City of Flint

Department of Purchases & Supplies

Sheldon A. Neeley

TO: All Proposers
FROM: Jarin McGee, Chief Buyer
DATE: **July 20, 2023**
SUBJECT: **Addendum #01 –** P24-502 – Avon Pump Station Demolition

This addendum has been published to address the following.

The bidding documents have been modified. Please see attached.

All other bidding terms, requirements, and conditions continue as indicated in the remaining original bid documents.
The Chief Buyer, Jarin McGee, is an officer for the City of Flint with respect to this RFP.

In the submission of their proposal, Proposer must acknowledge receipt of this addendum. Proposer shall acknowledge this addendum by signing and returning one copy of this notice with their submission.

Company Name: _____

Address: _____

City / State / Zip: _____

Telephone: _____Fax: _____ Email: _____

Print Name: _____Title: _____

Signature: _____Date: _____

Thank you.

Avon Pumping Station
SECTION 00 91 13
ADDENDUM NO. 01

To all prospective bidders and others concerned, YOU ARE HEREBY ADVISED THAT the Contract Documents for the above referenced Project are revised in the following particulars:

General	Description
Pre-Bid Meeting	Meeting Minutes from the Pre-Bid Meeting that took place on Tuesday, July 11, 2023, at 1:00 PM (EST) accompany this Addendum and include Questions and Answers that were provided during the Pre-Bid Meeting and subsequent site visit that took place at the Avon Pumping Station by meeting attendees.

Section	Description of Change
31 23 19	Add Section 31 23 19 - Dewatering. A copy of this Section accompanies this Addendum.
31 23 33	Add Section 31 23 33 - Trenching and Backfilling. A copy of this Section accompanies this Addendum.
33 05 13	Add Section 33 05 13 - Manholes and Structures. A copy of this Section accompanies this Addendum.
33 30 00	Add Section 33 30 00 - Sanitary Utility Sewerage Piping. A copy of this Section accompanies this Addendum.

Sheet	Description of Change
G-001	The address for the Avon Pump Station noted on the Cover Sheet (Sheet G-101), shall be revised to read "251 E BOULEVARD DR".
C-102	Sheet C-102 has been revised and is being reissued as part of this Addendum.
C-103	Sheet C-103 has been revised and is being reissued as part of this Addendum.

This Addendum is hereby incorporated into the original Contract Documents for the bidding referred to above and is considered as binding as though originally appearing therein. Receipt of this Addendum must be noted in the place provided in Section 00 42 43 - Proposal, dated **July 20, 2023**.

PRE-BID MEETING MINUTES

Meeting Topic: Avon Pumping Station Demolition Pre-Bid Meeting

Date: Tuesday, July 11, 2023

Time: 1:00 PM

Location: Water Pollution Control Facility, G-4652 Beecher Rd, Flint MI 48532

Welcome:

1. Please register on the sign-in sheets available; this meeting is *mandatory* in order to submit a responsive bid.

Introduction:

1. Owner: City of Flint
   Jeanette Best, WPCF Manager
2. Engineer: Wade Trim, Inc.
   Tiffany Harrison, PE, Project Manager

Project Summary:

1. This project will consist of Demolition of three (3) existing screw pumps, including connected ancillary equipment, wiring, piping and other appurtenances from within the Pump Station building and exterior wet well. Work includes the remove of the wet well structure to 18 inches below existing grade, removing gates, piping, wiring and other ancillary equipment and appurtenances from within the wet well, as well as bulkheading opening into and out of the wet well. The remaining wet well structure will then be backfilled with compacted fill material, followed by the placement of topsoil and seed, resulting in a grassy area that matches surrounding grade.
2. On July 25, 2023 ~~July 20, 2023~~, at 11:00 AM ~~3:00 PM~~ all responsive bids will be publicly opened, and the total bid prices read aloud.

Contract Requirements:

1. Examination of Site (Section 00 21 13, Article 1.03): Bidders should familiarize themselves with the site and the laws and regulations that may affect cost, progress, performance, or furnishing of the Work.
2. Bid Security (Section 00 21 13, Article 1.06): Five percent (5%) of the Bidder's maximum price in the form of a Bid Bond or Cashier's Check. If the Successful Bidder fails to execute and deliver the Contract Documents and to furnish the required Contract security within twenty (20) days after the Notice of Award, Owner may annul and cancel the Notice of Award, and the Bid security of that Bidder shall be forfeited and retained by the Owner.
3. Proposal (Section 00 42 43): The Contract Price will be split between two items:
   a. Demolition of the Screw Pumps and Ancillary Equipment/Appurtenances
   b. Demolition, Backfill and Restoration within the Wet Well
4. Submittal of Bid: Bids shall be accompanied by:
   a. Bid Security (Section 00 43 13)
   b. Legal Status of Bidder (Section 00 43 45)

c. Non-Collusion Affidavit (Section 00 45 19)

5. Davis Bacon Requirements (Section 00 65 21):
    a. A final wage rate determination will be issued by Addendum no earlier than 10 days prior to the bid opening, if applicable.
6. Agreement (Section 00 51 00):
    a. Contract Time: Work will be substantially completed within **30 calendar days** of the issuance of the Notice to Proceed and completed and ready for final payment in accordance with the General Conditions within **45 calendar days** of said Notice.
    b. Liquidated Damages: Liquidated damages are **$500.00** for each day that expires after Substantial Completion until the Work is Substantially Complete.
7. Insurance Requirements (Section 00 73 00): Required limits of liability for insurance coverages are outlined.
8. Contractor's Application for Payment (Section 01 3300 Article 1.06): Contractor shall submit a completed Payment Schedule with an executed Contractor's Application for Payment and Contractor's Declaration to Engineer not more often than once per month. Engineer will certify payments with the use of Engineer's Certificate for Payment.

Important Project Elements:

1. Temporary Facilities and Control (Section 01 5000): Site access and parking; public road maintenance, emergency access, public access to roadways, maintaining traffic, temporary utilities (power, sanitary, water, etc.).
2. Permit(s):
    a. State Permits:
        i. EGLE Part 41 Construction Permit – Permit has been issued.
3. Easements:
    a. No permanent easements were required as designed.
    b. Temporary Easements (Section 01 11 00, Article 1.06): In the event that the Contractor deems it necessary or advisable to operate beyond the limits of the existing rights-of-way or easements, he shall be responsible for making special written agreements with the property owners and shall furnish such copies of agreement to the Owner.
4. Utilities: Contact information for the various utilities that may be affected by this Project have been included on the cover sheet of the plan set.
    a. Water / Sewer – City of Flint
    b. Natural Gas / Electric – Consumers Energy
    c. Telephone – AT&T
    d. Telecom – Comlink
    e. Buses – Flint Community Schools / MTA
5. Addenda:
    a. Addendum No. 1 will be issued and will include pre-bid meeting minutes, revised specifications, reissued Contract Drawings, and any other contract documents for clarification, as necessary.

6. Communication:
    a. Communications concerning bids shall be addressed to Tiffany Harrison and must be submitted in writing.

Questions from the Audience:

Question: If there is any sewage left in the wet well, how will it need to be disposed?

Answer: Any sewage remaining in the wet well may be pumped to a sanitary manhole adjacent to the Avon Pumping Station.

Question: There are several large trees and bushes that may interfere with demolition. Can these be cut down?

Answer: Yes, the trees and bushes may be cut down and removed if they interfere with demolition activities. Cost to remove and dispose of the trees will be considered incidental to the project.

Question: Is there any asbestos known to be present in the area(s) of the project?

Answer: No.

Question: Should there be holes placed in the bottom of the wet well before the fill is placed to allow for drainage?

Answer: Yes.

Question: Is the depth of the wet well shown correctly on Sheet C-102 of the plan set?

Answer: No, the dimensions shown on Sheet C-102 that was issued for bid are incorrect. Sheet C-102 will be revised and reissued as part of Addendum 1. Please note that approximate elevations within the wet well will be shown in the revised drawing.

Question: During the site visit a small hatch in the northeast corner of the wet well was opened and it appears that there is flow going into the wet well. What is this and how should it be addressed?

Answer: Flow is from a diverted sewer. The existing diversion will be addressed in Addendum 01.

Meeting Adjourned:

Meeting adjourned at approximately 2:00 PM after attendees were provided an opportunity to visit the site and examine the facilities.

SECTION 31 23 19
DEWATERING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section includes dewatering work complete with design of dewatering systems, construction and operation of dewatering systems, abandonment of dewatering systems, protection of personnel and structures, environmental protection and restoration.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 57 13 - Temporary Erosion and Sediment Control

B. Section 01 89 00 - Site Construction Performance Requirements

C. Section 31 23 16 - Structural Excavation and Backfill

D. Section 31 23 33 - Trenching and Backfilling

1.03 DESIGN OF DEWATERING CONSTRUCTION

A. Geotechnical investigations made in relation to this Project are provided as reference documents. Interpretations of all data and reports, performing any additional investigations, and obtaining any additional data for construction purposes is the responsibility of the Contractor.

B. Contractor shall be responsible for the complete design of all structures and methods proposed for dewatering the project site, including the implementation of materials, tools and equipment proposed for use in the Work.

C. Temporary wiring associated with the dewatering shall comply with applicable portions of the National Electrical Code.

D. Provide monitoring wells as necessary to determine the groundwater levels along the alignment and shaft locations.

1.04 SOIL EROSION AND SEDIMENTATION CONTROL

A. Dewatering systems design and construction shall conform to the provisions of Part 91 of Soil Erosion and Sedimentation Control, Act 451 "Natural Resources and Environmental Protection Act" of 1994; and Section 01 57 13 - Temporary Erosion and Sediment Control. Where applicable, the Contractor shall obtain and pay for all permits and inspections for dewatering construction in accordance with the provisions of PA 451, State of Michigan, 1994, and all local government agencies having jurisdiction. No additional claim for compensation shall be allowed because of the Contractor's failure to obtain or pay for such permits and inspections.

B. Contractor, at Contractor's expense, shall provide, maintain and remove such temporary and/or permanent soil erosion and sedimentation control measures as specified on the Plans or as determined by the Engineer. The measures shall prevent surface runoff from carrying excavated materials into the waterways, to reduce erosion of the slopes, and to prevent silting in of waterways downstream of the Work. Measures should include provisions to reduce erosion by the wind of areas stripped of vegetation, including material stockpiles.

1.05 FEDERAL, STATE, AND LOCAL REGULATIONS

A. Dewatering operations shall conform to the requirements of all federal, state, and local agencies having jurisdiction.

B. Dewatering water discharged to streams, drains or sewers may require permits from federal, state or local agencies having jurisdiction. Contractor shall comply with all water quality requirements prior to discharging dewatering water. Contractor shall be responsible for testing and treatment required to meet water quality requirements prior to discharge. No discharges to

sanitary sewers will be allowed without prior approval of local agencies with jurisdiction for the sanitary sewers.

1.06 PROTECTION

A. Take steps necessary, during the Work of this Section, to protect surrounding property and adjacent buildings, private water supplies, roads, drains, sewers, structures and appurtenances. Adequate measures shall be taken to protect such property and construction from the effects of the dewatering operations.

1.07 SUBMITTALS

A. Submit detailed plans indicating proposed type and location of dewatering wells, type and location of collection/conveyance piping, and point of disposal of pumped water. Do not begin any dewatering work until submittals and supporting data have been reviewed by Engineer.

B. Dewatering system shall be designed by a professional with a minimum of seven years documented experience in the installation and design of dewatering systems. Submittal shall be signed and sealed by a registered Professional Engineer in the state of Michigan, stating that the proposed dewatering method is adequate to perform the required tasks.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

A. Provide electrical power from local utility. Provide stand-by power and other required auxiliary dewatering equipment to ensure continuous dewatering capability. Dewatering, where required, shall be continuous. Dewatering will not be stopped during work stoppage without approval of the Engineer. Coordinate construction operations to minimize duration and extent of dewatering required.

B. Dewatering wells are to use properly designed filters to prevent the migration of soil fines into the well.

3.02 MONITORING AND CONTROL

A. During dewatering operations, monitor ground water level with piezometers to ensure the design or specified groundwater elevation is maintained. Install monitoring wells with screens below the excavation level as required. Install wells at a minimum of 200-foot intervals located between dewatering wells. Provide access to monitoring wells by Engineer.

B. Modify dewatering operation if geotechnical instrumentation or survey measurements indicates movement of structures, sheeting or embankments, or inability to lower groundwater as specified.

C. Inspect wells and lines on a daily basis to ensure integrity and watertightness. Keep fittings and connections watertight to ensure release of sulfide to atmosphere from groundwater does not occur.

3.03 EXISTING DRAINAGE CONDITIONS

A. Prior to beginning Work, verify in the field the location, type and capacity of existing drainage facilities and conditions which will affect the Work of this Section. No allowances shall be made for conditions found during the progress of the dewatering operations because of the Contractor's failure to verify such conditions.

3.04 EXISTING STRUCTURES AND UTILITIES

A. Contractor shall make field verification of existing structures and utilities at the site of the Work which are scheduled to remain, and which may be affected by the Work of this Section. Contractor shall be responsible for damage to existing structures and/or utilities caused

because of his Work and shall repair such damage at Contractor's expense to the satisfaction of the Engineer or utility owner.

3.05 DRAINAGE OF EXCAVATIONS

A. Contractor shall maintain finished excavation Work free of water during the preparation of the subgrade and until the completion of the Work. No ground or surface water shall be discharged into existing sanitary sewer. No unit of Work shall be constructed under water except as otherwise determined by the Engineer.

B. Provide and maintain adequate dewatering equipment to remove and dispose of surface or groundwater entering excavations, trenches or other parts of the Work. Each excavation shall be kept dry during subgrade preparation and continually thereafter until construction is complete.

C. Excavations which extend down to or below the static groundwater elevation shall be dewatered by lowering and maintaining the groundwater level beneath such excavations a distance of not less than 12 inches below the bottom of the excavation. Drainage system methods shall not cause damage to wells or adjacent property.

D. Outlet drainage piping and conduit shall be kept clean and free from sediment. Contractor shall be held responsible for the condition of existing pipes, conduits and structures which Contractor may use for drainage.

3.06 DEWATERING SUMPS AND PUMP WELLS

A. Sumps and pump wells used as a part of the dewatering system shall be strongly sheathed and braced to protect the construction while in use. Tops of well casings must be covered to prevent animals and debris from entering and shall be 2 to 3 feet above ground. Sumps and wells, when abandoned, shall be backfilled and compacted to the satisfaction of the Engineer.

3.07 DRILLING

A. Methods used in drilling wells associated with dewatering systems shall be the responsibility of the Contractor and shall be acceptable to the Engineer.

B. Drilling methods shall ensure proper placement of well materials and shall not involve displacement of earth formations.

C. Drilling shall be done with equipment of proper type, in good condition, and acceptable to the Engineer.

3.08 PUMPING

A. Equipment for pumping and pumping methods associated with dewatering systems shall be the responsibility of the Contractor and shall be acceptable to the Engineer. Contractor shall construct or furnish adequate discharge piping to conduct and dispose of the water so as to prevent damage to existing structures or property.

B. Pumping equipment shall be of proper type and size for the Work, in good condition, and acceptable to the Engineer. Provide anchors and supports necessary for pumping equipment.

3.09 FILLING AND GRADING

A. Upon completion of dewatering Work for the Project, abandon and/or fill holes, trenches, ditches and other earth excavations created by the Work of this Section and not scheduled to remain. Do filling, backfilling and grading to restore excavations and earth banks to the lines and levels indicated on the Contract Drawings and as determined by the Engineer. Earth fills shall be compacted to a density equal to that of the surrounding undisturbed earth.

END OF SECTION

ADDENDUM 01
ISSUED 07-20-2023

SECTION 31 23 33
TRENCHING AND BACKFILLING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section includes open trench construction for utility installation, complete with trenching, sheeting, bracing, bedding, bedding materials, backfilling, backfill materials, and compaction.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 57 13 - Temporary Erosion and Sediment Control

B. Section 01 89 00 - Site Construction Performance Requirements

C. Section 31 22 00 - Grading

D. Section 31 23 16 - Structural Excavation and Backfill

E. Section 32 92 19 - Seeding

1.03 REFERENCE STANDARDS

A. Unless otherwise specified, the Work for this Section shall conform to the applicable portions of the following Standard Specifications:

1. ASTM C94/C94M: Standard Specification for Ready-Mixed Concrete
2. ASTM C150/C150M: Standard Specification for Portland Cement
3. ASTM C595/C595M: Standard Specification for Blended Hydraulic Cements
4. ASTM C618: Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
5. ASTM C1479/C1479M: Standard Practice for Installation of Precast Concrete Sewer, Storm Drain, and Culvert Pipe Using Standard Installations
6. ASTM D1557: Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3))
7. ASTM D2321: Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
8. American Association of State Highway Transportation Officials
9. Michigan Department of Transportation (MDOT), Standard Specifications for Construction, latest edition

1.04 TEST REPORTS

A. Testing laboratory shall provide the Engineer with two (2) certified copies of the test results of the compaction of the backfill.

B. Testing for compaction and the certification of the test results shall be performed by a testing laboratory approved by the Engineer.

1.05 MIX DESIGN

A. Submit mix designs for any concrete or flowable fill mixtures to be used on the Project. Include certified test results for seven day and 28-day strengths, together with any technical information for admixtures.

1.06 SOIL EROSION AND SEDIMENTATION CONTROL

A. Contractor, at Contractor's expense, shall provide, maintain and remove such temporary and/or permanent soil erosion and sedimentation control measures as specified on the Plans or as determined by the Engineer.

B. Measures shall prevent surface runoff from carrying excavated materials into the drain, to reduce erosion of the slopes, and to prevent silting in of drain downstream of the Work.

C. Measures should include provisions to reduce erosions by the wind of all areas stripped of vegetation, including material stockpiles.

D. Comply with requirements of Section 01 57 13 - Temporary Erosion and Sediment Control.

PART 2 PRODUCTS

2.01 GRANULAR MATERIALS CLASS II

A. Granular Material Class II shall conform to the requirements for granular material Class II, as specified in MDOT Section 902 except as follows. The granular material shall be natural bank run sand with a maximum size of 1-1/2 inches.

2.02 CRUSHED STONE BEDDING

A. Crushed, angular, natural stone material, meeting the requirements of 21AA coarse aggregate as specified in MDOT Section 902. Crushed concrete and slag are not allowed.

2.03 CONCRETE

A. Concrete shall conform to MDOT Section 1004; use 3,000 psi strength; Type IA cement; MDOT 6A coarse aggregate; MDOT 2NS fine aggregate; 3 inch maximum slump; no admixtures without Engineer's approval.

2.04 FLOWABLE FILL FOR BACKFILLING

A. Materials

1. Fly Ash shall have a maximum loss on ignition of 12% and meet the other requirements of ASTM C618 (Class F).
2. Water shall meet the requirements of ASTM C94/C94M.
3. ASTM C150/C150M or ASTM C595/C595M, Type I or Type IA.

B. Mixture (Strength 100 to 120 psi)

1. Fly Ash: 2,000 lbs per cyd min
2. Cement: 70 lbs per cyd min
3. Water: Sufficient water to produce desired flowability 700 lbs per cyd

C. The temperature of the flowable fill mix as manufactured and delivered shall be at least 50 degrees Fahrenheit.

D. The flowable fill can be mixed by pugmill, central concrete mixer, ready mix truck, turbine mixer, or other acceptable equipment or method.

PART 3 EXECUTION

3.01 DEWATERING

A. The area within the vicinity of the trenching operation shall be dewatered in accordance with Section 31 23 19 - Dewatering prior to the trenching operation.

B. Depth of the dewatering shall be sufficient to allow the trench excavating operation including backfilling and compacting to proceed in a dry condition.

3.02 TRENCH EXCAVATION

A. Open cut trench excavation shall include the site clearing and grubbing, the excavating of all materials encountered, the supporting and protecting of all structures and/or utilities encountered above and below the ground surface, and the removal of water from the construction site.

B. The trenching operation shall commence at the downstream or outlet end of the new Work and proceed upstream, unless otherwise specified on the Plans or directed by the Engineer.

C. The trench shall be excavated in reasonably close conformity with the lines and grades specified on the Plans or as established by the Engineer.

D. The excavated materials shall be temporarily stored along the trench in a manner that will not cause damage to trees, shrubs, fences, improvements, utilities, private property, public property or traffic. The excavated materials shall not be placed at such locations that will endanger the trench banks by imposing loads thereon.

E. For rigid pipe, the trench shall be of sufficient width to provide adequate working space to permit the installation of the pipe and the compaction of the bedding material under and around the pipe. However, for rigid pipe, the width of the trench from below the pipe bedding to 12 inches above the top of the pipe shall not exceed the following dimensions:

Diameter of Pipe	Width of Trench
6 thru 12 inch pipe	30 inches wide
15 thru 36 inch pipe	outside diameter plus 16 inches
42 thru 60 inch pipe	outside diameter plus 20 inches
over 60 inch pipe	outside diameter plus 24 inches

1. To support the additional load of the backfill when the maximum trench width as specified for rigid pipe is exceeded, the Contractor shall install, at Contractor's expense, concrete encasement which shall completely surround the pipe and shall have a minimum thickness at any point of 1/4 of the outside diameter of the pipe or 4 inches whichever is greater; or at Contractor's expense, install another type bedding, approved by the Engineer. The concrete encasement shall consist of 3,000 psi strength concrete.

F. For flexible pipe, the minimum width shall be not less than the greater of either the pipe outside diameter plus 16 inches or the pipe outside diameter times 1.25, plus 12 inches. The maximum trench width for flexible pipe shall not exceed the minimum width by more than 6 inches.

1. To support the additional load of the backfill when the maximum trench width as specified for flexible or semi-rigid pipe is exceeded, the Contractor shall install, at Contractor's expense, crushed stone bedding material to the full width between undisturbed trench walls or at least 2.5 pipe diameters on each side of the pipe.

G. When, through the Contractor's construction procedure or because of unsuitable existing ground conditions, it becomes impossible to maintain alignment and grade properly, the Contractor, at Contractor's expense, shall excavate below the normal trench bottom grade and shall fill the void with a large size aggregate or 3,000 psi (21 MPa) concrete as approved by the Engineer to ensure that the pipe when laid in the proper bedding will maintain correct alignment and proper grade.

H. Trench excavations, including those for shafts and structures, shall be adequately braced and/or sheeted where necessary to prevent caving or squeezing of the soil.

3.03 SHEETING, SHORING, AND BRACING

A. Contractor shall furnish, place and maintain sheeting, shoring, and bracing of the trench and/or shaft as may be required for safety of the workmen and for protection of the new Work or adjacent structures, including pavement, curbs, sidewalks, pipe lines, and conduits next to or crossing the trench; and for the protection and safety of pedestrian and vehicular traffic.

B. Contractor shall be responsible for the complete design of all sheeting, shoring and bracing Work. The design shall be appropriate for the soil conditions; and shall be of such strength, quality, dimension and spacing as to prevent caving or loss of ground or squeezing within the neat lines of the excavation; and shall effectively restrain movement of the adjacent soil.

C. Prior to installing the sheeting, shoring or bracing, the Contractor shall submit plans for this Work to the Engineer for informational purposes only.

D. Sheeting, shoring, bracing, and excavation shall conform to the current federal or state regulations for safety.

E. Where indicated on the Plans and where necessary in the Work, install and leave sheeting, shoring, and bracing in place. No additional compensation shall be paid to Contractor for sheeting, shoring or bracing left in place.

F. Supports for pipes, conduits, etc. crossing the trench shall conform to the requirements of the owners of such facilities and if necessary, shall be left in place.

G. Furnishing, placing, bracing, maintaining, and removing of sheeting, shoring, and trenching materials shall be at the Contractor's expense.

H. Contractor shall not remove the trench sheeting, shoring and bracing until the pipe has been properly bedded, and the trench backfilled to sufficiently support the external loads.

I. Sheeting, shoring, and bracing material shall not come in contact with the pipe, but shall be installed so that no concentrated loads or horizontal thrusts are transmitted to the pipe.

3.04 PIPE BEDDING

A. Install and compact in 6-inch layers. Particular care shall be taken to assure filling and tamping all spaces under, around, and above the top of the pipe. Work in and around pipe by hand to provide uniform support.

B. Rigid Pipe Bedding:

1. Rigid pipe bedding shall conform to ASTM C1479, except as noted.

2. Class R-A:

a. Pipe shall be bedded in crushed stone bedding material placed on the trench bottom. Bedding shall have a minimum thickness beneath the pipe of 4 inches or 1/4 of the outside diameter of the pipe, whichever is greater; and shall extend up the sides of the pipe to the horizontal centerline.

b. The top half of the pipe shall be covered with a monolithic plain concrete arch having a thickness of at least 4 inches or 1/4 of the inside diameter of the pipe, whichever is greater, at the pipe crown; and a minimum width equal to the outside diameter of the pipe plus 8 inches or 1-1/4 of the diameter of the pipe, whichever is greater.

3. Class R-B:

a. Pipe shall be bedded in crushed stone bedding material placed on the trench bottom. Bedding shall have a minimum thickness beneath the pipe of 4 inches or 1/8 of the outside diameter of the pipe, whichever is greater, and shall extend up the sides of the pipe to the horizontal centerline.

b. Backfill from pipe horizontal centerline to a level not less than 12 inches above the top of the pipe shall be granular material Class II. This material shall be placed in 6 inch layers with each layer thoroughly compacted by mechanical means with the finished compacted material a minimum of 12 inches above the top of pipe.

4. Class R-C:

a. Pipe shall be bedded in granular material Class II placed on the trench bottom. Bedding shall have a minimum thickness beneath the pipe of 4 inches or 1/8 of the

outside diameter of the pipe, whichever is greater, and the bedding shall extend to a level not less than 12 inches above the top of the pipe.

b. This material shall be placed in 6-inch layers with each layer thoroughly compacted by mechanical means with the finished compacted material a minimum of 12 inches above the top of pipe.

C. Flexible Pipe Bedding:

1. Flexible pipe bedding shall conform to ASTM D2321, except as noted. A continuous and uniform bedding shall be provided in the trench for all buried pipe.

2. Class F-I:

a. Pipe shall be bedded in crushed stone bedding material placed on the trench bottom. The bedding shall have a minimum thickness beneath the pipe of 4 inches and shall extend up the sides of the pipe until the top of pipe is covered by a minimum thickness of 12 inches.

b. Where allowable trench widths are exceeded, bedding shall be used to the full width between undisturbed trench walls. Concrete cradle bedding shall not be used.

3. Class F-II:

a. Pipe shall be bedded in crushed stone bedding material placed on the trench bottom. Bedding shall have a minimum thickness beneath the pipe of 4 inches or 1/8 of the outside diameter of the pipe, whichever is greater; and shall extend up the sides of the pipe to the horizontal centerline.

b. Backfill from pipe horizontal centerline to a level not less than 12 inches above the top of the pipe shall be granular material Class II. This material shall be placed in 6 inch layers with each layer thoroughly compacted by mechanical means with the finished compacted material a minimum of 12 inches above the top of pipe.

c. Where allowable trench widths are exceeded, bedding shall be used to the full width between undisturbed trench walls. Concrete cradle bedding shall not be used.

4. Class F-III:

a. Pipe shall be bedded in granular material Class II placed on the trench bottom. Bedding shall have a minimum thickness beneath the pipe of four 4 inches or 1/8 of the outside diameter of the pipe, whichever is greater, and the bedding shall extend to a level not less than 12 inches above the top of the pipe. This material shall be placed in 6 inch layers with each layer thoroughly compacted by mechanical means with the finished compacted material a minimum of 12 inches above the top of the pipe.

b. Where allowable trench widths are exceeded, bedding shall be used to the full width between undisturbed trench walls. Concrete cradle bedding shall not be used.

3.05 BACKFILLING TRENCHES

A. Backfill material shall be placed on sections of bedded pipes only after such pipe bedding and backfill materials have been approved by the Engineer.

B. The trench backfilling shall follow the pipe laying as closely as possible. However, at no time shall the pipe laying in any trench precede backfilling of that trench by more than 100 feet, unless otherwise directed by the Engineer.

C. Backfilling shall not be done in freezing weather except by permission of the Engineer. Frozen materials shall not be used in trench backfilling.

D. The following trench backfill specifications are for use in that portion of the trench beyond the scope of the pipe bedding requirements which normally stops at a point 12 inches above the

top of pipe. Backfill material to be placed above pipe bedding shall be free of cinders, ashes, refuse, boulders, roots, stumps, trees, timbers, brush, debris, or other extraneous materials which in the opinion of the Engineer, are unsuitable. Rocks or stones having a dimension larger than 6 inches shall not be placed within three 3 feet of the top of the pipe. Large stones may be placed in the remainder of the trench backfill only if well separated and arranged so that no interference with backfill settlement will result.

E. The type and method of backfilling is dependent on its location and function and shall conform to the following requirements:

1. Trench B:

a. Trenches under road surfaces, pavement, curb, driveway, sidewalk and where the trench edge is within three 3 feet of the pavement and as noted on the plans shall be backfilled with natural bank run sand meeting the requirements of granular material Class II, unless otherwise indicated on the Plans.

b. Trenches under pavement to be constructed in the near future, as noted or shown on the Plans, shall be backfilled with natural bank run sand, meeting the requirements of granular material Class II, unless otherwise indicated on the Plans.

c. Where a pipe is installed under an existing or proposed utility, the backfill between the two shall be natural bank run sand meeting the requirements of granular material Class II, unless otherwise indicated on the Plans, constructed as herein specified.

d. The material shall be placed in uniform layers that can be adequately compacted and tested from the surface of that layer and shall be compacted to 95% of the material's maximum unit weight, unless otherwise specified on the Plans or by the Engineer.

2. Trench A:

a. All other trenches shall be backfilled with suitable excavated material placed in uniform layers that can be adequately compacted and tested from the surface of that layer.

b. Each layer shall be thoroughly compacted by approved mechanical methods to a density equivalent to the undisturbed adjacent soil or 90% of its maximum unit weight, whichever is less.

3. Unless otherwise specified on the Plans or as directed by the Engineer, the trench backfill shall be carried to the adjacent existing ground or proposed grade whichever is higher.

4. Where any backfill or bedding as shown on the plans or specified is to be flowable fill, care shall be used to avoid displacing any pipes or structures due to fluid pressure. Pipes in backfill areas may need to be secured to avoid the buoyancy effect.

3.06 COMPACTING BACKFILL

A. Compaction of the backfill will not be paid for separately but shall be considered incidental to the Work of installation of the pipe and backfilling and shall include all the Work of manipulating the soil to obtain the specified densities. No additional compensation will be allowed for any delay required to obtain the specified moisture content or the specified density.

3.07 CLEANUP

A. Immediately following the placing and compacting of the backfill, the excess material shall be removed and disposed of by the Contractor, at Contractor's expense, as specified in Section 01 89 00. The construction area shall be leveled and left in a neat workmanlike condition.

B. At a seasonally correct time, approved by the Engineer, the disturbed area shall be raked, having topsoil placed thereon and restored.

1. Restoration with seed, fertilizer and mulch shall be the requirements of Section 32 92 19 - Seeding.

3.08 FIELD TESTING

A. During the course of the Work, the Engineer may require testing for compaction or density of the backfill. The taking of samples and the testing required shall be performed by a testing laboratory suitable to the Owner and approved by the Engineer.

1. Cost for testing and sampling shall be at the expense of the Contractor and considered incidental to the Work.

B. The maximum unit weight, when used as a measure of compaction or density of soils, shall be understood to mean the maximum unit weight per cubic foot or per cubic meter as determined by ASTM D1557, Method C.

3.09 DEFECTIVE WORK

A. Any portion of the trench backfill which is deficient in the specified density shall be corrected by methods meeting the approval of the Engineer.

B. Any extra testing or sampling required because of deficiencies shall be at the Contractor's expense.

END OF SECTION

ADDENDUM 01
ISSUED 07-20-2023

SECTION 33 05 13
MANHOLES AND STRUCTURES

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section includes Monolithic concrete manholes with lid frame, covers, anchorage and accessories, as well as modular precast concrete manhole sections with tongue-and-groove joints with masonry transition to lid frame, covers, anchorage and accessories.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 31 23 16 - Structural Excavation and Backfill

B. Section 31 23 33 - Trenching and Backfilling

1.03 REQUIREMENTS OF REGULATORY AGENCIES

A. Conform to the applicable requirements of State and local health authorities having jurisdiction for disinfection and testing of water mains.

1.04 REFERENCE STANDARDS

A. Unless otherwise specified, the Work of this Section shall conform to the applicable portions of the following Standard Specifications:

1. ACI - American Concrete Institute
2. ASTM - ASTM International

1.05 SUBMITTALS

A. Shop Drawings: Indicate manhole and vault locations, elevations, piping, conduit, and sizes and elevations of penetrations.

B. Product Data: Provide manufacturer’s data and installation instructions for precast manhole and vault sections, joint connections, water stops, gaskets, corrosion protection system, flexible pipe joints, chimney seals, manhole and vault castings, and other pertinent information for precast and cast-in-place manholes and vaults.

C. Manufacturers Certification: Certify that all products furnished meet or exceed the specified requirements, including worst case depth loadings for this project.

D. Calculations: Submit calculations for review sealed and signed by a registered Professional Structural Engineer in the State of Michigan. Include structural, depth of bury, buoyancy, and all other information necessary to determine adequacy of the item.

E. Results of manhole and vault leakage and vacuum tests.

1.06 CLOSEOUT SUBMITTALS

A. The following shall be submitted in accordance with Section 01 77 00 - Closeout Procedures:

1. Manufacturer's field reports.

B. Project record documents:

a. Accurately record actual locations of manholes, connections, and invert elevations.

b. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.07 DESIGN REQUIREMENTS

A. Equivalent strength: Based on structural design of reinforced concrete as outlined in ACI 318.

B. Design of Lifting Devices for Precast Structures: In accordance with ASTM C890 "Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures." Provide lifting inserts designed for four times the anticipated lifting load. Grout inserts in place when complete.

C. Design of Joints for Precast Structures: Gaskets in accordance with ASTM C923/C923M "Standard Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals" with maximum leakage of 0.025 gallons per hour per foot of joint at 3 feet of head.

D. Use precast concrete manholes or vaults designed by the precast manufacturer's registered Professional Structural Engineer, licensed in the State of Michigan in accordance with the Contract Documents. Furnish precast concrete manholes, however, conforming to the following minimum design requirements in addition to the ASTM standards referenced in this Section:

E. The top slab of all manholes or vaults shall be designed for an H-20 truck loading.

F. Minimum manhole or vault base slab thickness shall be eight (8) inches up to twenty-five (25) feet depth and twelve (12) inches over twenty-five (25) feet depth.

G. Manholes and vaults shall resist buoyancy due to flooding with a high ground water table elevation at the top of the precast concrete structure. The factor of safety against buoyancy shall be 1.20. Buoyancy calculations shall be provided with the submittal.

H. Walls backfilled with cohesive soil shall be designed for an equivalent horizontal fluid at-rest soil pressure of 135 pounds per square foot (psf) per foot of wall height for walls below the ground water table.

I. Walls backfilled with granular soil shall be designed for an equivalent horizontal fluid at-rest soil pressure of 125 psf per foot of wall height for walls below the ground water table.

J. Design walls for surcharge load from adjacent structures or minimum 300 psf surcharge, whichever is greater.

K. Loads associated with testing manholes and vaults for watertightness by vacuum testing in accordance with this Section.

1.08 DELIVERY, STORAGE AND HANDLING

A. Comply with precast concrete manufacturer’s instructions for unloading, storing and moving precast manholes, vaults and drainage structures.

B. Store precast concrete manholes, vaults and drainage structures to prevent damage to Owner’s property or other public or private property. Repair property damaged from materials storage.

C. Mark each precast structure by indentation or waterproof paint showing date of manufacture, manufacturer, and identifying symbols and numbers shown on Contract Drawings to indicate its intended use.

1.09 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five years documented experience.

PART 2 PRODUCTS

2.01 VALVE VAULTS, MANHOLES, FRAMES, AND COVERS

A. Valve Vaults and Manhole Manufacturers:

1. Northern Concrete Pipe, Inc.
2. Engineer approved equal.

B. Manhole and Vault Sections: Reinforced precast concrete in accordance with ASTM C478 with gaskets in accordance with ASTM C923.

C. Benching:

1. Provide full height and poured-in-place benching.
2. Use non-shrink grout as specified in Section 04 0511.
3. Appropriate granular filler may be used, subject to the approval of Engineer.

D. Watertight Cover and Frame Manufacturers:

1. East Jordan Iron Works, Inc. - Model 1040 ZPT, Type A.
2. Neenah Foundry Co. - Model R-1916-F.
3. Engineer approved equal.

E. Cover and Frame Product Description:

1. ASTM A48/A48M, Class 35B Cast iron construction, machined flat bearing surface, removable, watertight, and boltable lid, 304 stainless steel frame anchors with non-seizing 304 stainless steel nuts, 304 stainless steel bolts for cover, and a cover molded with name and logo per Contract Drawings.

2.02 STORM SEWER MANHOLES, FRAMES, AND COVERS

A. Storm Sewer Manhole Manufacturers:

1. Northern Concrete Pipe, Inc.
2. Mack Industries
3. Engineer approved equal.

B. Cover and Frame Manufacturers:

1. East Jordan Iron Works, Inc. - Model 1040 ZPT, Type A.
2. Neenah Foundry Co. - Model R-1916-F.
3. Engineer approved equal.

C. Cover and Frame Product Description:

1. ASTM A48/A48M, Class 35B Cast iron construction, machined flat bearing surface, removable, watertight, and boltable lid, 304 stainless steel frame anchors with non-seizing 304 stainless steel nuts, 304 stainless steel bolts for cover, and a cover molded with name and logo per Contract Drawings.

2.03 OTHER MANHOLE AND VAULT COMPONENTS

A. Base Slab:

1. Cast-in-place concrete or integral, monolithically cast precast concrete or standard tee pipe base sections.

B. Pipe to Manhole/vault Connection:

1. Unless noted otherwise on the Contract Drawings, use a resilient type connector, in accordance with ASTM C923/C923M, to connect pipes to the manhole. Use an A-Lock press wedge, Kor-n-Seal, or Res-Seal connector. No substitutions will be allowed. Non-shrink grout may only be used per the Contract Drawings or with written permission of Engineer.

C. Manhole and Vault Chimney Seals:

1. As shown on the Contract Drawings, seal the outside of the manhole or vault cone or riser section to the grade rings and manhole and vault frame with a heat shrinkable wrap or a compressible rubber seal with 304 stainless steel compression bands.

D. Manufacturers:

1. Canusa - WrapidSeal Manhole Encapsulation System
2. Cretex Specialty Products - External Manhole Seal
3. Engineer-approved equal

2.04 CONFIGURATION

A. Shaft Construction: Concentric with eccentric cone top section; lipped male/female gasketed joints; flexible rubber joint to receive pipe.

B. Shape: Cylindrical.

C. Clear Inside Dimensions: As indicated on Contract Drawings and as required for construction.

D. Design Depth: As indicated on Contract Drawings and as required for construction.

E. Clear Lid Opening: As indicated on Contract Drawings and as required for construction.

F. Pipe Entry: Provide openings as indicated on Contract Drawings and as required for construction.

G. Steps: As indicated on Contract Drawings and required by applicable safety code.

2.05 BEDDING AND COVER MATERIALS

A. Structure and Pipe Bedding: Fill Type A1, A2 or A5 as specified in Section 31 23 33 - Trenching and Backfilling and on the Contract Drawings.

B. Topsoil Fill Type: S3 or S4 as specified in Section 31 23 33 - Trenching and Backfilling and on the Contract Drawings.

C. Soil Backfill from Above Pipe to Finish Grade: Soil Type S1 or S2, as specified in Section 31 23 33 - Trenching and Backfilling and on the Contract Drawings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify items provided by other sections of Work are properly sized and located.

B. Verify that built-in items are in proper location, and ready for roughing into Work.

C. Verify excavation for manholes or vault is correct.

3.02 PREPARATION

A. Coordinate placement of inlet and outlet pipe or duct sleeves required by other sections.

B. Do not install structures where site conditions induce loads exceeding structural capacity of structures.

C. Inspect precast concrete structures immediately prior to placement in excavation to verify structures are internally clean and free from damage. Remove and replace damaged units.

D. Prepare manhole or vault for installation of chimney seals per manufacturer’s instructions.

3.03 INSTALLATION

A. Excavation and Backfill:

1. Excavate for manholes, vaults and drainage structures in accordance with Section 31 23 16 - Structural Excavation and Backfill in location and to depth shown. Provide clearance around sidewalls of structure for construction operations.
2. When groundwater is encountered, prevent accumulation of water in excavations. Place manholes, vaults or drainage structures in dry trench.
3. Where possibility exists of watertight structure becoming buoyant in flooded excavation, anchor structure to avoid flotation.
4. Placement and compaction of surrounding backfill material shall be accomplished to provide sufficient and equal side pressure on the manhole or vault.
5. Backfill excavations for manholes, vaults and drainage structures in accordance with Section 31 23 16 - Structural Excavation and Backfill.
6. Form and place manhole cylinder or vault wall plumb and level, to correct dimensions and elevations.
7. Connect pipe with flexible rubber joints as shown on the Contract Drawings.
8. Set cover frames and covers level without tipping, to correct elevations.
9. Install chimney seals per manufacturer’s instructions and Contract Drawings.
10. Coordinate with other sections of Work to provide correct size, shape, elevation, and location.
11. Use manufacturer's recommended method, procedure and equipment for handling, installing, and connecting the manholes or vaults.

3.04 STANDARD PRECAST CONCRETE MANHOLE, VAULT AND DRAINAGE STRUCTURE INSTALLATION

A. Prepare granular bedding as shown on Drawings, to receive integral, monolithically cast base slab as specified.

B. Lift precast structures at lifting points designated by manufacturer. Grout all lifting holes when structure is in place.

C. When lowering manholes, vaults and drainage structures into excavations and joining pipe to units, take precautions to ensure interior of pipeline and structure remains clean.

D. Set precast structures bearing firmly and fully on compacted granular bedding or on other support system shown on Contract Drawings.

E. Assemble multi-section structures by lowering each section into excavation. Lower, set level, and firmly position base section before placing additional sections.

F. Remove foreign materials from joint surfaces and verify gaskets are installed properly.

G. Maintain alignment between sections by using guide devices affixed to lower section.

H. Verify manholes, vaults and drainage structures installed satisfy required alignment and grade.

I. Remove knockouts or cut structure to receive piping without creating openings larger than required to receive pipe. Connect pipe to manhole or vault with a flexible rubber joint as specified. Fill annular space with mortar.

J. Cut pipe to finish flush with interior of structure.

K. Shape inverts through manhole or vault as shown on Contract Drawings. Provide cast-in-place full height benching. Trowel smooth and slope to drain per Contract Drawings.

3.05 CASTINGS INSTALLATION

A. Set frames using a precast concrete grade ring with butyl rope to seal joint. Use grade ring sizes per Contract Drawings

B. Unless Contract Drawings indicate otherwise, set frame and cover 6 inch above finished grade for manholes, vaults and other structures with covers located within unpaved areas to allow area to be graded away from cover beginning 1 inch below top surface of frame.

C. Set frame and cover flush with ground surface for manholes, vaults and other structures located within paved areas.

3.06 LEAKAGE TESTING FOR MANHOLES AND VAULTS

A. After completion of manhole or vault construction, inspect all manholes for leakage and repair all visible leaks.

B. After repairing all leaks, test manholes and vaults for watertightness using vacuum testing procedure as follows:

C. Temporarily plug the influent and effluent lines with suitably sized pneumatic or mechanical plugs. Ensure plugs are properly rated for the pressure required for the test. Place plugs a minimum of 6 inches outside the manhole or vault walls. Brace inverts to prevent lines from being dislodged.

D. Install vacuum tester head assembly at the top access point of the manhole or vault and adjust for a proper seal. Following manufacturer's instructions and safety precautions, inflate sealing element to the recommended maximum inflation pressure. Do not over-inflate.

E. Evacuate manhole or vault with vacuum pump to 10-inches of mercury (Hg). Disconnect the pump and monitor vacuum for the time period specified in the following table (Use equivalent volume for testing vaults):

Depth (feet)	48" Dia. MH	60" Dia. MH	72" Dia. MH	96" Dia. MH
4	30	30	30	30
8	30	30	32	38
12	30	39	48	57
16	40	52	64	76
20	50	65	80	95
24	60	78	96	114

F. If the drop in vacuum exceeds 1-inch of mercury (Hg) over the specified time period, locate the leaks and complete repairs necessary to seal the manhole or vault. Repeat the test until acceptable results are obtained.

3.07 FIELD QUALITY CONTROL

A. Vertical Adjustment of Existing Manhole and Drainage Structures:

1. Where required, adjust top elevation of existing manholes and drainage structures to finished grades shown on Drawings.

2. Reset existing frames, grates, and covers, carefully removed, cleaned of mortar fragments, to required elevation in accordance with requirements specified for installation of castings.

3. Remove concrete without damaging existing vertical reinforcing bars when removal of existing concrete wall is required. Clean vertical bars of concrete and bend into new concrete top slab or splice to required vertical reinforcement, as indicated in the Contract Drawings.

4. Clean and apply sand-cement-bonding compound on existing concrete surfaces to receive cast-in-place concrete.

END OF SECTION

ADDENDUM 01
ISSUED 07-20-2023

SECTION 33 30 00
SANITARY UTILITY SEWERAGE PIPING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section includes sanitary sewer Work indicated on the Plans complete with pipe, joints, structures, pipe bedding, installation, television inspection and testing.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 31 23 16 - Structural Excavation and Backfill

B. Section 31 23 19 - Dewatering

C. Section 31 23 33 - Trenching and Backfilling

1.03 REQUIREMENTS OF REGULATORY AGENCIES

A. Testing shall conform to the applicable requirements of State and local authorities having jurisdiction, and shall include such tests as: deflection, air, exfiltration and infiltration.

1.04 REFERENCE STANDARDS

A. Unless otherwise specified, the Work for this Section shall conform to the applicable portions of the following Standard Specifications:

1. ANSI - American National Standard Institute
2. ASTM A185: Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
3. ASTM A615/A615M: Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
4. ASTM A1064/A1064M: Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
5. ASTM C14: Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe
6. ASTM C55: Standard Specification for Concrete Building Brick
7. ASTM C76: Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
8. ASTM C94/C94M: Standard Specification for Ready-Mixed Concrete
9. ASTM C139: Standard Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes
10. ASTM C150/C150M: Standard Specification for Portland Cement
11. ASTM C361: Standard Specification for Reinforced Concrete Low-Head Pressure Pipe
12. ASTM C478/C478M: Standard Specification for Circular Precast Reinforced Concrete Manhole Sections
13. ASTM C595/C595M: Standard Specification for Blended Hydraulic Cements
14. ASTM C618: Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
15. ASTM C969: Standard Practice for Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines

16. MDOT - Michigan Department of Transportation, Standard Specifications for Construction, latest edition
17. NASSCO - National Association of Sewer Service Companies

1.05 SOURCE QUALITY CONTROL

A. Laboratory test not less than one (1) percent, with a minimum of three (3) pieces, each size, material and class of gravity pipe required in the Work.

1.06 TOLERANCES

A. The actual grade of the invert of the sewer shall not deviate from plan grade by more than 0.1 foot per 100 feet, and not more than 0.2 feet in total for a sewer run from manhole to manhole.

B. Alignment of sewer shall be within 0.2 foot per 100 feet and within 6 inches in total for a sewer run from manhole to manhole.

1.07 SUBMITTALS

A. Submit independent grade checks in accordance with Part 3 of this Section.

B. Submit manufacturer's data for pipe bulkheading devices in accordance Part 3 of this Section.

C. A complete field report of the location of all wyes, risers and building leads shall be submitted to the Engineer at the end of each sewer section of the Project or on the last day of each week, whichever occurs first.

1. The complete field report shall include witnessing by the Contractor of the ends of all building leads placed. Witnessing shall consist of recording three (3) horizontal distances to the nearest 1 foot with the lines of measurement at minimum angles of 45 degrees with respect to one another.
2. Witnessing shall also include recording of the depth to nearest 6 inches from the invert at the end of the lead to the finish ground above the end of the lead.
3. No payment will be made for un-witnessed installation or for improperly witnessed installations.

D. As part of the television inspection, a wye location report shall be submitted to the Engineer. The report shall contain the precise location of each wye, notes, photographs, and other pertinent information.

E. Submit two (2) copies of the laboratory test reports required per Part 1 of this Section to the Engineer.

F. Shop Drawings shall be provided of all manhole tees.

1.08 STORAGE OF MATERIALS

A. Piping material shall not be stacked higher than 4 feet. Suitable racks, chairs, and other supports shall be provided to protect preformed pipe mating surfaces from damage. Store bottom tiers off the ground, alternate tiers and chock tier ends.

B. Joint and sealing materials used in the sanitary sewer system shall be protected from sunlight and stored in cool and clean place until ready for installation.

1.09 HANDLING OF MATERIAL

A. Load and unload piping using suitably approved hoists, skids, etc. Piping shall not be dropped, bumped or allowed to impact against itself. Damaged piping shall not be used by the Contractor.

B. Lifting devices shall be suited to the Work and shall protect surfaces from damage.

PART 2PRODUCTS

2.01 PRECAST CONCRETE PIPE SYSTEMS

A. Reinforced Precast Concrete Pipe System

1. Pipe 12-inch through 30-inch diameter shall be ASTM C76, Class II through V (as specified on the plans), Wall B or Wall C, circular reinforced.

2. Pipe 36-inch through 108-inch diameter shall be ASTM C76, Class I through V (as specified on the plans), Wall B or Wall C, circular or elliptical reinforced.

    a. When elliptical reinforcement is used, the following method of indexing the steel and the pipe barrel shall be used:

        1) A dummy lift pin form shall be set in the outer pipe wall form projecting into the pipe wall a minimum 1-3/4 inches and a maximum of . An additional spacer chair shall be welded to the elliptical steel cage at the proper location so as to engage the dummy lift pin form during the pipe casting operation.

        2) It is the intent of the spacer chair and dummy lift pin arrangement to provide a means of assuring the final position of the elliptical steel cage within the barrel of the pipe and, for providing a means of indexing the pipe in the field to assure proper placement of the pipe.

        3) Prior to shipment of the pipe, they shall be striped along the inside top with a minimum wide indelible marker so that final inspection of the pipe orientation can be made following completion of the installation.

3. For pipe 114 inches or larger in diameter, the design information in accordance with Section 6 of ASTM C76 shall be submitted to the Engineer for approval, prior to fabrication. The design of all pipes shall meet the D-load requirements for the class of pipe indicated on the Plans.

B. Joints for Concrete Pipe

1. Premium joints for concrete pipe shall be ASTM C443 limited as follows:

    a. Section 6.1 of ASTM C443, "Physical Requirements for Gaskets," shall be replaced with Section 6.9 of ASTM C361, "Rubber Gaskets." Also, Section 5 of ASTM C443 shall be limited to a modified grooved tongue to receive an "O" ring rubber gasket.

2. For concrete pipe sizes 12-inch through 24-inch, the modified grooved tongue and bell ends of the pipe shall be made smooth and shall not have over a 3-1/2 degree slope formed to fit the rubber gasket to tolerances as determined by the manufacturer. Pipe tongue shall not be out of round by more than ± 1/16 inch.

3. For pipe sizes 27-inch through 108-inch, the modified groove and bell ends of the pipe shall be smooth and shall not have over a 2-degree slope, formed to fit the rubber gasket to tolerances as determined by the manufacturer.

4. For pipe sizes and larger, the tongue shall be reinforced with an amount of circular steel equivalent in area to the inner steel cage specified for the pipe barrel and the bell shall be reinforced with an amount of circular steel equivalent in area to the outer steel cage specified for the pipe barrel.

5. For pipe sizes under 36 inches in diameter, including C14-XM5 extra strength, the bell or tongue shall be reinforced. Where the reinforcing steel for the tongue, barrel and bell is not continuous, the steel shall be lapped a minimum of 2 inches.

6. Only lubricant, as supplied by the pipe manufacturer, shall be used on the groove and on the tongue in making up joints, and the joints shall be coupled in accordance with the pipe manufacturer's requirements.

7. All joints in concrete pipe 36-inches in diameter and larger shall have the inside annular space filled with cement mortar and troweled flush. Mortar shall consist of 1-part Portland Cement and two (2) parts of plaster sand. Mortar for inside joints shall be mixed with only enough water for dry packing.

C. Wyes and Tees

1. Wyes and tees shall be manufactured to the same standards as the pipe. Spurs shall be of the same size and type as the house lead/riser pipe. Wye and tee fittings shall be furnished with the spurs securely fastened by the manufacturer to the barrel of the pipe. There shall be no projection on the inner surface of the pipe.

2.02 STRUCTURES

A. Material for sanitary sewer structures shall conform to the requirements as indicated on the plans and as specified below. Precast concrete structures are required except when constructing a structure over an existing sewer which may require limited use of concrete block or brick as approved by the Engineer.

B. Precast Concrete:

1. Precast concrete manhole, flat top slabs, risers, cone, transition sections and bottom sections shall conform to ASTM C478/C478M and shall be circular with circular reinforcement.

a. For depths greater than 32 feet, manhole shall be designed for the earth loading at the design depth of bury with a factor of safety of 1.5.

b. Base slab shall be minimum 8 inches thick for depths up to 25 feet and minimum 12 inches thick for depths greater than 25 feet.

2. Transition sections, reducers and flat top slabs shall be designed for the earth loading at the design depth of bury with a factor of safety of 1.5.

3. Precast doghouse sections shall be used for:

a. connections to existing sewer 15 inches and smaller on straight through runs and depths no greater than 20 feet.

b. and on right angle runs, with a maximum of four cutouts for depths up to 12 feet.

c. Openings in precast doghouse sections shall be cast in the pipe before curing and no breaking or chipping of sections will be allowed after the manhole section has cured.

d. The size of the opening shall be cast as indicated on the Plans.

4. Precast bottom sections shall be cast with the bottom end flat to provide bearing of the full wall thickness.

5. The openings for sewer pipe shall be cast in the manhole section by the manufacturer.

6. Connections to manholes for pipe sizes 6 through 24 inch shall use a mechanically compressible flexible joint, as indicated on the Plans.

7. Connections to manholes for pipe sizes 27 inch and larger shall be grouted, as indicated on the Plans.

8. Manhole sections shall have modified grooved tongue joints with "O" ring gaskets or a tongue and groove joint with a Butyl Rubber based gasket type sealant meeting the requirements of ASTM C990 and having a nominal size of 1 inch.

9. Eccentric cone sections of a manhole shall have modified grooved tongue joints with "O" ring gaskets and be provided with 4-stud inserts cast in the top. The top shall have a smooth finished surface.

10. Concrete grade rings shall have smooth finished top and bottom surfaces. Grade rings shall be provided with "O" ring gaskets.

11. Manholes on sewers to be subjected to air tests shall be equipped with a 1/2 inch diameter galvanized capped pipe nipple extending through the manhole wall, 3 inches into the manhole, and at an elevation equal to the top of the sewer pipe.

12. Pipe, 48 inches in diameter or larger, shall be installed as an integral part of the manhole (manhole tees) which shall be constructed of 3,500 psi concrete placed in one continuous pour to 12 inches above the top of pipe as indicated on the Plans.

13. Precast manhole tees will be allowed on straight through runs with no angle at the manhole and where stubs or openings in manhole are above the tee section.

14. Precast concrete manhole tee units shall conform to ASTM C76, Class IV and shall be circular with circular reinforcement. The precast tees must be a monolithic pour with wire cage inspection prior to concrete placement. Joints for tee shall be the same as the joints on the sanitary sewer.

C. Manhole Steps:

1. Cast iron manhole steps shall conform to ASTM A48/A48M, Class 30, gray iron with a minimum cross section dimension of 1 inch in any direction.

2. Steel reinforced plastic manhole steps shall be of suitably approved co-polymer polypropylene conforming to ASTM D4101, PP0344B33534Z02 with 1/2-inch minimum diameter deformed reinforcing bar conforming to ASTM A615/A615M, Grade 60 and shall be in accordance with ASTM C478/C478M.

3. Manhole steps shall be of the types and sizes indicated on the Plans and shall comply with applicable Michigan Occupational Safety and Health Standards (MIOSHA).

D. Manhole Frames and Covers:

1. Manhole frames and covers shall conform to ASTM A48/A48M, Class 30, gray iron and shall be of the types and sizes as indicated on the Plans. The castings shall be neatly made and free from cracks, cold sheets, holes and other defects.

2. Surfaces of casting shall be ground to assure proper fit and to prevent rocking.

3. For all sanitary manholes, use a bolted waterproof frame with a pressure tight cover. Bolted down frame and cover shall be installed as indicated on the Plans.

2.03 BOLT, STUDS, NUTS

A. Bolt, studs, and nuts shall conform to the following ASTM Standards:

1. Cadmium Plating: ASTM B766, Grade N.S.

2. Zinc Coating: ASTM A153/A153M or ASTM B633, Type G.S.

2.04 CONCRETE

A. Concrete shall conform to MDOT Section 1004, use 3,500 psi strength concrete; Type IA cement; MDOT 6A coarse aggregate; MDOT 2NS fine aggregate; 3-inch maximum slump; no admixtures without the Engineer's approval.

2.05 CONCRETE REINFORCEMENT

A. Use ASTM A615/A615M, Grade 60 for bars and ASTM A1064/A1064M for welded wire fabric.

B. In accordance with MDOT Section 905, use ASTM A615/A615M, Grade 60 for bars and ASTM A185 for welded wire fabric.

2.06 FLOWABLE FILL

A. Flowable fill for filling abandoned utility pipes:

1. Materials
    a. Cement: Cement shall conform to ASTM C150/C150M or ASTM C595/C595M
    b. Fly Ash: Fly ash shall have a maximum loss on ignition of 12 percent and meeting the other requirements of ASTM C618 (Class F)
    c. The water shall meet the requirements of ASTM C94/C94M
2. Mixture Strength (50 to 100 psi
    a. Fly ASh: 2,000 lbs/cyd minimum
    b. Cement: 100 lbs/cyd minimum
    c. Sufficient water to produce the desired flowability (approximately 700 lbs/cyd)

B. The temperature of the flowable fill mixture as manufactured and delivered shall be at least 50 degrees F.

C. The flowable fill can be mixed by pugmill, central concrete mixer, ready mix truck, turbine mixer, or other acceptable equipment or method.

D. Contractor shall submit a history of the mix design for seven (7) day and 28-day strengths, together with any other technical information. The design mix shall also be included as part of the Contractor's submittals for project.

PART 3 EXECUTION

3.01 VERIFICATION OF EXCAVATION AND BEDDING

A. Prior to the installation of any sanitary sewer piping, structures, or materials, examine all trenches and other excavations for the proper grades, lines, levels and clearances required to receive the new Work.

B. Ascertain that all excavation bottoms, compacted subgrades and pipe bedding are adequate to receive the sanitary sewer materials to be installed.

C. Correct all defects and deficiencies before proceeding with the Work.

3.02 EXISTING SANITARY SEWERS

A. The Contractor shall expose the existing sanitary sewer and structures to which the new Work is to be connected and notify the Engineer of same. The Engineer will verify the vertical and horizontal locations of the existing system and shall inform the Contractor as to the necessary adjustments required to align the new sanitary sewer work with the existing system.

B. Connecting to an existing manhole requires removing the existing flow channel and constructing a new flow channel as necessary.

C. When connecting a new sewer to an existing sewer or a new building lead to an existing building lead, where the pipe joints are not compatible, use a "Fernco" rubber adapter. When connecting concrete to concrete, use stainless steel shear ring type couplers.

3.03 VERIFICATION OF PIPE CLASS AND JOINTS

A. Prior to the installation of any sanitary sewer piping, ascertain that the class of pipe, joint material and bedding are as specified herein and as indicated on the Plans.

3.04 PREPARATION OF PIPE ENDS

A. The outside surface of the spigot end and the inside surface of the bell end shall be cleaned and free of any foreign material, other than sealant recommended by the manufacturer, prior to installation.

3.05 EXAMINATION OF MATERIAL

A. All pipe, frames, covers, accessories, and appurtenances shall be examined carefully for damage and other defects immediately before installation. Defective or damaged material shall be rejected and removed from the Project by the Contractor.

3.06 INSTALLATION - GENERAL

A. Each section of pipe, when placed to grade and line, shall have firm bearing on the trench bedding throughout its length.

B. Pipe shall be laid to the line and grade called for on the Plans. Each pipe as laid shall be checked by the Contractor with line and grade pole or laser system to ensure proper result is obtained.

1. When employing a laser system, the Contractor shall have an alternate and independent means of checking the line and grade. Contractor shall check line and grade every 100 feet.

C. The finished work shall be straight and shall be sighted through between manholes.

D. Construction shall begin at the outlet end and proceed upstream with spigot ends pointing in direction of flow. Bell holes shall be excavated so that the full length of the barrel will bear uniformly on the bedding.

E. Mechanical means shall be used for pulling home all pipe where manual means will not result in pushing and holding the pipe home. Mechanical means shall consist of a cable placed inside of the pipe with a suitable winch, jack, or come along for pulling the pipe home and holding the pipe in position.

F. After laying of pipe, care shall be taken so as not to disturb its line and grade. Any pipe found off grade or out of line shall be re-laid.

G. Cutting of pipe shall be done with approved tools and by approved methods suitable for the pipe material. Pipe cutting methods that produce a smooth, square-cut end without damage to the pipe and that minimize airborne particles shall be employed.

H. Pipe cutting shall be performed using the recommendations of the manufacturer of the type of pipe materials being cut and according to the best trade practices.

I. When cutting of pipe or fittings, care shall be taken to prevent damage to the lining and the exterior surface. Damage to either shall be cause for rejection of complete section.

J. During the preparation of the pipe bedding and until the trench has been satisfactorily backfilled, the trench shall be kept free of water and sewage. A dewatering system, in accordance with Section 31 23 19 - Dewatering, shall be provided and maintained by the Contractor. The dewatering system shall remain in operation until the trench is backfilled.

K. Where pipe is located in a flood plain or otherwise susceptible to flotation it shall be anchored against flotation.

L. Backfill shall be as indicated on the Plans and as specified in Section 31 23 33 - Trenching and Backfilling.

3.07 PIPE LAYING

A. Rigid Pipe:

1. Installation of rigid pipe shall conform to ASTM C12.

2. Pipe shall be jointed by means of a resilient gasket. The resilient gasket shall be lubricated and installed to form a watertight joint between the bell and spigot of the pipe. The bell of the pipe in place shall be cleaned and properly lubricated prior to the installation of the next pipe spigot. The pipe shall be centered in the bell or groove. After the spigot is well entered into the bell and the gasket is fully compressed and brought to

final shape, check the gasket for proper position around the full circumference of the joint. Complete installation by pushing the pipe tightly together to form a smooth and continuous invert.

3. Circular concrete pipe with elliptical reinforcement shall be installed with the lift holes on the top of the pipe. The manufacturer's marks designating the top and bottom of the pipe shall not be more than five (5) degrees from the vertical plane through the longitudinal axis of the pipe. After the pipe is installed, the lift holes shall be sealed with suitable concrete plugs and grouted.

4. When adapters are required to properly connect the new pipe to an existing pipe of other materials or manufacture, the nominal inside diameter of adapters shall be the same size as the nominal pipe diameter to which it is to be connected.

3.08 PIPE BEDDING

A. After the bottom of trench has been excavated the pipe bedding material will be installed in accordance with Section 31 23 33 - Trenching and Backfilling.

B. The pipe shall then be installed strictly in accordance with the manufacturer's recommendations.

C. After the pipe is laid, the bedding shall be continued above the pipe as specified in Section 31 23 33 - Trenching and Backfilling.

D. Particular care shall be taken to assure filling and tamping all spaces under, around and above the top of the pipe.

E. A continuous and uniform bedding as specified in Section 31 23 33 - Trenching and Backfilling, shall be provided in the trench for buried pipe.

3.09 MANHOLE STRUCTURES

A. Construct sanitary sewer manhole and other sanitary structures to the grades, lines and levels indicated on the Plans, or as specified herein.

B. Structures shall be precast concrete, complete with concrete bases, reinforcing, frames, covers, and adjustment rings, as shown and as required for a complete installation.

C. Sanitary manholes as called for on the Plans shall carry a stub opening as specified herein.

D. Wye openings in manholes are prohibited unless indicated on Plans.

E. Sanitary sewer structures shall conform to the type of material and dimensions indicated on the Plans. Construct as detailed on the Plans.

F. Manholes shall be completed and ready for final inspection either before 600 feet of additional sewer construction is completed or within one (1) week after the manhole is constructed, whichever comes first.

G. Block Structures:

1. Sanitary manholes may only be constructed with block where specifically shown on the plans or where approved by the Engineer.

2. The first course of concrete block shall be placed on the prepared base in a full bed of mortar.

3. Mortar joints shall be full and closed in all courses. Courses shall be level throughout.

4. Stagger joints in adjoining courses by one-half the length of the block as nearly as practicable. Joints shall be uniform in thickness throughout the structure. Strike all joints and properly point to provide true, smooth surfaces.

5. Prior to applying plaster coat, block shall be thoroughly wetted with water and the surface allowed to dry sufficiently to effect proper bonding.

6. Cement mortar plaster coat shall be applied to the exterior surfaces of all brick and/or concrete block sections of all manholes. Plaster coat shall be 1/2 inch thick.

H. Where precast doghouse sections cannot be used, the manhole shall be brick or block to 8 inches above top of highest pipe. Above that point manholes shall be precast concrete as shown on the plans.

I. Provide and install all cast iron covers, frames, adjusting rings, and anchors to the elevation indicated on the Plans, or as specified herein. Castings shall be set on 1 inch diameter rubber "O" ring gasket, resting on adjustment rings. The casting shall be anchored to the precast concrete cone section as indicated on the Plans.

J. Steps are to be installed at the plant by the manufacturer of precast units. Field install steps in other than precast structures of the types and in the locations indicated on the Plans.

K. Concrete flow channels shall be constructed in each manhole, as indicated on the Plans.

1. For manholes with outlet pipe diameter of 24 inches or less, construct concrete flow channel straight through a manhole to conform as closely as possible in shape, and slope to that of the connecting sewers.

2. The channel walls shall be formed or shaped to the full height of the crown of the outlet sewer in such a manner to not obstruct maintenance, inspection or flow in the sewers.

3. The concrete flow channel shall be constructed with a 3/4 to 1-1/4 inch gap provided at the pipe ends to maintain joint flexibility.

L. For manholes with outlet pipe diameters from 27 to 42 inches or for manholes constructed over existing sewers to 42 inches in diameter, the channel shall be constructed by filling around the pipe to the spring line and splitting the pipe at the spring line and removing the top half after the manhole is constructed.

3.10 SANITARY SEWER STUB OPENING

A. Stub openings shall be at least two (2) pipe lengths, with a minimum length of 10 feet (unless otherwise indicated on the Plan), and the first joint located approximately 18 inches from the outside manhole wall. The end of the stub shall have a manufactured bell, which shall be plugged with a watertight manufacturer plug that is blocked to prevent movement.

3.11 BULKHEADS

A. A solid masonry or approved water and airtight bulkhead shall be placed at each point of beginning and at each stub that is constructed or as indicated on the Plans.

B. At the completion of construction and testing, all the bulkheads shall be removed, unless otherwise indicated on the Plans or as directed by the Engineer.

3.12 RISERS

A. Risers shall be installed where the sewer is more than 12 feet below the established grade or future grade and carried to between 9 to 10 feet of the established grade or future grade, as indicated on the Plans. Pipe 6 inches in diameter, with approved compression type joints, shall be installed in the manner indicated on the Plans.

B. Riser openings shall be closed with a stopper, as recommended by the manufacturer, to make a watertight closure.

3.13 ABANDONING SANITARY SEWER WITH FLOWABLE FILL

A. Install a bulkhead in each end of the sanitary sewer to be abandoned leaving a small opening in the very top of each bulkhead.

B. Install a minimum 2 inch 2-inch (50 mm) diameter standpipe in the top of the bulkhead of the sanitary sewer to be abandoned. The standpipe should be installed such that it can be removed after use and the hole sealed.

C. Install a minimum 2-inch air release pipe in the bulkhead in the opposite end of the sanitary sewer from the stand pipe. The air release pipe should bend up to a 90-degree angle with the end of the pipe being a minimum of 6 inches above the top of the sanitary sewer.

D. Using the standpipe, pump flowable fill into the sanitary sewer to be abandoned. The flowable fill shall be pumped into the sanitary sewer until free water flows from the air release pipe at the opposite end. Continue filling the sanitary sewer until the material released at the air release pipe is representative of the flowable fill being introduced at the fill end of the sanitary sewer.

E. Remove the standpipe and air release pipe and plug the hole in both bulkheads.

3.14 ABANDON EXISTING MANHOLES

A. Manholes on the existing sanitary sewer shall be abandoned and the structures shall be removed in accordance with the following:

1. The removal of existing structures shall consist of removing and salvaging the existing frame and cover.
2. The ends of the existing sanitary sewer shall be bulkheaded.
3. The top masonry shall be broken down to an elevation at least 30 inches below the proposed subgrade or finished grade.
4. The abandoned structure shall be backfilled with flowable fill to 1 foot above the pipes and the remainder of the structure with sand-cement mixture at a 10 to 1 ratio to subgrade elevation.

3.15 FIELD QUALITY CONTROL

A. After all the pipe, structures, and leads have been laid, constructed and backfilled, the system shall be final inspected and tested. The inspection and testing shall consist of the following parts:

1. first inspection
2. television inspection
3. testing

B. The first inspection shall be completed, and all repairs made in ample time so that the television inspection of the underground portion of the system, can be completed within four (4) weeks of the completion of the construction.

C. Television inspection shall be considered completed when the necessary construction repairs have been made and the installation re-televised when required, and the system is acceptable for the testing phase.

1. When re-television is necessary, an additional two (2) weeks will be allowed for completion.

D. Testing of the system shall immediately follow the television inspection and shall be completed within a 2-week period.

E. Failure to maintain a schedule in compliance with this specification will automatically cause the stoppage of other work at the particular site in question until such time as the final inspection of the completed underground portion of the system has progressed to within acceptable limits.

F. First Inspection:

1. The Contractor shall have the underground portion of the sewer system ready for the first inspection within two (2) weeks after the completion of the installation of each 2,000-foot section of sewer.
2. The first inspection shall consist of:

a. a visible and audible check of the sewers and manholes to ascertain that the manhole steps have been placed,

b. all lift holes plugged,

c. the channeling of the manhole bottoms completed,

d. all visible or audible leaks stopped,

e. all pipe has been placed straight and true to the proper grades and elevation,

f. the required adjusting rings and frame and cover properly installed,

g. all trenches and structures backfilled in a workmanlike manner,

h. and that the system has been thoroughly cleaned.

3. The first inspection shall be considered completed when all the repairs have been made and the system is ready for television inspection.

G. Television Inspection:

1. The Contractor shall provide for television inspection of the various sanitary sewer lines installed under this Contract.

2. The Contractor shall arrange for, engage and pay all expenses involved for the services of a competent company to perform this television inspection.

3. The television inspection shall observed by representatives of the Owner, Engineer, and the Contractor. Any television viewing performed in the absence of the Engineer will not be considered as a part of the final inspection.

4. The inspection shall involve the visual observation by closed-circuit television of all sanitary sewer 8 to 30 inches in diameter inclusive, installed as a part of this Contract.

5. Prior to television inspection, the Contractor shall run water down the line to show any dips or high spots in the line. Water shall be run continuously during television inspection if necessary to determine changes in grade in the line.

6. The inspection shall be performed at a maximum rate of speed of 30 feet per minute, which will allow examination of all points of infiltration, cracked or crushed pipe, defective joints, misalignment in line or grade, location of all wye openings and any defects or items of poor workmanship which may appear.

7. Observations shall be documented per NASSCO current Pipeline Assessment Certification (PACP) requirements.

a. Any items which, in the opinion of the Engineer, require repair shall be precisely located and photographed along with a detailed statement of the condition.

8. The Contractor shall take immediate action to repair all such defects including excessive infiltration at any specific location, even though the infiltration limits as herein specified have not been exceeded for the entire length of sewer being inspected.

a. Following completion of the repair, the Owner or the Engineer, at their discretion, may require a second television inspection of any repaired areas. The Contractor shall arrange for and pay all costs involved in performing this re-inspection.

9. As a part of the television inspection, the precise location of each wye shall be noted in relation to the downstream manhole. These locations shall be entered on the Wye Location Sheet as supplied by the Engineer and verified by comparison with the locations as established at the time of construction.

a. Any discrepancies in location between the field location record and the television inspection record shall be reconciled and the proper location of the wye determined as a part of the television inspection.

10. Two (2) copies of all notes, photographs, wye locations and other pertinent information shall be made as a part of the television inspection.
    a. One (1) set of this information shall be turned over to the representative of the Engineer upon the completion of the inspection of each line.
    b. The second copy of the information shall be held by the television inspection company until completion of the project, at which time it shall be neatly assembled and turned over to the Engineer as a complete, comprehensive report on the television inspection of the project.
11. Television inspection shall be recorded and shall be submitted in the format(s) as specified by the Engineer.
12. Television inspection shall be considered completed when the necessary construction repairs have been made and the installation re-televised when required, and the system is acceptable for the testing phase.

H. Testing:

1. The Contractor shall provide the necessary supervision, labor, tools, equipment and the materials necessary for the tests which shall be conducted in the presence of the Engineer. The Engineer shall be notified two (2) working days in advance of all testing. The following tests shall be performed and approved prior to placing any system in service:
    a. Leakage tests shall be conducted on all new sewer lines and existing lines which have not been previously approved. All sewers shall be subjected to air, exfiltration or infiltration tests, or a combination of same, prior to acceptance.
        1) All sewers over 24-inch diameter shall be subjected to infiltration tests.
        2) All sewers of 24-inch diameter or smaller, where the groundwater level above the top of the sewer is over 7 feet, shall be subjected to infiltration tests.
        3) All sewers of 24-inch diameter or less, where the groundwater level above the top of the sewer is 7 feet or less, shall be subjected to air tests or exfiltration tests.
    b. Exfiltration/Infiltration Test:
        1) Exfiltration and Infiltration testing will be performed in accordance with ASTM C969 for precast concrete lines except as specified herein.
        2) If an exfiltration test is performed, the maximum exfiltration rate shall be the same as the permitted from infiltration.
            (a) For the purposes of exfiltration testing, the internal water level shall be equal to the external water level plus 7 feet as measured from the top of pipe, and the elevation must be at least as high as the highest house service.
        3) Maximum allowable infiltration shall not exceed 100 gallons per inch of diameter per mile of pipe between manholes per 24 hours for any section of the system and shall include the infiltration from all manholes and other appurtenances.
    c. Air Test:
            (a) The sewer shall be pressurized to an initial test pressure of 4 psi greater than the greatest back pressure caused by groundwater over the top of the sewer pipe.
                (1) At least two (2) minutes shall be allowed for the air pressure to stabilize.

(2) If necessary, air shall be added to the sewer to maintain a pressure within 1 psi of the initial test pressure.

(b) After the stabilization period, the air supply control valve shall be closed so that no more air will enter the sewer. The sewer air pressure shall be noted and timing for the test begun. The test shall not begin if the air pressure is not within 1 psi of the initial test pressure.

(c) The time required for the air pressure to decrease 1 psi during the Test shall not be less than the time calculated from Table 1 and the Appendices of the applicable ASTM standard as noted above.

(d) Manholes on sewers to be subjected to air tests shall be equipped with a capped pipe nipple extending through the manhole wall and at an elevation equal to the top of the sewer pipe. See Part 2 of this specification.

(1) Prior to the air test, the groundwater elevation shall be determined by blowing air through the pipe nipple to clear it and then connecting a clear plastic tube to the pipe nipple.

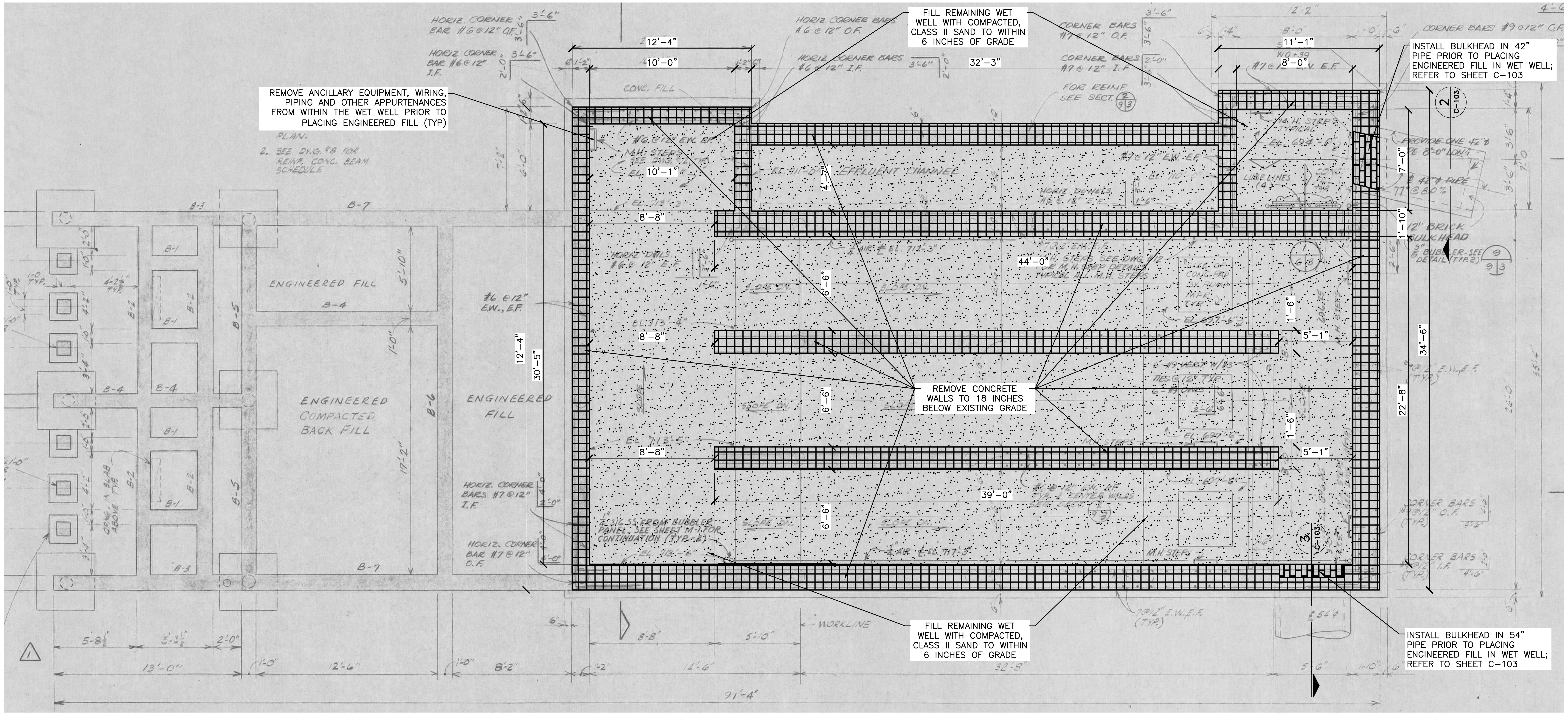
(2) The tube shall be suspended vertically in the manhole and the groundwater elevation determined by observing the water level in the tube.

(3) The air test pressure shall be adjusted to compensate for the maximum groundwater level above the top of the sewer pipe to be tested.

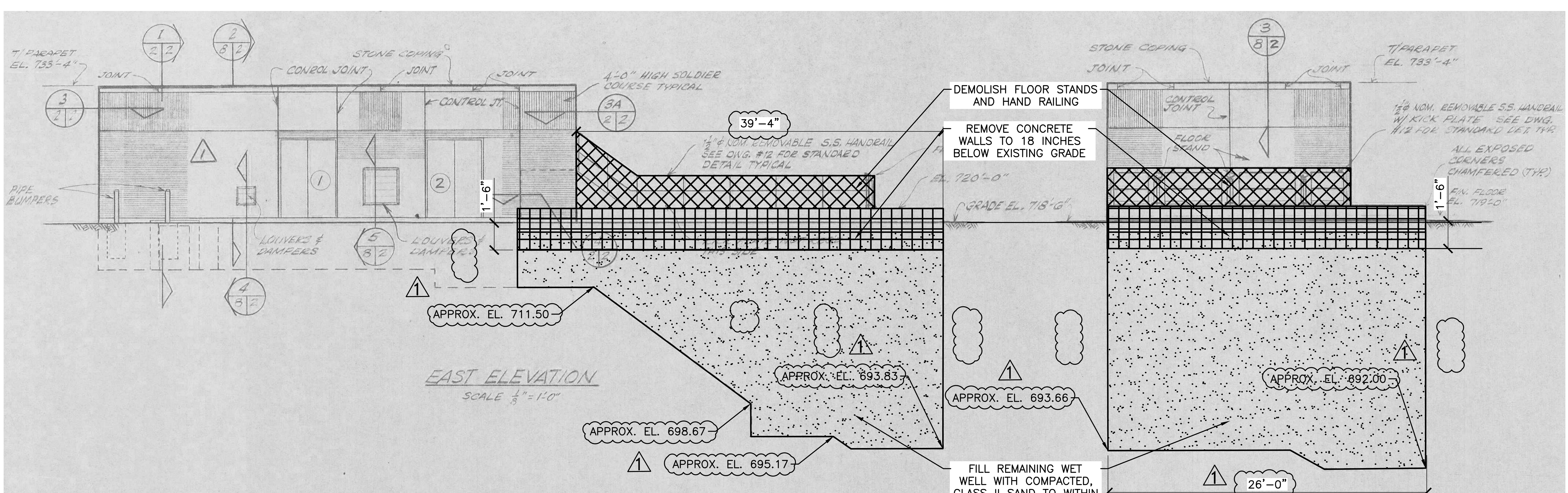
(4) After all tests are performed and the sewer is ready for final acceptance, the pipe nipple shall be removed and the hole in the manhole wall shall be plugged with hydraulic cement.

2. If a sewer fails to pass any of the previously described tests, the Contractor shall determine the location of the leaks, repair them and retest the sewer. The tests shall be repeated until satisfactory results are obtained.

END OF SECTION



FOUNDATION PLAN
NOT TO SCALE



1 EAST ELEVATION (C-101)
NOT TO SCALE

2 NORTH ELEVATION (C-101)
NOT TO SCALE

NOTES:

1. INSTALL BULKHEAD IN 54" PIPE PRIOR TO PLACING ENGINEERED FILL IN WET WELL; REFER TO SHEET C-103.
2. DEMOLISH WET WELL STRUCTURE AFTER REMOVING SCREW PUMPS AND THEIR APPURTENANCES (REFER TO SHEET C-101). CONCRETE TO BE REMOVED 18 INCHES BELOW GRADE.
3. BACKFILL REMAINING WET WELL STRUCTURE WITH COMPACTED ENGINEERED FILL (E.G., CLASS II SAND) TO WITHIN 6 INCHES OF GRADE AND CAP TO GRADE WITH 6 INCHES OF TOP SOIL, SEED IN ACCORDANCE WITH SECTION 32 92 19.

811 Know what's below. Call before you dig.

REV#	DATE	DESCRIPTION	BY
1	07/19/23	REVISED DIMENSIONS, ADDED APPROX. ELEVATIONS	TLH

WADE TRIM
555 S. Saginaw Street, Suite 201
Flint, MI 48502
810.235.2555
www.wadetrim.com

CITY OF FLINT
GENESEE COUNTY, MICHIGAN

CONSTRUCTION PLANS FOR
AVON PUMPING STATION DEMOLITION
WET WELL DEMOLITION PLAN

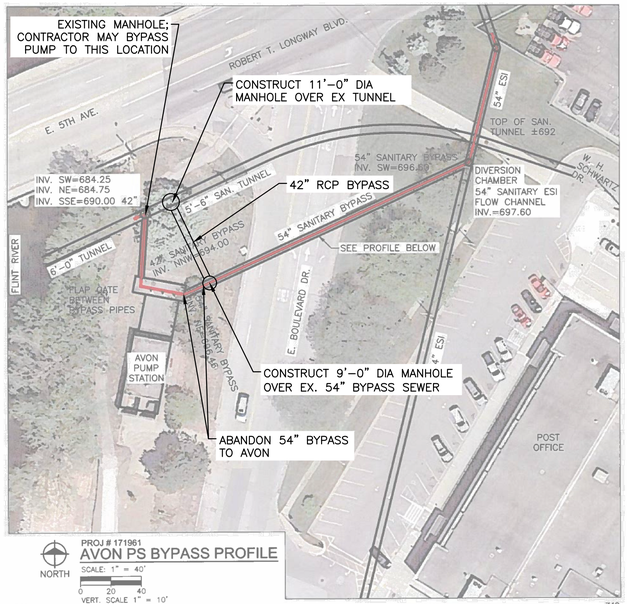
ISSUED FOR:	DATE:	BY:
PERMIT	06/23/23	TLH
IFB	06/23/23	TLH

JOB NO. COF107801F

SHEET C-102

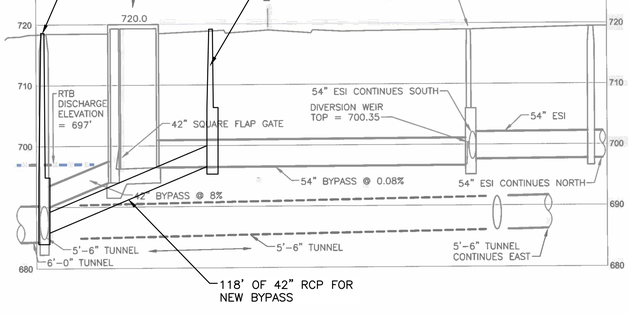
AVON PUMPING STATION DEMOLITION

PROJECT MANAGER: T. HARRISON
C:\PW_WORK2\D1343721\CRS-PLTS-DEMO.DWG -- C-102 -- PLOTTED 7/19/2023 3:13 PM BY HARRISON, TIFFANY
FIELD BOOK INFORMATION:--

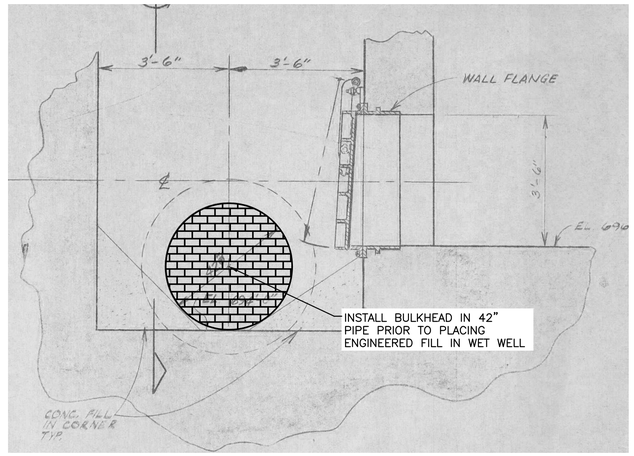


PROJ # 171961

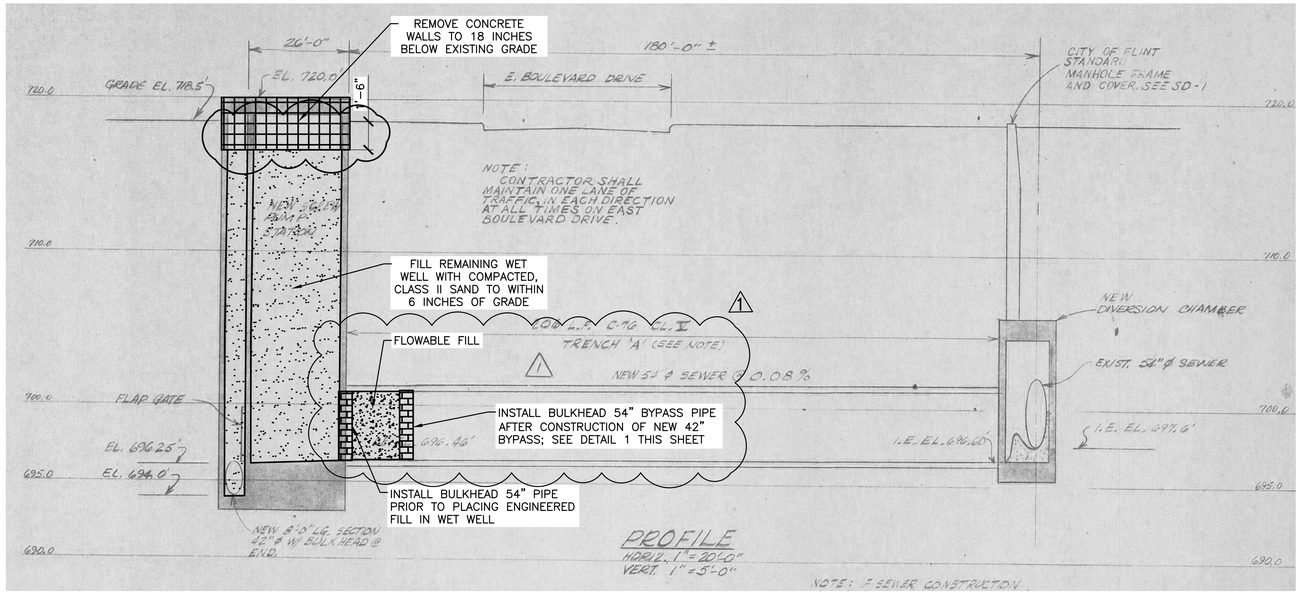
AVON PS BYPASS PROFILE



3 / C-102 EXISTING & PROPOSED BYPASS
NOT TO SCALE



1 / C-103 42" SEWER – SECTION
NOT TO SCALE



2 / C-102 54" SEWER – PROFILE
NOT TO SCALE

NOTES:
1. CONSTRUCT NEW BYPASS SEWER AROUND AVON PUMPING STATION. TO ACHIEVE THE NEW BYPASS, CONSTRUCTE NEW MANHOLE OVERTOP OF EXISTING 54" BYPASS AND THE 72" TUNNEL AS INDICATED IN DETAIL 3, THIS SHEET. THEN CONSTRUCT NEW 42" RCP BYPASS SEWER BETWEEN THE TWO MANHOLES.
2. BULKHEAD EXISTING 54" BYPASS SEWER.
3. INSTALL BULKHEAD IN 54" PIPE INTO THE WET WELL – DETAIL 2 AND 3 THIS SHEET – PRIOR TO PLACING ENGINEERED FILL IN WET WELL; REFER TO SHEET C-102.
4. DEMOLISH WET WELL STRUCTURE AFTER REMOVING SCREW PUMPS AND THEIR APPURTENANCES (REFER TO SHEET C-101). CONCRETE TO BE REMOVED 18 INCHES BELOW GRADE.
5. BACKFILL REMAINING WET WELL STRUCTURE WITH COMPACTED ENGINEERED FILL (E.G., CLASS II SAND) TO WITHIN 6 INCHES OF GRADE AND CAP TO GRADE WITH 6 INCHES OF TOP SOIL, SEED IN ACCORDANCE WITH SECTION 32 92 19.

Know what's below. Call before you dig.

REV#	DATE	DESCRIPTION	BY
1	7/19/23	ADDED NEW BYPASS SEWER & MHs	TLH

WADE TRIM
565 S. Saginaw Street, Suite 201
Flint, MI 48502
810.235.2555
www.wadetrim.com

CITY OF FLINT
GENESEE COUNTY, MICHIGAN

CONSTRUCTION PLANS FOR
AVON PUMPING STATION DEMOLITION
SEWER BULKHEAD PLAN

ISSUED FOR:	DATE:	BY:
PERMIT	06/23/23	TLH
IFB	06/23/23	TLH

JOB NO. COF107801F

SHEET C-103

AVON PUMPING STATION DEMOLITION

PROJECT MANAGER:T. HARRISON
C:\PW_WORK2\D1343721\CRS-PLTS-DEMO.DWG – C-103 – PLOTTED 7/20/2023 9:17 AM BY HARRISON, TIFFANY
FIELD BOOK INFORMATION:—