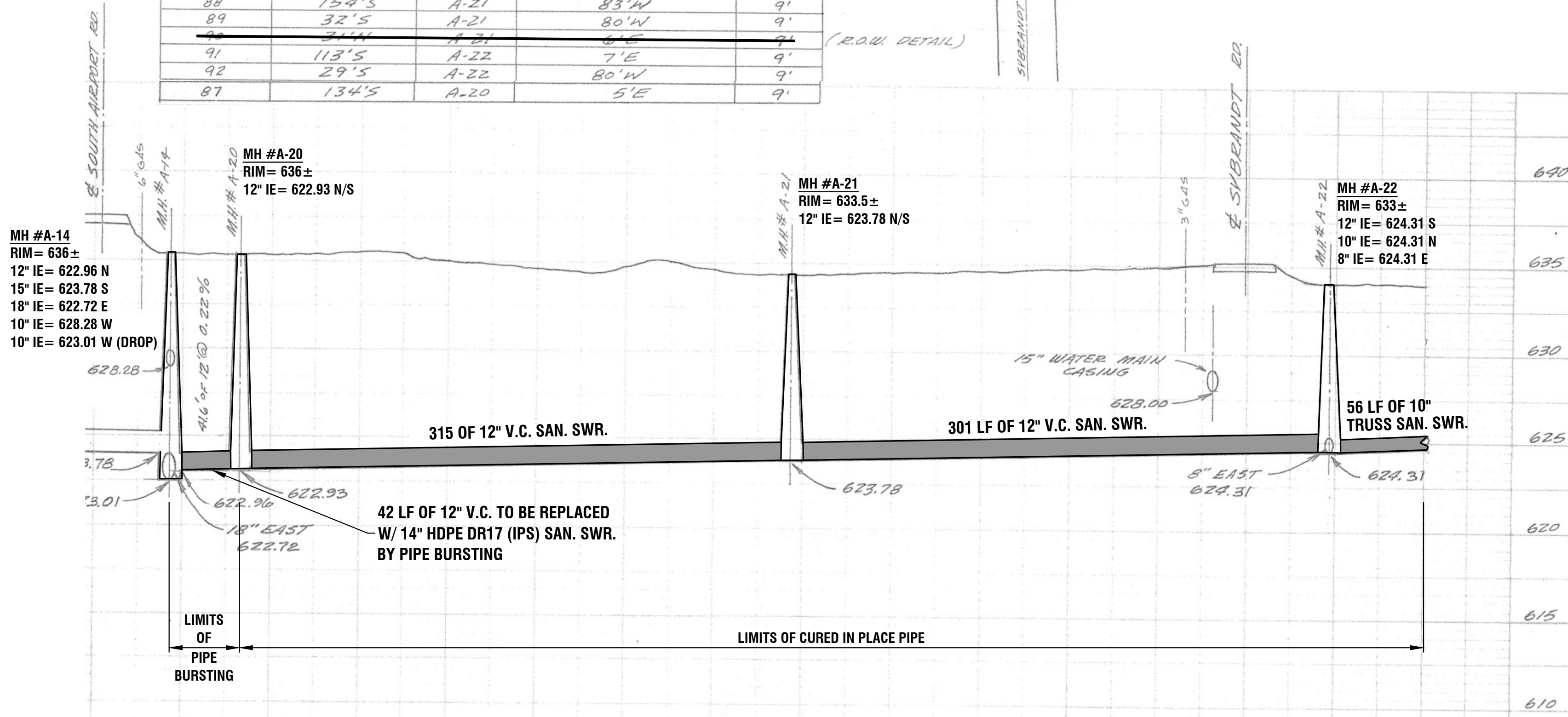
REV#	DATE	BY	DESC
0	09/02/2024	CPB	ISSUED FOR BIDS

DESIGNED BY JENNIFER GRAHAM P.E.	DRAWN BY A. BELANGER
CHECKED BY C. BALLANCE	DATE 202322
PROJECT NO. C1.2	

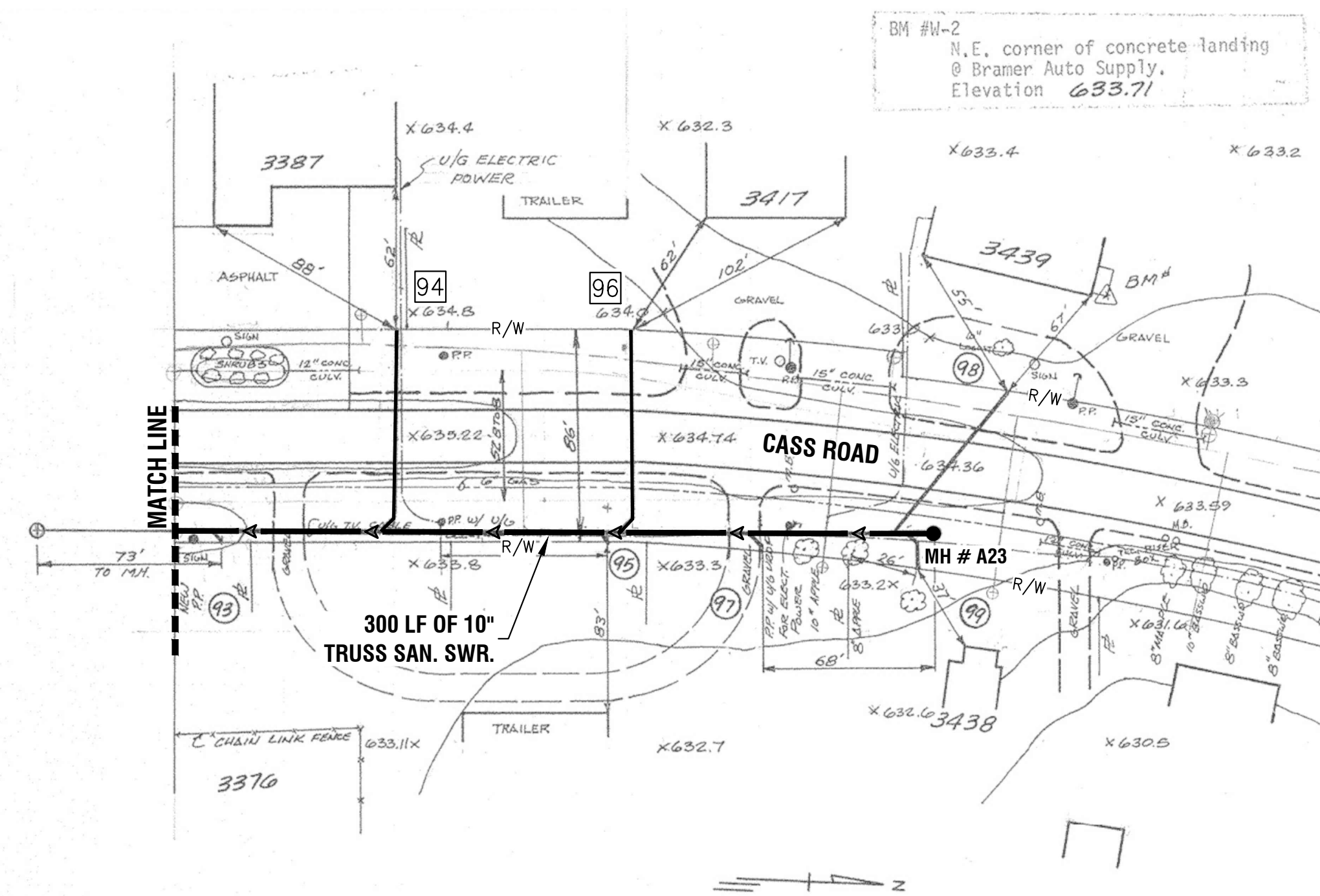
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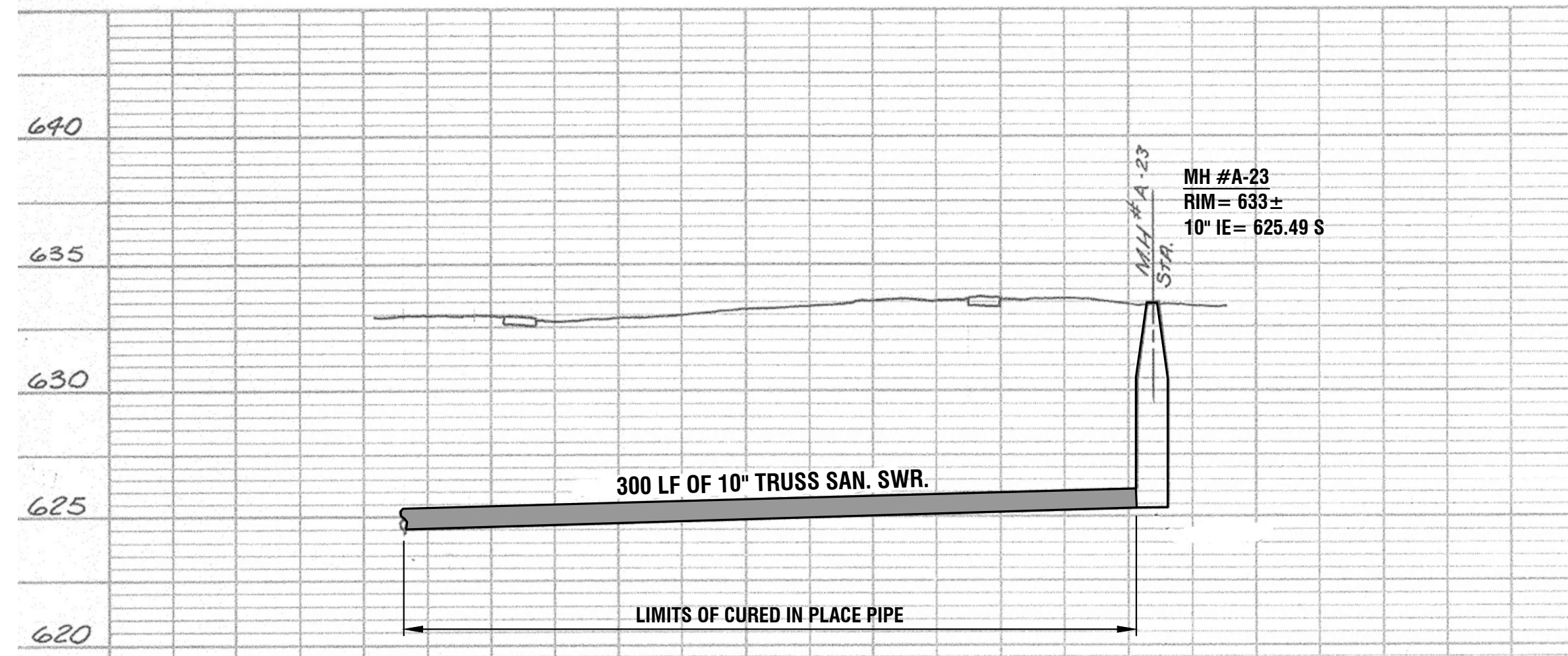
SEWER LEAD #	LOCATION FROM MH DISTANCE FROM	MH#	END OF LEAD DISTANCE FROM SEWER	DEPTH @ FL
87A	159'S	A-21	6'E	9'
88	154'S	A-21	83'W	9'
89	32'S	A-21	80'W	9'
91	113'S	A-22	7'E	9'
92	29'S	A-22	80'W	9'
87	134'S	A-20	5'E	9'



MANHOLE REHABILITATION TABLE	
MANHOLE NO.	REQUIRED REHABILITATION
A-14	LINING, CEMENT/GROUT SEAL, FLOW CHANNEL CONSTRUCTION, CHIMNEY SEAL
A-20	LINING, CEMENT/GROUT SEAL, FLOW CHANNEL CONSTRUCTION, CHIMNEY SEAL
A-21	LINING, CEMENT/GROUT SEAL, FLOW CHANNEL CONSTRUCTION, CHIMNEY SEAL
A-22	LINING, CEMENT/GROUT SEAL, FLOW CHANNEL CONSTRUCTION, CHIMNEY SEAL
A-23	LINING, CEMENT/GROUT SEAL, FLOW CHANNEL CONSTRUCTION, CHIMNEY SEAL, ADJUST ACCESS LID TO FINISH GRADE



SEWER LEAD #	LOCATION FROM MH DISTANCE FROM	MH#	END OF LEAD DISTANCE FROM SEWER	DEPTH @ FL
94	140'N	A-22	82'W	6'
95	130'S	A-23	5'E	6'
96	120'S	A-23	81'W	6'
97	89'S	A-23	10'E	6'
98	N	A-23	75'W	6'
99	7'S	A-23	14'E	6'



NOTES

- INFORMATION PROVIDED IS BASED UPON 1970'S RECORD DRAWINGS AND ARE FOR REFERENCE ONLY. CONTRACTOR IS RESPONSIBLE TO FIELD VERIFY PRIOR TO BEGINNING WORK. EXISTING INFORMATION IS SHOWN IN GRAY SCALE. LIMITS OF PROPOSED WORK SHOWN IN BOLD.
- CONTRACTOR SHALL PERFORM ALL WORK ONLY WITHIN EXISTING RIGHT-OF-WAYS AS SHOWN. ANY STAGING/COORDINATION ON PRIVATE PRIVATE PROPERTY REQUIRES OWNERS PERMISSION.
- CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD VERIFYING LOCATIONS OF STRUCTURES, PIPE, AND SERVICE LEADS PRIOR TO PERFORMING ANY WORK.
- FOR SEWER PIPE PROPOSED TO BE REPLACED BY PIPE BURSTING, THE NEW PIPE SHALL BE INSTALLED UTILIZING EXISTING INVERTS WITHIN EXISTING MANHOLES. CONTRACTOR SHALL SELECT PROCEDURES THAT MINIMIZE STRESS. NO EXISTING LEADS ARE CONNECTED TO THIS SEGMENT OF PIPE.
- BY-PASS PUMPING SHALL BE REQUIRED AND INCLUDED WITH THE COST OF THE PIPE UPGRADES. PUMPING EQUIPMENT MUST BE CAPABLE TO HANDLE 400 GPM. INCLUDE ITS OWN POWER SOURCE ALONG WITH LEVEL CONTROL MONITORING TO ENSURE NO SYSTEM BACKUPS. IT IS RECOMMENDED THAT THE CONTRACTOR HAVE AN ALTERNATE METHOD OF BY-PASS PUMPING IN THE EVENT THE PUMP DOES NOT WORK PROPERLY. CONTRACTOR IS RESPONSIBLE TO SUBMIT A BY-PASS PUMPING PLAN, INCLUDING PUMP/HAUL, WITH EQUIPMENT TO THE D.P.W. AND ENGINEER FOR APPROVAL PRIOR TO PERFORMING ANY WORK.
- ALL MANHOLES IDENTIFIED FOR REPAIRS/REHABILITATION ARE IDENTIFIED WITH SCOPE (SEE TABLE) AS COORDINATED WITH THE D.P.W. WORK SHALL BE PERFORMED AND COMPLIANT WITH TECHNICAL SPECIFICATIONS.

CHARTER TOWNSHIP OF GARFIELD CASS ROAD SANITARY SEWER REHABILITATION PLAN AND PROFILE SHEET SECTION 15, T.27 N., R.11 W. GARFIELD TOWNSHIP, GRAND TRAVERSE COUNTY, MICHIGAN

DATE: 06/02/2024
DRAWN BY: JENNIFER GRAHAM, P.E.
CHECKED BY: C. BALLANCE, A. BELANGER
PROJECT NO.: 26232
SHEET NO.: C2.1

ENGINEERING
SURVEYING
TESTING & OPERATIONS
1820 Oak Hollow Drive
Traverse City, MI 49686



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These documents are prepared in accordance with the contractual terms and conditions for this project.



Engineering
Surveying
Testing &
Operations

820 Oak Hollow Drive
Traverse City, Michigan 49686
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231.946.3703 

TECHNICAL SPECIFICATIONS FOR:

CASS ROAD SANITARY SEWER REHABILITATION



The CHARTER TOWNSHIP *of* GARFIELD
Grand Traverse County, Michigan

GFA PROJECT NO.: 26232
DATE: SEPTEMBER 2026



PROJECT SPECIFICATIONS

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- SEWER LEAD REPORTS

SECTION 01270 – MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. Refer to Article of the General Conditions.
- B. Bid price includes all labor, tools, equipment, materials, transportation, applicable fees, and sales tax necessary to complete the work in accordance with the Plans and Specifications. In addition, where applicable, all excavation, dewatering, stone bedding, backfilling, density, tight sheeting, thrust blocks, and all accessories and related work not paid for separately in order to complete the installation according to the plans and specifications.
- C. All measurement and payment will be based on completed work, ready for use, performed in strict accordance with the Plans and Specifications.
- D. Owner reserves the right to delete any line item or quantity on the BID SCHEDULE.
- E. All work shall conform to all applicable OSHA standards.
- F. Owner reserves the right to delete divisions from this contract.

1.02 APPLICATION FOR PAYMENT

- A. Pay period: Begins on the 1st of the month and continues through the end of the month.
- B. Payment requests shall be submitted on the forms included in the Specifications and shall be submitted no later than the last Monday of each month.

1.03 SUBMITTALS

- A. Submit Conditional Partial Waiver of Lien with each application for payment request, as specified in the General Conditions paragraph 14.2.
- B. Prior to the first partial payment, submit a construction progress schedule in accordance with Article 2.05.B.1 of the General Conditions.

12.04 PAY ITEM DESCRIPTIONS

1. **Mobilization, max 5%:** The completed work for mobilization will be paid for at the contract lump sum (LS) price. This payment shall be payment in full for equipment and material delivery, transportation and storage, bonds, insurances, permits including fees, all coordination with the GTCRC, EGLE, Township, Engineers, and public and all other labor and materials.
2. **Traffic Control:** The completed work for traffic control will be paid for at the contract lump sum (LS) price. This payment shall be payment in full for temporary signage, flagging, re-routing of traffic, all coordination with the GTCRC, Township, Engineers,

and public and all other labor and materials. The proposed traffic control to be implemented shall comply with 2020 MDOT Specifications.

3. **Bypass Pumping:** The completed work for bypass pumping, as shown on the plans and detailed in the specifications, will be paid for at the contract price per lump sum (LS). Payment shall be based on the completion of the work in accordance with the plans and specifications. Price shall be payment in full for all labor, materials, and equipment required to set up, operate, and ensure uninterrupted sewer service during bypass pumping and/or pump and haul operation as necessary to maintain sewer service to users and to divert the flow of sewage around the area at which construction will occur. This pay item shall include, but is not limited to, bulkheads, pumping equipment capable of handling the anticipated flows, stand-by pumps, piping, valves, joints, fittings, thrust and restraint blocks, pumper trucks, temporary bypass structures, cost for electrical, fuel costs, back-up holding trucks for offsite disposal, handling fees, standby power source, pump operators available 24-hours a day, barricading, restoration, cleanup, and other related appurtenances necessary to complete the job, whether specifically mentioned or implied.
4. **Sanitary Sewer, 12-inch, Cured in Place Pipe:** The completed work for the installation and testing of Sanitary Sewer, 12-inch, Cured in Place Pipe, as shown on the plans and specifications, will be paid for at the contract unit price per linear foot (LF). Payment shall be based on the horizontal field measurements from the point of beginning to the point of ending. Payment shall include, but not be limited to, complete design and installation of cured in place pipe liner, compliance and testing requirements, pre and post cleaning, repairs of damage to all existing structures, and all other work necessary to complete the work according to the plans and specifications.
5. **Sanitary Sewer, 10-inch, Cured in Place Pipe:** The completed work for the installation and testing of Sanitary Sewer, 10-inch, Cured in Place Pipe, as shown on the plans and specifications, will be paid for at the contract unit price per linear foot (LF). Payment shall be based on the horizontal field measurements from the point of beginning to the point of ending. Payment shall include, but not be limited to, complete design and installation of cured in place pipe liner, compliance and testing requirements, pre and post cleaning, repairs of damage to all existing structures, and all other work necessary to complete the work according to the plans and specifications.
6. **Pipe Burst 12-inch Sanitary Sewer and Replace w/ 14-inch HDPE DR 17:** The completed work for pipe burst and replace sanitary sewer installation and testing of the size as shown on the plans and specifications, will be paid for at the contract price linear foot (LF) as quoted in the proposal. Payment will be based on horizontal field measurement from structure to structure. The unit price shall include, but is not limited to, pneumatic pipe bursting equipment, pulleys, rollers, bumpers, alignment control devices, any other equipment necessary to protect existing manhole structures, lubrication (as applicable), all piping, fittings, and joint butt-fusion, pressure testing, labor, equipment, furnishing materials, and all accessories and related work not paid for separately in order to the complete the installation according to the plans and specifications.
7. **Connect to Existing Sewer Manhole:** The completed work for Connect to existing sewer manhole will be paid for at the contract unit price each (EA) as quoted in the Bid and according to the plans and specifications. Payment shall be based on the actual number of connections made to existing sewer manholes after pipe bursting and replacement has been completed. The unit price shall include, but not be limited to, all labor, equipment, furnishing all materials, accessories and all related items, not paid for

separately under a specific item, necessary to complete the work according to the plans and specifications.

8. **Sanitary Lead, Repair & Reinstatement:** The completed work for sanitary lead, repair and reinstatement will be paid for at the contract unit price each (EA) as quoted in the Bid and according to the plans and specifications. Payment shall be based on the actual number of existing sewer leads connected / reopened after the CIPP has been placed and cured. The unit price shall include, but not be limited to, bypass pumping, remote cutting tool, removal of coupons from sewer, installation curing and finishing of sealing system for sealing connections between mainline sewer and service laterals, labor, equipment, furnishing all materials, accessories and all related items, not paid for separately under a specific item, necessary to complete the repair and reinstatement according to the plans and specifications.
9. **Manhole Rehabilitation, Flow Channel Repairs:** The completed work for installation and testing of manhole flow channel repair, as shown on the plans and in the specifications, will be paid for at the contract price per each (EA) price as quoted in the Bid. Payment shall be based on the actual number of manholes repaired and shall include, but not be limited to, preparation of manhole interior, identification of original flow channel path and bench, reconstructing flow channels and bench with cementitious mortar to existing inverts, removal of excess mortar to provide smooth surface, by-pass pumping, labor, equipment, testing, furnishing materials and all accessories necessary to complete the installation according to the plans and specifications.
10. **Manhole Rehabilitation, Cement / Grout Seal, Interior:** The completed work for installation and testing of interior ground seal, as shown on the plans and in the specifications, will be paid for at the contract price per each (EA) price as quoted in the Bid. Payment shall be based on the actual number of manholes repaired and shall include, but not be limited to, preparation of manhole interior, identification of leak present, plugging and patching with cementous mortar, drilling pilot hole(s) as needed for grout placement, grout insertion to stop leaks present, removal of excess grout and all labor, equipment, testing, furnishing materials and all accessories necessary to complete the installation according to the plans and specifications.
11. **Manhole Rehabilitation, Liner, Interior:** The completed work for installation and testing of manhole liner, as indicated on the plans and specs, will be paid for at the contract price per each (EA) price as quoted in the Bid. Payment shall be based on the actual number of manholes repaired and shall include, but not be limited to, labor, equipment, testing, furnishing materials and all accessories necessary to complete the installation according to the manufacturer's recommendations.
12. **Manhole Rehabilitation, Chimney Seal, 48" Dia.:** The completed work for installation and testing of chimney seal, as shown on the plans and in the specifications, will be paid for at the contract price per each (EA) price as quoted in the Bid. Payment shall be based on the actual number of manholes repaired and shall include, but not be limited to, furnishing and installing heat shrink band infiltration countermeasure on internal manhole chimney and including all labor, equipment, testing, furnishing materials and accessories necessary to complete the installation according to the plans and specifications to provide a waterproof seal.
13. **Manhole Rehabilitation, Lid Adjustment:** The completed work for installation of manhole lid adjustments, as shown on the plans and in the specifications, will be paid for

at the contract price per each (EA) price as quoted in the Bid. Payment shall be based on the actual number of manholes repaired and shall include, but not be limited to, furnishing and installing concrete adjustment rings to raise manhole lid to existing grade and including all labor, equipment, testing, furnishing materials and accessories necessary to complete the installation according to the plans and specifications.

14. **Restoration & Cleanup:** The completed work for site restoration & cleanup shall be paid for at the contract lump sum (LS) price, as quoted in the proposal. This payment shall be payment in full for topsoil, raking and seed bed preparation, providing seed, fertilize, mulch and mulch blanket, replacement of landscape materials removed during excavation, and any labor or equipment necessary to complete the work as per the plans and specifications.

PART 2 – MATERIALS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 01270

SECTION 33010 - CLEANING SEWER PIPELINES

PART 1 - GENERAL

1.01 REFERENCES

- A. The publications listed in this section form a part of this specification to the extent referenced. The publications are referenced in the text by basic designation. In the event a referenced publication has been replaced or superseded, the current version shall govern.

1.02 PERFORMANCE REQUIREMENTS

- A. The intent of sewer line cleaning is to remove foreign materials from the lines and restore the sewer to a minimum of 95% of the original carrying capacity of the pipe and to inspect and document the condition of the pipelines. Since the success of the other phases of work depends a great deal on the cleanliness of the lines, the importance of this phase of the operation is emphasized.
- B. If cleaning an entire section between any two manholes cannot be successfully performed from one of the manholes, the equipment shall be set up at the other manhole and cleaning attempted from the other direction. If, again, successful cleaning cannot be performed or the equipment fails to traverse the entire distance between the two manholes, it will be assumed that a major blockage exists. It is recognized that there are some conditions such as broken pipe and major blockages that prevent cleaning from being accomplished or where additional damage would result if cleaning were attempted or continued. Should such conditions be encountered, the Contractor will not be required to clean those specific manhole sections.

1.03 QUALITY ASSURANCE

- A. Safety
 - 1. Perform Work in accordance with Local, State and Federal standards for safety.
- B. Environmental
 - 1. Comply with all Local, State, and Federal environmental regulations pertaining to the handling of all waste materials and byproducts of the cleaning operations.

PART 2 – PRODUCTS – NOT USED

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verification of existing conditions before starting work.
- B. Verify location of sewer pipelines to be inspected.

3.02 CLEANING EQUIPMENT

- A. Hydraulically Propelled Equipment: The equipment used shall be of a movable dam type and be constructed in such a way that a portion of the dam may be collapsed at any time during the cleaning operation to protect against flooding of the sewer. The movable dam shall be equal in diameter to the pipe being cleaned and shall provide a flexible scraper around the outer periphery to insure removal of grease. If sewer cleaning balls or other equipment which cannot be collapsed are used, special precautions to prevent flooding of the sewers and public or private property shall be taken.
- B. High-Velocity Jet (Hydro-cleaning) Equipment: All high-velocity sewer cleaning equipment

shall be constructed for ease and safety of operation. The equipment shall have a selection of two or more high-velocity nozzles. The nozzles shall be capable of producing a scouring action from 15 to 45 degrees in all size lines designated to be cleaned. Equipment shall also include a high-velocity gun for washing and scouring manhole walls and floor. The gun shall be capable of producing flows from a fine spray to a solid stream. The equipment shall carry its own water tank, auxiliary engines, pumps, and hydraulically driven hose reel. The NASSCO Jetter Code of Practice shall be consulted as a guide for the selection of different type nozzles and recommended pressure applications for various cleaning requirements

- C. Mechanically Powered Equipment: Bucket machines shall be in pairs with sufficient power to perform the work in an efficient manner. Machines shall be belt operated or have an overload device. Machines with direct drive that could cause damage to the pipe will not be allowed. A power rodding machine shall be either a sectional or continuous rod type capable of holding a minimum of 750 feet of rod. The rod shall be specifically heat treated steel. To insure safe operation, the machine shall be fully enclosed and have an automatic safety clutch or relief valve.

3.03 SEWER FLOW CONTROL

- A. Bypass Pumping: When bypassing flow around a sewer line via the use of pumping equipment, the Contractor shall supply the labor, supervision, tools and equipment, including pumps and hoses necessary to divert the flow of sewage around the work area. The bypass system shall have sufficient capacity to bypass the full design capacity of the pipe

3.04 CLEANING PRECAUTIONS

- A. During sewer cleaning operations, satisfactory precautions shall be taken in the use of cleaning equipment. When hydraulically propelled cleaning tools (which depend upon water pressure to provide their cleaning force) or tools which retard the flow in the sewer line are used, precautions shall be taken to insure that the water pressure created does not damage or cause flooding of public or private property being served by the sewer. When possible, the flow of sewage in the sewer shall be utilized to provide the necessary pressure for hydraulic cleaning devices. When additional water from municipal water system is necessary contractor is responsible for permitting and to utilize meter and backflow prevention received from DPW.
- B. Common debris such as build up is assumed to be accepted at the wastewater treatment plant.

3.05 SEWER CLEANING

- A. General
 - 1. The designated sanitary sewer sections, including manholes, shall be cleaned using hydraulically propelled, high-velocity jet, or mechanically powered equipment. Selection of the equipment used shall be based on the conditions of lines at the time the work commences. The equipment and methods selected shall be satisfactory to the Owner's Representative.
 - 2. The equipment shall be capable of removing dirt, grease, rocks, sand, and other materials and obstructions from the sewer lines and manholes.
 - 3. If cleaning of an entire section cannot be successfully performed from one manhole, the equipment shall be set up on the other manhole and cleaning again attempted. If, again, successful cleaning cannot be performed or the equipment fails to traverse the entire manhole section, it will be assumed that a major blockage exists and the cleaning effort shall be abandoned.

4. Remove intruding roots with rotary cutting equipment.
5. Clean pipe such that the pipeline is free of solids, sediment, debris and roots.

END OF SECTION

SECTION 33030 - CURED-IN-PLACE PIPE (CIPP)

SECTION 1 – GENERAL

1.01 SUMMARY

- A. This specification includes the minimum requirements for the rehabilitation of gravity sanitary pipelines, by providing the work necessary to furnish and install cured-in-place pipe (CIPP) within the existing pipe, as specified by the Owner.
- B. This includes the minimum requirements for the rehabilitation defined herein and as shown on the plans included as part of these contract documents.
- C. The Contractor is responsible for the accurate and complete installation and warranty of products installed.
- D. The Work covered by this specification consists of work necessary to furnish and install the CIPP rehabilitation solution. The Contractor shall deliver a finished product including materials, labor, equipment, and services necessary for mobilization, traffic control, bypass pumping and/or diversion of sewage flows, use and payment for potable water, cleaning equipment, product installation, site restoration, quality controls and samples for performance of required material tests, final inspection and warranty work, as included in this specification and at the quantities of each component contained in the Bid Proposal.
- E. The CIPP product shall be a complete system, including a specific resin and tube combination, appropriate equipment, and installation and curing procedures that have been tested together to verify the system's ability to meet the requirements of this specification..
- F. The pipeline rehabilitation solution shall be integrated and compatible with materials, equipment, and installation procedures used to complete the work.
- G. Inspection of pipelines has been provided by Owner using close circuit television (CCTV) inspection techniques. Specific areas of concern have been identified in the Pre Inspection Report provided as an attachment to the specifications for contractor reference. These shall be noted for correction. Contractor responsible to review televising records and inspect the interior of the pipe to determine the location of any conditions that may prevent proper installation of CIPP. A digital recording and suitable written log for each line section is available to contractor upon request.

1.02 REFERENCED DOCUMENTS

- A. The publications listed in this section form a part of this specification to the extent referenced. The publications are referenced in the text by basic designation. In the event a referenced publication has been replaced or superseded, the current version shall govern.
- B. American Society for Testing and Materials (ASTM)
 - 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 Pull in and inflate and Curing of a Resin-Impregnated Tube
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 - F2019-03 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{2004} 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{2002} 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 Quality Assurance
13. ASTM - D5813 Standard Specification for Cured-in Place Thermosetting Resin

1.03 QUALIFICATION REQUIREMENTS

- A. The Contractor shall submit, to the Owner, a Performance Work Statement (PWS) which defines the proposed method for rehabilitation using CIPP and demonstrates conformance with the requirements of the contract documents. At a minimum, the PWS should include the following:
 1. Documentation that the CIPP will conform to the project requirements as outlined in these specifications.
 2. A CIPP installation plan describing the preparation work, cleaning operations, pre-inspections, bypass or flow maintenance, traffic control, installation procedure, method of curing, quality control, testing to be performed, final inspection, warranties furnished, and that necessary and appropriate for a complete CIPP installation.

3. An installation schedule that meets the requirements of this contract.
4. A description of the proposed CIPP, or materials that comprise the CIPP, to be furnished for the project. Material descriptions shall be sufficient to verify conformance to these specifications, and/or shall conform to the pre-approved CIPP submission.
5. A description of equipment required for the complete installation of the CIPP system proposed, including identification of redundant tools and equipment that will be available on site in case of failure. Primary and backup equipment shall be identified and described. The Contractor shall provide a mitigation plan for equipment failure during installation.
6. A plan for identifying active service connections and maintaining service to each building connected to the section of pipe being rehabilitated.
7. Contractor shall have a minimum of three (3) years of cumulative experience installing CIPP in pipe of a similar size, length and configuration as contained in this contract.
8. An odor control plan shall be submitted by the Contractor that will ensure that project-specific odors will be minimized at the project site and surrounding area. A component of the plan must include methods for removing odors from homes or buildings, if required by the Owner.

1.04 QUALITY ASSURANCE

A. Contractor's Qualifications

1. The lead personnel including the superintendent, the foreman and the lead crew personnel for the resin wet-out, the CIPP liner installation, liner curing and the robotic service reconnections each must have demonstrated competency and experience to perform the scope of work contained in this contract.
2. CIPP Design
 - i. Engineering design calculations, in accordance with the Appendix of ASTM F-1216, for each length of liner to be installed including the thickness of each proposed CIPP.
 - ii. It will be acceptable for the Contractor 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.
 - iii. All calculations shall include data that conforms to the requirements of these specifications.
3. Work Plan Requirements
 - i. Where the scope of work is specifically delineated in the contract documents, a detailed installation plan describing all preparation work, cleaning operations, bypass pumping, traffic control, installation procedure, method of curing, service reconnection, quality control, testing to be performed, warranties furnished and all else necessary and appropriate for a complete CIPP liner installation.
 - ii. A detailed installation schedule shall be prepared, submitted and conform to the requirements of this contract.
 - iii. Contractor's description of the proposed CIPP lining technology, including a

- detailed plan for identifying all active service connections maintaining service, during mainline installation, to each home connected to the section of pipe being lined, including temporary service if required by the contract.
- iv. 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 product submission.
 - v. A detailed description of the Contractor's proposed procedures for removal of any existing blockages in the pipeline that may be encountered during the cleaning process.
 - vi. A detailed public notification plan shall be prepared and submitted including detailed staged notification to residences affected by the CIPP installation.
 - vii. An odor control plan shall be submitted, by the contractor, that will ensure that project specific odors will be minimized at the project site and surrounding area.
4. Quality Control Plan
- i. 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 Contractor.
 - b. Defined responsibilities, of the Contractor's personnel, for assuring that all quality requirements, for this contract, are met. These shall be assigned, by the Contractor, 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 reviews between the Contractor 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 contract and submitted with the QCP.

1.04 PRODUCT DATA SUBMITTALS

- A. Product data submittals are required for the CIPP system, defined as the specific combination of tube and resin materials and the designated curing method, and other materials proposed for use in the rehabilitation.
- 1. Technical data sheet(s) including manufacturer, product material type, intended use, resin saturation charts, reference standards for materials or design, and the description of CIPP product components.
 - i. Fabric Tube - including the manufacturer and description of product components.
 - ii. Flexible membrane {coating} material - including recommended repair {patching} procedure if applicable.
 - iii. Raw Resin Data - including the manufacturer and description of product components.
 - 2. Safety Data Sheets (SDS) for materials to be furnished for the project.

3. Manufacturer's installation requirements for the CIPP system proposed, including cleaning and preparation of the existing pipeline, flow diversion, insertion, cure, and service reinstatement processes, and the equipment required for delivery of a quality product.
 - i. Tube wet-out & cure method including:
 1. A complete description of the proposed wet-out procedure for the proposed technology.
4. Manufacturer's quality assurance guidelines for inspection and testing throughout the installation process including acceptance protocol.
5. The Manufacturer's recommended cure method - for each diameter and thickness of CIPP liner to be installed.

SECTION 2 – PRODUCTS

2.01 GENERAL

- A. The CIPP systems defined herein include those identified as commercially accepted methods for rehabilitation of gravity sewer pipelines. Methods or products not defined herein must be pre-approved by the Owner before use on this project under these specifications.
- B. Materials used to stop infiltration, repair, and rehabilitate shall be chemically compatible and designed to work together without causing adverse reactions or degradation to ensure the durability and effectiveness of the installed CIPP.
- C. The CIPP system must meet the chemical resistance requirements of these specifications.
- D. 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 Contractor's expense and disposed of in accordance with all current applicable agency regulations.
- E. 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.

2.02 FABRIC TUBE

- A. The sewn Tube shall consist of one or more layers of absorbent non-woven felt fabric and meet the requirements of ASTM F 1216, ASTM F 1743, ASTM D 5813 & 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 contractor 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 Tube shall have a relatively uniform thickness that when compressed at installation pressures will equal or exceed the design CIPP wall thickness.

- C. The Tube shall be manufactured to a size that when installed will tightly fit the internal circumference and length of the original pipe. Allowance should 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 Contractor shall determine the minimum tube length necessary to effectively span the designated run between manholes. The Contractor 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 Contractor 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 (wetout) procedure.
- E. The Tube shall contain no intermediate or encapsulated elastomeric layers. No material shall be included in the Tube that may cause delamination in the cured in place pipe (CIPP). No dry or unsaturated layers shall be evident.
- F. The wall color of the interior pipe surface of CIPP after installation shall be a relatively 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. Seams in the Tube shall be stronger than the non-seamed felt material.
- H. The Tube shall be marked for distance at regular intervals along its entire length, not to exceed 5 ft. Such markings shall include the Manufacturers name or identifying symbol.
- I. The minimum length of the fabric tube shall be that deemed necessary by the installer 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.
- J. 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.

2.03 RESIN

- A. The resin system shall be a corrosion resistant polyester or vinyl ester system including all required catalysts, initiators that when cured within the tube create a composite that satisfies the requirements of ASTM F1216 and ASTM F1743, the physical properties herein, and those which are to be utilized in the submitted and approved design of the CIPP for this project. The resin shall produce a CIPP that will comply with the structural and chemical resistance requirements of this specification.

- B. The resin shall be a corrosion resistant thermosetting resin system that, when properly cured within the tube composite, meets the requirements of ASTM F1216, ASTM F1743, or ASTM F2019, and the chemical resistance, physical and mechanical properties specified herein, and those used in the design of the CIPP for this project.
- C. The method of cure may either be from a manufacturer recommended heat source or by photoinitiated reaction (i.e., UV or LED light). Method of cure instructions along with a cure log shall always be on-site. 3. The resin-to-tube ratio, by volume, for wet-out (i.e., impregnation) of the selected tube shall be provided by the CIPP system manufacturer.
- D. The resin to tube ratio, by volume, shall be furnished as recommended by the manufacturer.

2.04 STRUCTURAL REQUIREMENTS

- A. The physical properties and characteristics of the finished liner will 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 Contractor to control these variables and to provide a CIPP system which meets or exceeds the minimum properties specified herein:
 - 1. 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 Contractor 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.

Minimum Physical Properties

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

- D. 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:

Minimum Design Parameters

Parameter	Value
Design Safety Factor	2.0 (1.5 for pipes 36" or larger)
Creep	50%
Ovality	2% or as measured by field inspection
Constrained Soil Modulus	Per AASHTO LRFD Section 12 and AWWA Manual M45
Groundwater Depth	As specified or indicated on the Plans
Soil Depth (above the crown)	As specified or indicated on the Plans
Live Load	Highway, H-20
Soil Load (assumed)	120 lb/cu. Ft.
Minimum Service Life	50 years

- E. The Contractor 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 specification and/or the pre-approved system. Materials not complying with these requirements will be rejected.
- F. The design soil modulus may be adjusted based on data determined from detailed project soil testing results as provided by the Owner in the contract documents.

2.04 LATERAL REPAIR MATERIALS

- A. A system capable of sealing the connection from the mainline pipe to a service connection lateral pipeline.
- B. The system shall be capable of installing, curing, and reinstating the mainline pipe to lateral connection from within the mainline sewer, without the need to excavate or access the upstream portion of the pipe.
- C. The system shall be capable of sealing a combination of tees and wyes of varying angles. The resin shall be cured to form the tube into a hard impermeable pipe-within-a-pipe.
- D. Sealing: The system shall provide a watertight seal at the connection to the main-line pipe and for the length of the lateral CIPP lined. The following methods/materials are recommended for ensuring a water tight seal:
 - 1. 100% Solids Epoxy providing an adhesive bond between the system and the host pipe, installed/applied per the manufacturer's recommendations.
 - 2. Hydrophilic materials installed/applied per the manufacturer's recommendations

2.05 INSTALLATION RESPONSIBILITIES FOR INCIDENTAL ITEMS

- A. Line Obstructions - It shall be the responsibility of the Contractor to clear the line of obstructions such as solids and roots that will prevent the insertion of CIPP. If inspection, after cleaning, reveals an obstruction such as a protruding service connection, dropped joint, or a collapse that will prevent the installation process, and it cannot be

removed by conventional sewer cleaning equipment, then the Contractor shall make a point repair excavation to uncover and remove or repair the obstruction. Such excavation shall be approved in writing by the Owner's representative prior to the commencement of the work and shall be considered as a separate pay item. All costs shall be approved prior to commencing work/excavation.

- B. The Contractor shall be responsible for confirming the locations of all lateral service connections prior to installing the CIPP as coordinated with DPW Staff.

SECTION 3 - EXECUTION

3.01 GENERAL

- A. CIPP installation shall be carried out by the Contractor in accordance with these specifications, using equipment and methods as recommended and approved by the CIPP manufacturer.
- B. The Contractor may, under the direction of the Owner, utilize 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 Contractor shall furnish an Owner approved traffic control plan with necessary labor and equipment. The plan shall be in conformance with the requirements of the local agency having jurisdiction over traffic control. Contractor responsible for all permitting and fees, as applicable.
- C. The Contractor shall provide the Owner with a bypass plan including backup methods for pump/haul, as well as public notification as necessary, to be followed for each pipeline segment throughout the rehabilitation process before proceeding with the liner installation. Installation shall not begin until the required diversion or bypass, along with necessary pumping facilities, has been completed and tested under operating conditions. Pumps and bypass lines shall be of adequate capacity and size to convey stipulated flow conditions.
- D. The Contractor shall coordinate sewer bypass and flow interruptions with the Owner at least 3 days in advance. Service connection effluent may be plugged, only after notification, as approved by the Owner, has been made to the affected property owners, tenants, or occupants, and may not remain plugged overnight.
- E. The Contractor shall verify the location and operational status of adjacent pipes, including service connections, and confirm that the pipeline system has been isolated before commencing work.

3.02 PREPARATION

- A. Verify location and size for existing sewers as well as direction of flow, depth and location of access to and from location for placement of CIPP.
- B. As applicable the contractor shall either plug or install a flow bypass pumping system to properly clean the pipe lines.
- C. If contractors pre 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 Contractor may be directed by the Engineer to correct the problem(s) prior to lining by utilizing open cut repair methods.

3.03 CLEANING

- A. Conduct cleaning in accordance with Section 33010 - Cleaning of Sewer Pipelines.
- B. Maintain flow or provide bypass pumping in accordance with Section 33010 - Cleaning of Sewer Pipelines.
- C. The Contractor 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 Contractor.
- D. Moving material from manhole section to manhole section shall not be allowed. As applicable the contractor shall either plug or install a flow bypass pumping system to properly clean the pipe lines.
- E. Precaution shall be taken, by the Contractor 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 Contractor.
- F. It shall be the responsibility of the Contractor to clear the line of obstructions that will interfere with the installation and long-term performance of the CIPP.

3.04 SERVICE LATERAL ASSESSMENT AND REINSTATEMENT

- A. The Contractor shall be responsible for confirming the locations of all branch service connections prior to installing and curing the CIPP.
- B. 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.
- C. Unless otherwise directed by the Owner, only service connections deemed "active" as identified on the plans shall be reopened by the Contractor.

3.05 INSTALLATION OF LINER

- A. The CIPP Liner shall be installed and cured in the host pipe per the manufacturer's specifications.
- B. CIPP installation shall be in accordance with the applicable ASTM standards with the following modification:
 - 1. 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.
 - 2. 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.

3. To monitor the temperature of the liner wall and to verify correct curing and where specified by the contract documents, 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 can be placed at intervals as recommended by the sensor manufacturer. Additional sensors can be placed where significant heat sinks are likely or anticipated. The sensors, if installed, 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. Temperatures wires are acceptable with a manual cure log, monitoring during the cure cycle and logged during the curing of the liner.
- C. Curing shall be accomplished by utilizing the appropriate medium in accordance with the manufacturer's recommended cure schedule. The curing source or in 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 Contractor.
1. 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 installer 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 manufacturers recommendations.
 2. 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 manufacturers recommendation as included in the PWS submission by the contractor.

3.06 COOL DOWN

- A. The Contractor shall cool the CIPP in accordance with the approved CIPP manufacturer's recommendations as described and outlined in the PWS, per section 1.03.
- B. Temperatures and curing data shall be monitored and recorded, by the Contractor, 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.
- C. The Contractor shall cool down the CIPP in accordance with the CIPP system manufacturer's recommendations and the applicable requirements of ASTM F1216, ASTM F1743, or ASTM F2019, as included in the PWS submitted and approved by the Owner. Reduction or omission of the cool down process shall not be permitted.

3.07 INTERNAL END SEALS

- A. The Contractor shall install end seals at the pipe lining beginning and termination points.
- B. The end seals shall be a mechanical expansion type, constructed of stainless steel and elastomeric seals. The end seals shall be rated by the manufacturer for the operating pressure and shall be compatible with the piped fluid. The pipe at the end seal installation point shall be structurally sound and free of any significant pitting or heavy corrosion. This is required to ensure an adequate seal between the pipe lining and the existing pipeline. Otherwise, replacement with a new steel spool piece at these ends may be required.

3.08 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 Contractor's expense, in accordance with these specifications.
- 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.
- 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 with a watertight pipe as recommended by the manufacture of the CIPP system.
- F. Internal service reconnections that have been opened greater than 100 percent of the opening shall be repaired in accordance with the CIPP manufacturer's recommendations to completely cover the overcut connection. No additional compensation will be paid for the repair of overcut service connections.
- G. Where required by the Owner, the Contractor shall backfill known voids that remain after installation of CIPP. The material shall be of the flowable fill type and shall be injected into the void while removing trapped air from the void. The Contractor shall submit the proposed method of placing the flowable fill, including pressures that will not collapse the CIPP, and the air release method to be employed, to the Owner for review before material is installed. The cost of this work shall be at the unit price bid for flowable fill and include material, equipment, and labor to complete the filling of the soil void.

3.09 MANHOLE CONNECTIONS AND REINSTATEMENT OF EXISTING SERVICES

- A. The Contractor shall install end seals at the pipe lining beginning and termination points. Locate seals at manhole/wall interface in accordance with the CIPP System manufacturer's recommendations.
- B. The end seals shall be a mechanical expansion type constructed of stainless steel and elastomeric seals. The end seals shall be rated by the manufacturer for the operating pressure and shall be compatible with the piped fluid. The pipe at the end seal installation point shall be structurally sound and free of any significant pitting or heavy corrosion. This is required to

ensure an adequate seal between the pipe lining and the existing pipeline. Otherwise, replacement with a new steel spool piece at these ends may be required.

1. Elastomeric seals, consisting of a resin mixture, or hydrophilic seal compatible with the installed CIPP may be accepted at the sole discretion of the Engineer.
- C. Reconnections of existing services shall be made after the CIPP has been installed, fully cured, and cooled down. It is the CONTRACTOR'S responsibility to make sure that all active service connections are reconnected. Existing services shall be connected internally.
- D. 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.
- E. In the event that service reinstatements result in openings that are greater than 100 percent of the service connection opening, the Contractor 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.
- F. 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.

3.10 TESTING OF 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 Contractor to the Owner for testing. All materials testing shall be performed at the Owner's expense, by an independent third party laboratory selected by the Owner 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 these contract documents.
- B. CIPP samples shall be prepared for each installation designated by the owner/engineer or approximately 20% of the project's installations. Pipe physical properties will be tested in accordance with ASTM F1216 or ASTM F1743, Section 8, using either method proposed. The flexural properties must meet or exceed the values listed in the table on page 4 of this specification, Table 1 of ASTM F1216 or the values submitted to the Owner/engineer by the contractor for this project's CIPP wall design, whichever is greater.
- C. The laboratory results shall identify the test sample location as referenced to the nearest manhole and station. 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 Contractor unless the actual physical properties and the thickness of the sample tested meet the design requirements as required in the contract.
- 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 may be submitted, by the contractor, from the manufacturer, verifying that the chemical resistance of the CIPP meets the contract requirements.
- 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 Contractor 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 that specified in the contract and submitted as the approved design by the Contractor 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 contract. The liner thickness shall have tolerance of minus 5% plus 10%. In man-entry size piping the Contractor 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 Contractor may use industry proven, non-destructive methods for confirming the thickness of the installed CIPP.
 - G. Wall thickness of samples shall be determined as described in paragraph 8.1.6 of ASTM F1743. The minimum wall thickness at any point shall not be less than 87½% of the submitted minimum design wall thickness as calculated in paragraph 5.6 of this document.
 - H. Visual inspection of the CIPP shall be in accordance with ASTM F1743, Section 8.6.
 - I. In pipeline segments with diameters of 36 inches or less, where services are either absent or have not been reconnected, the CIPP shall be tested according to Section 8.2 of ASTM F1216 or ASTM F1743, Section 7.2.1 of ASTM F2019, or by using a low-pressure air test referenced in Appendix A of this Performance Specification Guideline.

3.11 SEWER LATERAL SEALS

- A. The entire liner shall be wetout using vacuum impregnation including the lateral and mainline portions.
- B. The system shall be loaded inside and/or on a pressure apparatus. The pressure apparatus, attached to a robotic device, shall be positioned in the mainline pipe at the service connection. The robotic device, together with a CCTV camera, shall be used to align the lateral portion of the system with the service connection opening. Air pressure, supplied to the pressure apparatus through an air hose, shall be used to invert or expand the resin impregnated CIPP into the lateral pipe, and push the main-line portion of the system against the main-line pipe (typically lined pipe). The pressure shall be adjusted to the manufacturer's recommended installation pressure to fully install the CIPP into the lateral pipe and hold the system tight to the pipe walls. Care shall be taken during the curing process not to over-stress the tube.

- C. After lateral CIPP installation is completed, manufacturer's recommended pressure is maintained on the impregnated CIPP for the duration of the curing process. Curing method shall be compatible with the resin selected and shall be in accordance with manufacturer's recommendations. The initial cure shall be deemed to complete when the CIPP has been exposed to the UV light, heat source or held in place for the time period specified by the manufacturer.
- D. The Contractor shall cool (if heat cured) the hardened CIPP before relieving the pressure in the apparatus. Cool-down may be accomplished by the introduction of cool air into the pressure apparatus. Care shall be taken to maintain proper pressure throughout the cure and cool-down period.
- E. If cured by ambient-cure process, the Contractor shall maintain bladder pressure until CIPP has completely cured per manufacturer's recommendations before relieving the pressure in the pressure apparatus.
- F. The finished CIPP shall be free of dry spots, lifts and de-lamination. The system shall not inhibit the closed circuit television post video inspection of the mainline or service lateral pipes. Frayed ends of the system shall be removed prior to acceptance.
- G. Contractor shall maintain a visible, written log of all activities in accordance with manufacturers' recommendations and shall include time/location of wet out, time of insertion, time/location of lateral insertion, bladder pressure requirements, required cure time, actual cure time, and cool down duration.

3.12 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. Immediately prior to the Owner conducting the closed circuit television inspection, the Contractor 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 contractor 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 the contract.

3.13 WARRANTY

- A. The materials used for the project shall be certified by the manufacturer for the specified purpose. The Contractor shall warrant the liner material and installation for a period of one (1) year. During the Contractor warranty period, any defect which may materially affect the integrity, strength, function and/or operation of the pipe, shall be repaired at the Contractor's expense.

- B. On any work completed by the contractor that is defective and/or has been repaired, the contractor shall warrant this work for {1} year in addition to the warrantee 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.
 - 1. 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.
 - 2. If, after inspection of a portion of the lined system under the contract, problems are found, the Owner may televise all the CIPP installed on the contract. All verified defects shall be repaired and/or replaced by the Contractor at no additional cost to the Owner.

3.14 CLEAN-UP

- A. Upon acceptance of the installation work and testing, the Contractor shall restore the project area affected by the operations to a condition at least equal to that existing prior to the work.

END OF SECTION 33030

SECTION 33050 REHABILITATION OF SEWER STRUCTURES (MANHOLES)

SECTION 1 - GENERAL

1.01 DESCRIPTION

- A. This specification includes all work for manhole rehabilitation including materials and equipment required for the structural rehabilitation of sewer structures. The purpose is to eliminate infiltration, repair voids, restore structural integrity and provide corrosion protection by the application of a liner to the wall and bench surfaces of brick/concrete structures or structures produced with any other masonry construction material including grout, mortar and cement repairs.

1.02 QUALITY ASSURANCE

- A. Furnish materials of quality required by the American Society for Testing and Materials (ASTM) standards or other approved standards and specifications.
- B. Provide guarantee against defective materials and workmanship in accordance with the requirements of these specifications.
- C. The contractor installing the finished protective liner will be a certified trained applicator of the specified process.
- D. Provide verifiable independent third party creep test results documenting no less than 70% retention of flexural modulus of elasticity after 50 years of service. The third party testing firm may not be affiliated with the manufacturer in any way.

1.03 REFERENCES

- A. American Society for Testing and Materials (ASTM) Annual Book of Standards:
 - 1. ASTM D638-91: Test Method for Tensile Properties of Plastics.
 - 2. ASTM D790-91: Test Methods for Flexural Properties of Unreinforced and reinforced Plastics and Electrical Insulating Materials.
 - 3. ASTM D638 - Tensile Properties of Plastics.
 - 4. ASTM D790 - Flexural Properties of Unreinforced and Reinforced Plastics.
 - 5. ASTM D695 - Compressive Properties of Rigid Plastics.
 - 6. ASTM D4541 - Pull-off Strength of Coatings Using a Portable Adhesion Tester.
 - 7. ASTM D2584 - Volatile Matter Content.
 - 8. ASTM D543 - Resistance of Plastics to Chemical Reagents.
 - 9. ASTM C109 - Compressive Strength Hydraulic Cement Mortars.
 - 10. ACI 506.2-77 - Specifications for Materials, Proportioning, and Application of Shotcrete.
 - 11. ASTM C579 - Compressive Strength of Chemically Setting Silicate and Silica Chemical Resistant Mortars.
 - 12. SSPC SP-13/NACE No. 6 – Surface Preparation of Concrete
 - 13. ASTM - The published standards of the American Society for Testing and Materials, West Conshohocken, PA.
 - 14. NACE - The published standards of National Association of Corrosion Engineers (NACE International), Houston, TX.
 - 15. SSPC - The published standards of the Society of Protective Coatings, Pittsburgh, PA.

1.02 QUALITY ASSURANCE

A. Qualifications:

1. The lead personnel including the superintendent, the foreman and the lead crew personnel for manhole cleaning, chimney and grout sealing, and the installation of composite liners each must have demonstrated competency and experience to perform the scope of work contained in this contract.

B. Manhole Lining:

1. The manufacturer of the liner system must provide the design, installation and inspection of the liner and must have an authorized representative on site during installation.
2. Conduct panoramic manhole inspection of the existing structure before after cleaning and after lining. This work shall include all cleaning, maintaining flow, bypass pumping, and site preparation is included in this work.

1.03 SUBMITTALS

- A. Product Data: Submit product data on grout and sealant and lining system.
- B. Test Reports: Indicate vacuum testing results exfiltration testing results and electrostatic testing for pinhole leaks.
- C. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

SECTION 2 - PRODUCTS

2.01 GENERAL

- A. The materials to be utilized shall prohibit water infiltration and shall have proven resistance to a broad range of corrosive chemicals, including sulfuric acid created by hydrogen sulfide gas as well as other chemicals typically found in sanitary sewers. The materials shall be suitable for application over damp or dry surfaces without the use of a primer. The material shall have a non-sagging consistency to permit applications on vertical and overhead surfaces. The manufacturer of the corrosion protection products shall have a long proven experience in the production of the lining products utilized and shall have a satisfactory installation record.
- B. Equipment for installation of lining materials shall be high quality grade and be as recommended by the manufacturer.

2.02 CEMENTITIOUS PLUGGING AND CHEMICAL GROUTING MATERIALS

- A. General: Plugging Material shall be cementitious or polyurethane compounds capable of rapid setting under running water and/or hydraulic pressure. The products shall be designed for use un underground infrastructure and suitable for exposure to water or wastewater.
- B. Cementitious Plugging Material: Plugging Material shall be fast setting, non-shrinking and fiber reinforced calcium aluminate cement mortar capable of rapid setting under water and/or light hydraulic pressure. Material shall be capable of stopping leaks within 1 minute of

application. Plug materials shall be compatible with applications in excess of 2 inches in thickness.

1. Products

- i. Madewell Products Corporation: Mainstay ML-10 Parson
- ii. Environmental Products, Inc: Parson Quick Plug
- iii. Spectra-Grout, CCI Spectrum, LLC
- iv. Standard Cement Materials, Inc: Custom Plug Cement
- v. Or engineer approved equal

C. Chemical Grout: Chemical grouts used to plug and seal leaks in manhole walls shall consist of 2-Component Gun-Applied Polyurethane Grout Material. Material shall be self-mixing within application nozzle.

1. Products

- i. Sealing Systems, Inc.: Aqua Seal
- ii. Parsons Environmental: Seal-Tite
- iii. SealGuard, Inc.: SealGuard II
- iv. Avanti Grouts
- v. Prime Resins
- vi. Or engineer approved equal

2.03 CEMENTITIOUS REPAIR MORTAR (PATCHING MATERIALS)

A. General

1. Premixed Portland Cement or Calcium Aluminate repair mortar materials for manhole interior manhole repairs shall be high-strength, fast-setting, non-shrink cement mortar material designed for patching cracks, spalls and invert repairs.
2. Materials shall be a premixed, non-metallic, and shall have minimum one day and 28 day compressive strength of 3,000 and 9,000 psi, respectively.
3. Materials used for storm or sanitary sewers shall be suitable for wastewater exposure. Products used for potable water distribution or storage shall be NSF approved for potable water use.
4. Repair mortars shall be suitable for vertical or overhead applications except where specified for bench or invert repair only. The mortar material shall be capable of Manhole Cleaning and Rehabilitation placement of ½. per lift and by compatible with successive applications to achieve required build thickness.

B. Special Applications: The materials shall meet the following additional requirements shown below.

1. Flow Channel, Bench and Invert Repair: Material shall be rapid-setting, high early strength cementitious repair mortar capable of setting within 15 minutes and opening to flow within 1 hour.
2. Sulfide Resistant: Material designed to offer increased resistance to sulfide gas attack. Sulfide resistant mortars shall be used in all lift stations and wastewater holding tanks as well as any manholes so designated on the plans.

3. Underlayment Materials: Material shall be suitable as an underlayment for the proposed polymeric topcoat material. Top-coating with polymer or epoxy shall be permitted within 48 hours of application. Where rapid-curing materials are specified, exposure to flow shall be permitted within 24 hours of application and top-coating shall be permitted within 48 hours.

C. Manufacturers

1. Madewell Products Corporation: ML-72
2. Parson Environmental, Inc.
3. Raven Lining Systems: 705 or 755 Cementitious Repair Mortar
4. Spectra-Grout, CCI Spectrum, LLC
5. Standard Cement Materials, Inc.
6. Or engineer approved equal

2.04 EPOXY COATING PRODUCTS

A. Coatings:

1. Interior Coating: 100% Solids High-Build Epoxy with 0% VOC Content (ASTM D2584).
 - i. Chemical Resistance (ASTM D543/G20) all types of service for:
 1. Municipal sanitary sewer environment
 2. Sulfuric acid
 3. Sodium hydroxide

B. Products:

1. Raven Lining Systems
 - i. Raven 405/405UFS: 2 coats at 80 mils per coat
2. Sherwin-Williams:
 - i. Tnemec
 1. Series 435: 2 coats at 60 mils per coat

2.05 CHIMNEY SEALING MATERIALS

A. Internal Chimney Sealant

1. Two-Component Urethane Sealant appropriate for application to brick, block, precast concrete, fiberglass, or polymer substrates.
2. Approved by manufacturer for use in municipal manhole applications.
3. Products
 - i. Madewell 806 by Madewell Products Corporation
 - ii. ParsonPoxy FP by Parsons Environmental Products, Inc.
 - iii. Flex-Seal by Sealing Systems International
 - iv. Or engineer approved equal

SECTION 3 - EXECUTION

3.01 INSPECTION

- A. Verify location, size and condition of manholes identified for rehabilitation.
- B. Applicator shall take appropriate action to comply with all local, state, and federal

regulations including those set forth by OSHA, EPA, the Owner and any other applicable authorities.

- C. Prior to conducting any work, an initial inspection of the structure shall be performed to determine need for protection against hazardous gases or oxygen depleted atmosphere and the need for flow control or flow diversion.
- D. If required, submit a plan for flow control or bypass to the owner/engineer for approval prior to conducting the work..

3.02 MANHOLE INTERIOR CLEANING

- A. Clean each defective or fouled manhole interior with high velocity water jet. Remove grease, dirt, sludge, and roots. Cut flush roots not removed by water jet.
- B. Flush foreign material cleaned from interior of manhole. Remove and legally dispose of material off project site.
- C. When leaks are not readily identifiable upon completion of cleaning operation, use blower to dry manhole interior for positive identification of leaks and weep areas.

3.04 SURFACE PREPARATION AND REPAIR

- A. Conduct surface preparation program to include monitoring of atmosphere for hydrogen sulfide, methane, low oxygen or other gases, approved flow control equipment, and surface preparation equipment.
- B. Surface preparation methods may include high pressure water cleaning, hydro blasting, abrasive blasting, grinding, detergent water cleaning and shall be suited to provide a surface compatible for installation of the liner system.
- C. Surface preparation method shall produce a cleaned, abraded and sound surface with no evidence of laitance, loose concrete, brick or mortar, contaminants or debris, and shall display a surface profile suitable for application of liner system.
- D. After completion of surface preparation, perform the seven point check list, which is the inspection for:
 - 1. Leaks Ring and Cover condition
 - 2. Cracks
 - 3. Holes
 - 4. Exposed Rebar.
 - 5. Ring and cover condition
 - 6. Invert condition
 - 7. Inlet and Outlet pipe condition

3.05 INTERNAL REPAIRS

- A. Prepare surfaces to receive repairs in accordance with manufacturer's instructions
- B. Severe cracks with rapid infiltration under hydraulic pressure shall be repaired with a urethane based chemical sealant designed for use in field sealing of rapid ground water infiltration under hydrostatic pressure. Lower rate seepage infiltration may be sealed with

cementitious plugging material.

- C. Repair interior spalling, damaged inverts, exposed aggregates or rebar materials with an appropriate cementitious mortar repair material.
- D. Repair damaged and deteriorated chimneys with an appropriate cementitious mortar and top coat with an approved chimney repair material.
- E. Materials shall be hand pointed in cracks or spalls deeper than 1 inch.
- F. The material shall be trowel or pump/gun applied in deteriorated areas less than 1 inch, troweled smooth, and broom-finished.

3.04 INSTALLATION / APPLICATION

- A. Application Temperatures: Application of liner shall not be made unless the ambient temperature inside the structure is 50 degrees or higher.
- B. Bench, Invert Repair:
 - 1. The manhole bench must be sprayed but depending on availability and future plans, some judgment consideration will have to be made regarding the invert. Important issue here is the necessity to insure a monolithic system is achieved.
 - 2. After blocking flow through the structure and thorough cleaning preparatory work has been achieved. The sprayed on resin-based liner shall be applied to the invert, bench and wall areas in the same manner as specified for the liner application below. The spray shall be applied such that the entire structure receives a structurally enhanced monolithic liner.
 - 3. The finished invert surfaces shall be smooth, free of ridges and will be sloped in the direction of flow. Special care shall be used to insure a smooth transition between the new manhole invert and intersecting pipeline inverts such that flow will not be impaired.
- C. Preparation: Preparation of concrete substrate shall be in accordance with coating manufacturer's recommendations.
- D. Application:
 - 1. Follow manufacturer recommendations for maximum coating thicknesses on horizontal, vertical, and overhead surfaces. Refer to manufacturer documentation for curing and reapplication time based on substrate material, porosity, temperature and relative humidity present.
 - 2. Application procedures shall conform to recommendations of the manufacturer, including materials handling, mixing, environmental controls during application, safety and spray equipment.
 - 3. Spray equipment shall be specifically designed to accurately ratio and apply the liner system.

4. Refer to manufacturer documentation for curing and reapplication time based on substrate material, porosity, temperature and relative humidity present.
 5. Application of the liner system shall be in strict accordance with the manufacturer recommendations. The thickness of the epoxy liner shall be as specified in Article 2.06.A per the specified product. A permanent identification and date of work performed shall be affixed to the structure in a readily visible location.
- D. Curing: The structure should be allowed to cure for 24 hours and return to ambient temperature prior to any physical testing.

3.05 FIELD QUALITY CONTROL

- A. The following test/inspection will be performed by the Township Engineer.
1. Visually verify the absence of leaks from infiltration.

End of Section

SECTION 35000 – PNEUMATIC PIPE BURSTING

SECTION 1 - GENERAL

1.01 DESCRIPTION

- A. The following specifications are intended to address the installation of high-density polyethylene pipe for sewer main using pipe bursting methods and technology for sanitary sewer lines.

1.02 DEFINITIONS

- A. Pipe Bursting: Method of trenchless construction in which a bursting tool splits/fractures the existing pipe while simultaneously installing a new Polyethylene Pipe of the same size or larger using a Static or Pneumatic Pipe Bursting Technique.

1.03 SCOPE

- A. This specification addresses the installation of sewer mains by the pipe bursting method, including connecting to existing sewer mains, connecting to existing services or installing house connections. The Contractor will furnish all labor, equipment, materials, tools and appurtenances necessary or proper for the performance and completion of the contract. Inspection and payment will be by the method stipulated in the contract.

1.04 QUALIFICATIONS

- A. The Pipe Bursting Contractor will have actively engaged in the installation of pipe using pipe bursting for a minimum of three (3) years and have installed, as a company, a minimum of 50,000 feet in similar conditions.
- B. Field Supervisory Personnel employed by the Pipe Bursting Contractor will have at least (3) three years of documented experience in the performance of the work and tasks as stated in the contract document.
- C. The contractor shall be certified by the particular Pipe Bursting System Manufacturer that such a company is a fully trained user of the pipe bursting system.

1.05 SUBMITTALS

- A. The Contractors shall submit the following:
 - a. Documentation showing that personnel has three (3) years of Pipe Bursting experience with a list of a minimum 50,000 LF installed by the company including 3 sewer main projects similar or greater in scope and value to the project specified in the contract documents. Information for each supervisor and the company must include, but not be limited to, date of work, location, pipe information (i.e., length, diameter, depth of installation, pipe material, etc.), project owner information, (i.e., name, address, and telephone number, contact person).
 - b. Drawings and documents:
 - i. Shop drawings, catalog data, and manufacturer's technical data showing

complete information on material composition, physical properties, and dimensions of new pipe and fittings. Include manufacturer's recommendations for handling, storage, and repair of pipe and fittings damaged.

- ii. Certifications of personnel involved in Butt Fusion Welding.

SECTION 2 - MATERIALS

2.01 HDPE PIPE

- A. Polyethylene Plastic Pipe shall be High Density Polyethylene Pipe (HDPE) and meet applicable requirements of ASTM F714
- B. HDPE pipe and fittings will be used in accordance with the material specifications. All additional appurtenances (manholes, tees, gaskets, etc.) will meet the material specifications. All pipe installed by pipe bursting will be joined by butt fusion, electro fusion, or full circle repair clamp as detailed in paragraph B (Pipe Joining) of this section.
- C. HDPE pipe will be produced from resins meeting the requirements of ASTM D1248, designation PE3408, ASTM D3350 cell classification PE345444C, and will meet the requirements of AWWA C901 and C906. HDPE pipe will meet the minimum stability requirements of ASTM D3350. Pipe will be legibly marked at intervals of no more than five feet with the manufacturer's name, trademark, pipe size, HDPE cell classification, appropriate legend such as SDR 19 or SDR 17, ASTM D3035, AWWA C901 or C906, date of manufacture and point of origin.
- D. Sizes of the insertions to be used shall be such to renew the sewer to its original or greater than flow capacity.
- E. All pipe shall be made of virgin material. No rework material except that obtained from the manufacturers own production of the same formulation shall be used.
- F. The pipe shall be homogeneous throughout and shall be free of visible cracks, holes, foreign material, blisters, or other deleterious faults.
- G. Material color shall be white, black or whatever is specified with interior of pipe having a light reflective color to allow easier/better viewing for television inspection..
- H. HDPE Pipe shall be Iron Pipe Size (IPS) unless otherwise specified in these contract documents.
- I. Dimension Ratios: The minimum wall thickness of the HDPE pipe shall meet the following;
 - a. Minimum DR : DR 17

2.02 PIPE JOINING FOR TERMINAL SECTIONS OF HDPE PIPE

- A. The polyethylene pipe shall be assembled and joined at the site using the butt-fusion method to provide a leak proof joint. Threaded or solvent-cement joints and connections are not permitted. All equipment and procedures used shall be in strict compliance with

the manufacturer's recommendations. Fusing shall be accomplished by personnel certified as fusion technicians by a manufacturer of polyethylene pipe and/or fusing equipment

- B. Terminal sections may also be joined by Electrofuse Couplings by Central Plastic Company, Friatec, or approved equal.
- C. Terminal sections may also be joined by Full Circle Repair Clamps by Smith Blair, JCM, or approved equal.

2.03 MATERIALS FOR SEALING MANHOLES

- A. The annular space at each manhole may be sealed with Oakum saturated with Avanti 202 or approved equal and covered with a quick setting grout.
- B. The annular space at each manhole may also be sealed with a water stop gasket by Fernco Company or approved equal and finished with a quick setting grout.

2.04 EQUIPMENT

- A. The pipe bursting unit shall be designed and manufactured to force its way through the existing line by fracturing the pipe and compressing the broken pieces into the surrounding soil as the equipment progresses. The bursting unit shall generate sufficient force to burst and compact the existing pipeline. In each case the pipe bursting unit shall pull the polyethylene pipe with it as it moves forward.

SECTION 3 - EXECUTION

3.01 GENERAL

- A. The Contractor shall provide flow diversion with pumps adequate in size and capacity to handle all flows generated during the pipe burst process.
- B. The Contractor shall be responsible for continuity of sanitary sewer service to each facility connected to the section of sewer during the execution of the work.
- C. If sewage backup occurs and enters buildings, the Contractor shall be responsible for clean-up, repair, property damage cost and claims
- B. Excavation of insertion pits shall be at locations determined by the Contractor.
- C. Insertion pits shall be of sufficient length to allow the bursting head and new HDPE pipe to enter the host pipe at an angle that will maintain the grade of the existing sanitary sewer.

3.02 PREPARATION

- A. Pre-CCTV Inspection has been completed by Owner and records are provided for reference. The section of sewer being pipe burst does not have existing service connections.

- B. Contractor responsible to review Pre-CCTV Inspection records and include all associate costs for removal of any anticipated obstructions, sags/humps, or any other obstacle that may prevent installation of pipe as specified shall be included.

3.03 INSTALLATION AND APPLICATION

- A. Equipment used to perform the work shall be located away from buildings so as not to create noise impact. Provide a silent engine compartment with the winch to reduce machine noise as required to meet local requirements.
- B. The Contractor shall install all pulleys, rollers, bumpers, alignment control devices and other equipment required to protect existing manholes, and to protect the pipe from damage during installation. Lubrication may be used as recommended by the manufacturer. Under no circumstances will the pipe be stressed beyond its elastic limit. Winch line is to be centered in pipe to be burst with adjustable boom.
- C. The polyethylene pipe shall be assembled and joined at the site using the butt-fusion method to provide a leak proof joint. Threaded or solvent-cement joints and connections are not permitted. All equipment and procedures used shall be in compliance with the manufacturer's recommendations. Fusing shall be accomplished by personnel certified as fusion technicians by a manufacturer of HDPE pipe and/or fusing equipment.
- D. The butt-fused joint shall be in true alignment and shall have uniform rollback beads resulting from the use of proper temperature and pressure. The joint shall be allowed adequate cooling time before removal of pressure. The fused joint shall be watertight and shall have tensile strength equal to that of the pipe. All defective joints shall be cut out and replaced at the expense of the Contractor.
- E. Service connections to the HDPE pipe shall be made with materials submitted and approved in accordance with Paragraph 2. Materials.
- F. An appropriate relaxation period shall be allowed prior to making service connections and connecting to manholes. The relaxation period shall be appropriate with and dependent upon site conditions, as determined by Contractor.
- G. If concrete encasements are encountered, a point repair shall be performed to excavate and break out concrete prior to the bursting operation to allow the steady and free passage of the pipe bursting head, with approval from the Owner/Engineer. Separate payment for this work will be made and it is not considered incidental to the pipe bursting process.
- H. The new HDPE pipe shall be inserted immediately behind the bursting head in accordance with the manufacturer's recommended procedures. The bursting tool shall be specifically designed and manufactured for the type of insertion process being used. It shall be utilized to guide and assist the bursting head during the operation. A pushing machine may be utilized to aid pipe insertion from the rear.
- I. New HDPE pipe shall extend a minimum of 6" into each manhole. The annular space shall be sealed at each manhole with Oakum saturated with Avanti 202 or a Water Stop Gasket (as described in Paragraph 2) and finished with a quick setting grout.

3.04 PIPE JOINING

- A. The polyethylene pipe shall be assembled and joined at the site using the butt-fusion method to provide a leak proof joint. Threaded or solvent-cement joints and connections are not permitted. All equipment and procedures used shall be used in strict compliance with the manufacturer's recommendations. Fusing shall be accomplished by personnel certified as fusion technicians by a manufacturer of polyethylene pipe and/or fusing equipment.
- B. The butt-fused joint shall be true alignment and shall have uniform roll-back beads resulting from the use of proper temperature and pressure. The joint shall be allowed adequate cooling time before removal of pressure. The fused joint shall be watertight and shall have tensile strength equal to that of the pipe. All joints shall be subject to acceptance by the engineer and/or his representative prior to insertion.
- C. All defective joints shall be cut out and replaced at no cost to the owner. Any section of the pipe with a gash, blister, abrasion, nick, scar, or other deleterious fault greater in depth than ten percent (10%) of the wall thickness, shall not be used and must be removed from the site. However, a defective area of the pipe may be cut out and the joint fused in accordance with the procedures stated above. In addition, any section of the pipe having other defects such as concentrated ridges, discoloration, excessive spot roughness, pitting, variable wall thickness or any other defect of manufacturing or handling as determined by the Engineer and/or his representative shall be discarded and not used.
- D. Terminal sections of pipe that are joined within the insertion pit shall be connected with Central Plastics Electrofusion Couplings or connectors with tensile strength equivalent to that of the pipe being joined.

3.05 SERVICE RECONNECTIONS

- A. No existing service reconnections to be completed within this specified replacement section.

3.06 TESTING AND ACCEPTANCE

- A. After the new HDPE pipe is installed and all services are reconnected, the line shall be inspected by CCTV (performed by owner). Contractor responsible to clean sewers for completion of Post-CCTV video prior to approval and acceptance of line.

End of Section

SECTION 1

GENERAL REQUIREMENTS

1.01 PROJECT DESCRIPTION

Work includes the following major items:

- Approximately 650 LF of 12" vitrified clay (VC) by method of cured in place pipe (CIPP) technology, including repair and reinstatement of existing service laterals.
- Approximately 400 LF of 10" truss pipe by method of cured in place pipe (CIPP) technology, including repair and reinstatement of existing service laterals.
- Approximately 50 LF of 12" VC to be replaced with 14" HDPE DR 17 (IPS) by method of pneumatic pipe burst technology.

1.02 DEFINITIONS

The intent of this section is to identify certain persons involved in the project.

DPW	The agency performing the system operations and maintenance typically identified as a Department of Public Works.
Township Engineer	Engineer whose services are procured by the Township to review sanitary sewage and/or water system plans and installation methods. When the Township is the owner, the engineer will function as the owner's engineer.
Design or Owner's Engineer	Engineer who provided the sanitary sewage and/or water system design, plans and specifications for the owner.
Owner	Project developer or Township who is having sanitary sewage and/or water facilities installed.
Contractor	Contractor is prime Contractor who is so identified by the Owner and is responsible for the sanitary sewage and/or water system facilities installation.
Township	The governing Township (Acme, East Bay, Garfield, Peninsula, Elmwood) that the work is being performed in.

1.02 QUALIFICATIONS

The contractor shall agree to the terms and conditions stipulated by the Township. The contractor shall provide the following for consideration to meet qualifications in addition to those stated in the specifications.

- a) Provide a schedule for completion of the work.
- b) Provide a minimum of three (3) references for similar municipality/commercial projects located within Michigan and completed within the last two (2) years.

PRECONSTRUCTION CONFERENCE

Prior to commencement of any construction activities involving the sanitary sewer system and/or water system, a principal member representing the Owner, the Contractor, the Design Engineer, the Township Engineer and the County DPW shall meet at a pre-determined location and time to discuss the project. It shall be the responsibility of the Owner or his/her Design Engineer to organize this meeting. At that time, the Contractor schedule, as well as the Township Engineer's requirements, will be discussed to obtain a mutual understanding of the project and the Township's inspection process.

1.03 LINES AND GRADES FOR CONSTRUCTION

The Owner (his Contractor and/or Engineer) shall provide adequate lines and grades for construction of the sanitary sewer and/or water main prior to installing the utilities.

1.04 PROGRESS SCHEDULE

The Owner shall, as soon as practical, prepare and submit to the Township Engineer three (3) copies of the Progress Schedule regarding sanitary sewer and/or water main construction. This schedule shall show in a clear, graphical manner the proposed date for commencement, progress and completion of the work.

1.05 INTERFERENCE WITH EXISTING WATER AND/OR SEWAGE SYSTEM

No disruption to existing services will be allowed unless coordinated and approved by the Township. The Contractor shall provide a plan of work including bypass plan to the Township Engineer and DPW for approval before starting work on any phases of the project which might involve existing water or sewage facilities.

1.06 RELATIONS TO OTHER CONTRACTORS AND UTILITY FORCES

The Contractor shall so conduct his operations as not to interfere with or injure the work of other contractors or adjacent force account work, and he shall promptly

SECTION 1
GENERAL REQUIREMENTS

make good any injury or damage which may be done to such work by him or his employees or agents.

The Contractor shall grant to other contractors and forces necessary means of access to their work.

1.07 PERMITTING AGENCIES

The Contractor shall perform all work in accordance with any and all applicable permit requirements. The Owner or his Design Engineer shall present the Township Engineer with a copy of all documentation and calculations for the permit process. The Township, with the assistance of the Township Engineer, will obtain the necessary EGLE Act 399 and/or Part 41 permits for construction/installation prior to commencement of any work. The contractor and/or developer shall be responsible for all other local, state and/or federal permits.

1.08 ACCESS TO WORK

The Township Engineer or Township Resident Project Representative shall have access maintained to all sanitary sewer or water main work at all times. Proper notification (48 hours) shall be given to the Township Engineer prior to the start of any construction or testing.

1.09 SUBMITTALS

Submittals of all equipment shall be issued to the Design Engineer during the submittal review stage for their approval. The Design Engineer shall indicate their approval in writing and then forward these to the Township Engineer prior to any preconstruction meeting for their review regarding compliance with the Township requirements. The Township Engineer will not perform a technical review. That shall remain the responsibility of the Design Engineer. The Contractor should supply copies* of all equipment submittals to the Design Engineer. Final record submittals shall be issued to the Township Engineer as part of the close-out procedure in accordance with the close-out section of these specifications. *Digital or hard copies are acceptable, as coordinated with Design/Township Engineer.

1.10 STREAM CROSSINGS

Stream crossings shall be performed in accordance with all permit requirements of the regulatory agencies and Technical Specifications.

1.11 DUST AND NOISE REDUCTION

The Contractor shall keep dust and noise from construction operations to a minimum. A dust palliative shall be used on disturbed road sections prior to surfacing if so determined by the Township Engineer.

1.12 MATERIAL CERTIFICATION

Manufacturer's certification slips shall be submitted to the Township Engineer for all pipe, manholes, fittings, etc. used in the installation of sanitary sewer or water mains prior to installation. This is to verify that the product meets applicable standard specifications required.

1.14 MAINTENANCE BOND REQUIREMENTS

The Contractor shall supply the Owner and Township with a maintenance bond for 50% of the cost of the installation of the sanitary sewer and/or water system that is to be turned over to the Township. The maintenance bond shall be effective from the date of Township acceptance for a period of one (1) year.

1.15 INSURANCE REQUIREMENTS

For any project requiring Township inspection, the Contractor shall provide proof of insurance to the Township Engineer in the type and amounts required by the Township prior to start of the construction. In addition to the Township, the Grand Traverse County DPW and Township Engineer shall be named as additional insured.

1.16 ESCROW FOR TELEMETRY REQUIREMENTS

When telemetry equipment is required, the owner of the project will be required to provide an upfront funds above and beyond the construction contract price for standard telemetry equipment. Amount shall be determined by the Grand Traverse DPW and made payable to the Township in advance of project initiation through an escrow. If the owner of the project is the Township, this work shall be completed by the DPW Integrator of Record with costs incorporated into the project and contract. This equipment will be integrated into the Grand Traverse County DPW network of monitoring systems. The types of units this may apply to include submersible lift stations, well houses, water booster stations, and pressure reducing valve vaults.

SECTION 2

STANDARDS AND REGULATIONS

2.01 REFERENCE STANDARDS

- A. Throughout these specifications, reference is made to various standard specifications. Such reference gives the serial designation. The latest revised specification shall apply in all cases. These standard specifications, where applicable, shall be binding on all construction activities.
- B. The following specifications and standards form part of this specification to the extent indicated by reference thereto or for quality of workmanship and materials required under the contract.

American Society of Testing Materials	(ASTM)
American Water Works Association	(AWWA)
American National Standards Institute, Inc.	(ANSI)
Michigan Department of Transportation	(MDOT)
American Society of Mechanical Engineers	(ASME)
American Concrete Institute	(ACI)
National Concrete Masonry Association	(NCMA)
Truss Plate Institute	(TPI)
National Electrical Code	(NEC)
MI Dept of Environment, Great Lakes, & Energy	(EGLE)
National Fire Code	(NFC)
Underwriters Laboratories	(UL)
National Sanitation Foundation	(NSF)

2.02 REGULATORY REQUIREMENTS

- A. All construction work, alterations, repairs or mechanical installations and appliances connected herewith shall comply with all the State Rules and Regulations and local ordinances and such other statutory provisions pertaining to this class of work. Such Rules and Regulations and local ordinances are to be considered a part of these specifications by reference.
- B. All electrical work shall be in accordance with the latest edition of the National Electrical Code, the National Electrical Safety Code and applicable state and local codes. This shall not be construed to permit a lower grade of construction where the plans and specifications require workmanship or materials in excess of code requirements. All electrical equipment, wiring, cable, pre-assembled electrical panels, and materials shall be listed by Underwriters Laboratories, Inc.

PROJECT CLOSE OUT

3.01 CLEANUP

Before final acceptance of the sanitary sewer system or water main system work, the Contractor shall remove all false work, excavated or useless materials, and rubbish, and restore to presentable condition per the restoration specifications and satisfactory to the Township Engineer, all property, both public and private, which may have been used or damaged during the installation of the sanitary sewer or water system work.

3.02 OPERATING AND MAINTENANCE DATA

The Contractor shall furnish written instructions for the operation and maintenance of the equipment furnished at the time of submittal of shop drawings. The instructions shall be short, easy to understand, with directions specifically written for this project, describing the various possible methods of operating the equipment. The instructions shall include procedures for tests required, adjustments to be made and safety precautions to be taken with the equipment. Maintenance instructions shall include test and calibration charts, exploded views of assembled components and spare parts lists. At least two (2) bound paper copies and two (2) pdf copies on a flashdrive of the instruction booklets shall be furnished for each separate piece of equipment. These shall be transmitted to the Township Engineer as part of the close out of the project.

A. Pumps

Include the manufacturer's technical specification of the pump along with the application for the pump, the manufacturer's warranty certificate, installation instructions, serial numbers for all pumps, pump performance curve, pump trouble shooting guide and the pump efficiency rating.

B. Control Panel Operation and Maintenance Manual

Include the electrical panel legend, bill of material report, catalog cut sheets indicating make and model of all general accessories, installation instructions for the control panel, recommended spare parts, installation instructions for general accessories and a maintenance frequency chart.

C. Electrical Wiring

A color coded drawing of the as-installed electrical schematic shall be submitted for all electrical work performed as part of the project.

3.03 GUARANTEE

The Contractor shall guarantee all materials and equipment furnished and work performed for a period of one (1) year from the date of Township Acceptance. The Contractor shall warrant and guarantee for a period of one (1) year from the date of Township Acceptance of the system that the completed system is free from all defects due to faulty materials or workmanship. The Contractor shall promptly make such corrections, as may be necessary including the repairs of any damage to other parts of the system resulting from such defects. The Owner or Township, if they have taken over the system, will give notice of observed defects with reasonable promptness. In the event that the Contractor should fail to make such repairs, adjustments or other work that may be made necessary by such defects, the Owner or Township may do so and charge the Contractor the cost thereby incurred. Refer to the templated Letter of Guarantee to be included with final close-out documents (Appendix 5).

The Contractor shall supply a one (1) year maintenance bond per the "General" section of these specifications. Refer to Appendix 3

3.04 FINAL COMPLETION/ACCEPTANCE OF PROJECT BY TOWNSHIP

A. Township Projects

Final payment will not be made to the Contractor until all close out documents have been received and approved by the Township Engineer. These items are listed in Section 3.04.C.

B. Private Projects

The Township will not accept the facility or allow connections to or use of the facilities until all close out documents have been received and approved by the Township Engineer. These items are listed in Section 3.04.C

C. Closeout Documents (As applicable)

1. Punch list items satisfactorily completed.
2. Maintenance bond. (Valid for a period of one year from the date of Township acceptance of the system – Refer to Appendix for Example).
3. Letter of Guarantee (Refer to Appendix 5 for Example).
4. Recorded Easements (Refer to Appendix for Example Template).

A. Easements are to be prepared and reviewed by the Township Engineer for accuracy prior to finalizing. The developer shall be responsible for recording with Grand Traverse County including fees. The document shall meet the following criteria:

- Minimum 2 ½ inch margin at top of first page (only) for recording stamps. All other margins can be ½ inch.
- Minimum 10 pt font size.
- Documents must be signed and notarized with printed names, and position with company if applicable.
- Name and address of person who drafted the document.

5. Descriptions of the facilities for a bill of sale.
6. Certification by the Engineer reviewing the installation.
7. Sanitary Sewer Lead Reports.
8. Water Service Lead Reports.
9. Water Valve Reports.
10. Hydrant Reports.
11. Testing reports including water analyticals, pressure tests, and sewer mandrel / televising videos
12. Operation and Maintenance Manuals
13. Record Drawings

A. Record drawings (2 sets of paper copies (24" x 36"), one (1) digital copy (AutoCad/ArcView GIS format) and one (1) in pdf shall be submitted to the Township along with hydrant and valve reports, water service lead reports, and sanitary sewer lead reports, as applicable to the project.

Digital Submittal Format Requirements: The developer shall submit to the Township a digital copy of the Record Drawings (as described in Section 3.04.B Item 12B of the Technical Specifications) in one of the following formats:

1. AutoCAD (.DWG) release 2004 or higher
2. ArcView GIS format (.SHP)

All digital record drawings must be submitted utilizing the appropriate Michigan State Plane coordinate system (i.e. NAD 1983 State Plane Michigan Central). No local coordinate systems are allowed.

B. Record Drawings: drawings shall consist of plan and profile, refer to Approval and Design Guidelines for additional information. Sanitary sewer leads and water service leads shall be re-drawn in the actual location along with the mainline structures and piping. Hydrant, valve and manhole numbering sequences shall be obtained from the Township Engineer. Each structure installed, such as manholes, water service leads, hydrants, valves, sewer leads,

bends, tees, or other structures placed shall have 3 physical measurements from structures which are to be shown on the plans along with survey and/or gps coordinates and elevations. Lead measurements are to be placed on the individual reports. Survey and/or gps information shall be included in the digital record drawing or provided in shapefile format. Sanitary sewer profiles shall include manhole number, rim and invert elevations, distances between structures, size and type of pipe. Water main profiles shall include hydrant and valve number and rim elevations, all fittings, horizontal/vertical, and the accurate depth of placement. All profiles shall show conflict with existing utilities. Sanitary sewer lead and water service lead information shall be placed in a table format on the record drawings. Each plan sheet shall have a separate table for the type of lead shown on that sheet. See Table 3.1 and Table 3.2 for examples.

C. For projects completed in multiple phases, the developer shall submit to the Township record drawings for each phase as completed and a final record drawing set that includes all phases consistent with Section 12.A.

Table 3.1

SEWER LEAD NUMBER	DISTANCE FROM DOWNSTREAM MANHOLE	DISTANCE FROM SEWER TO END OF LEAD AT PROPERTY LINE OR EASEMENT LINE	DEPTH BELOW GRADE

Table 3.2

WATER SERVICE LEAD NUMBER	DISTANCE FROM GATE VALVE OR FIRE HYDRANT. INCLUDE VALVE OR HYDRANT NUMBERS.	DISTANCE FROM WATER MAIN TO END OF LEAD AT PROPERTY LINE OR EASEMENT LINE	CURB STOP RIM ELEVATION	CURB STOP COORDINATES

GRAND TRAVERSE COUNTY

WATER/SEWER SYSTEM CLOSEOUT CHECKLIST

Section 3 of the current specifications outline in detail the information to be submitted for close out of the project. The following checklist is being provided as a convenience to the developer completing the project and does not relieve the developer from reviewing the appropriate section (s) in the specifications.

Check If Completed:

	Description	Reference Specification	Task Completed
1	Letter of Guarantee (see Appendix 5 for example format)	3.03, 3.04.C.3 Appendix 5	
2	1-Year Maintenance Bond Valid for 1-Year from Township Acceptance of System(see Appendix 3 for example format)	1.14, 3.04C.2 Appendix 3	
3	Material Certifications (project and funding specific, AWWA, ASTM, etc.)	1.13	
4	Shop Drawings	1.10	
5	Letter from Developer Outlining Project Costs including permitting, engineering, and construction (without service leads)		
6	Affidavit of Completion/Consent of Surety (See attached format)		
7	Inspector Daily Reports		
8	Description of facilities for a Bill of Sale	3.04. C.5.	
9	Certification of Acceptance by Developer or Developer's Engineer Reviewing Installation	3.04. C.6.	
10	Water Service Lead Reports	3.04. C.8	
11	Water Valve Reports	3.04. C.9	
12	Fire Hydrant Reports	3.04. C.10	
13	Sanitary Sewer Service Lead Reports	3.04. C.7	
14	Operation and Maintenance Manuals (if applicable)	3.04. C.11	
15	Water Main / Force main Pressure Test Results	9.07.C / 8.05	
16	Water Sample Analytical Results	9.07. D	
17	Survey Field Notes		
18	Electronic Copy of Record Drawings in AutoCAD .dwg or ArcView GIS and .pdf Formats (See Section 3 of specification for additional requirements)	3.04.C.12.A	
19	Paper Copy of Record Drawings (See Section 3 of specification for additional requirements)	3.04. C.12.A	
20	Easements including Descriptions, Recorded	3.04. C.4	
21	Sanitary Sewer Mandrel Test Results	6.03. J.2	
22	Sanitary Sewer Air Test Results	6.03. J.1	
23	Gravity Sewer Television Inspection Videos (if applicable)	6.03. J.3	
24	EGLE Part 41 / Act 399 Issued Permits		

SECTION 3
PROJECT CLOSE OUT

25	Completion of Punch List Items	3.04. C.1	
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REPLACEMENT AND CLEANUP

13.01 SCOPE OF WORK

Under this item, the Contractor will restore all lawns, trees, gardens, landscape plantings, sidewalks, ramps, trails, fences, commercial signs, water courses and sand, gravel, dirt, asphalt and concrete roads, catch basins, storm sewers, building sewers, water services, water valve boxes, meter vaults, property markers (such as concrete monuments, irons, stakes, pipes, etc.), mailboxes and other items which may be damaged during the course of construction. All replacement and cleanup work will be incidental to the project except those items of work that are delineated in the bid proposal.

All restoration work shall attempt to return the existing facilities to their original condition. Substitutions, such as gravel instead of grass, will not be allowable.

The Contractor shall pay special attention to the requirements of Act 347, "Soil Erosion and Sedimentation Control". In all construction work the Contractor shall take all precautions necessary to prevent erosion and to conform to the requirements of Act 347. Should erosion occur within the guarantee period, the Contractor shall regrade and reseed the disturbed area at no additional cost to the Owner.

Replacement and cleanup operations shall follow immediately behind the construction work. The Contractor shall make every effort to keep the job site clean and free of trash and miscellaneous building materials. The Contractor shall pay special attention in order to restore commercial signs, fences, etc. and to patch and repair pavement, driveways and sidewalks immediately after the construction work. In the event that replacement and cleanup work does not proceed in a satisfactory manner, the Owner may withhold periodic payments or close the construction area until such time as the replacement and cleanup is satisfactory. An exception may be made if there are physical limitations which do not allow for immediate replacement and cleanup.

13.02 PAVEMENT RESTORATION

A. General

All permanent pavement restoration shall be done over compacted backfill and a minimum six (6) inches thick compacted M.D.O.T. 22A gravel base. The gravel base shall be placed and maintained in accordance with the M.D.O.T. Standard Specifications. All patches shall have square, neat, saw cut edges regardless of the final surfacing method planned for that section of the pavement restoration.

No patching work shall be started until the subgrade has been properly prepared. Prior to laying the bituminous patch, the adjacent road surfaces shall be swept clean of all foreign materials and the patch area and pavement primed with Michigan Department of Transportation's approved prime coat.

A bituminous bond coat shall be placed between successive lifts of the bituminous patch and bituminous surfacing. Each lift shall be thoroughly compacted before adding the next lift. This includes running the compaction roller longitudinally along the entire length of the joints between the patch and the existing pavement.

The bituminous mixture to be furnished under these specifications shall be delivered to the paver at a temperature no lower than 250 F. Any mixture that has a temperature below 250 F at the time of "laying" shall be rejected and hauled from the project.

Temporary road patches shall be gravel or bituminous cold patch. The patches shall be maintained in a smooth condition until final repairs are made.

The Design Engineer, Township Engineer and the County Road Commission shall be notified at least two (2) working days prior to the placement of any and all final pavement overlays.

Aggregate for mixes shall conform to Grand Traverse County Road Commission/Leelanau County Road Commission current standards where applicable.

B. Bituminous Patching

Existing asphalt roads and driveways shall be patched using the current Road Commission standards. All patches shall be placed in two lifts of 165 pounds per square yard, each using 4EL. A bituminous prime coat of 0.25 gallons per square yard and a tack coat of 0.10 gallons per square yard shall be used for all bituminous patches. Shoulders shall be restored to their original width and depth in accordance with M.D.O.T. Standard Specifications using M.D.O.T. 23A gravel.

C. Gravel Roads, Driveways and Shoulders

All gravel roads shall be restored in accordance with M.D.O.T. Standard Specifications using six (6) inches of M.D.O.T. 22A gravel. Shoulders shall be restored to their original width and depth in accordance with the current M.D.O.T. Standard Specification 3.09 using M.D.O.T. 23A gravel. Shoulders shall be raised on the side opposite of sewer construction to match new pavement surfaces.

D. Concrete Pavement, Sidewalk and Driveways

Concrete for restoring pavement, sidewalks, and driveways shall attain a 28-day strength of 4,000 pounds per square inch. Neat edges of patch areas shall be obtained by the use of a concrete saw. Concrete mixing aggregates and curing methods shall conform to Concrete section. Concrete patches shall match the original width and depth and in no case, a depth less than four (4) inches. Sidewalks shall have contraction joints a distance apart equal to the width of the slab.

13.03 GRASS AREA

Grass areas shall be considered as two types: A) Type 1, areas which had lawns before construction, and B) Type 2, open fields or ditches not adjacent to established lawns. The plans may specifically call for Type 1 mixtures in which case the plans will govern. If there is a question as to which mixture to use, the Design Engineer shall make the final decision.

Terraces, lawns, ditches, open fields and other grassy areas shall be topsoiled, fertilized, seeded and mulched in such a manner that a grass approximately equal in type and density of the original is obtained. Slopes between 1:3 and 1:2 shall be sodded and staked or receive seed with mulch blankets.

A. Topsoil

Topsoil furnished shall consist of dark brown or black loam, clay loam, silt loam, or sandy loam surface of fertile, friable humus soil of mineral organics, not including peat or muck. Soil shall be screened topsoil, free of stones, roots, sticks and any other extraneous materials. All topsoil furnished shall be approved by the Design Engineer. Type 1 areas shall be topsoiled to a depth of four (4) inches and Type 2 areas to a depth of two (2) inches.

B. Seeding and Fertilizing

Areas to be seeded and fertilized shall be carefully raked to even surfaces and all stones, sticks and other debris removed.

The area to be seeded shall be fertilized with agricultural fertilizer 12-12-12 analysis, Davco or Agrico or equal, applied on the prepared surface at the rate of 20 pounds per 1,000 square feet. Fertilizer shall be harrowed or raked into the soil to a depth of not less than one (1) inch.

Seeds shall be furnished in durable bags. On each bag of seed, the vendor shall attach a tag giving name, lot number, net weight of contents, purity and germination. All seed shall be thoroughly mixed and sown in a method which will ensure uniform distribution. Seeding during high winds or inclement weather will not be permitted. All seed is to be raked in and

compacted. The seed shall be sown at the rate of five (5) pounds per 1,000 feet. The seeding mixtures shall be composed of certified seed of the purity, germination and proportions by weight as specified in the following table:

Kind	SEEDS		MIXTURES	
	Minimum Purity	Minimum Germination	Type I	Type 2
Perennial Rye Grass	98%	90%	20%	50%
Kentucky Blue Grass	90%	75%	60%	15%
Creeping Red Fescue	98%	80%	20%	35%

C. Mulching

Immediately after seeding all seeded areas, Type 1 and Type 2 shall be mulched with unweathered small grain straw or hay spread uniformly at a rate of 100 pounds per 100 square feet (two tons per acre). Hydroseeding method with similar application rate will be allowed.

D. Mulching Anchoring

All mulch shall be anchored using one of the following methods. The Contractor may use either method unless otherwise shown on the plans.

1. Method "A": The straw mulch shall be anchored by applying one of the following asphalt products at the rate shown. The asphalt may be blown on with the mulch or sprayed on immediately after the mulch is spread.

<u>Asphalt Product</u>	<u>Application Rate</u>
Liquid Asphalt R.C. 1, 2 or 3; M.C. 2 or 3	0.10 gal. per S.Y.
Emulsified Asphalt R.S. 1 or 2; M.S. 2; or S.S. 1	0.04 gal. per S.Y.

2. Method "B": A "Terra-Tak" mulch binder may be used in lieu of asphalt. Mixing and application shall be done in accordance with the manufacturer's recommendations.
3. Method "C": In areas with slopes greater than 10% or where shown on the plans, the Contractor shall place mulch netting or excelsior blanket mulch.

- a. Mulch Netting: Mulch shall be anchored by the use of mulch netting. The light weight fibrous netting shall be properly placed over the mulch and secured to the ground using wire staples, spaced per manufacturer's recommendations.
- b. Excelsior Blanket Mulch: An excelsior blanket shall be used in lieu of other mulch. The excelsior blanket shall be a consistent thickness of evenly distributed wood excelsior fibers, 80% of which are six (6) inches or more in length. The top side of the blanket shall be covered with a coarse net of twisted Kraft paper or biodegradable extruded plastic mesh. Ends and sides shall be securely butted and stapled with U-shaped wire staples of a size and length suited to the soil conditions.

13.04 DITCHES

Ditches which have been grassed and maintained by the abutting property owner shall be restored to the current Grand Traverse County/Leelanau County (where applicable) specifications.

Ditches in which culverts or drain tile have been installed shall have the same tile replaced, if in good condition, or a tile satisfactory to the Design Engineer installed in its place at the original line and grade.

Catch basins shall be reconstructed, if removed or damaged.

13.05 FENCE REPLACEMENT

- A. Chain Link Fence shall be replaced according to M.D.O.T. specifications.
- B. Other Fences shall be replaced equal to and of the same type as existing.
- C. Salvaged material, if approved by the Engineer, may be used for replacement.

13.06 COMMERCIAL SIGNS

Commercial signs, which must be removed by the Contractor in order for work to proceed, shall be replaced and reconstructed to original condition. It is very important that replacement follow immediately behind the construction work.

13.07 BUILDING SEWERS

Building sewers shall include any and all parts of private residential, commercial or industrial sewage disposal system such as sewer pipe, septic tanks, drainfield, etc. Whenever the service of any such facility is interrupted because of the Contractor's operations, he shall provide such interim methods of sewage disposal as are required to maintain a safe, nuisance free, non-polluting construction operation.

13.08 OTHER DEBRIS

The Contractor shall remove, at his own expense from the site, any and all broken pipe, bricks, blocks, lumps of concrete, broken machinery, cans, containers, and other trash and debris.

13.09 TREES

The Contractor shall endeavor to save as many trees as possible. Cut trees, including stumps, shall be disposed of by the Contractor. Any elm tree which is removed must be burned. Tree branches which become broken shall be removed by cutting off flush with trunk and the cut on the trunk shall be painted with an approved tree paint. Where removal of a stump would result in damage to existing utilities, the stump may be removed by chipping to a depth of at least one foot below the finished ground surface.

Trees removed by the Contractor and where approved by the Engineer shall be replaced with a reasonably sized tree of the same variety. Trees along the State Highways and County Roads that fall on the property line or in the road right-of-way shall be replaced at a new location off the right-of-way.

Replacement trees of the deciduous or hardwood type shall be furnished from nursery stock, at least 2 to 2½ inches in diameter, and shall have the roots contained in a ball of soil and wrapped in burlap.

Replacement trees of the evergreen type may be furnished from either nursery or native stock, at least 8-10 feet in height, and shall have roots contained in a ball of soil and wrapped in burlap.

Pipe Master Data

Location

Drainage Area	Street	Cass RD
Pipe Segment Ref. A-20 - A-14	City	Traverse City
Location Code		
Location Details		

Pipe

Pipe Use	Sanitary Sewage Pipe
Height (Diameter)	12 in
Width	
Shape	Circular
Material	Polyvinyl Chloride
Lining Method	
Coating Method	
Pipe Joint Length	
Total Length	27.920 ft
Year constructed	
Year Renewed	

Manholes

upstream

Downstream

Number	A-20	A-14
Rim to Invert		
Rim to Grade		
Grade to Invert		
Northing		
Easting		
Elevation		
Coordinate System		
Vertical Datum		
GPS Accuracy		

PACP Inspection Report

General information

Project	P/O Number	Reviewed by
Owner	Work Order No.	Certificate No.
Customer		
Purpose of Survey	Sewer System Evaluation Survey (SSES)	
COF		
Pressure Value		
Surveyed by	Nathan Dale	Date 8/18/2026
Certificate No.	1234	Weather Dry - No precipitation during survey
Inspection Status	Complete Inspection	Pre-cleaning No Pre-Cleaning
Inspection Tech.		Date Cleaned
		Flow Control Not Controlled
Direction of Survey	Downstream	

Location

Drainage Area	Street	Cass RD
Pipe Segment Ref. A-20 - A-14	City	Traverse City
Location Code		
Location Details		

Pipe

Pipe Use	Sanitary Sewage Pipe
Height (Diameter)	12 in
Width	
Shape	Circular
Material	Polyvinyl Chloride
Lining Method	
Coating Method	
Pipe Joint Length	
Total Length	27.920 ft
Length Surveyed	27.920 ft
Year constructed	
Year Renewed	

Manholes

upstream

Downstream

Number	A-20	A-14
Rim to Invert		
Rim to Grade		
Grade to Invert		
Northing		
Easting		
Elevation		
Coordinate System		
Vertical Datum		
GPS Accuracy		

Distance	Video Ref.	Code	Description	Cont. Defect	Value		Grade	Joint	Circumferential Location		Image	Remarks	
					Dimension				%	From			To
					1st	2nd							
0.00	00:00:00	AMH	Access Point Manhole								008	A-20	
0.00	00:00:10	MWL	Miscellaneous Water Level			30					009	constant flow	
1.54	00:01:02	TFA	Tap Factory Activity		6				03		010	Switched to Clay Pipe	
14.24	00:01:52	TFA	Tap Factory Activity		6				03		011	Switched back to PVC Pipe	
20.57	00:02:36	TFA	Tap Factory Activity		6				03		012	Switched back to clay pipe	
27.92	00:04:34	AMH	Access Point Manhole								013	Unable to go past this point	

Quick Rating

QSR	QMR	QOR
0000	0000	0000

Overall Rating (OR)

Structural	O&M
0	0

Rating Index (RI)

Structural	O&M
0.0	0.0

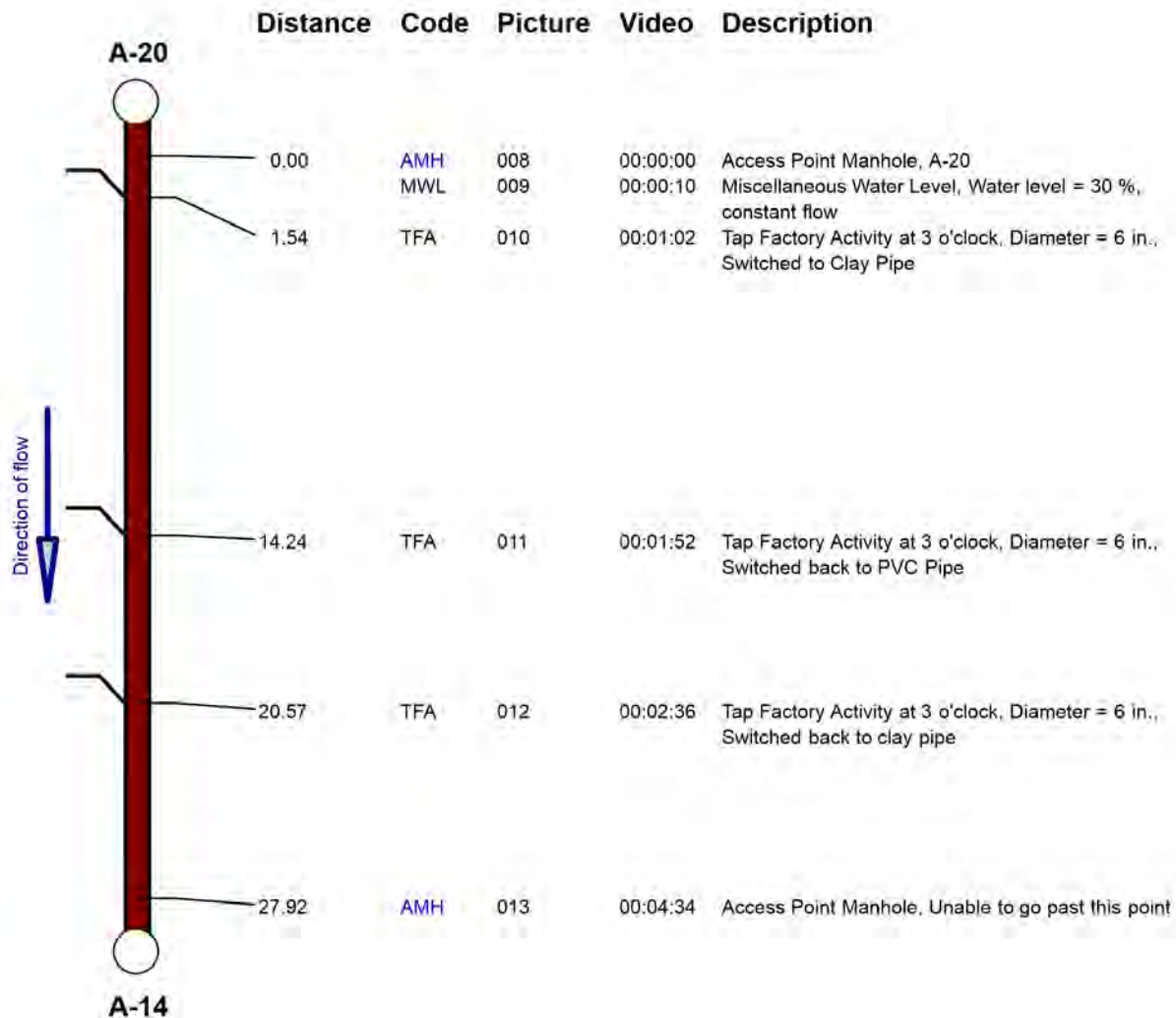
Segment Grade

Structural	0	0	0	0	0
O&M	0	0	0	0	0

Pipe Segment Graphics

General information				Location		
Project				Drainage Area		
Owner				Pipe Segment Ref. A-20 - A-14		
Surveyed by		Nathan Dale		Location Code		
Date		8/18/2026		Street		
		Time 08:16		Cass RD		
Direction of Survey		Downstream		City		
				Traverse City		
Pipe						
Pipe Use		Sanitary Sewage Pipe		Total Length		
				27.920 ft		
Dimension [in]		12		Length Surveyed		
				27.920 ft		
Shape		Circular		Upstream MH		
				A-20		
Material		Polyvinyl Chloride		Downstream MH		
				A-14		
Quick Rating			Overall Rating (OR)		Rating Index (RI)	
					Segment Grade	
QSR	QMR	QOR	Structural	O&M	Structural	O&M
0000	0000	0000	0	0	0.0	0.0
					Structural	O&M
					0	0
					0	0
					0	0
					0	0
					0	0

Display direction: In inspection direction



Pipe Segment Images

Surveyed by	Nathan Dale	Date	8/18/2026	Pipe Segment Ref.	A-20 - A-14
Owner		Upstream Manhole	A-20	Downstream Manhole	A-14
Pipe Use	Sanitary Sewage Pipe				
Dimension [in]	12				

Access Point Manhole, A-20

Image Ref. 008

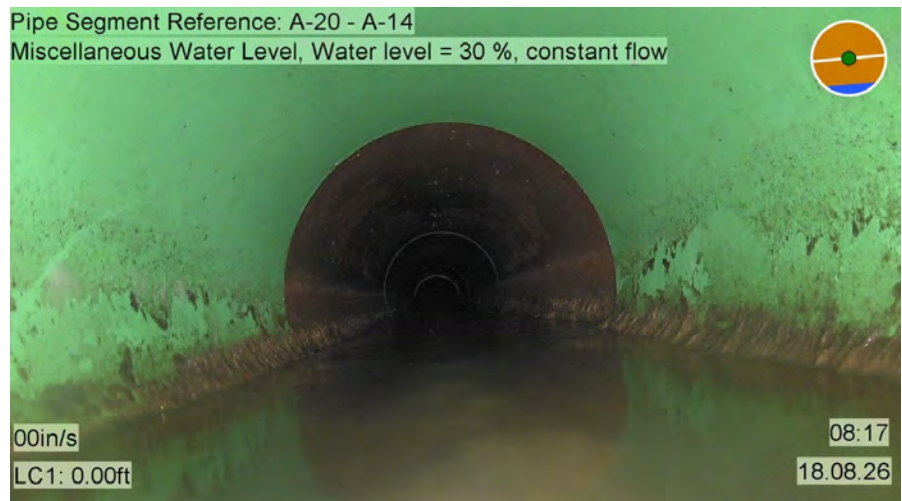
Video 00:00:00
Dist. downstream 0.00 ft
Code AMH
C. Location



Miscellaneous Water Level, Water level = 30 %, constant flow

Image Ref. 009

Video 00:00:10
Dist. downstream 0.00 ft
Code MWL
C. Location



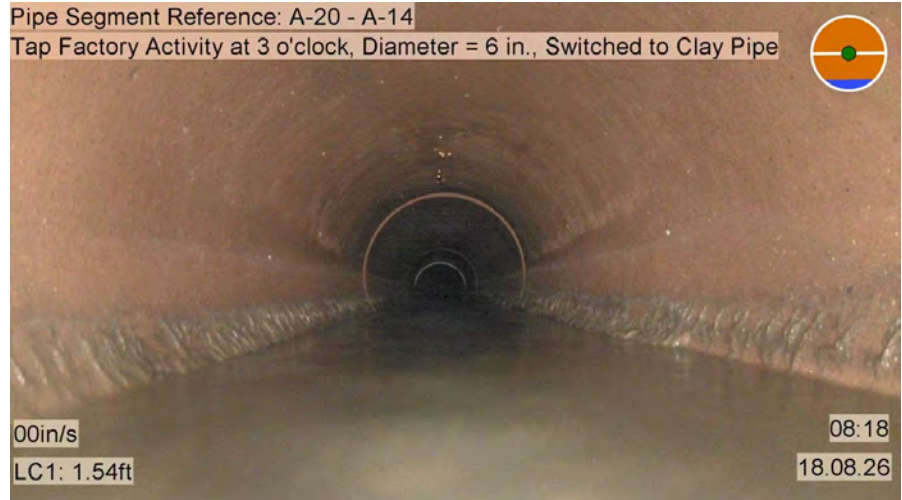
Pipe Segment Images

Surveyed by	Nathan Dale	Date	8/18/2026	Pipe Segment Ref.	A-20 - A-14
Owner				Upstream Manhole	A-20
Pipe Use	Sanitary Sewage Pipe			Downstream Manhole	A-14
Dimension [in]	12				

Tap Factory Activity at 3 o'clock,
Diameter = 6 in., Switched to Clay
Pipe

Image Ref. 010

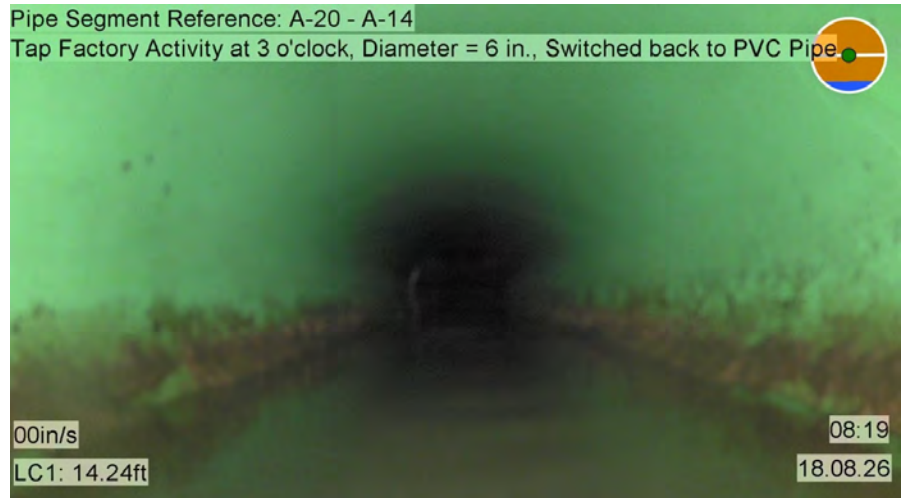
Video 00:01:02
Dist. downstream 1.54 ft
Code TFA
C. Location 03



Tap Factory Activity at 3 o'clock,
Diameter = 6 in., Switched back to
PVC Pipe

Image Ref. 011

Video 00:01:52
Dist. downstream 14.24 ft
Code TFA
C. Location 03



Pipe Segment Images

Surveyed by	Nathan Dale	Date	8/18/2026	Pipe Segment Ref.	A-20 - A-14
Owner		Upstream Manhole	A-20	Downstream Manhole	A-14
Pipe Use	Sanitary Sewage Pipe				
Dimension [in]	12				

Tap Factory Activity at 3 o'clock,
Diameter = 6 in., Switched back to
clay pipe

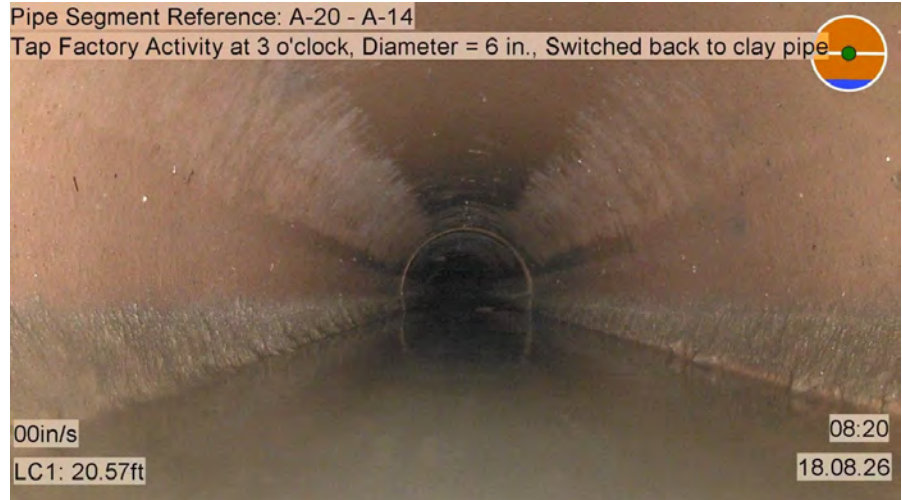


Image Ref. 012

Video 00:02:36
Dist. downstream 20.57 ft
Code TFA
C. Location 03

Access Point Manhole, Unable to
go past this point

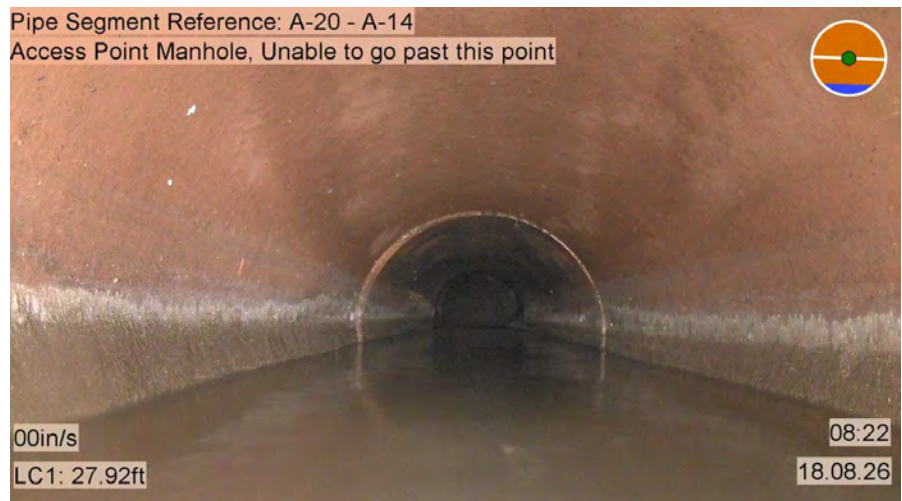


Image Ref. 013

Video 00:04:34
Dist. downstream 27.92 ft
Code AMH
C. Location

Pipe Master Data

Location

Drainage Area		Street	Cass RD
Pipe Segment Ref.	A-21 - A-20	City	Traverse City
Location Code			
Location Details			

Pipe

Pipe Use	Sanitary Sewage Pipe
Height (Diameter)	12 in
Width	
Shape	Circular
Material	Vitrified Clay Pipe
Lining Method	
Coating Method	
Pipe Joint Length	
Total Length	307.090 ft
Year constructed	
Year Renewed	

Manholes

upstream

Downstream

Number	A-21	A-20
Rim to Invert	11.000 ft	
Rim to Grade		
Grade to Invert		
Northing		
Easting		
Elevation		
Coordinate System		
Vertical Datum		
GPS Accuracy		

PACP Inspection Report

General information

Project	P/O Number	Reviewed by
Owner	Work Order No.	Certificate No.
Customer		
Purpose of Survey	Sewer System Evaluation Survey (SSES)	
COF		
Pressure Value		
Surveyed by	Nathan Dale	Date 8/18/2026
Certificate No.	1234	Time 07:51
Inspection Status	Complete Inspection	Weather Dry - No precipitation during survey
Inspection Tech.		Pre-cleaning No Pre-Cleaning
		Date Cleaned
		Flow Control Not Controlled
Direction of Survey	Downstream	

Location

Drainage Area	Street	Cass RD
Pipe Segment Ref. A-21 - A-20	City	Traverse City
Location Code		
Location Details		

Pipe

Pipe Use	Sanitary Sewage Pipe
Height (Diameter)	12 in
Width	
Shape	Circular
Material	Vitrified Clay Pipe
Lining Method	
Coating Method	
Pipe Joint Length	
Total Length	307.090 ft
Length Surveyed	307.090 ft
Year constructed	
Year Renewed	

Manholes

upstream

Downstream

Number	A-21	A-20
Rim to Invert	11.000 ft	
Rim to Grade		
Grade to Invert		
Northing		
Easting		
Elevation		
Coordinate System		
Vertical Datum		
GPS Accuracy		

Distance	Video Ref.	Code	Description	Cont. Defect	Value		Grade	Joint	Circumferential Location		Image	Remarks	
					Dimension				%	From			To
					1st	2nd							
0.00	00:00:00	AMH	Access Point Manhole								001	A21	
0.00	00:00:01	MWL	Miscellaneous Water Level				30				002	constant flow	
21.82	00:01:29	TFA	Tap Factory Activity		6				02		003	lead to the west	
147.97	00:06:29	TFA	Tap Factory Activity		6				02		004	lead to the west	
149.87	00:07:02	TFA	Tap Factory Activity		6				10		005	Lead to the east	
171.69	00:08:10	TFA	Tap Factory Activity		6				10		006	Lead to the east	
307.09	00:13:44	AMH	Access Point Manhole								007	A-20	

Quick Rating

QSR	QMR	QOR
0000	0000	0000

Overall Rating (OR)

Structural	O&M
0	0

Rating Index (RI)

Structural	O&M
0.0	0.0

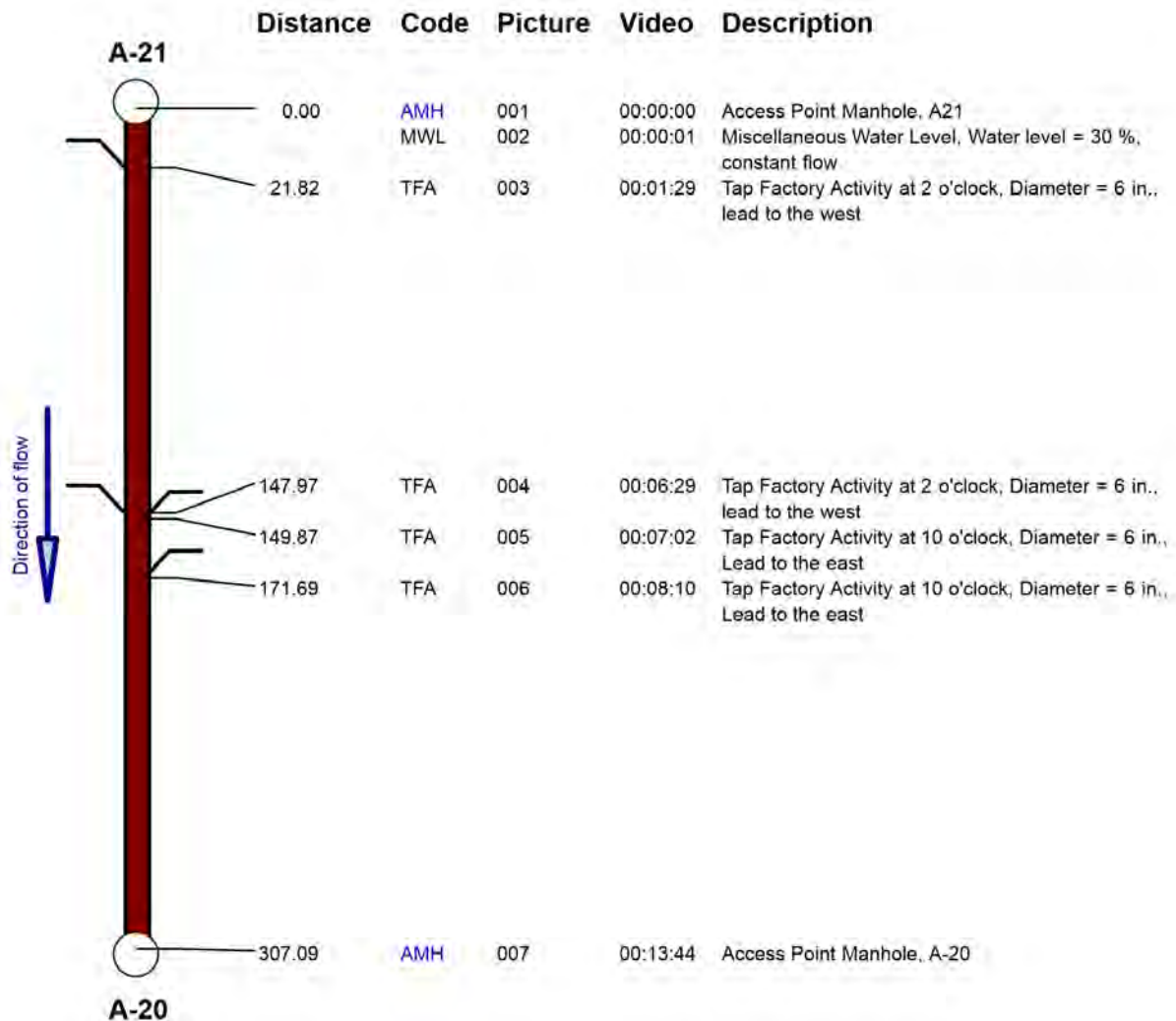
Segment Grade

	1	2	3	4	5
Structural	0	0	0	0	0
O&M	0	0	0	0	0

Pipe Segment Graphics

General information				Location										
Project				Drainage Area										
Owner				Pipe Segment Ref. A-21 - A-20										
Surveyed by		Nathan Dale		Location Code										
Date		8/18/2026		Time		07:51		Street		Cass RD				
Direction of Survey		Downstream		City		Traverse City								
Pipe														
Pipe Use		Sanitary Sewage Pipe				Total Length		307.090 ft						
Dimension [in]		12				Length Surveyed		307.090 ft						
Shape		Circular				Upstream MH		A-21						
Material		Vitrified Clay Pipe				Downstream MH		A-20						
Quick Rating			Overall Rating (OR)			Rating Index (RI)		Segment Grade		1	2	3	4	5
QSR	QMR	QOR	Structural	O&M		Structural	O&M	Structural		0	0	0	0	0
0000	0000	0000	0	0		0.0	0.0	O&M		0	0	0	0	0

Display direction: In inspection direction



Pipe Segment Images

Surveyed by	Nathan Dale	Date	8/18/2026	Pipe Segment Ref.	A-21 - A-20
Owner				Upstream Manhole	A-21
Pipe Use	Sanitary Sewage Pipe			Downstream Manhole	A-20
Dimension [in]	12				

Access Point Manhole, A21

Pipe Segment Reference: A-21 - A-20
Access Point Manhole, A21

Image Ref. 001

Video 00:00:00
Dist. downstream 0.00 ft
Code AMH
C. Location



Miscellaneous Water Level, Water level = 30 %, constant flow

Pipe Segment Reference: A-21 - A-20
Miscellaneous Water Level, Water level = 30 %, constant flow

Image Ref. 002

Video 00:00:01
Dist. downstream 0.00 ft
Code MWL
C. Location



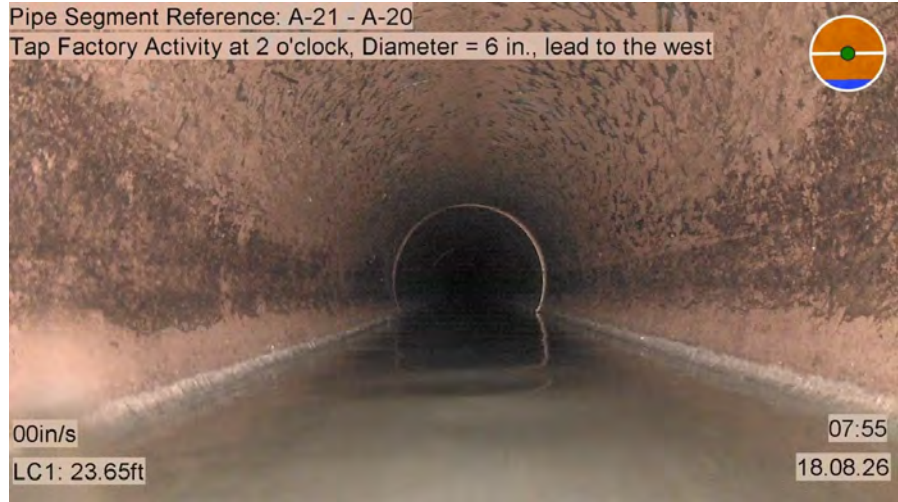
Pipe Segment Images

Surveyed by	Nathan Dale	Date	8/18/2026	Pipe Segment Ref.	A-21 - A-20
Owner		Upstream Manhole	A-21	Downstream Manhole	A-20
Pipe Use	Sanitary Sewage Pipe				
Dimension [in]	12				

Tap Factory Activity at 2 o'clock,
Diameter = 6 in., lead to the west

Image Ref. 003

Video 00:01:29
Dist. downstream 21.82 ft
Code TFA
C. Location 02



Tap Factory Activity at 2 o'clock,
Diameter = 6 in., lead to the west

Image Ref. 004

Video 00:06:29
Dist. downstream 147.97 ft
Code TFA
C. Location 02



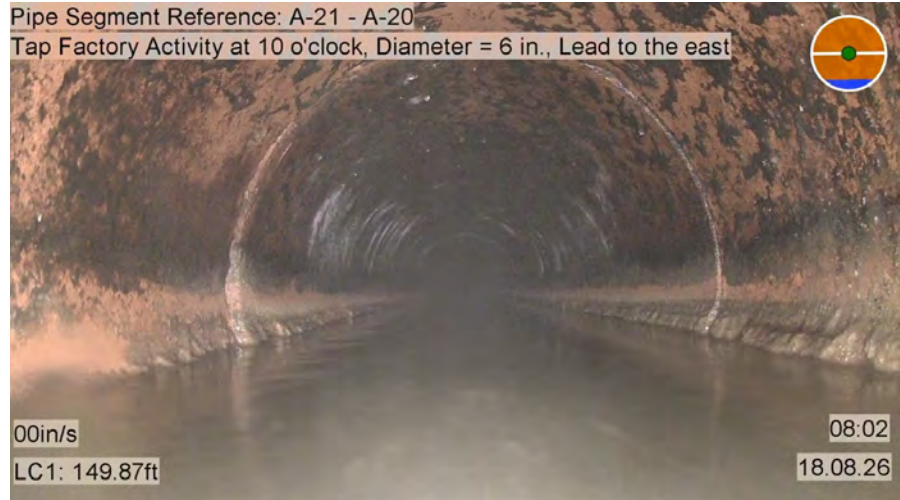
Pipe Segment Images

Surveyed by	Nathan Dale	Date	8/18/2026	Pipe Segment Ref.	A-21 - A-20
Owner				Upstream Manhole	A-21
Pipe Use	Sanitary Sewage Pipe			Downstream Manhole	A-20
Dimension [in]	12				

Tap Factory Activity at 10 o'clock,
Diameter = 6 in., Lead to the east

Image Ref. 005

Video 00:07:02
Dist. downstream 149.87 ft
Code TFA
C. Location 10



Tap Factory Activity at 10 o'clock,
Diameter = 6 in., Lead to the east

Image Ref. 006

Video 00:08:10
Dist. downstream 171.69 ft
Code TFA
C. Location 10



Pipe Segment Images

Surveyed by	Nathan Dale	Date	8/18/2026	Pipe Segment Ref.	A-21 - A-20
Owner				Upstream Manhole	A-21
Pipe Use	Sanitary Sewage Pipe			Downstream Manhole	A-20
Dimension [in]	12				

Access Point Manhole, A-20

Pipe Segment Reference: A-21 - A-20
Access Point Manhole, A-20

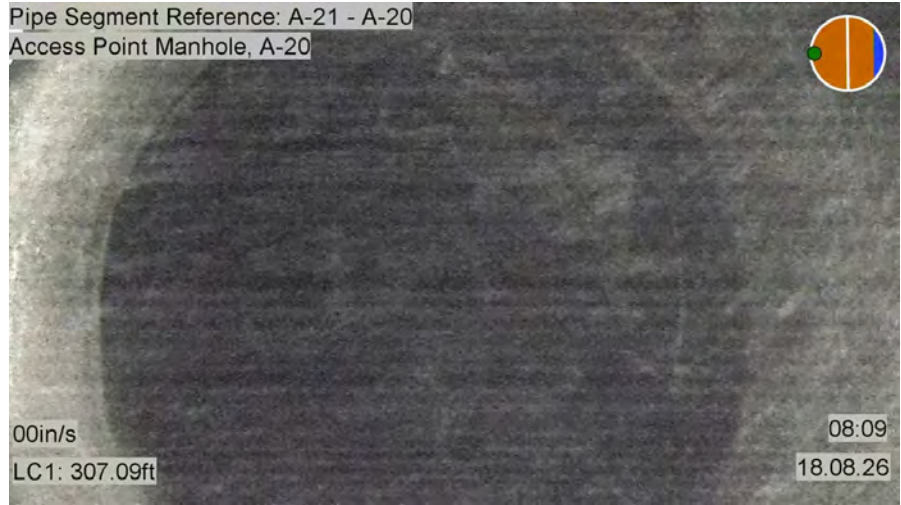
Image Ref. 007

Video 00:13:44

Dist. downstream 307.09 ft

Code AMH

C. Location



Pipe Master Data

Location

Drainage Area	Street	Cass RD
Pipe Segment Ref. A-22 - A-21	City	Traverse City
Location Code		
Location Details		

Pipe

Pipe Use	Sanitary Sewage Pipe
Height (Diameter)	12 in
Width	
Shape	Circular
Material	Vitrified Clay Pipe
Lining Method	
Coating Method	
Pipe Joint Length	
Total Length	293.310 ft
Year constructed	
Year Renewed	

Manholes

upstream

Downstream

Number	A-22	A-21
Rim to Invert		
Rim to Grade		
Grade to Invert		
Northing		
Easting		
Elevation		
Coordinate System		
Vertical Datum		
GPS Accuracy		

PACP Inspection Report

General information

Project	P/O Number	Reviewed by
Owner	Work Order No.	Certificate No.
Customer		
Purpose of Survey	Sewer System Evaluation Survey (SSES)	
COF		
Pressure Value		
Surveyed by	Nathan Dale	Date 8/18/2026
Certificate No.	1234	Weather Light Rain
Inspection Status	Complete Inspection	Pre-cleaning No Pre-Cleaning
Inspection Tech.		Date Cleaned
		Flow Control Not Controlled
Direction of Survey	upstream	

Location

Drainage Area	Street	Cass RD
Pipe Segment Ref. A-22 - A-21	City	Traverse City
Location Code		
Location Details		

Pipe

Pipe Use	Sanitary Sewage Pipe
Height (Diameter)	12 in
Width	
Shape	Circular
Material	Vitrified Clay Pipe
Lining Method	
Coating Method	
Pipe Joint Length	
Total Length	293.310 ft
Length Surveyed	293.310 ft
Year constructed	
Year Renewed	

Manholes

upstream

Downstream

Number	A-22	A-21
Rim to Invert		
Rim to Grade		
Grade to Invert		
Northing		
Easting		
Elevation		
Coordinate System		
Vertical Datum		
GPS Accuracy		

Distance	Video Ref.	Code	Description	Cont. Defect	Value		Grade	Joint	Circumferential Location		Image	Remarks	
					Dimension				%	From			To
					1st	2nd							
0.00	00:00:00	AMH	Access Point Manhole								014	A-21	
0.00	00:00:01	MWL	Miscellaneous Water Level				30				015		
0.82	00:00:55	TFA	Tap Factory Activity		6					03	016	tree root infiltration	
22.15	00:01:39	TFA	Tap Factory Activity		6					02	017	lead to the east	
181.73	00:07:57	TFA	Tap Factory Activity		6					03	018	tree root infiltration	
188.19	00:08:37	TFA	Tap Factory Activity		6					02	019	Lead to the east	
254.66	00:14:25	TFA	Tap Factory Activity		6					10	020	Lead to the west	
293.31	00:18:47	AMH	Access Point Manhole								021	A-22	

Quick Rating

QSR	QMR	QOR
0000	0000	0000

Overall Rating (OR)

Structural	O&M
0	0

Rating Index (RI)

Structural	O&M
0.0	0.0

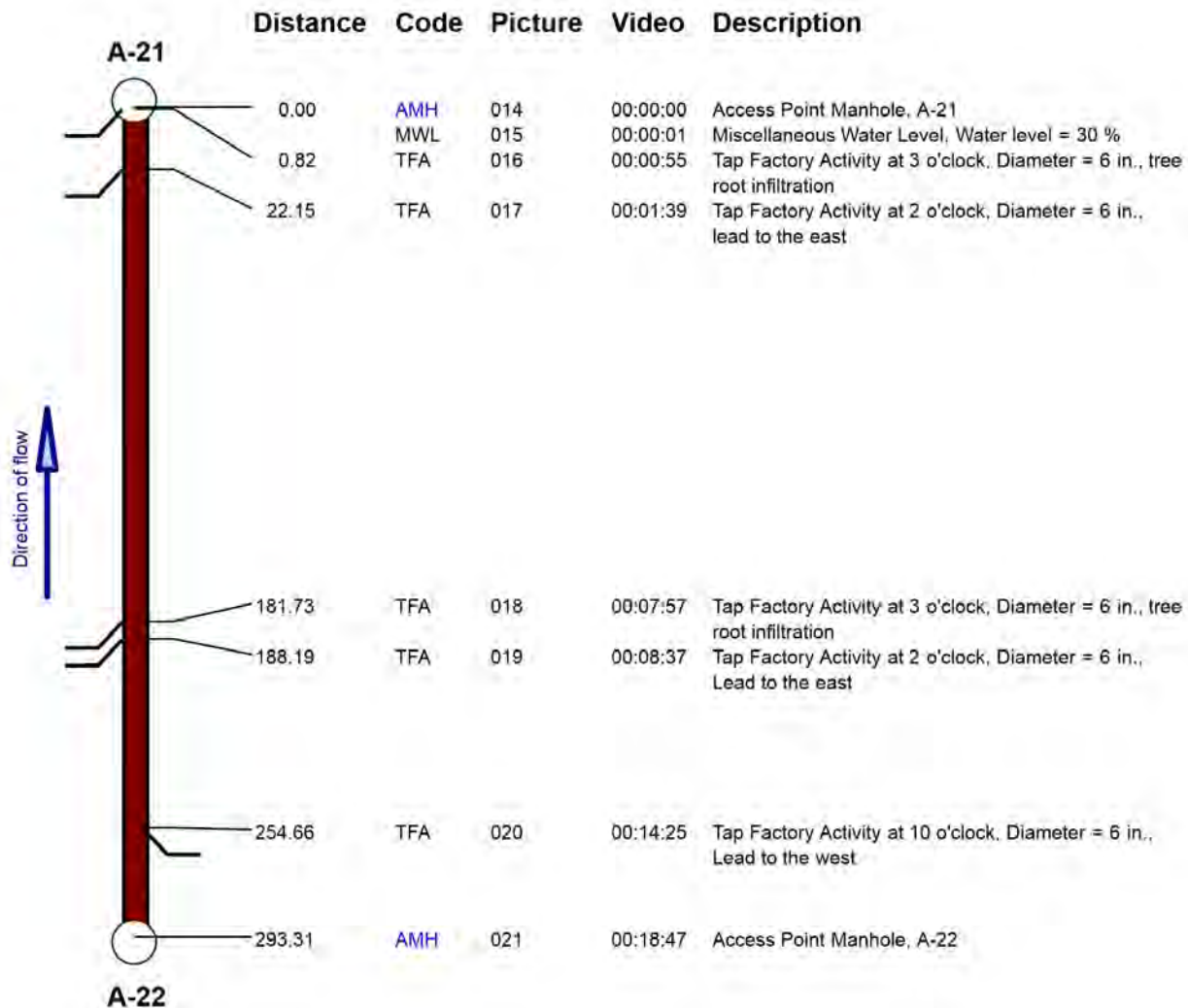
Segment Grade

Structural	1	2	3	4	5
0	0	0	0	0	0
O&M	0	0	0	0	0

Pipe Segment Graphics

General information				Location									
Project				Drainage Area									
Owner				Pipe Segment Ref. A-22 - A-21									
Surveyed by		Nathan Dale		Location Code									
Date		8/18/2026		Time		09:41							
Direction of Survey		upstream		Street		Cass RD							
				City		Traverse City							
Pipe													
Pipe Use		Sanitary Sewage Pipe		Total Length		293.310 ft							
Dimension [in]		12		Length Surveyed		293.310 ft							
Shape		Circular		Upstream MH		A-22							
Material		Vitrified Clay Pipe		Downstream MH		A-21							
Quick Rating			Overall Rating (OR)		Rating Index (RI)		Segment Grade		1	2	3	4	5
QSR	QMR	QOR	Structural	O&M	Structural	O&M	Structural	0	0	0	0	0	0
0000	0000	0000	0	0	0.0	0.0	O&M	0	0	0	0	0	0

Display direction: In inspection direction



Pipe Segment Images

Surveyed by	Nathan Dale	Date	8/18/2026	Pipe Segment Ref.	A-22 - A-21
Owner				Upstream Manhole	A-22
Pipe Use	Sanitary Sewage Pipe			Downstream Manhole	A-21
Dimension [in]	12				

Access Point Manhole, A-21

Image Ref. 014

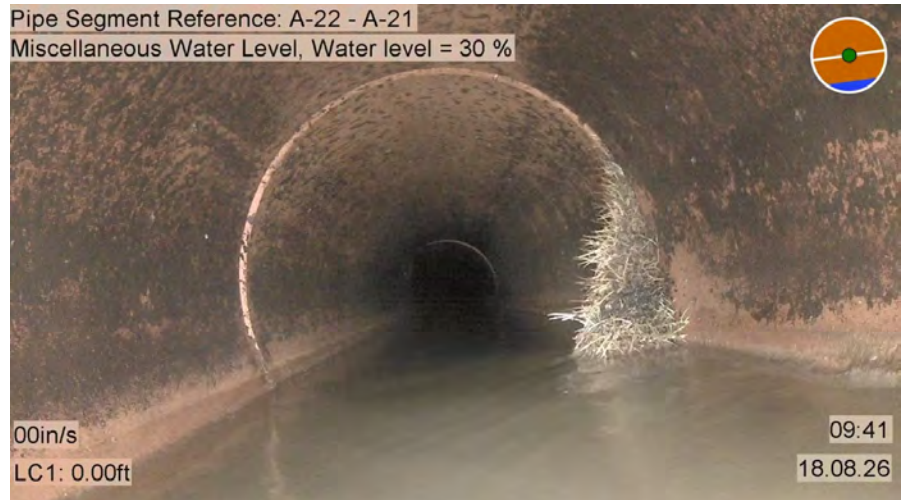
Video 00:00:00
Dist. upstream 0.00 ft
Code AMH
C. Location



Miscellaneous Water Level, Water level = 30 %

Image Ref. 015

Video 00:00:01
Dist. upstream 0.00 ft
Code MWL
C. Location



Pipe Segment Images

Surveyed by	Nathan Dale	Date	8/18/2026	Pipe Segment Ref.	A-22 - A-21
Owner		Upstream Manhole	A-22	Downstream Manhole	A-21
Pipe Use	Sanitary Sewage Pipe				
Dimension [in]	12				

Tap Factory Activity at 3 o'clock,
Diameter = 6 in., tree root infiltration

Image Ref. 016

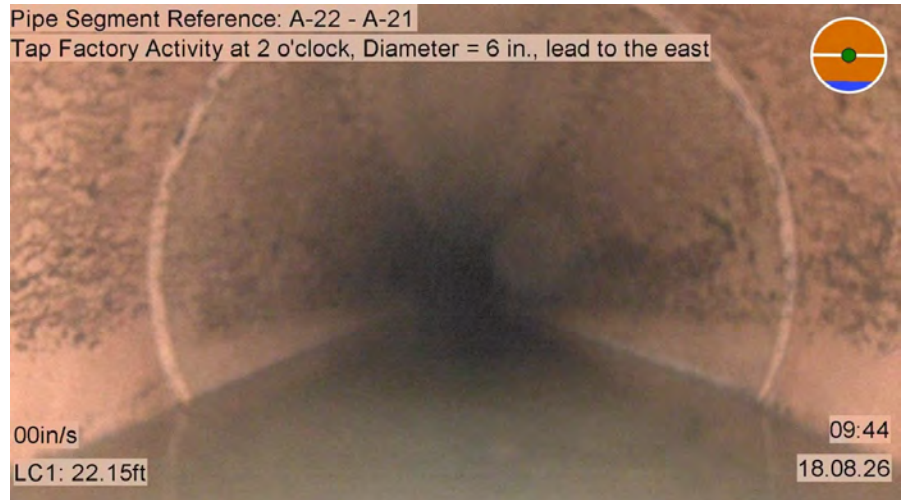
Video 00:00:55
Dist. upstream 0.82 ft
Code TFA
C. Location 03



Tap Factory Activity at 2 o'clock,
Diameter = 6 in., lead to the east

Image Ref. 017

Video 00:01:39
Dist. upstream 22.15 ft
Code TFA
C. Location 02



Pipe Segment Images

Surveyed by	Nathan Dale	Date	8/18/2026	Pipe Segment Ref.	A-22 - A-21
Owner		Upstream Manhole	A-22	Downstream Manhole	A-21
Pipe Use	Sanitary Sewage Pipe				
Dimension [in]	12				

Tap Factory Activity at 3 o'clock,
Diameter = 6 in., tree root infiltration

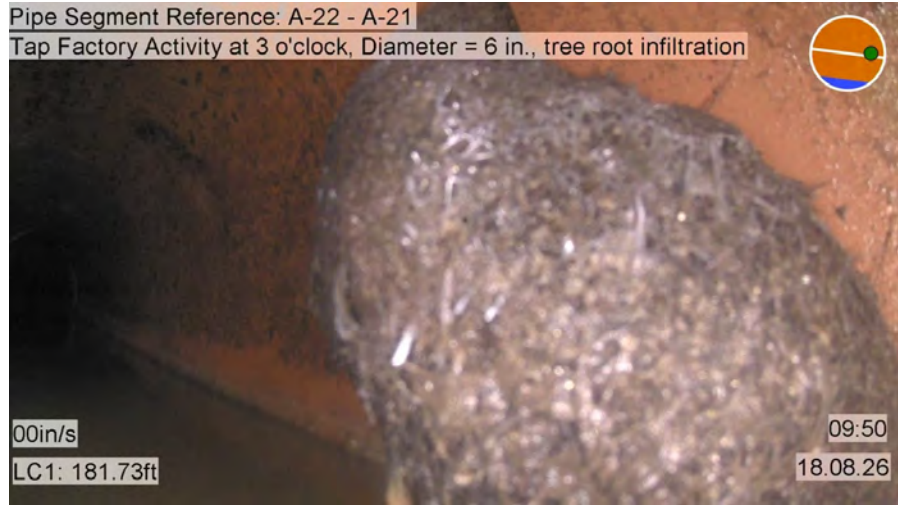
Pipe Segment Reference: A-22 - A-21

Tap Factory Activity at 3 o'clock, Diameter = 6 in., tree root infiltration



Image Ref. 018

Video 00:07:57
Dist. upstream 181.73 ft
Code TFA
C. Location 03



Tap Factory Activity at 2 o'clock,
Diameter = 6 in., Lead to the east

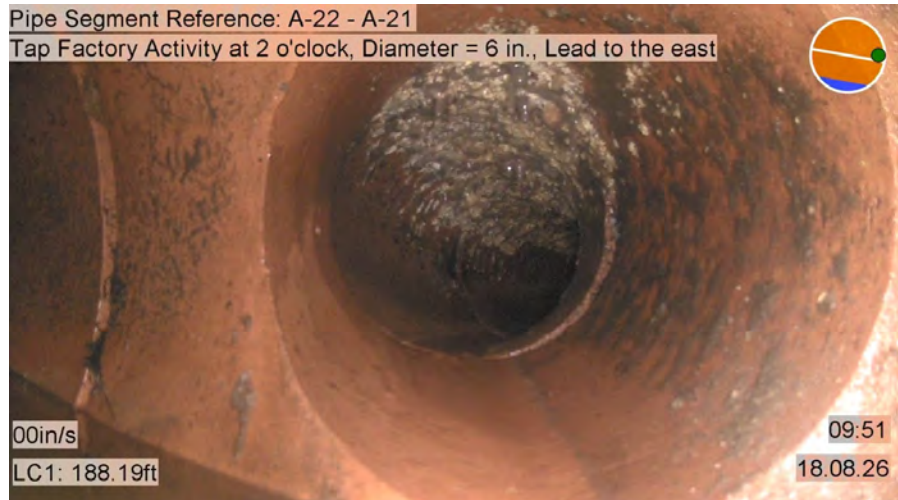
Pipe Segment Reference: A-22 - A-21

Tap Factory Activity at 2 o'clock, Diameter = 6 in., Lead to the east



Image Ref. 019

Video 00:08:37
Dist. upstream 188.19 ft
Code TFA
C. Location 02



Pipe Segment Images

Surveyed by	Nathan Dale	Date	8/18/2026	Pipe Segment Ref.	A-22 - A-21
Owner		Upstream Manhole	A-22	Downstream Manhole	A-21
Pipe Use	Sanitary Sewage Pipe				
Dimension [in]	12				

Tap Factory Activity at 10 o'clock,
Diameter = 6 in., Lead to the west

Image Ref. 020

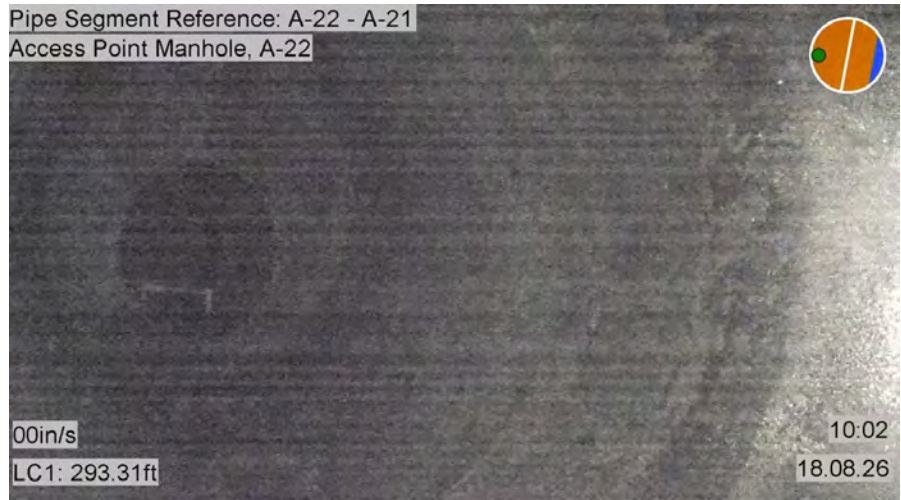
Video 00:14:25
Dist. upstream 254.66 ft
Code TFA
C. Location 10



Access Point Manhole, A-22

Image Ref. 021

Video 00:18:47
Dist. upstream 293.31 ft
Code AMH
C. Location



NO. 87

HOUSE LEAD REPORT

Project G-1 GARFIELD
 Contractor D & L
 Subd. or Lot # VANS SUBD LOT #1
 Address or Street CASS ROAD

Between MH# A-20 and MH# A-21
 Plan Sheet # 28
 Date 4-14-76

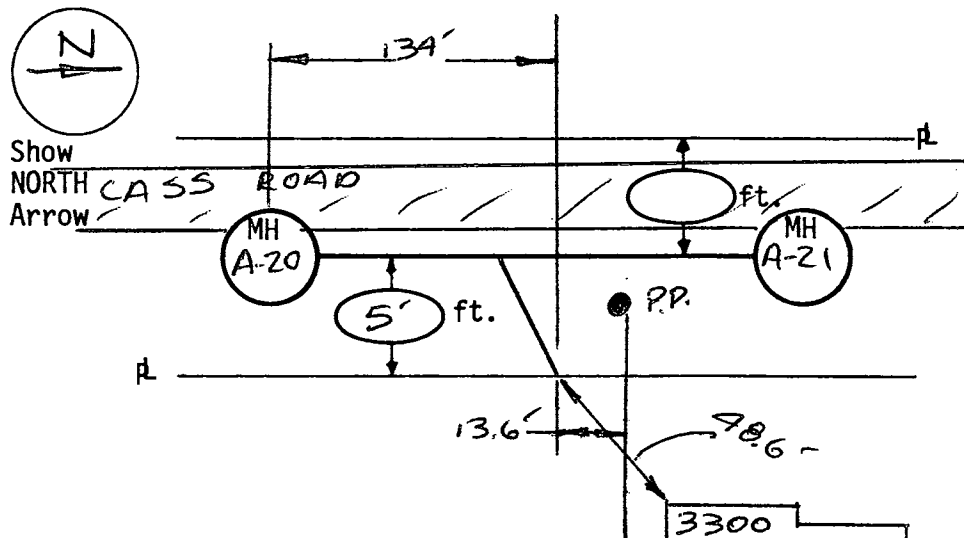
2500 S. Airport Road - Active

Location Requested _____ ft. _____ of _____ Building Wall
 by Owner _____ ft. _____ of _____ Property Line

Pipe Type	Diam.	Lin.Ft.	Wye Dir.	Wye Depth	Depth @ P	Marker	Ground Condition
PVC	6"	5'	(N) S (E) W	11 ft.	9 ft.	☒ Yes ☒ No	☐ Wet ☒ Dry

Remarks:

AS BUILT:



SHOW FOLLOWING INFORMATION ON DRAWINGS

1. North Arrow
2. Wye measurement from lower invert elevation of M.H.
3. Location of end of sewer lead from P.L. or side of building or both if necessary
4. Make sketch of sewer lead and building to match plan
5. Show direction of wye

INSPECTOR

Craig R. Goodwin

HOUSE LEAD REPORT

Project G-1 TRUSE LEAD REF
Contractor D & L GARFIELD
Subd. or Lot # _____
Address or Street 3300 CASS ROAD

Between MH# A-20 and MH# A-21
Plan Sheet # 28
Date 4-14-76
3300 Cass Rd - Active

Location

Requested
by Owner

ft.

of

Building Wall

ft.

of

Property Line

Pipe
Type

Diam.

Lin.Ft.

Wye Dir.

Wye
Depth

Depth
@ PL

Marker

Ground

Remarks:

PVC.

6"

6

Ⓢ

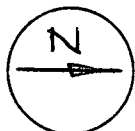
11.7 f.

4 ft

☒ No

ater

AS BUILT:



Show
NORTH
Arrow

CASS
ROAD

MH
A-20

MH
A-21

၂

~~42.6~~
3300

SHOW FOLLOWING INFORMATION
ON DRAWINGS

1. North Arrow
2. Wye measurement from lower invert elevation of M.H.
3. Location of end of sewer lead from R or side of building or both if necessary
4. Make sketch of sewer lead and building to match plan
5. Show direction of wye

INSPECTOR

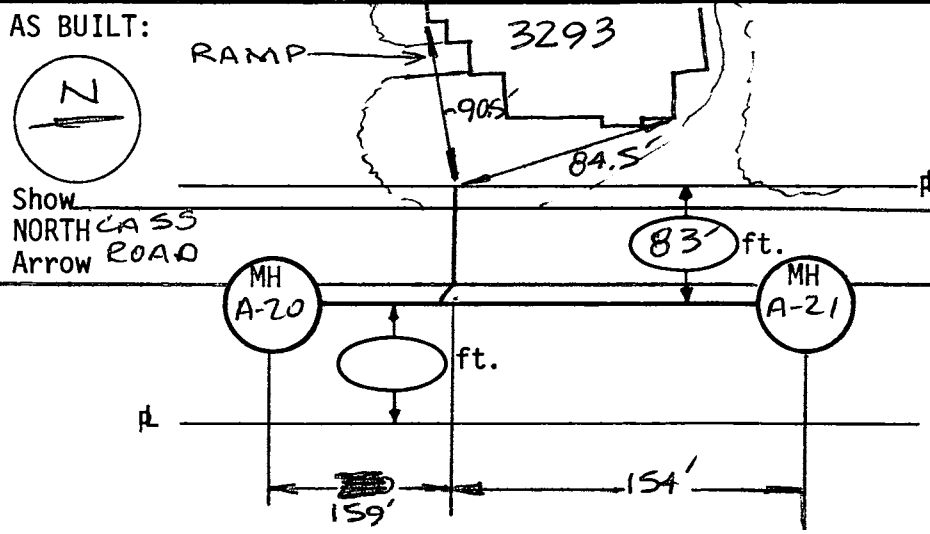
Craig R. Goodrich

NO. 88

HOUSE LEAD REPORT

Project G-1
 Contractor D&L
 Subd. or Lot #
 Address or Street 3293 Cass Road

Between MH# A-20 and MH# A-21
 Plan Sheet # 28
 Date 4-14-76
 2600 S. Airport Rd - Active

Location Requested by Owner _____ ft. _____ of _____ Building Wall _____ ft. _____ of _____ Property Line								
Pipe Type	Diam.	Lin.Ft.	Wye Dir.	Wye Depth	Depth @ P	Marker	Ground Condition	Remarks:
PVC	6"	83'	N S (N) (S)	12 ft.	9 ft.	Yes No	☐ Wet ☒ Dry Water _____ ft.	
AS BUILT:  SHOW FOLLOWING INFORMATION ON DRAWINGS 1. North Arrow 2. Wye measurement from lower invert elevation of M.H. 3. Location of end of sewer lead from P or side of building or both if necessary 4. Make sketch of sewer lead and building to match plan 5. Show direction of wye								INSPECTOR <u>Craig R. Goodrich</u>

HOUSE LEAD REPORT

NO. 89

Project G-1 GARFIELD
 Contractor D & L
 Subd. or Lot # _____
 Address or Street 3319 CASS ROAD

Between MH# A-20 and MH# A-21
 Plan Sheet # 28
 Date 4-14-76

3319 Cass Rd - Active

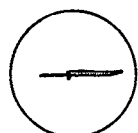
Location
 Requested
 by Owner

_____ ft. _____ of _____ Building Wall
 _____ ft. _____ of _____ Property Line

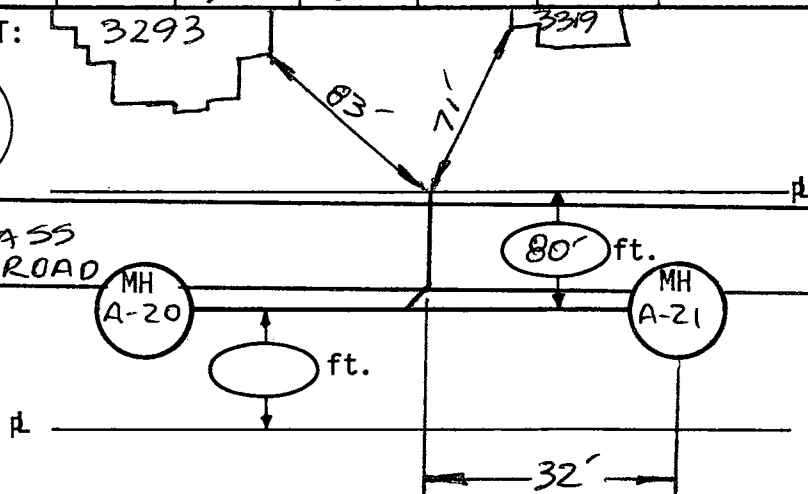
Pipe Type	Diam.	Lin.Ft.	Wye Dir. N S	Wye Depth	Depth @ $\perp$	Marker ☒ Yes ☒ No	Ground Condition ☐ Wet ☒ Dry Water _____ ft.
PVC	6"	80'		12 ft.	9 ft.		

Remarks:

AS BUILT:



Show
 NORTH CASS
 Arrow ROAD



SHOW FOLLOWING INFORMATION ON DRAWINGS

1. North Arrow
2. Wye measurement from lower invert elevation of M.H.
3. Location of end of sewer lead from $\perp$ or side of building or both if necessary
4. Make sketch of sewer lead and building to match plan
5. Show direction of wye

INSPECTOR

Craig E. Goodrich

HOUSE LEAD REPORT

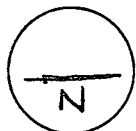
Project G-1 GARFIELD
 Contractor D&L
 Subd. or Lot # _____
 Address or Street 3344 CASS ST.

Between MH# A-21 and MH# A-22
 Plan Sheet # 28
 Date 4-14-76
 3344 Cass Rd - Active

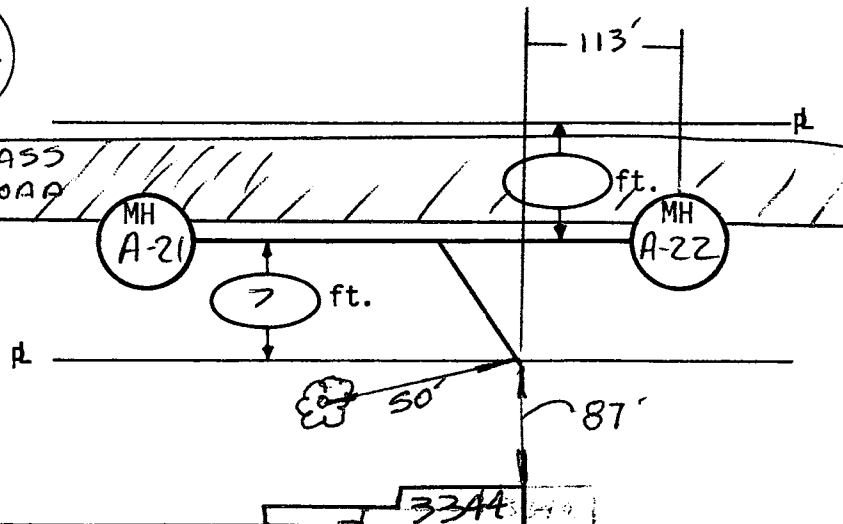
Location Requested by Owner _____ ft. _____ N of _____ N Building Wall
 _____ ft. _____ of _____ Property Line

Pipe Type	Diam.	Lin.Ft.	Wye Dir.	Wye Depth	Depth @ $\perp$	Marker	Ground Condition	Remarks:
PVC	6"	7'	(N) S (E) W	11 ft.	9 ft.	☒ Yes ☒ No	☐ Wet ☒ Dry Water _____ ft.	

AS BUILT:



Show
NORTH CASS
Arrow ROAD



SHOW FOLLOWING INFORMATION ON DRAWINGS

1. North Arrow
2. Wye measurement from lower invert elevation of M.H.
3. Location of end of sewer lead from $\perp$ or side of building or both if necessary
4. Make sketch of sewer lead and building to match plan
5. Show direction of wye

INSPECTOR

Craig R. Goodwin

HOUSE LEAD REPORT

Project G-1 GARFIELD
 Contractor D & L
 Subd. or Lot # LOT # GA-173-1
 Address or Street CASS ROAD

Between MH# A-21 and MH# A-22
 Plan Sheet # 28
 Date 4-14-76
 3353 / 3375 Cass Rd - Active

Location

Requested
by Owner

ft.

of

Building Wall

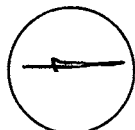
ft.

of

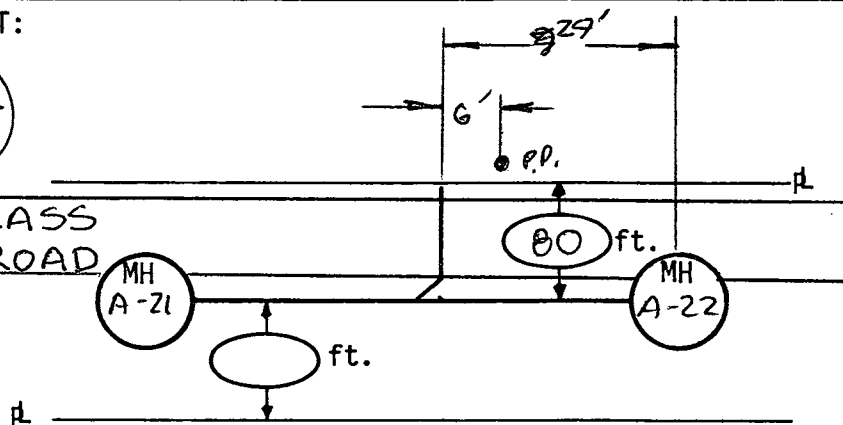
Property Line

Pipe Type	Diam.	Lin.Ft.	Wye Dir.	Wye Depth	Depth @ P	Marker	Ground Condition	Remarks:
PVC	6"	80'	N S E (W)	10 ft.	9 ft.	☒ Yes ☒ No	☐ Wet ☒ Dry Water ___ ft.	

AS BUILT:



Show
NORTH CASS
Arrow ROAD

SHOW FOLLOWING INFORMATION
ON DRAWINGS

1. North Arrow
2. Wye measurement from lower invert elevation of M.H.
3. Location of end of sewer lead from P or side of building or both if necessary
4. Make sketch of sewer lead and building to match plan
5. Show direction of wye

INSPECTOR

D.P.W. CONNECTION REPORT

DATE: 12/21/92
PERMIT NO. N/A 2741(S)
PERMIT NO. N/A 997(W)

CONNECTION ADDRESS:

GLASS EXPRESS
3353 CASS RD.

☒ SEWER	☒ NEW CONST.	☐ SEPTIC TANK PROPERLY DISPOSED OF.
☒ WATER	☐ EXIST. BLDG.	☐ PRIVATE WELL PROPERLY DISCONNECTED.

REMARKS: EASTWOOD EXC. GLASS EXPRESS + BARNETT'S AUTO TRIM
BOTH EMPTY INTO A HEAD MANHOLE LOCATED ON THE EASEMENT
BETWEEN THE TWO BUILDINGS. NEITHER IS CUT OPEN FOR INSPECTION
SAMPLING.

INSPECTOR

Axfell

NO. 94

HOUSE LEAD REPORT

Project G-1 GARFIELD
 Contractor D+L
 Subd. or Lot #
 Address or Street 3387 CASS ROAD

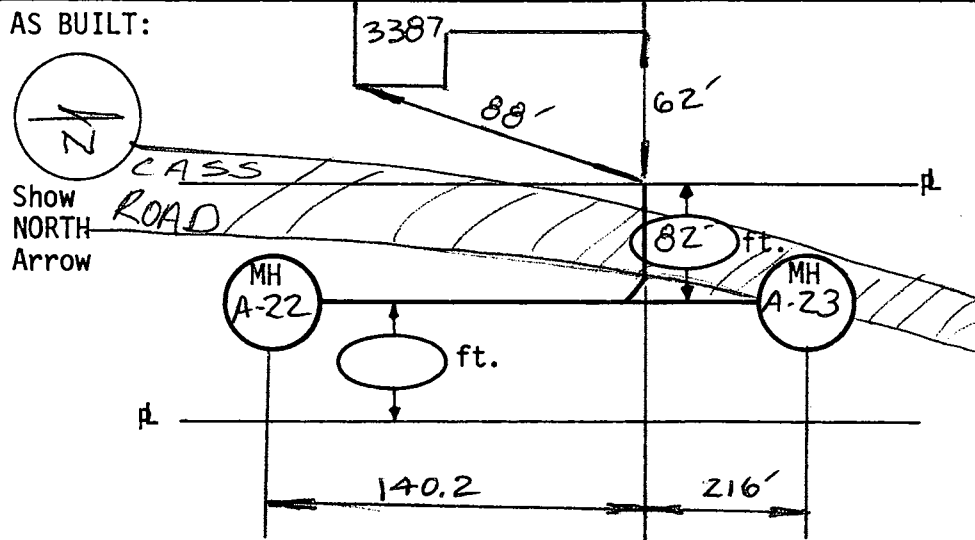
Between MH# A-22 and MH# A-23
 Plan Sheet # 29
 Date 4-14-76
 3387 Cass Rd - Active

Location Requested by Owner 0 ft. N of N Building Wall
 ft. of Property Line

Pipe Type	Diam.	Lin.Ft.	Wye Dir. N S	Wye Depth ft.	Depth @ ft.	Marker Yes ☐ No ☒	Ground Condition Wet ☐ Dry ☒ Water <u> </u> ft.
PVC	6"	82'	E (W)	0	6	No	

Remarks:

AS BUILT:



SHOW FOLLOWING INFORMATION ON DRAWINGS

1. North Arrow
2. Wye measurement from lower invert elevation of M.H.
3. Location of end of sewer lead from $\mathbb{R}$ or side of building or both if necessary
4. Make sketch of sewer lead and building to match plan
5. Show direction of wye

INSPECTOR

Craig R. Goodrich

NO. 96

HOUSE LEAD REPORT

Project G-1
 Contractor D&L
 Subd. or Lot # _____
 Address or Street 3417 CASS ROAD

Between MH# A-22 and MH# A-23
 Plan Sheet # 29
 Date 4-14-76

3423 Cass Rd - Active

Location
 Requested _____ ft. _____ of _____
 by Owner _____ ft. _____ of _____

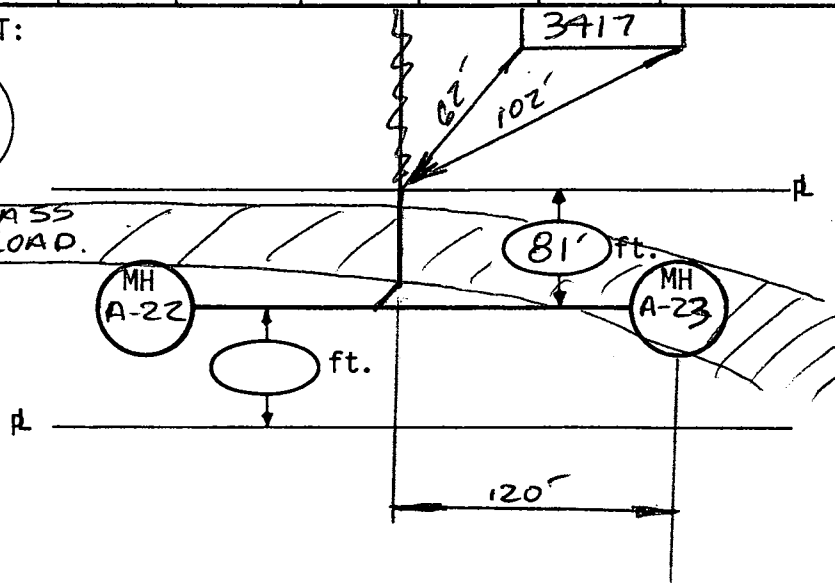
Building Wall
 Property Line

Pipe Type	Diam.	Lin.Ft.	Wye Dir.	Wye Depth	Depth @ P	Marker	Ground Condition	Remarks:
PVC	6"	81'	N S E <u>W</u>	8 ft.	6 ft.	☒ Yes ☒ No	☐ Wet ☒ Dry Water _____ ft.	

AS BUILT:



Show NORTH Arrow
CASS ROAD.



SHOW FOLLOWING INFORMATION
 ON DRAWINGS

1. North Arrow
2. Wye measurement from lower invert elevation of M.H.
3. Location of end of sewer lead from P or side of building or both if necessary
4. Make sketch of sewer lead and building to match plan
5. Show direction of wye

INSPECTOR

Craig R. Goodwin