



**REQUEST FOR PROPOSALS**  
**SANITARY SEWER MANHOLE REHABILITATION AND WATERPROOFING**  
Charter Township of Union  
Isabella County

**Proposals Due:**

10:30 A.M., Tuesday, October 12th

**Bid Opening (Signed and Sealed: Mailed and/or Delivered):**

Sealed Bids will be received, by the Charter Township of Union at the DPW Offices located at 5228 South Mission Road, Mt. Pleasant, until 10:30 AM local time on October 12, 2021, at which time the Bids received will be publicly opened and read.

Attention: Ms. Kim Smith  
Charter Township of Union  
5228 South Mission Road  
Mt. Pleasant, MI 48858  
Phone 989-772-4600, Ext 224

**Questions shall be directed to:**

Attention: Ms. Jennifer Hodges, P.E.  
Gourdie-Fraser, Inc.  
123 West Front Street  
Traverse City, MI 49684  
Phone 231-946-5874  
jennifer@gfa.tc

**Project Scope:**

The Charter Township of Union owns and operates a municipal sewer system that provides effluent collection and treatment to approximately 5,500 customers. The sanitary sewer system is comprised of pressure force main and gravity sewer mains that collect and transport the sewage to a 2.4 MGD oxidation ditch treatment system.

In June 2017, a substantial amount of rain and subsequent flooding in many areas of the Township was experienced which impacted the sanitary sewer system. In an effort to be proactive and protect the Township is soliciting this proposal to implement measures to mitigate potential future flooding events. The existing sewer system for this scope of services is limited to select gravity sewer infrastructure (manholes) within the sanitary sewer system constructed in 1980 and 1997 that is serviced by the Pump Station #7.

This Project shall consist of inspection, cleaning, channel reconstruction and waterproofing of the Charter Township of Union's sanitary sewer manholes in the Lift Station 7 service area (refer to attached location map). The project will also include manhole access lid adjustments and repairs as needed.

Scanned copies of the As-Built Drawings are included in this RFP. It is the responsibility of the bidder to review the drawings, conduct site visits and to familiarize themselves with the project. Contractor shall be responsible to review site conditions for accuracy to ensure adequate access is available and provide equipment capable to conduct rehabilitation and waterproofing identified in the RFP, specifications, and details.

**Scope of Services:***General:*

1. Work must comply with all applicable laws, regulations
2. Schedule of work shall be coordinated with the Township Engineer and DPW Staff.
3. Provide a (1) year full warranty on all workmanship, material and equipment furnished for this project.

*Work Items:*

1. Cleaning the manholes prior to channel rebuilding and waterproofing interior manhole structures.
2. Provide for removal and proper disposal of waste material produced during cleaning.
3. Reconstruct flow channel, as applicable to ensure proper transmission of flows.
4. Repair and raise manhole access lids above existing grade as applicable to prevent infiltration from entering lid.
5. Waterproof interior of manholes and encapsulate utilizing wrapidseal (or engineer approved equal). This includes all joints.
6. Restore each manhole site back to existing conditions after repairs and waterproofing. Any damage to existing manholes shall be repaired and /or restored to existing or better conditions at no additional cost to the project.

**Bid Submittal Requirements:**

The contractor shall agree to the above terms and conditions stipulated and will certify that their equipment will be able to operate under the requirements that have been stated above. The contractor shall include the following in addition to price with their submitted proposal:

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

**Terms of Agreement:***General:*

- To hold bid open for 60 consecutive calendar days from the bid due date
- To enter into and execute a contract with the Charter Township of Union

*Insurance:*

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

***Bonds:***

- The Contractor shall include in the Bid price the cost to provide the following:
  - Letter of Surety, licensed to do business in the State of Michigan, stating ability to obtain a Performance Bond.
  - 50% Maintenance Bond provided upon completion of project

**Equipment/Materials:**

Contractor shall provide all equipment, labor and materials necessary to complete the work outlined above including:

- Mobilization and Miss Dig
- Work zone signing and traffic maintenance as coordinated and approved by the Isabella County Road Commission
- Applicable investigation and excavation to access manholes as some may be buried
- Coordination and communication with property owners to access infrastructure as some is located within existing easements.
- Temporary power and bypass pumping equipment as applicable. Contractor shall anticipate peak flows up to 130 GPM and provide means to bypass pump including transfer pump or truck. Contractor shall provide a plan to the Owner prior to initiation of work for approval
- site restoration and clean-up

Owner shall provide all equipment, labor and materials necessary to complete the work outlined above including:

- Site accessibility. Contractor shall be responsible to coordinate and provide construction schedule and minimum 24 hour notice before completing work.
- Pump Station Operations to facilitate cleaning. This work shall be performed when the stations are not in operation and manhole is empty.

**Schedule:**

Project shall be completed by November 15, 2021

**Contractors Proposal Form**

Bidders are instructed to submit bids for this project on a unit cost per manhole t basis as stated in the Proposal. Bypass pumping, traffic control, and all other labor, materials and equipment are considered incidental and to be included in total bid price. All work shall be performed in compliance with the terms identified in the RFP and applicable laws.

NO.	ITEM DESCRIPTION	EST QTY	ITEM UNIT	UNIT PRICE	ITEM COST
1	Mobilization	1	LS		
2	Manhole Cleaning	20	EA		
3	Manhole Channel Reconstruction	20	EA		
4	Access Lid Adjustment	10	EA		
5	Waterproofing (interior and wrapidseal)	20	EA		
6	Site Restoration and Seeding	1	LS		
<b>TOTAL BID</b>					<b>\$</b>



Bidders Signature
Printed Name:
Business Name:
Address:
MI Contractor License No.:
Telephone:
Cell Phone:
Email:

The Owner may make such investigations as deemed necessary to determine the ability of the Bidder to perform the Work and the Bidder shall furnish to the Owner all such information and data for this purpose as the Owner may request. The Owner reserves the right to reject any / all bids if the evidence submitted by, or investigation of, such Bidder fails to satisfy the Owner that such Bidder is properly qualified to carry out the work as requested.



Engineering  
Surveying  
Testing &  
Operations

123 West Front Street  
Traverse City, Michigan 49684  
231.946.5874   
231.946.3703 

# TECHNICAL SPECIFICATIONS FOR

# SANITARY SEWER MANHOLE REHABILITATION AND WATERPROOFING



GFA PROJECT NO.: 21093  
DATE: September 23, 2021

**PROJECT SPECIFICATIONS  
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**STANDARD DPW SPECIFICATIONS**

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SECTION 1  
GENERAL REQUIREMENTS

1.01 PROJECT DESCRIPTION

Work includes the following major items:

Rehabilitation to select manholes within the Pump Station #7 Service Area including but not limited to cleaning, rim adjustment, channel reconstruction and waterproofing.

1.02 DEFINITIONS

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

DPW/Utility Department	The agency performing the system operations and maintenance typically identified as a Department of Public Works.
Engineer	Engineer who provided the sanitary sewage system and or water main design, plans and specifications for the owner.
Owner	Party who is having the sanitary sewage system and or water main facilities installed.
Contractor	Contractor is prime Contractor who is so identified by the Owner and is responsible for the sanitary sewage system and or water main facilities installation.
Township	The governing Township (Charter Township of Union).

1.03 PRECONSTRUCTION CONFERENCE

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

1.04 LINES AND GRADES FOR CONSTRUCTION

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

1.05 PROGRESS SCHEDULE

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

1.06 INTERFERENCE WITH EXISTING SEWAGE TREATMENT WORKS

No bypassing of untreated sewage will be allowed during the construction of this project other than that which normally takes place due to stormwater overflows, etc. The Contractor shall provide a plan of work to the Township for approval before starting work on any phases of the project which might involve existing sewage facilities.

1.07 RELATIONS TO OTHER CONTRACTORS AND UTILITY FORCES

The Contractor shall so conduct his operations as not to interfere with or injure the work of other contractors or adjacent force account work, and he shall promptly make good any injury or damage which may be done to such work by him or his employees or agents.

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

1.08 PERMITTING AGENCIES

The Contractor shall perform all work in accordance with any and all applicable permit requirements. The Owner or his Design Engineer shall present the Township with a copy of all documentation and calculations for the permit process. The Owner will obtain the necessary permit for construction/installation prior to commencement of any work.

1.09 ACCESS TO WORK

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

1.10 SHOP DRAWINGS

Shop drawings of all equipment shall be issued to the Design Engineer during the shop drawing review stage for his approval. The Design Engineer shall forward these (2 copies) to the Township for his review regarding compliance with the Township requirements. The Township will not perform a technical review. That shall remain the responsibility of the Design Engineer. The Contractor should supply a minimum of six (6) copies of all equipment shop drawings to the Design Engineer. Final record shop drawings shall be issued to the Township as part of the close-out procedure in accordance with the close-out section of these specifications.

1.11 STREAM CROSSINGS

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

1.12 DUST AND NOISE REDUCTION

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

1.13 MATERIAL CERTIFICATION

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

1.14 MAINTENANCE BOND REQUIREMENTS

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

1.15 INSURANCE REQUIREMENTS

Where the contract involves construction in a public right-of-way, the Contractor shall provide proof of insurance in the type and amounts required by the Township prior to start of the construction. In addition to the Township, the Township DPW and Township Engineer shall be named as additional insured.

1.16 ESCROW FOR TELEMETRY REQUIREMENTS

When telemetry equipment is required, the owner of the project will be required to provide an account above and beyond the construction contract price to be determined prior to approval and installation of project for standard telemetry equipment. This equipment will be integrated into the Township DPW network of monitoring systems. The types of units this may apply to include submersible lift stations, well houses, water booster stations, and pressure reducing valve vaults.

## SECTION 7

### SANITARY SEWER APPURTENANCES

#### 7.01 A. Scope of Work

The work covered in this section of the specifications consists in the furnishing of all plant, labor, materials, equipment and performing all operations involved in the construction of sewer appurtenances. This includes, but is not limited to, the following items:

1. Sewer Manholes

#### B. General

The following provisions apply to this section of the specifications:

1. All materials, unless otherwise indicated on the plans or authorized in writing by the Engineer, shall be new and unused materials of the size and type shown on the plans and standard details and shall conform to the requirements of the specifications.
2. All materials offered by the Contractor shall be the standard products of reputable manufacturers normally engaged in the manufacturing of such materials. Certifications shall be provided on all materials prior to final acceptances.
3. The foundations of all structures shall be rigidly supported by undisturbed earth or compacted backfill. The interiors of all appurtenances shall be thoroughly cleaned of all foreign materials.
4. Where appurtenances are shown to be constructed on private property, the location of the structure shall be as shown on the plans. All work done within private property shall have an easement provided to the Township by the owner prior to turnover.

#### 7.02 MATERIALS

##### A. Sanitary Sewer Manholes

Sanitary Sewer Manholes shall be constructed of pre-cast manhole units in accordance with ASTM C478. Unless otherwise indicated, all manholes shall be four (4) feet in diameter. Manholes shall be delivered to the project in an un-damaged condition. Any manhole which shows visible



**SECTION 7**  
**SANITARY SEWER APPURTENANCES**

signs of damage will not be accepted. Manholes shall be constructed to meet the dimensions shown on the Standard Details.

1. Manhole Waterstops: All manhole connections will be fitted with a waterstop assembly. The waterstop shall be of a design acceptable to the Engineer and the pipe manufacturer. Waterstops shall be KOR-N-SEAL as manufactured by National Pollution Control Systems; PRESS WEDGE II as manufactured by the Press-Seal Gasket Corporation; RES-SEAL as manufactured by Scales Manufacturing Corporation or equal.

The joint between the pipe and the manhole wall shall be flexible. Mortar and grout shall not be used to fill the space between the manhole wall and the pipe, except to form an adequate flow channel.

2. Manhole Waterproofing Material: All manholes shall be waterproofed on exterior.
  - a. Interior Manhole Waterproofing Material: The materials to be used for interior manhole waterproofing shall be "Thoroseal" as manufactured by Standard Dry Wall Products Company or equal.
  - b. Exterior Manhole Waterproofing Material: The material to be used for exterior manhole waterproofing shall be a heavy fibered type waterproofing mastic conforming to Federal Specification SS-C-153 Type 1 or CS-206. The mastic shall be A.C. Horn (Grace), Flink Kote 710-23 or equal.
3. Manhole Steps: Manhole steps shall be cast iron or steel-reinforced plastic. Steps shall not be aligned over the pipe.
  - a. Cast Iron: Cast iron manhole steps shall fulfill the requirements of the ASTM Standard Specifications for "Gray Iron Castings", A-48, Class No. 30, minimum width 14". They shall be East Jordan Iron Works No. 8509, Neenah Foundry Co. R-1980 or equal.
  - b. Plastic: Polypropylene plastic, steel reinforced, manholes steps may also be furnished, minimum width 14". They shall be #PS2 manhole steps as manufactured by M.A. Industries, Inc., of Peachtree Township, Georgia or equal.

**SECTION 7**  
**SANITARY SEWER APPURTENANCES**

4. Manhole Bricks and Blocks: Manholes Bricks and Blocks shall meet current Michigan Department of Transportation Standard Specifications.
5. Cast Iron Frames and Covers: Manhole frames and covers shall be cast iron. Cast iron frames and covers for sanitary sewer manholes shall be a self-sealing lid with no holes extending all the way through the lid. The self-sealing lid shall fit into a precisely machined groove. A rubber gasket shall make contact with the frame to create a leak proof seal. The self-sealing lid shall include a concealed pickhole to facilitate the removal of the lid, but not allow any water to enter the manhole.

Manholes shall have a 24" opening with Type A solid cover or equal. These will include bolted covers with stainless steel bolts.

**B. Sewer Wyes and Sewer Leads**

Sewer leads shall be Schedule 40 Polyvinyl Chloride (PVC) with solvent welded joints as defined in ASTM D-3034 or Extra Strength Solid Wall, SDR 23.5 ABS as defined in ASTM D-1788. Sewer wye fittings shall be of the same material as the pipe, unless otherwise approved by the Township Engineer.

The fitting between the SDR 35 wye and the SCH 40 PVC lead shall be a 35/40 adapter. SDR joint shall utilize a slip joint (no rigid glue joint will be allowed).

**C. Clean-Outs**

Clean-outs shall consist of pipe and fittings of the same type as the sewer main materials they connect to as required to provide a clean-out installation as shown in the standard details. The maximum distance between clean-outs on leads is 75 lineal feet.

**7.03 CONSTRUCTION METHODS**

**A. Excavation, Bedding and Backfilling**

Excavation, bedding and backfilling for sewer manholes and clean-outs shall be in accordance with the Section 4, "Excavation, Trenching and Backfilling" of these specifications and applicable standard details.

**B. Manholes and Pre-cast Structures**

Manholes and precast structures shall be constructed only when the temperature is above 32 F. All work shall be protected against freezing.

Water shall be removed from the excavation during construction of the structure and during the time required for the concrete or mortar to develop sufficient strength to resist rupture by groundwater pressure.

Pre-cast O-ring sections shall be joined by first applying a lubricant as approved by the concrete manufacturer. The lubricant shall be placed on the O-ring and both faces of the sections to be joined. The pre-cast sections shall then be set evenly to provide a full seating of the O-ring within the grooves in the concrete sections. After the pre-cast sections have been placed, the interior joint surface shall be grouted smooth. Additional methods for joining two barrel sections must be approved by the Engineer.

**C. Manhole Flow Channels**

Manhole flow channels shall be formed as shown on the Standard Detail Plans by laying pipe through and cutting out the top portion before completion of the base of the manholes. Cut edges of pipe laid through the manhole shall be fully covered by concrete when the manhole invert is complete. The finished invert shall be smooth and true to grade. No mortar or broken pieces of pipe shall be allowed to enter the sewers. Pre-cast flow channels will be allowed. Submit certification and documentation to the Engineer for approval prior to acceptance and placement.

**D. Drop Structures**

All sanitary manholes with an invert drop in excess of 24" shall have a drop structure. The drop structure shall be built as shown on the Standard Detail Plans.

**E. Manhole Waterstops**

The joint between the pipe and the manhole wall shall be flexible. Mortar and grout shall not be used to fill the space between the manhole wall and the pipe, except to form an adequate flow channel.

**F. Placing Castings**

Castings with adjustment rings, if applicable, shall be set to the required elevation in full mortar beds. No more than 9" of adjusting concrete rings,

mortar and/or brick work, and mortar shall be used on any manhole between the pre-cast top section and the casting.

**G. Connection to Existing Sanitary Sewer Systems**

Connection to existing sanitary sewer systems shall be made in such a manner as to minimize the interruption of flow in those systems. The connection to an existing manhole shall be made by coring and the installation of a waterstop.

When a new manhole is to be installed over an existing line, it shall be initially placed without damaging the existing pipe. The existing pipe shall not be damaged until the new lines are ready to be placed in operation and the new flow channel is ready to be formed to connect with the existing flow lines.

**H. Sewer Wyes and Leads**

The wyes and sewer leads shall be constructed as shown on the Sanitary Sewer Standard Details in the plans.

The sewer lead is defined as the sewer pipe between the wye installation and to the property/easement line in the case of installation to an undeveloped parcel as indicated on the Standard Details for sewers. The sewer lead shall be brought to the property/easement line at a grade and location established before construction commences, based on a location document or as staked in the field by the Engineer or Resident Project Representative. If the proposed location of a sewer lead is not identified, it is the Contractor's responsibility to obtain the information from the Design Engineer/Resident Project Representative prior to the installation. If the lead location is not as per directed by the Resident Project Representative or Engineer, the relocation of the sewer lead shall be performed at the Contractor's expense.

After each sewer lead is installed, it shall be permanently marked at its termination (the property line or easement line) with a treated wood post 0.40 penetration for underground purposes. The post shall be 12 feet long  $\pm 1/2$  inch, installed vertically and cut and painted as directed by the Design Engineer after record elevations off the top of the post have been obtained. For leads deeper than 12', use wood post that provides an 18" ( $\pm$ ) projection above ground. Should the post location fall in a driveway or other area where its above ground projection might cause problems, the Contractor shall pre-cut the 12' post to some convenient full foot dimension below grade level and attach 3-1/2" x 3-1/2" x 1/4" metal plate to the top of the post. The Contractor shall immediately report same to the project inspector. The Contractor shall allow the Resident Project

Representative to obtain necessary record measurements on the lead installation prior to backfilling. If the sewer leads are backfilled without notification to a Resident Project Representative, the sewer lead shall be excavated, clearly showing the newly placed pipe, at the Contractor's expense. Sanitary sewer saddles shall be SDR-25 wye assembly with stainless steel straps and shall meet ASTM 3034 specifications. Use of saddles shall require approval by the Township prior to installation.

**I. Sewer Cleanouts**

Sewer cleanouts, if required, shall be constructed as shown on the Sanitary Sewer Standard Detail Sheet. Placement shall be as required by site conditions and local plumbing codes. Sanitary sewer cleanouts for sewer leads shall be placed every 75'.

**J. Cleaning**

All manholes, sewer leads and cleanouts shall be kept thoroughly clean of silt, debris and foreign matter and shall be free from such accumulations at the time of final acceptance.

**K. Sanitary Sewer Manhole Waterproofing**

The Contractor shall apply a waterproofing system to the inside or outside of all manhole walls. The material to be used for this operation shall be as specified in these specifications.

The waterproofing system shall be applied and allowed to dry in accordance with the manufacturer's directions. All steps, lids, frames and castings and sewer pipe entering or leaving the manhole shall be protected during application to prevent their being coated.

**Interior Waterproofing**

If any leaks in the manhole walls are detected twenty-four (24) hours after application of the first coat of the waterproofing system, they shall be sealed by application of a quick-set sealer. This sealer shall be a mixture of Portland Cement - Type One and "Ipanex R", "Waterplug", "Preco" or equal. The quick-set sealer shall be applied in accordance with the manufacturer's directions. After the patched areas dry, they shall be covered with another coat of the waterproofing and allowed to dry. If any leaks are apparent after that time, the Contractor shall repatch them. The above steps shall be repeated until all leaks are sealed.

After all leaks are stopped and there are no leaks apparent after twenty-four (24) hours upon application of the first coat of the waterproofing

system or twelve (12) hours after application of a patch, the Contractor shall apply over the dry surface a finish coat.

**Exterior Waterproofing**

The Contractor may elect to provide an exterior rather than interior manhole waterproofing to the manhole sections before installation.

The exterior surfaces of all manholes shall be thoroughly covered with mastic at a rate of one (1) gallon per twenty-five (25) square feet. The exterior surfaces shall be thoroughly cleaned before application of the mastic. The mastic shall be as specified in these specifications.

Should the exterior waterproofing fail to provide an adequate seal then the Contractor shall seal the interior of the manhole as specified above.

**L. Defective Manholes**

Any manhole that is defective, due to manufacturer or realignment of the pipe openings, should be returned to the manufacturer.

**M. Acceptance Tests**

1. Sanitary sewer manholes shall be visually inspected for leaks prior to acceptance of the manhole. There shall be no visible leakage of groundwater into the manhole. Patching, if required, shall be accomplished via the methods indicated in 7.03K.
2. Sanitary sewer wyes and sewer leads shall be tested for leakage after completion of construction. The testing shall occur in conjunction with the overall main sewer testing. Should it be necessary to test sewer wyes and leads independently after the main sewer has been tested it shall be performed using air and following the procedure outlined in Section 6.03J of these specifications.



## SECTION 13

### REPLACEMENT AND CLEANUP

#### 13.01 SCOPE OF WORK

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

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

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

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

#### 13.02 PAVEMENT RESTORATION

##### A. General

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

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

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

The bituminous mixture to be furnished under these specifications shall be delivered to the paver at a temperature no lower than 285 F. Any mixture that has a temperature below 285 F at the time of "laying" shall be rejected and hauled from the project.

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

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

**Aggregate for mixes shall conform to the Isabella County Road Commission and the Union Township current standards.**

**B. Bituminous Patching**

Existing asphalt roads and driveways shall be patched using the current Road Commission standards. All patches shall be placed in two lifts of 165 pounds per square yard for the first course and 110 pounds per square yard for the second course or match existing thickness. A bituminous prime coat of 0.25 gallons per square yard and a tack coat of 0.10 gallons per square yard shall be used for all bituminous patches. Shoulders shall be restored to their original width and depth in accordance with M.D.O.T. Standard Specifications using M.D.O.T. 23A gravel.

**C. Gravel Roads, Driveways and Shoulders**

All gravel roads shall be restored in accordance with M.D.O.T. Standard Specifications using 6" of M.D.O.T. 22A gravel. Shoulders shall be restored to their original width and depth in accordance with 1984 M.D.O.T. Standard Specification 3.09 using M.D.O.T. 23A gravel.



Shoulders shall be raised on the side opposite of sewer construction to match new pavement surfaces.

D. Concrete Pavement, Sidewalk and Driveways

Concrete for restoring pavement, sidewalks, and driveways shall attain a 28-day strength of 3,500 pounds per square inch. Neat edges of patch areas shall be obtained by the use of a concrete saw. Concrete mixing aggregates and curing methods shall conform to Concrete section. Concrete patches shall match the original width and depth and in no case, a depth less than 4". Sidewalks shall have contraction joints a distance apart equal to the width of the slab.

13.03 GRASS AREA

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

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

A. Topsoil

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

B. Seeding and Fertilizing

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

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

Seeds shall be furnished in durable bags. On each bag of seed, the vendor shall attach a tag giving name, lot number, net weight of contents,

purity and germination. All seed shall be thoroughly mixed and sown in a method which will ensure uniform distribution. Seeding during high winds or inclement weather will not be permitted. All seed is to be raked in and compacted. The seed shall be sown at the rate of five (5) pounds per 1,000 feet. The seeding mixtures shall be composed of certified seed of the purity, germination and proportions by weight as specified in the following table:

Kind	SEEDS		MIXTURES	
	Minimum Purity	Minimum Germination	Type 1	Type 2
Perennial Rye Grass	98%	90%	20%	50%
Kentucky Blue Grass	90%	75%	60%	15%
Creeping Red Fescue	98%	80%	20%	35%

C. Mulching

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

D. Mulching Anchoring

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

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

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

2. Method "B": A "Terra-Tak" mulch binder may be used in lieu of asphalt. Mixing and application shall be done in accordance with the manufacturer's recommendations.

3. Method "C": In areas with slopes greater than 10% or where shown on the plans, the Contractor shall place mulch netting or excelsior blanket mulch.
  - a. Mulch Netting: Mulch shall be anchored by the use of mulch netting. The light weight fibrous netting shall be properly placed over the mulch and secured to the ground using wire staples, spaced per manufacturer's recommendations.
  - b. Excelsior Blanket Mulch: An excelsior blanket shall be used in lieu of other mulch. The excelsior blanket shall be a consistent thickness of evenly distributed wood excelsior fibers, 80% of which are 6" or more in length. The top side of the blanket shall be covered with a coarse net of twisted Kraft paper or biodegradable extruded plastic mesh. Ends and sides shall be securely butted and stapled with U-shaped wire staples of a size and length suited to the soil conditions.

#### 13.04 DITCHES

Ditches which have been grassed and maintained by the abutting property owner shall be restored to the pre-construction conditions.

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

Catch basins shall be reconstructed, if removed or damaged.

#### 13.05 FENCE REPLACEMENT

- A. Chain Link Fence shall be replaced according to current M.D.O.T. specifications.
- B. Other Fences shall be replaced equal to and of the same type as existing.
- C. Salvaged material, if approved by the Engineer, may be used for replacement.
- D. Right-of-way fences shall be repaired/replaced as indicated on the construction drawings.

#### 13.06 COMMERCIAL SIGNS

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

### 13.07 BUILDING SEWERS

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

### 13.08 OTHER DEBRIS

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

### 13.09 TREES

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

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

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

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

## SECTION 14 – Manhole Waterproofing (Wrapid Seal)

### **TECHNICAL SPECIFICATIONS**

#### **1.01 SCOPE**

This specification describes the requirements for procurement, installation and inspection of WrapidSeal (or engineer approved equal) Manhole Encapsulation System used for corrosion protection and the prevention of water infiltration into the manhole and below grade concrete structure. The specification governs functional properties of a product, pre-qualification of contractors, manufactures, installation techniques and inspection procedures.

The manufacture must be consulted where heavy soil stresses are common or where the installed product will be exposed for extended periods in temperatures greater than 130° F.

#### **1.02 SAFETY**

The product manufacture must follow standard safety, health and environmental practices in the manufacturing plant, such as those prescribed by EPA, OSHA, or the equivalent. SDS information must be provided for encapsulation system and primer upon request.

The installer must be familiar with the safe operation of tools used for installation of the product and following the equipment manufacture's safety guidelines.

#### **1.03 PRODUCT DESCRIPTION**

The finished product must consist of an irradiated, cross linked polyethylene backing with an adhesive layer such that the sleeve will bond to primed concrete, metallic or fiberglass surfaces. The material must be supplied in bulk rolls either 12 inches or 18 inches in width to provide sufficient overlap of joints to be sealed.

Separate closure seal of sufficient width shall be used to secure the sleeve in place during installation and seal the overlap area. Each closure seal length shall be equal to the respective bulk roll sleeve widths as noted in Section 3.1.

The sleeve must be compatible with concrete, steel, and fiberglass. The material should also meet or exceed the performance and properties as listed below:

## SECTION 14 – Manhole Waterproofing (Wrapid Seal)

### Functional Performance of Heat Shrinkable Sleeves

Property	ASTM Method	Units	Requirement
Peel Strength	D1000	Pli	8.6
Lap Shear	D1002	Psi	1.5
Impact Resistance	DIN 30672 (Class C)	Nm	18%
Water Absorption	D570	%	0.02 max
Low Temp. Flex.	D2671	°F	-20

### Physical Properties of Heat Shrinkable Sleeves

System Type	Stretch Ratio	Recovery Ratio	Nominal Thickness	Thickness Fully Recovered
High Shrink	70%	40%	101 mils	125 mils

### Sleeve Adhesive

Property	Test Method	Units	Requirements
Softening Point	ASTM E28	F	212

### Sleeve Backing

Property	ASTM Method	Units	Requirement
Tensile Strength	D882	Psi	3,000
Elongation	D882	%	669
Hardness	D2240	Shore D	46
Abrasion Resistance	D1044	mg	35

## 1.04 PRE QUALIFICATION

The contractor shall be familiar with the installation techniques as referenced below and shall attend one day of training at the manufacture's facility or onsite with a manufacturer's representative.

Manufacture qualification and quality control: The heat shrink sleeve system shall have been manufactures in an ISO 9002 registered facility. Capable of producing irradiated cross-linked polyethylene coating to allow shrinking of coating material in circumferential direction under influence of heat. Capable of providing manufacturer employed field personnel for site assistance as required.

The products shall conform to the requirements as stated in the tables above.

## 1.05 INSTALLATION

Sleeve must be installed in the corbel and joint sections of the manhole. The sleeve shall be installed from the frame to 3-4 inches below the cone to the lowest grade ring joint.

## SECTION 14 – Manhole Waterproofing (Wrapid Seal)

Manufacture shall provide complete installation guides with clear illustrations enclosed in each factory carton of sleeves. Installer shall follow all manufacture's procedures to ensure proper application.

### **1.06 INSPECTION OF QUALITY ASSURANCE**

Surface Preparation: The concrete structure and steel manhole frame shall be clean, dry and free from surface rust and foreign objects. Abrade and/or prepare the surface strictly according to manufacture's recommendations.

Inspection: Visually inspect the installed sleeve to ensure that the sleeve is in full contact with the substrate, there are no cracks or holes in the polyethylene backing and no voids are present below the sleeve. Ensure that the adhesive has flowed beyond the sleeve edges.

Testing: Perform peel tests on one of every 100 sleeves used. The surface temperature at the time of the test shall be 77+/- °F, unless environmental conditions will not allow, and the continuation of the test is approved by all parties involved. As the test is manually run under field conditions, use best direction to obtain a peel rate of 4 inches/min. Testing shall be performed using a hand peel gauge to the clamp and peel back at a 90° angle to the surface at the defined rate. A minimum peel strength of 8.6 pli with cohesive failure of the adhesive indicating a pass.

### **1.07 SHIPPING, PACKAGING, AND STORAGE PROVISIONS**

The heat shrinkable sleeves shall be packaged in containers to ensure acceptance and safe delivery to their destination. Individual sleeves shall be protected to prevent adherence to other sleeves, the packing material or carton.

The carton must be marked with the name of the manufacturer, product name, batch or lot number, date of manufacture and information required by state and federal law. Cartons shall be stored in an environment which protects the product from extremes in temperature and prevents rain or other moisture from damaging the cartons or finished product.

### **1.08 WARRANTY**

Manufacture must warrant that their product conforms to the minimum requirements of this specification and is appropriate for use as stated in their technical data sheets.



Engineering  
Surveying  
Testing &  
Operations

123 West Front Street  
Traverse City, Michigan 49684  
231.946.5874   
231.946.3703 

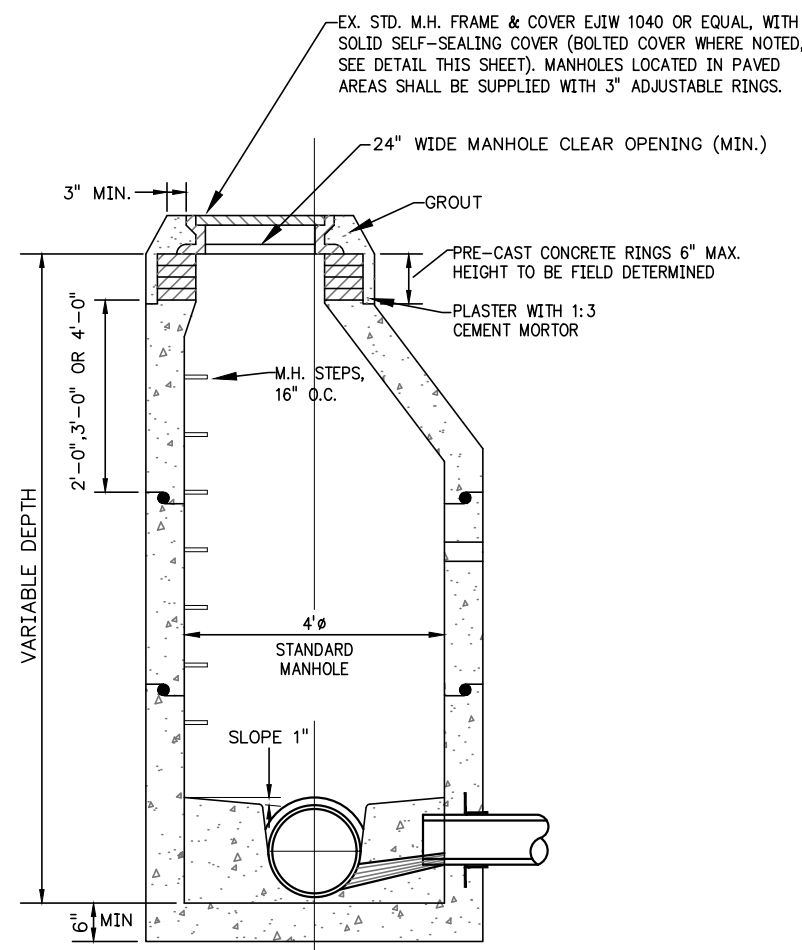
## LOCATION MAP FOR

## SANITARY SEWER MANHOLE REHABILITATION AND WATERPROOFING



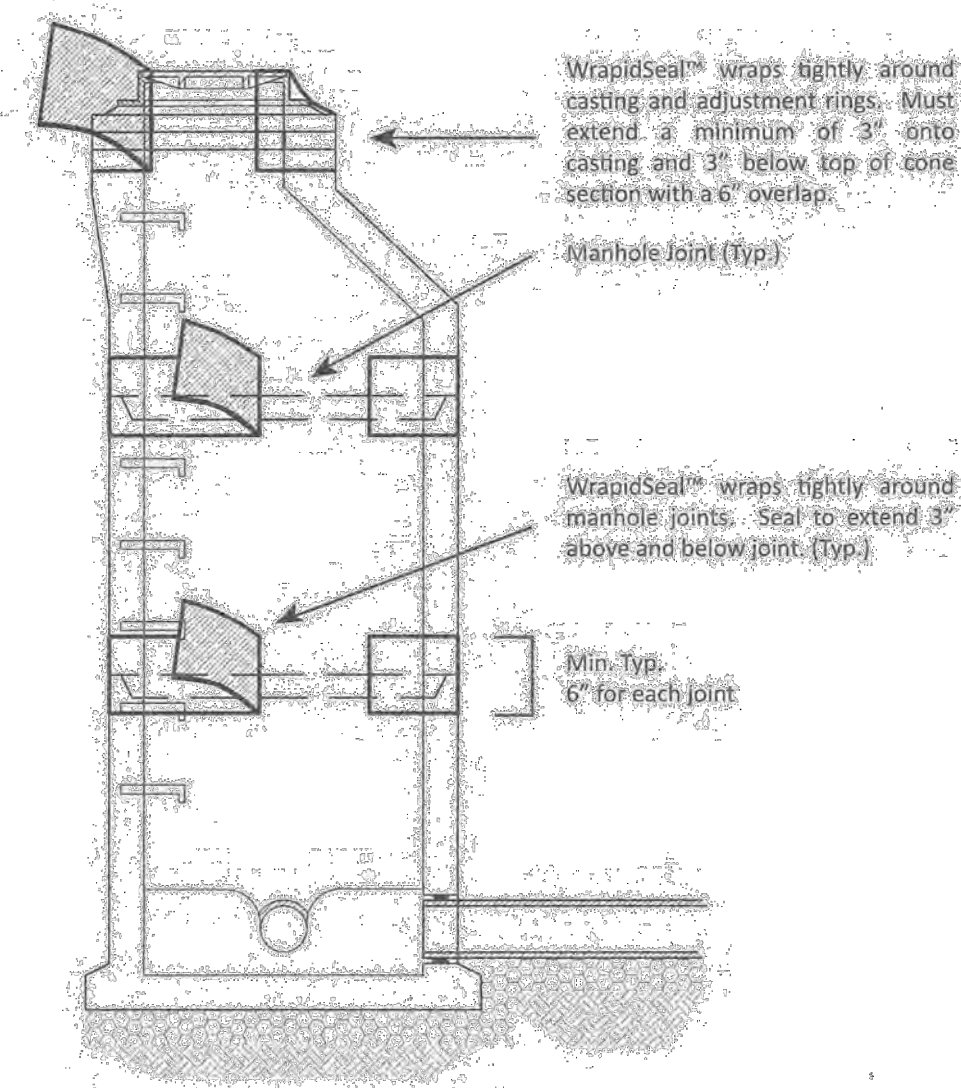
GFA PROJECT NO.: 21093  
DATE: September 23, 2021



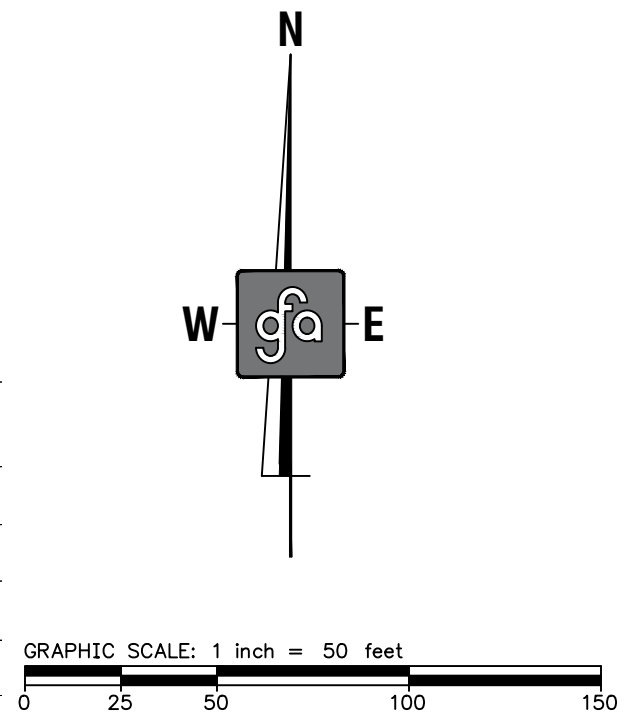
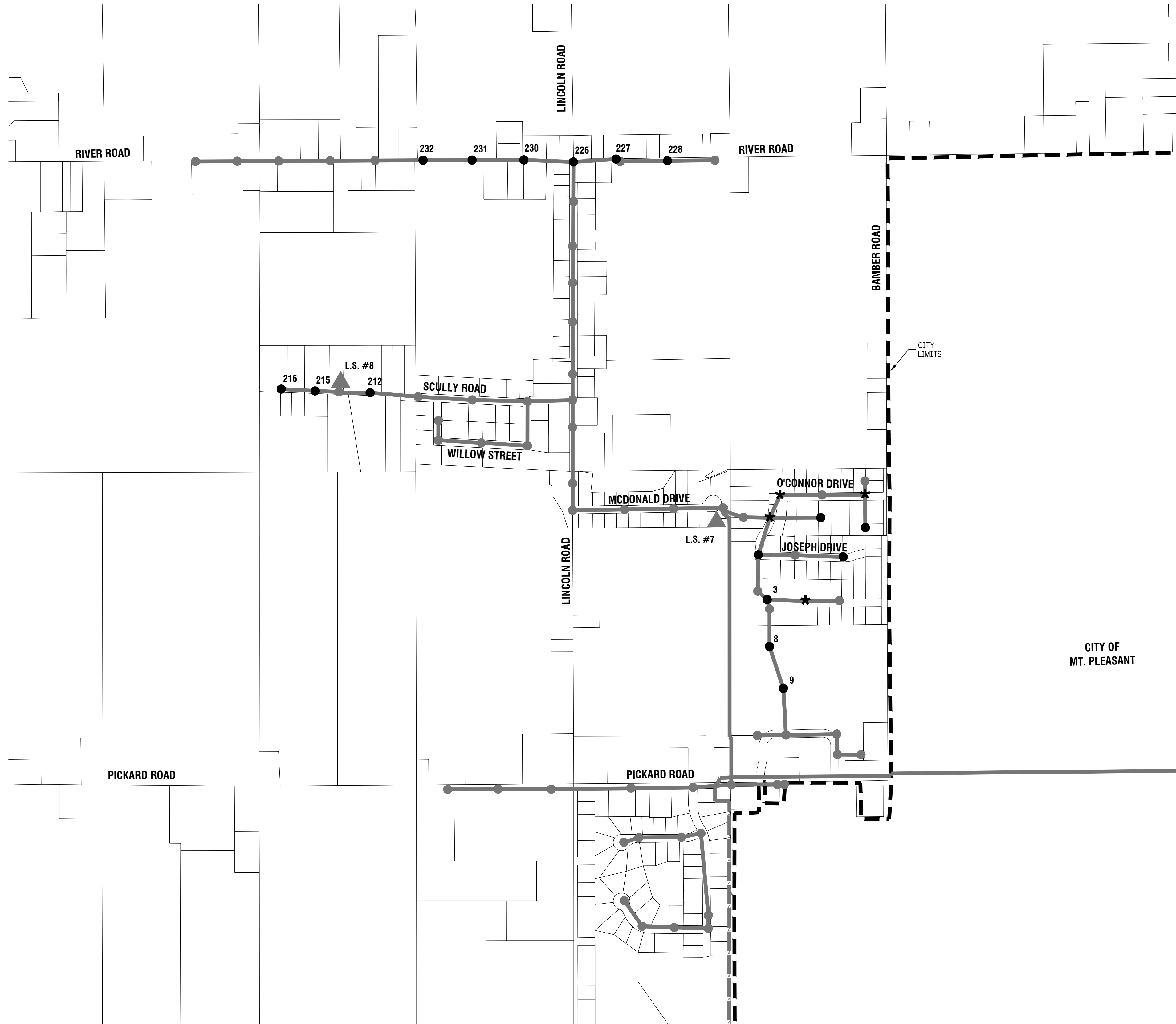


NOTE:  
CLEAN AND WATERPROOF INSIDE WALLS OF  
NEW MANHOLES PER SPECIFICATIONS

SECTION THRU STANDARD MANHOLE  
DETAIL - STANDARD MANHOLE  
NO SCALE



MANHOLE WATERPROOFING DETAIL  
NO SCALE



**LEGEND**

- UNION TOWNSHIP LIMITS
- EXISTING SANITARY SEWER
- MANHOLE WATERPROOFED. REFER TO DETAIL ON RIGHT
- \* MANHOLE LID ADJUSTMENT. REFER TO DETAIL ON RIGHT
- EXISTING MANHOLE - NO IMPROVEMENTS
- ▲ EXISTING LIFT STATION

MANHOLE NUMBERS CORRESPOND WITH ATTACHED RECORD DRAWINGS

CHARTER TOWNSHIP OF UNION  
PUMP STATION #7 UPGRADES  
MANHOLE REHABILITATION PLAN  
SECTION 9, T.14 N., R.4 W.  
UNION TOWNSHIP, ISABELLA TOWNSHIP, MICHIGAN

DATE: 10/26/2023  
DRAWN BY: JENNIFER HODGES, P.E.  
CHECKED BY: C. BALLANCE  
DESIGNED BY: A. BELANGER  
PROJECT NO: 21093

ENGINEERING SURVEYING TESTING & OPERATIONS  
123 West Front Street  
Traverse City, MI 49684  
http://gfa.io  
231.946.5874 (p)  
231.946.3703 (f)



Engineering  
Surveying  
Testing &  
Operations

123 West Front Street  
Traverse City, Michigan 49684  
231.946.5874   
231.946.3703 

## RECORD DRAWINGS

### SANITARY SEWER MANHOLE REHABILITATION AND WATERPROOFING



GFA PROJECT NO.: 21093  
DATE: September 1980

ISABELLA COUNTY  
SANITARY SEWAGE DISPOSAL  
SYSTEM

UNION

TOWNSHIP

C-262790

MISSION CREEK AREA

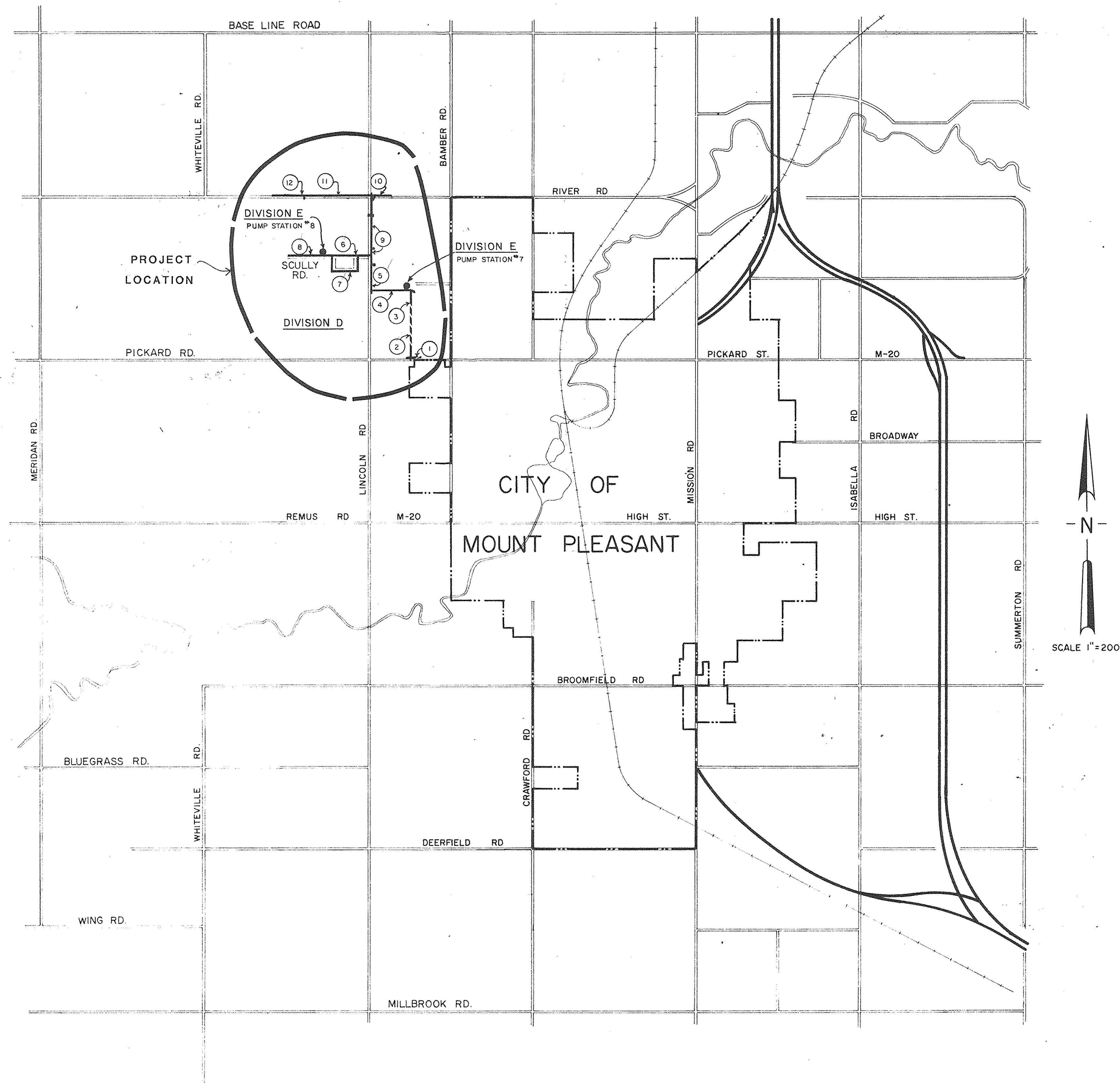
DIVISION D

COLLECTOR SEWERS

DIVISION E

PUMP STATIONS





**LOCATION PLAN**

**LEGEND**

- ② PLAN SHEET NUMBER
- GRAVITY SEWER
- FORCE MAIN
- PUMP STATION

**DRAWING INDEX**

SHEET	TITLE
—	COVER SHEET
A	LOCATION PLAN & INDEX
B	UTILITIES & LEGEND SHEET
C, D	GRANT ELIGIBILITY PLANS
1 THRU 12	SANITARY SEWER PLAN & PROFILE SHEETS
13	PUMP STATION #7 SITE PLAN & DETAILS
14	PUMP STATION #8 SITE PLAN & DETAILS
15	FORCE MAIN DETAILS
16	SANITARY SEWER DETAILS
17	SOIL EROSION CONTROL MEASURES

DRAWING SYMBOLS

PROPOSED	EXISTING	
		Manhole (M.H.)
		Inlet or Catch Basin (C.B.)
		Gate Valve (G.V.)
		Fire Hydrant (H.D.)
		Sign
		Pole, Electric or Telephone
		Reference Point
		Bench Mark
		Soil Boring
		Culvert
		Culvert with Headwall (H.W.)
		Sanitary Sewer (SAN)
		Sanitary Force Main (F.M.)
		Storm Sewer (STO)
		Water Main (W.M.)
		Gas Main
		Underground Cable
		Property Line
		Center Line

NOTES TO CONTRACTOR

NOTE: Special care shall be taken in excavating in the proximity of all underground utilities. The Contractor shall secure assistance from the appropriate utility company in locating its lines. The Contractor shall also: provide support for any utility within the excavation, provide proper compaction under any undermined utility structure and, if necessary, install temporary sheeting or use a trench box to minimize the excavation. The Contractor shall protect and save harmless from damage all utilities, whether privately or publicly owned, above or below the ground surface, which may be encountered during construction.

NOTE: Locations of 6" Wye installations and sewer leads are approximate only. Exact locations are to be determined in the field at time of construction to best serve each property.

NOTE: 15P 14T - Soil Erosion and Sedimentation Control Measure - keyed to "Michigan Unified Keying System." "P" indicates permanent. "T" indicates temporary. See Sheet #19. The use of these symbols is a general indication of the method of soil stabilization and surface restoration to be employed. The specific requirements of the specifications shall govern in all cases.

SOIL BORING LEGEND

GROUND WATER LEVEL IMMEDIATELY AFTER DRILLING	
SAND (Sa)	
CLAY (Cl)	
SAND-CLAY (Sa-Cl)	
SILT-CLAY (Si-Cl)	
SILT-SAND (Si-Sa)	
SILT (Si)	
GRAVEL (Gr)	
ROCK (Ro)	
MUCK (Mu)	

UTILITIES

UNION TOWNSHIP

Township Hall  
Address: 2010 South Lincoln Road  
Mt. Pleasant, Michigan 48858  
Telephone: (517) 772-4600  
Township Supervisor: Keith Decker

CITY OF MT. PLEASANT

City Engineer:  
Address: 120 South University Avenue  
Mt. Pleasant, Michigan 48858  
Telephone: (517) 773-7971  
Police Department  
Address: 120 South University Avenue  
Mt. Pleasant, Michigan 48858  
Telephone: (517) 773-7971  
(Business)  
(Emergency) (517) 773-5935

Fire Department

Address: 120 South University Avenue  
Mt. Pleasant, Michigan 48858  
Telephone: (517) 773-7971  
(Business)  
(Emergency) (517) 773-7994

ISABELLA COUNTY

Drain Commissioner  
Address: 200 North Main Street  
Mt. Pleasant, Michigan 48858  
Telephone: (517) 772-0911  
Road Commission  
Address: 2261 East Remus Road  
Mt. Pleasant, Michigan 48858  
Telephone: (517) 773-7131  
Sheriff  
Address: 207 Court Street  
Mt. Pleasant, Michigan 48858  
Telephone: (517) 773-5911  
Department of Public Works  
Address: 200 North Main Street  
Mt. Pleasant, Michigan 48858  
Telephone: (517) 772-0911

MICHIGAN DEPARTMENT OF STATE HIGHWAYS & TRANSPORTATION

Maintenance Garage  
Address: 1120 South Mission Road  
Mt. Pleasant, Michigan 48858  
Telephone: (517) 772-2455  
District Office  
Address: 1420 Front Street  
Grand Rapids, Michigan 49504  
Telephone: (616) 451-3091

CONSUMERS POWER COMPANY

Regional Office  
Address: 2400 Weiss Street  
Saginaw, Michigan 48605  
Telephone: (517) 799-7110

MICHIGAN CONSOLIDATED GAS COMPANY

District Office  
Address: 1205 South Mission Road  
Mt. Pleasant, Michigan 48858  
Telephone: (517) 773-3971

GENERAL TELEPHONE COMPANY OF MICHIGAN

Division Office  
Address: 327 East Center Street  
Alma, Michigan 48801  
Telephone: (517) 463-0211

ANN ARBOR RAILROAD COMPANY

Address: West Broadway Road  
Mt. Pleasant, Michigan 48858  
Telephone: (517) 772-3560

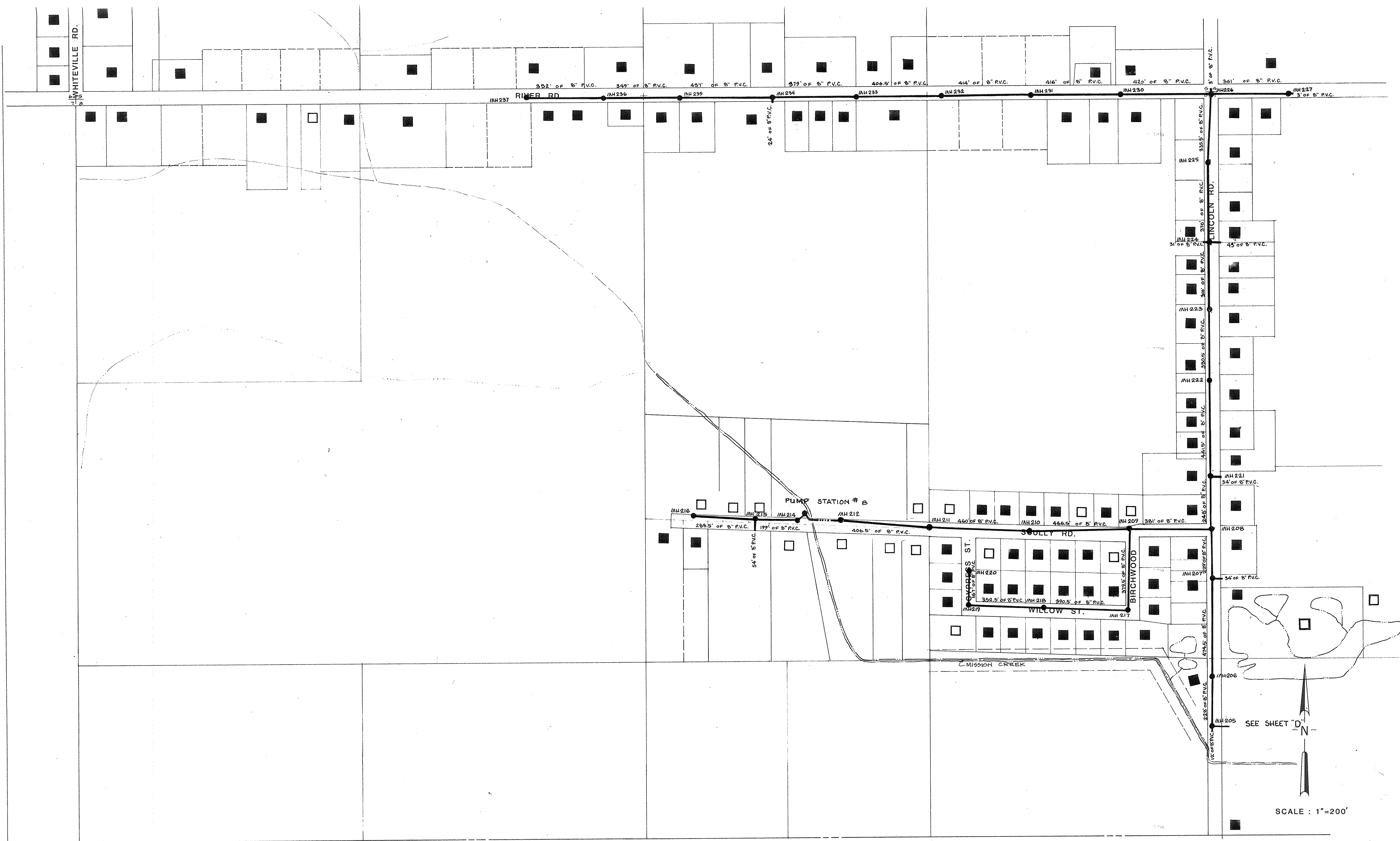
CABLE VISION, INC.

Address: 915 East Broomfield  
Mt. Pleasant, Michigan 48858  
Telephone: (517) 772-0956

MICHIGAN STATE POLICE

Address: 1011 North Mission Road  
Mt. Pleasant, Michigan 48858  
Telephone: (517) 773-5951

MISS DIG: (800) 482-7171



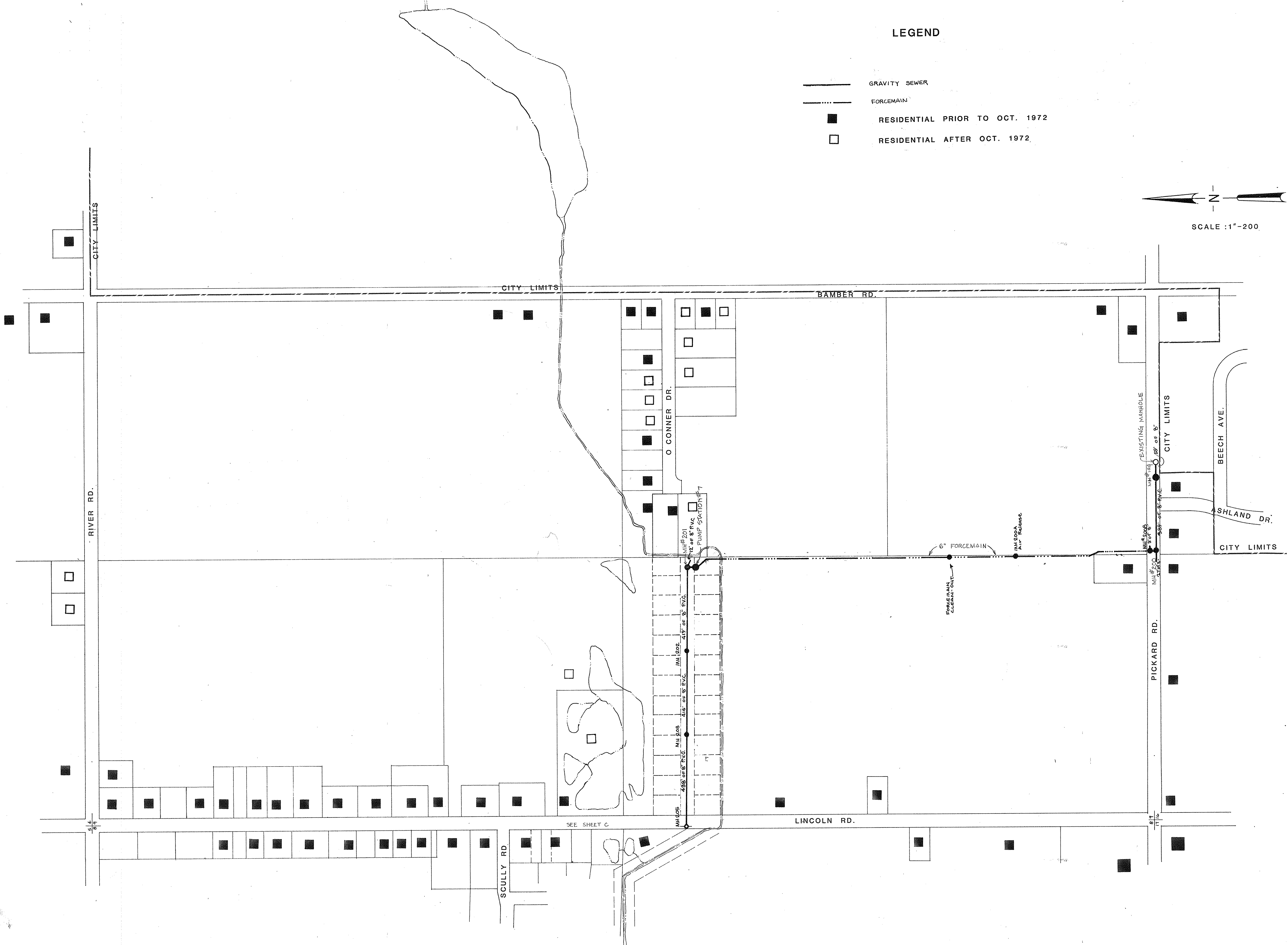
MATCH LINE A-A

**LEGEND**

- SEWER
- FORCEMAIN
- RESIDENTIAL PRIOR TO OCT. 1972
- RESIDENTIAL AFTER OCT. 1972

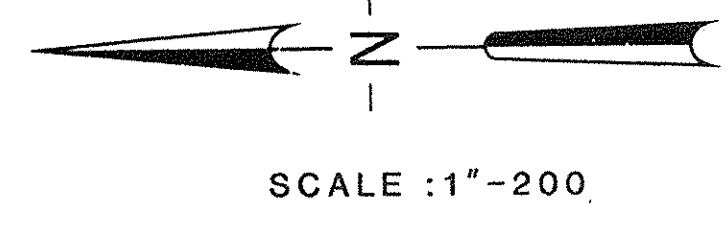
<b>UNION TOWNSHIP</b> SANITARY SEWER SYSTEM MISSION CREEK AREA ISABELLA COUNTY, MICHIGAN	<b>GOURDIE • FRASER &amp; ASSOCIATES, INC.</b> 124 W. STATE TRAVERSE CITY, MICH. 48864 • 105 E. WASHINGTON MARQUETTE, MICH. 49855 • ENGINEERS • LAND PLANNERS • LAND SURVEYORS	<b>GRANT ELIGIBILITY PLAN</b>
		DRN. 9-8-80
		CKD. MPL
		APR. 27TH
		DATE 9-8-80
REV. ASBUILT 8-13-81 - CRG		
SHEET C		
80006		





LEGEND

- GRAVITY SEWER
- FORCEMAIN
- RESIDENTIAL PRIOR TO OCT. 1972
- RESIDENTIAL AFTER OCT. 1972



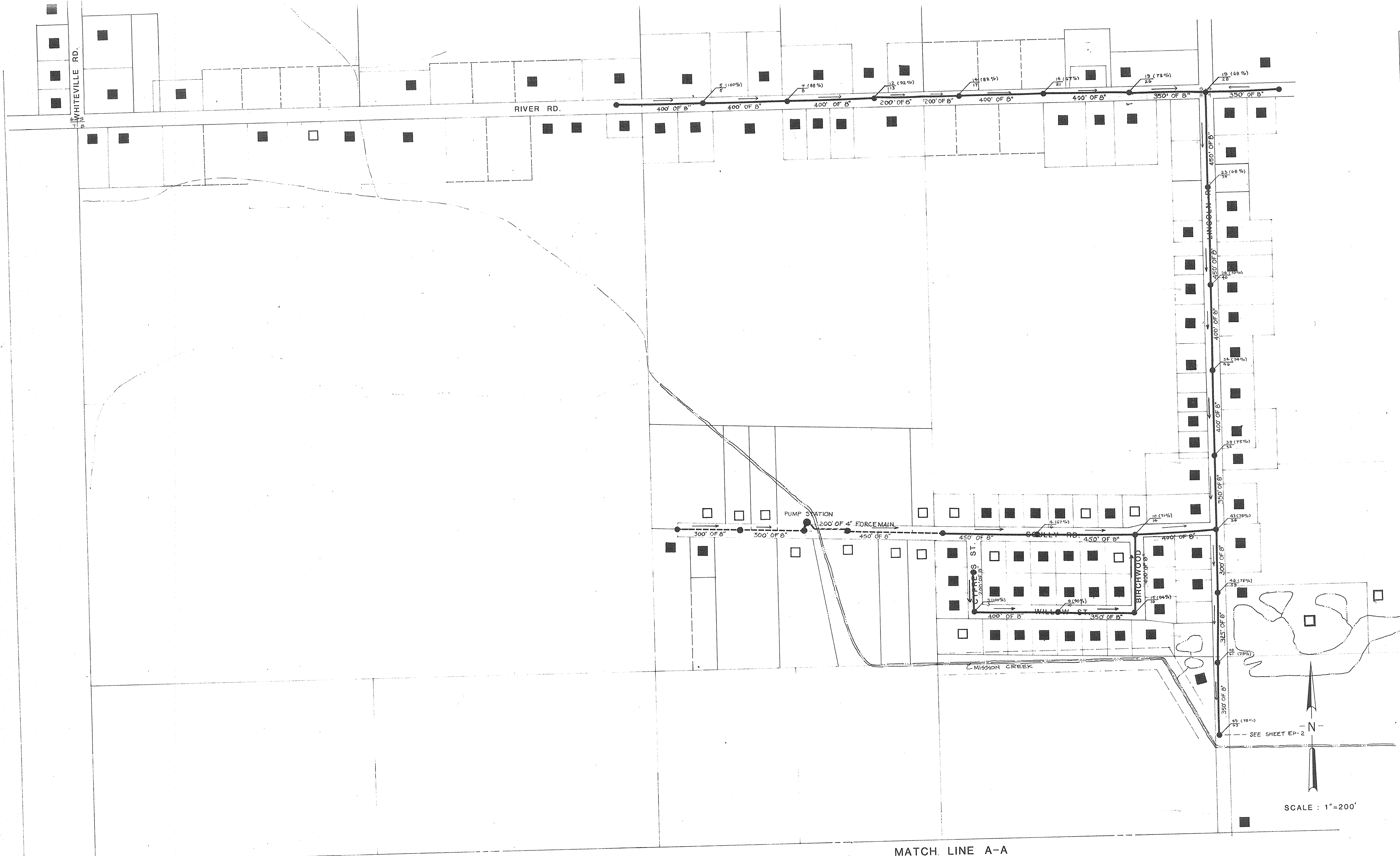
UNION TWP.  
SANITARY SEWER SYSTEM  
MISSION CREEK AREA  
ISABELLA COUNTY, MICH.

**GOURDIE • FRASER & ASSOCIATES, INC.**  
124 W. STATE TRAVERSE CITY, MICH. 49884 • 105 E. WASHINGTON MARQUETTE, MICH. 49855  
• ENGINEERS • LAND PLANNERS • LAND SURVEYORS

**GRANT ELIGIBILITY PLAN**

DRN  
JLS 9-8-80  
CKD  
MPL  
APR.  
RTH  
DATE  
9-8-80  
REV. AS BUILT  
8-13-81 CR6  
SHEET  
**D**  
80006

UNION TWP.  
SANITARY SEWER SYSTEM  
MISSION CREEK AREA  
ISABELLA COUNTY, MICH.



- LEGEND**
- SEWER ELIGIBLE FOR FEDERAL & STATE GRANTS
  - SEWER INELIGIBLE FOR FEDERAL & STATE GRANTS
  - FORCEMAIN (ALL ELIGIBLE EXCEPT WHERE NOTED)
  - RESIDENTIAL PRIOR TO OCT. 1972
  - RESIDENTIAL AFTER OCT. 1972

UNION TWP.

SANITARY SEWER SYSTEM

ISABELLA, COUNTY MICH.

GOURDIE • FRASER & ASSOCIATES INC

124 W. STATE TRAVERSE CITY, MICH. 48864 • 105 E. WASHINGTON MARQUETTE, MICH. 49855

• ENGINEERS • LAND PLANNERS • LAND SURVEYORS

GRANT ELIGIBILITY PLAN

MISSION CREEK AREA

REV 1-12-80

REV 3-17-80

REV 3-18-80

JLS

RTH

SHEET

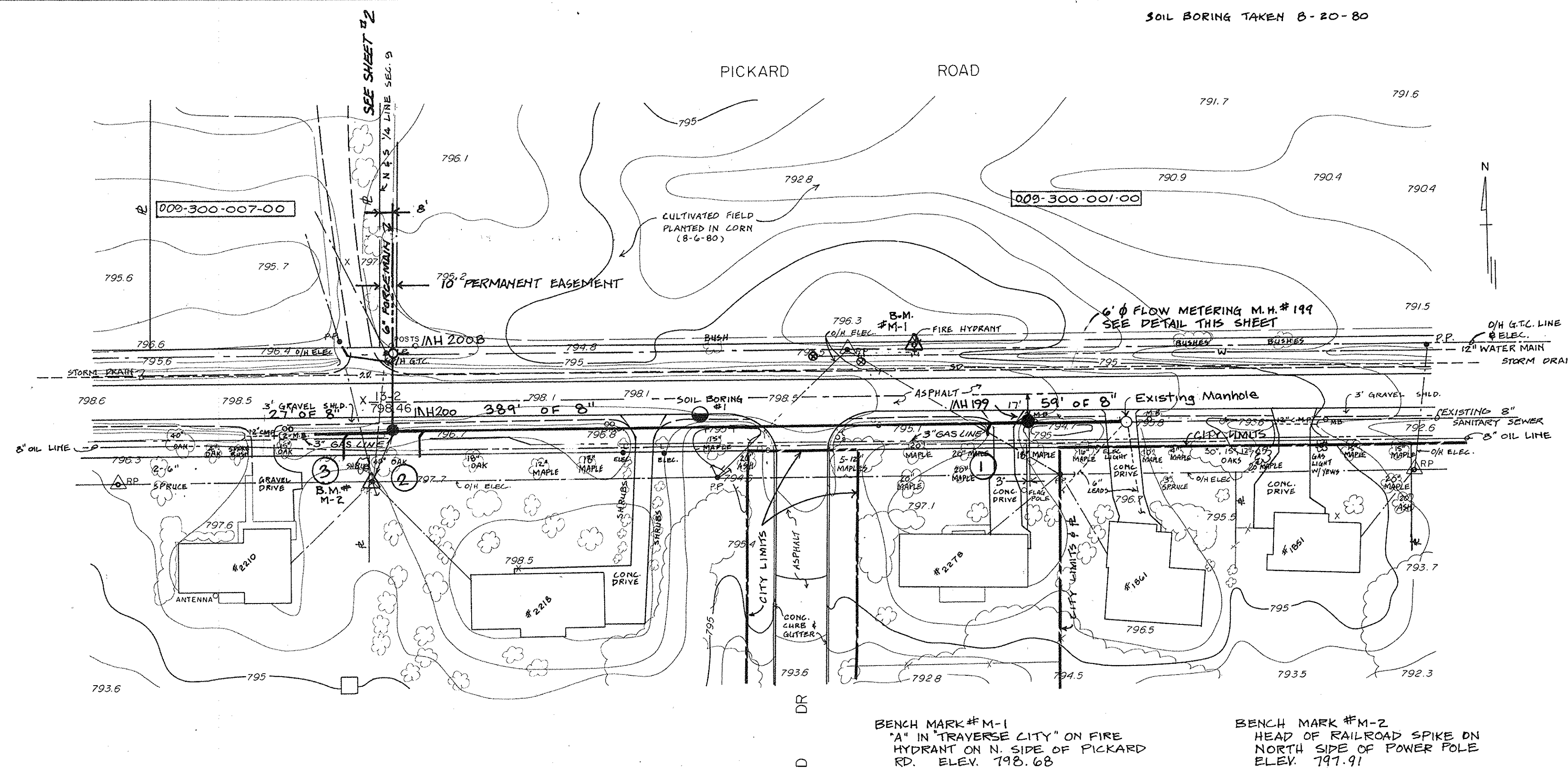
EP-1

P80006



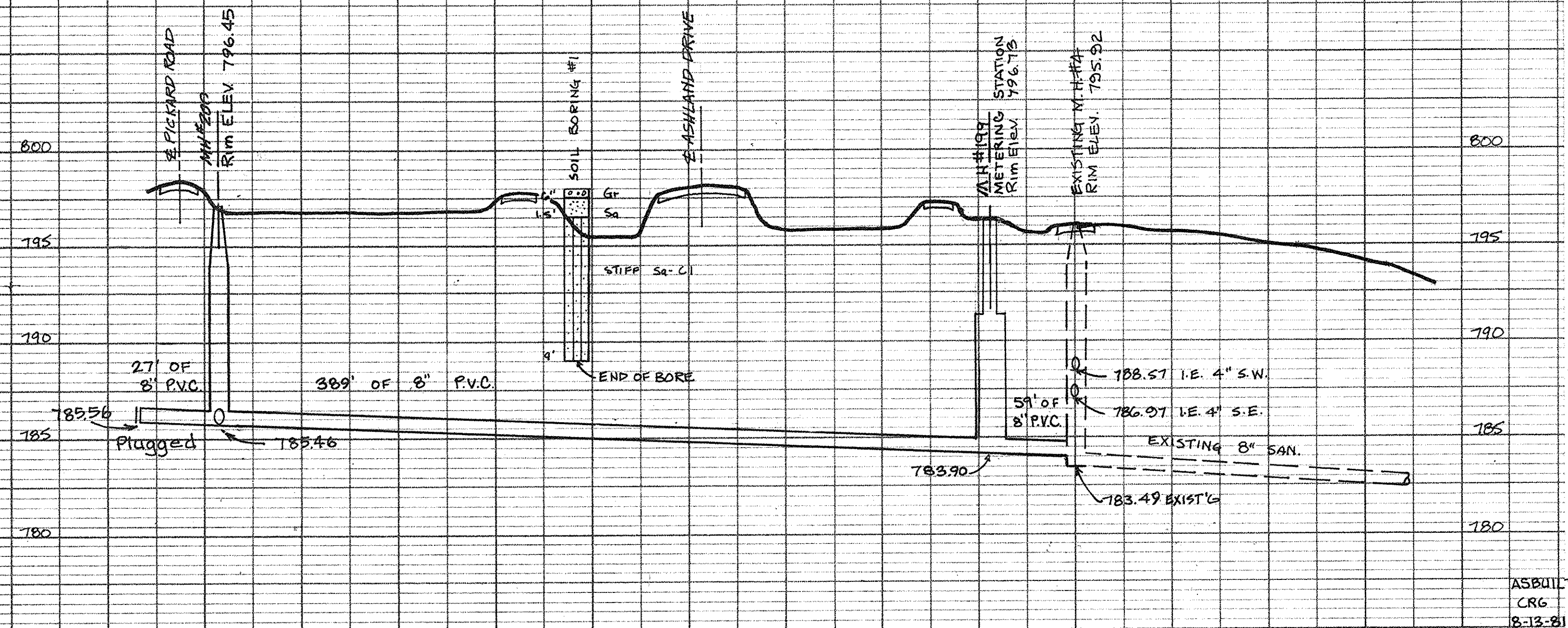




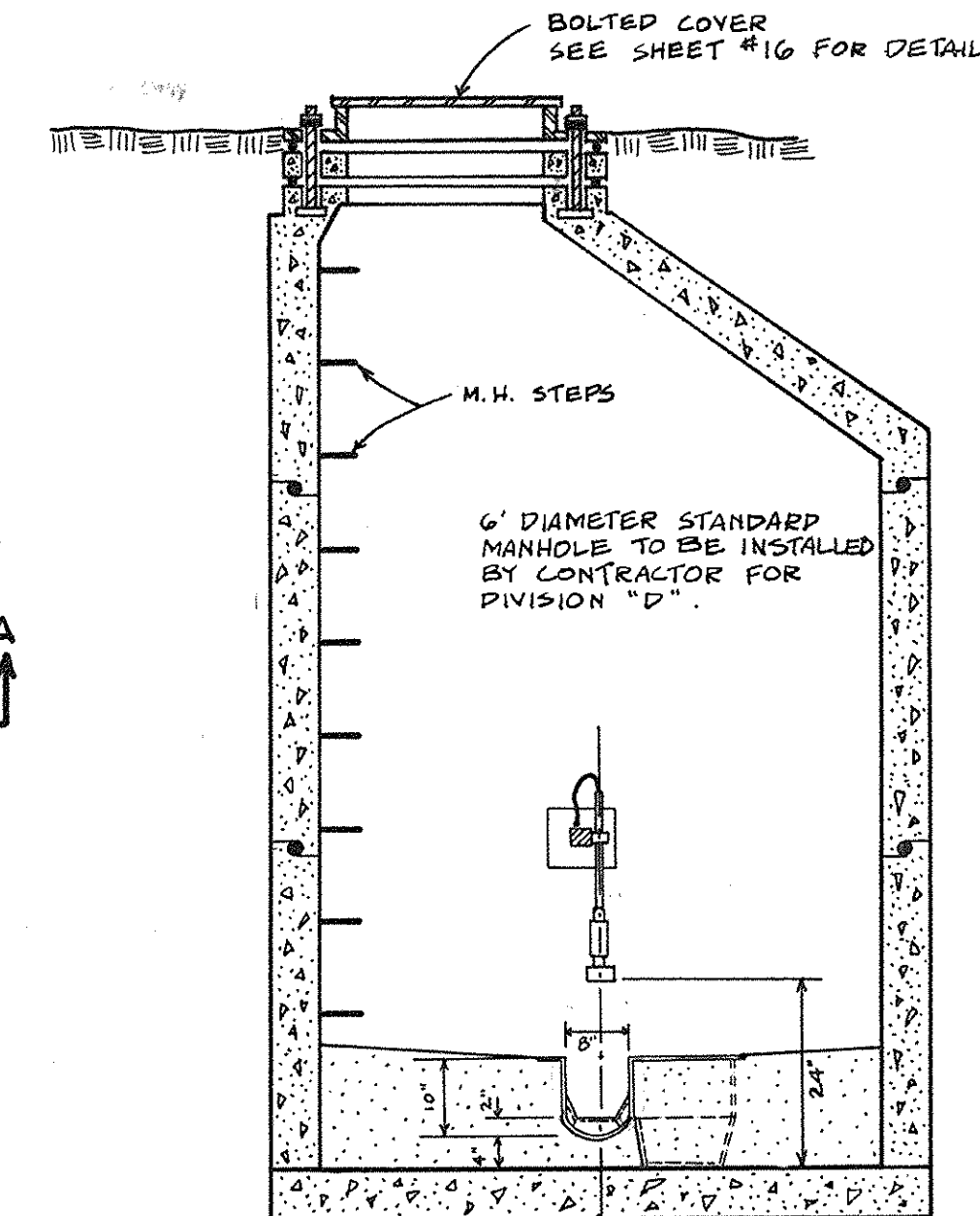
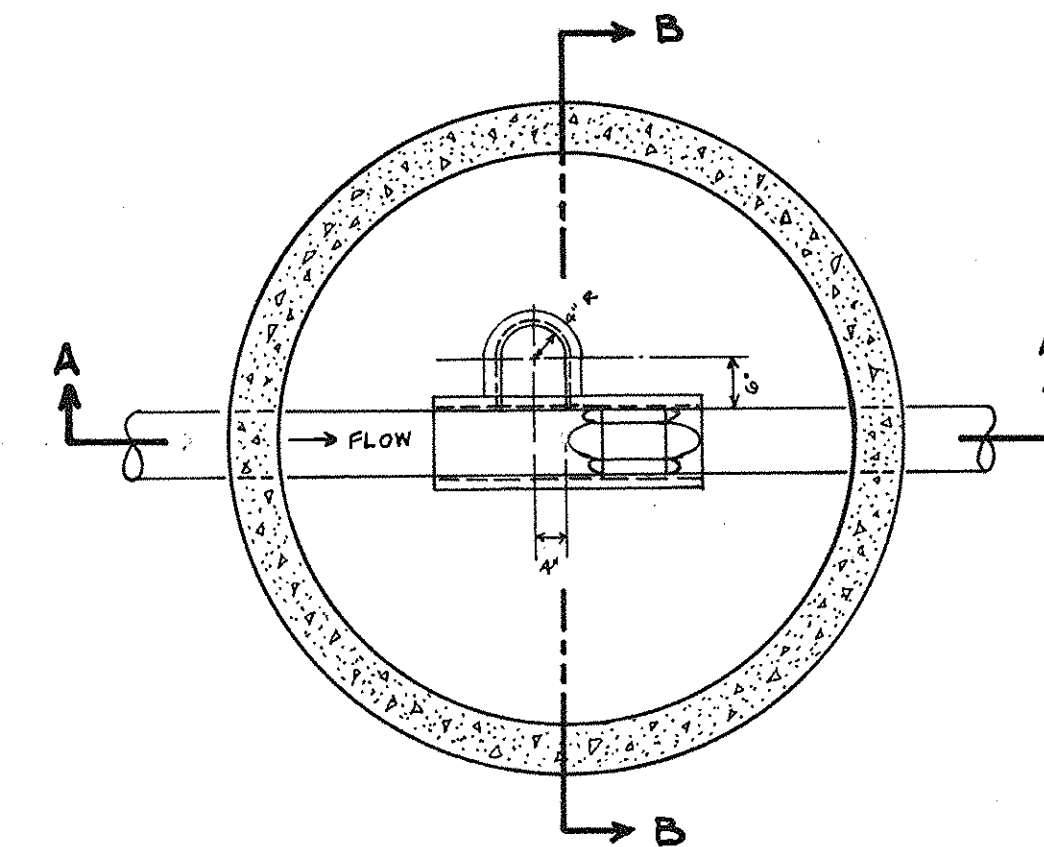


SEWER LEAD			LOCATION FROM M.H.		DISTANCE FROM SEWER TO END OF LEAD		DEPTH FROM TOP OF POST	
			DISTANCE FROM M.H.					
1			25'	West of M/H 199	2'	South	8'	
2			370'	West of M/H 199	14'	South	6'	
3			32'	West of M/H 200	14'	South	6'	
			all	leads	ave	6"	P.V.C.	

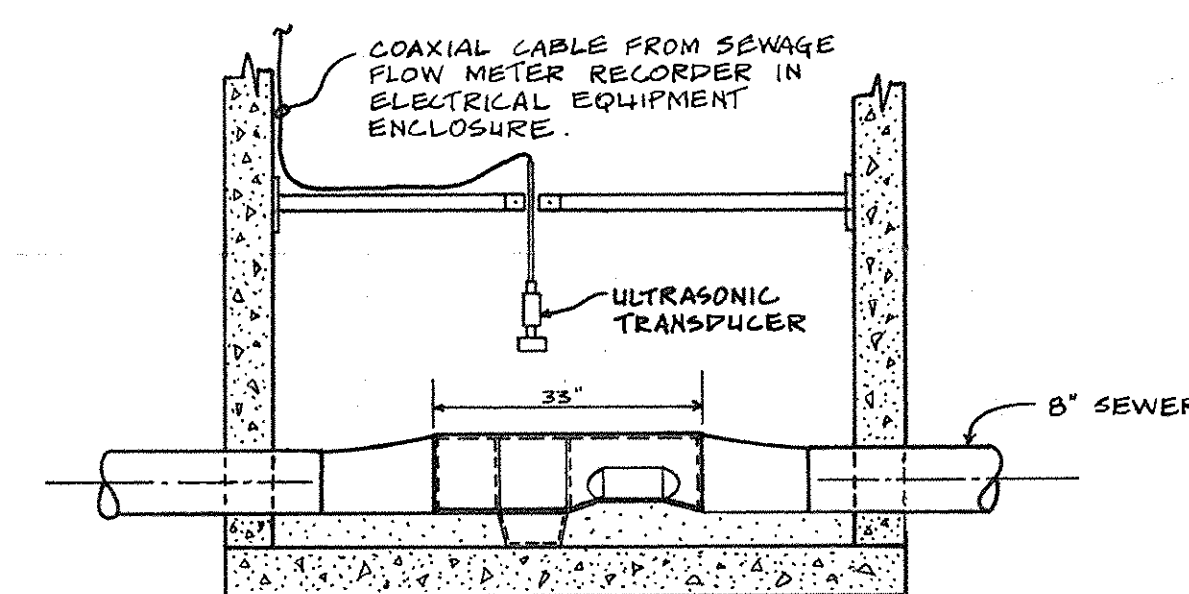
SCALE: 1" = 50'



6" FIBERGLASS MEASURING FLUME TO BE INSTALLED BY CONTRACTOR FOR DIVISION "D". FLUME SHALL BE AN 8" PALMER-BOWLUS WITH INTEGRAL APPROACH END BULKHEADS. FLUME SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.



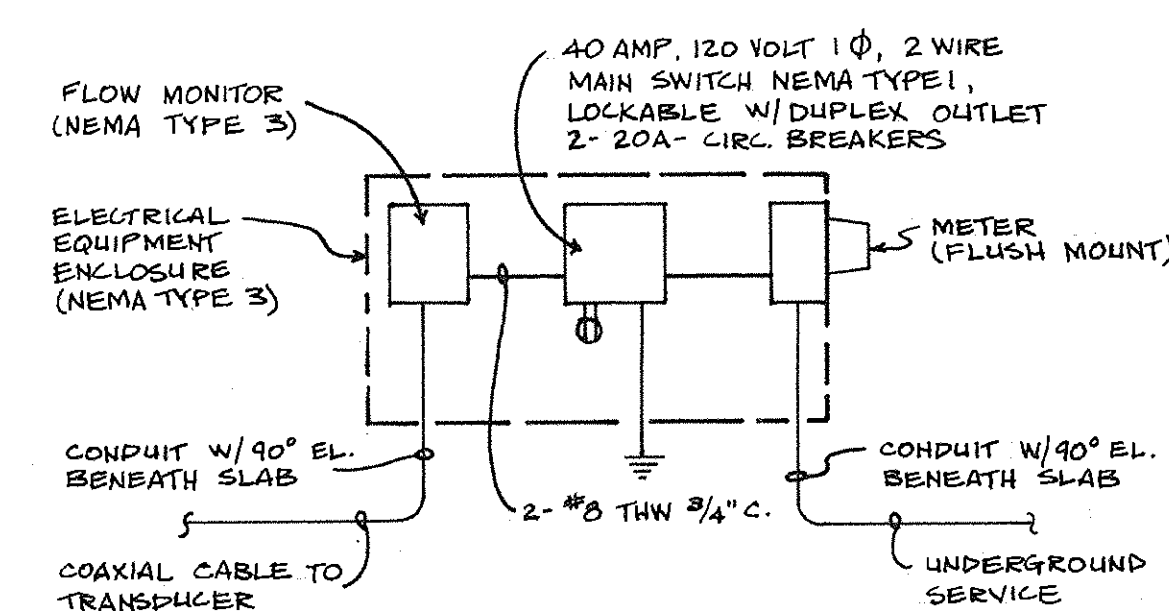
SECTION B-B



SECTION A-A

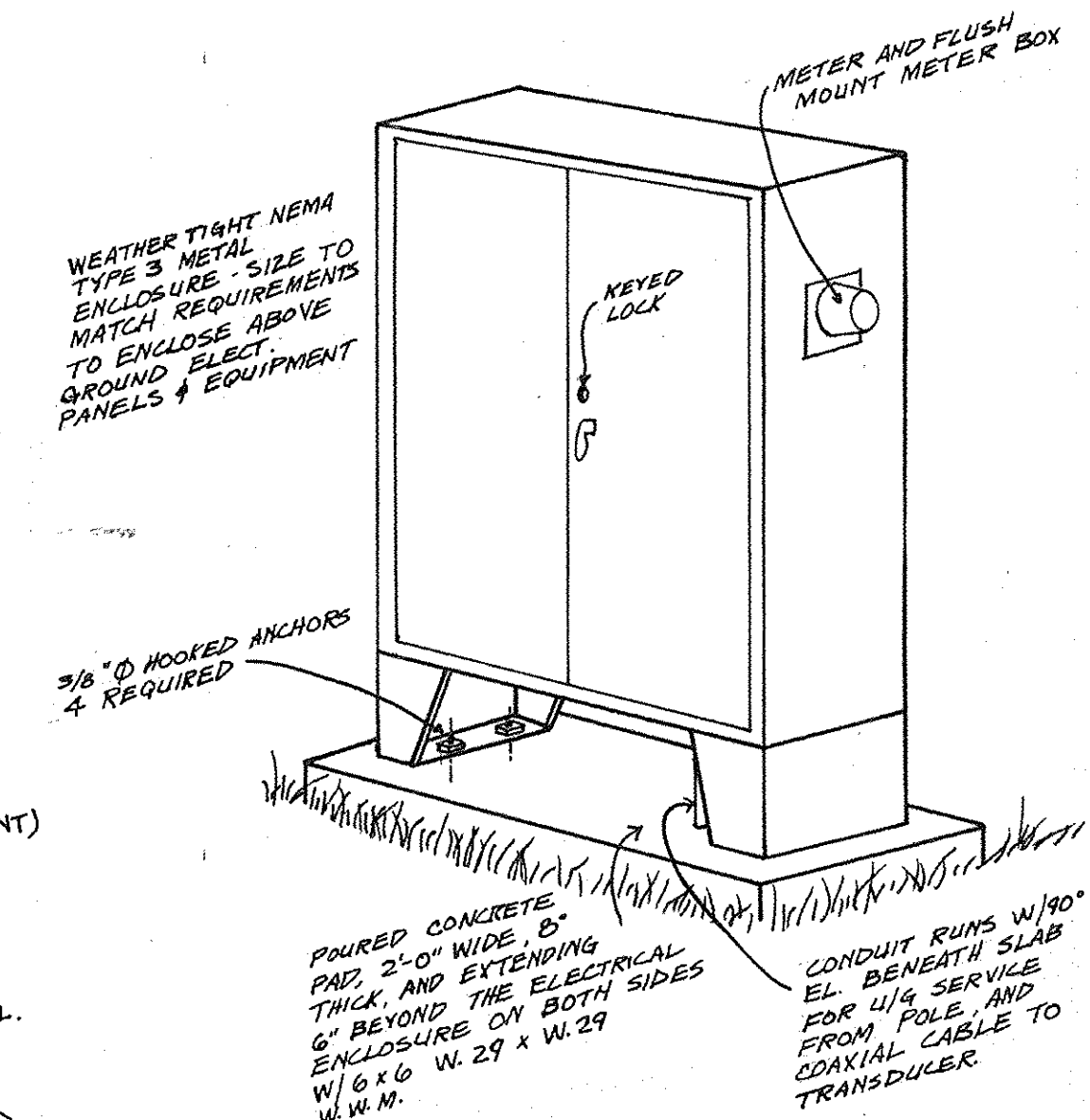
## METERING STATION

(NO SCALE)



ELECTRICAL SCHEMATIC FOR FLOW METER

(NO SCALE)

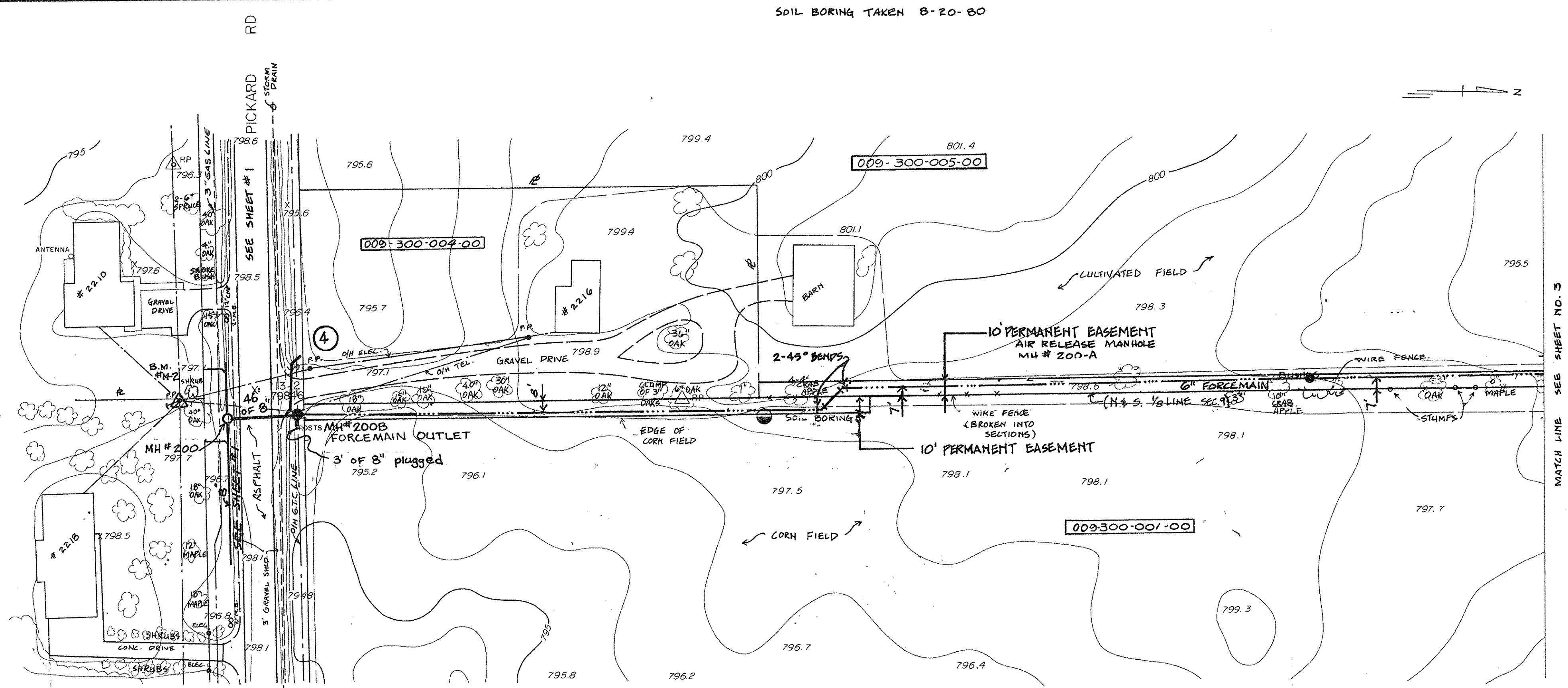


ELECTRICAL EQUIPMENT ENCLOSURE DETAIL

(NO SCALE)



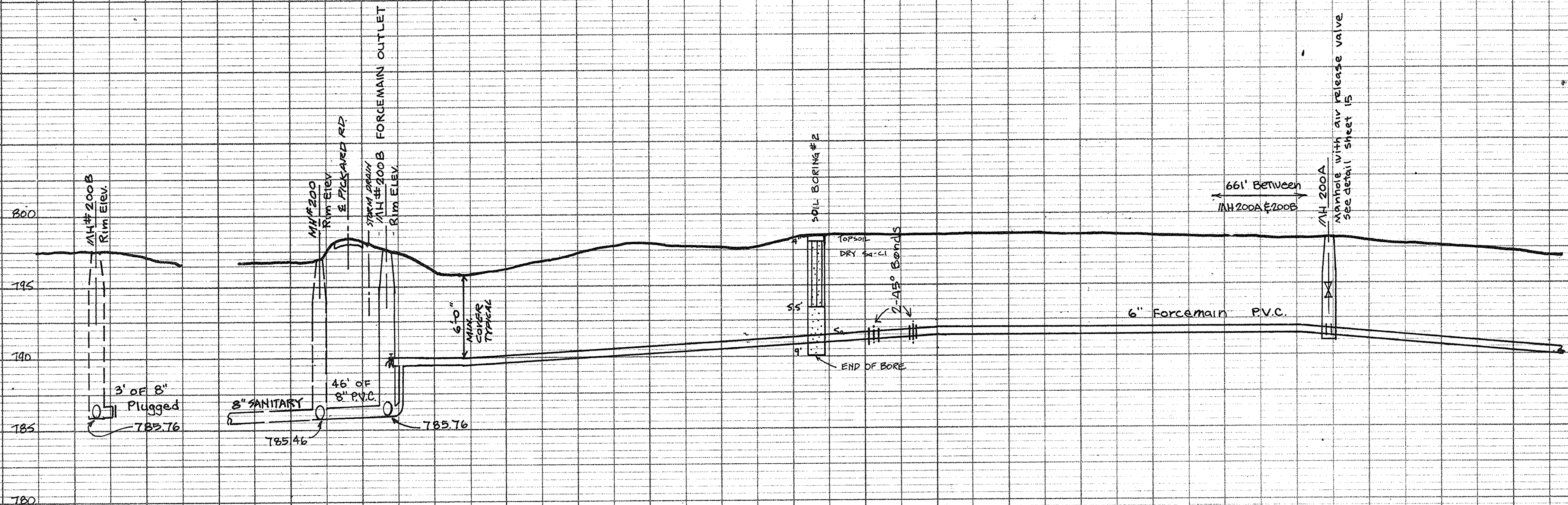
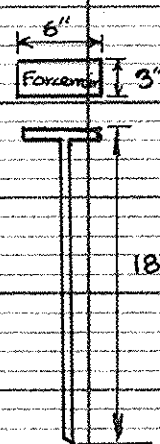
BENCH MARK #M-2  
HEAD OF RAILROAD SPIKE ON NORTH SIDE  
OF POWER POLE. ELEV. 797.91



SEWER LEAD		LOCATION FROM M.H.	DISTANCE FROM SEWER TO END OF LEAD	DEPTH FROM TOP OF POST
		DISTANCE FROM M.H.		
4	009-300-004-00	42' North of MH200	55' West	5'
		all leads are	6" P.V.C.	

SCALE: 1" = 50'

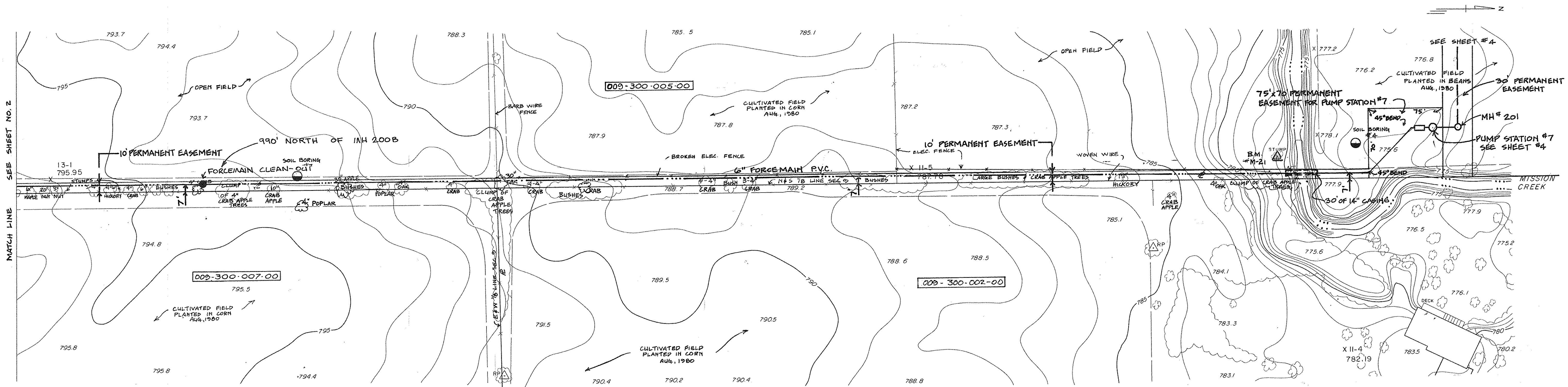
NOTE: Forcemain is marked with 1/2" steel rod with the top plate indicating "FORCEMAIN" every 100', Buried 12" to 18"



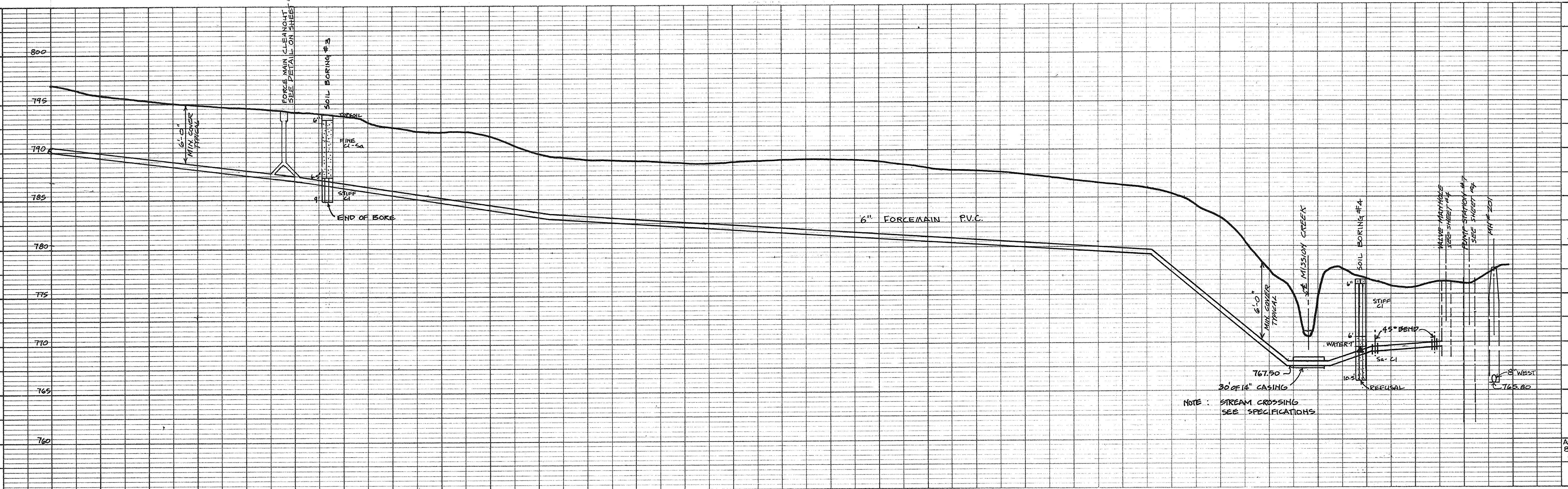


SOIL BORINGS TAKEN 8-20-80

BENCH MARK #M-21  
NAIL SET IN TOP OF 20" STUMP  
ELEV. 781.34



SCALE: 1" = 50'



UNION TOWNSHIP  
SANITARY SEWER SYSTEM  
MISSION CREEK AREA  
ISABELLA COUNTY, MICHIGAN

**GOURDIE · FRASER & ASSOCIATES, INC.**  
124 WEST STATE STREET · TRAVERSE CITY, MICHIGAN 49684  
ENGINEERING · SURVEYING · MAPPING

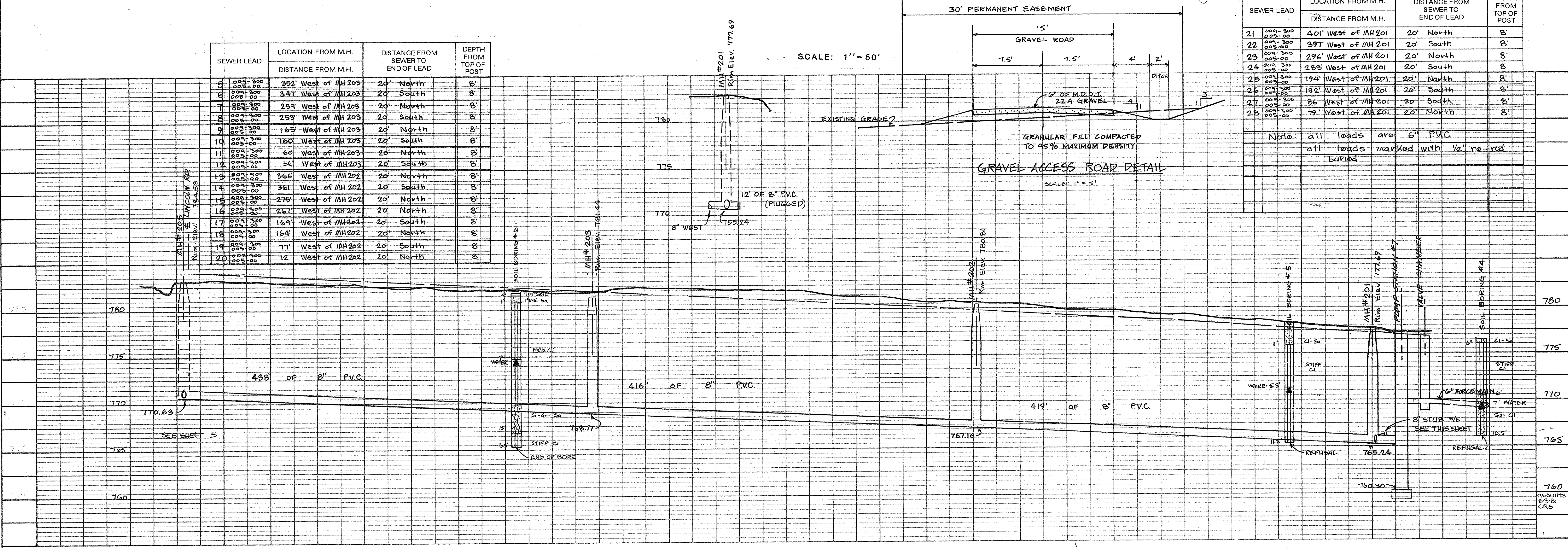
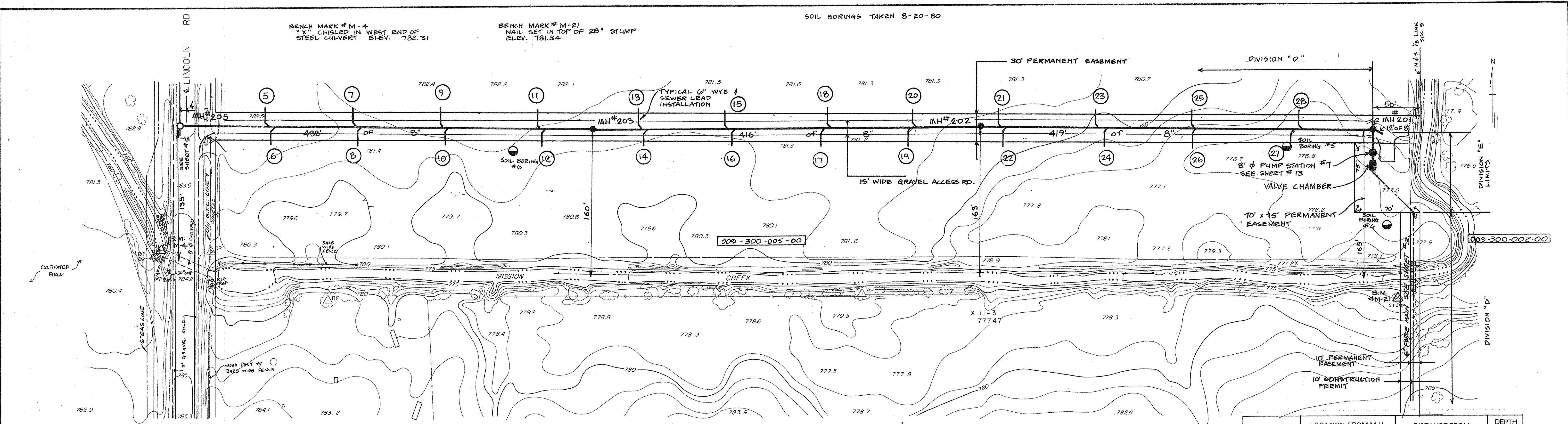
EASEMENT  
FROM 840' TO 2200', NORTH  
OF PICKARD ROAD

DRN. 8/28/80  
CHKD. MPL  
APR. BTH  
DATE 9-8-80  
REV.  
SHEET  
**3**  
80006

REFERENCE POINT  
THESE SELECTED POINTS ARE  
RECOMMENDED AS BASIC  
POINTS FOR THE CONSTRUCTION OF  
THESE SEWER LINES  
BY  
ABRAMS AERIAL SURVEY CORPORATION  
LANSING, MICHIGAN

760  
ASBUILT  
8-13-81  
CR6



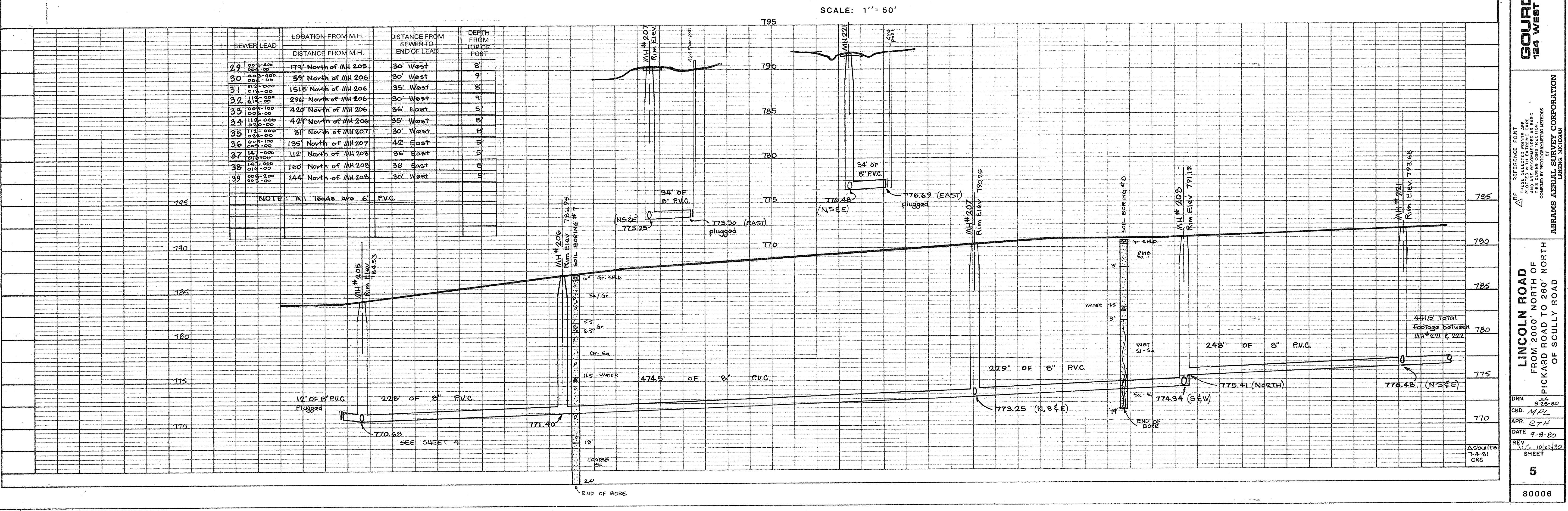
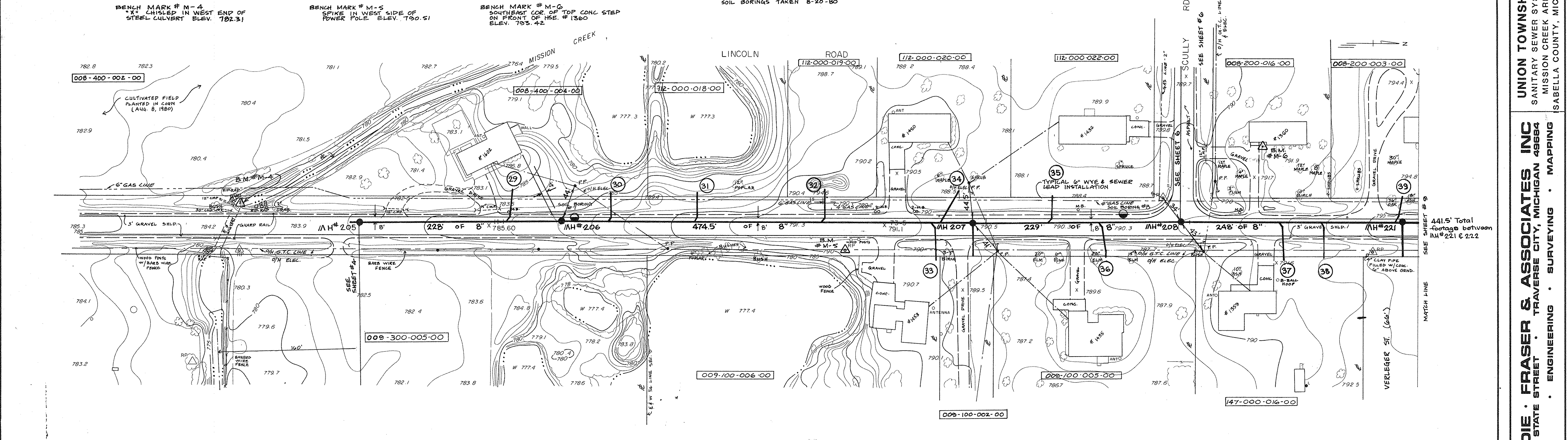


SEWER LEAD	LOCATION FROM M.H.	DISTANCE FROM SEWER TO END OF LEAD	DEPTH FROM TOP OF POST
	DISTANCE FROM M.H.		
5	004'-300' West of MH 203	20' North	8'
6	004'-300' West of MH 203	20' South	8'
7	004'-300' West of MH 203	20' North	8'
8	004'-300' West of MH 203	20' South	8'
9	004'-300' West of MH 203	20' North	8'
10	004'-300' West of MH 203	20' South	8'
11	004'-300' West of MH 203	20' North	8'
12	004'-300' West of MH 203	20' South	8'
13	004'-300' West of MH 202	20' North	8'
14	004'-300' West of MH 202	20' South	8'
15	004'-300' West of MH 202	20' North	8'
16	004'-300' West of MH 202	20' South	8'
17	004'-300' West of MH 202	20' North	8'
18	004'-300' West of MH 202	20' South	8'
19	004'-300' West of MH 202	20' North	8'
20	004'-300' West of MH 202	20' South	8'

SEWER LEAD	LOCATION FROM M.H.	DISTANCE FROM SEWER TO END OF LEAD	DEPTH FROM TOP OF POST
	DISTANCE FROM M.H.		
21	004'-300' 401' West of MH 201	20' North	8'
22	004'-300' 397' West of MH 201	20' South	8'
23	004'-300' 296' West of MH 201	20' North	8'
24	004'-300' 288' West of MH 201	20' South	8'
25	004'-300' 194' West of MH 201	20' North	8'
26	004'-300' 192' West of MH 201	20' South	8'
27	004'-300' 86' West of MH 201	20' South	8'
28	004'-300' 79' West of MH 201	20' North	8'

Note: all leads are 6" P.V.C.  
all leads marked with 1/2" re-rod buried

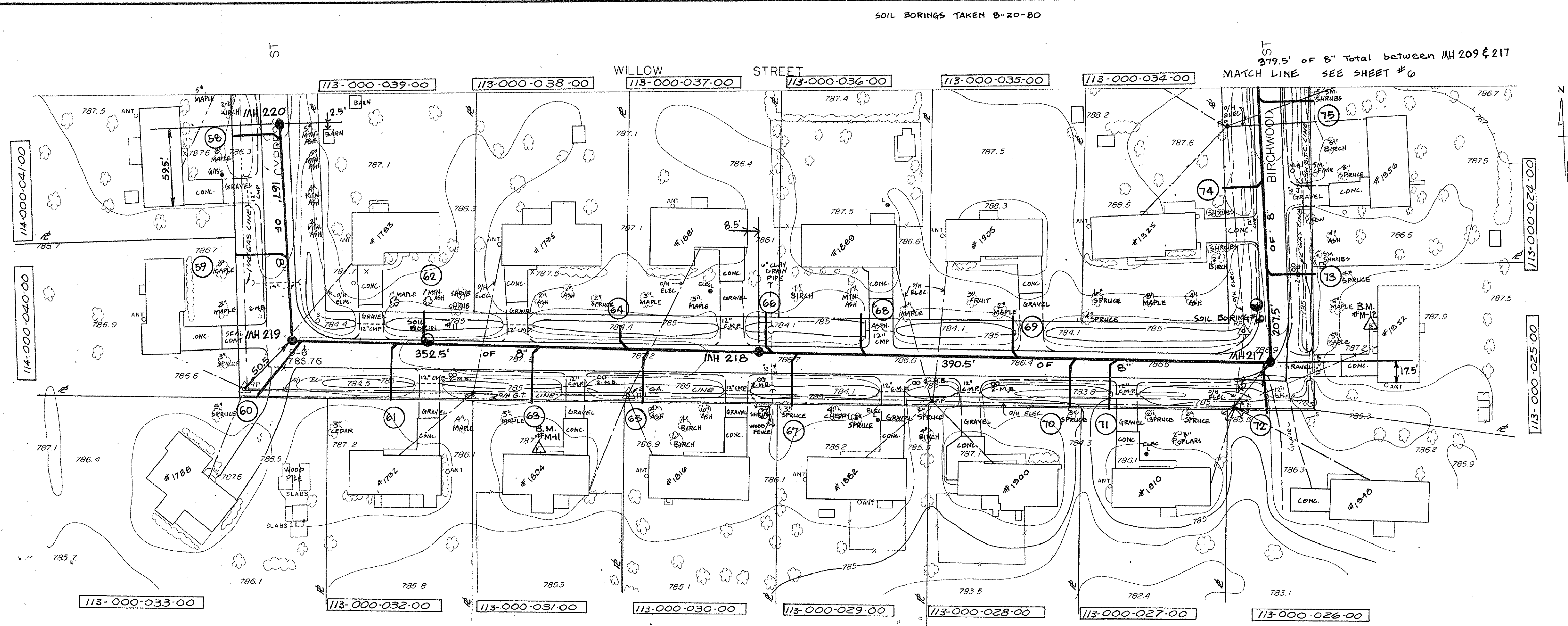












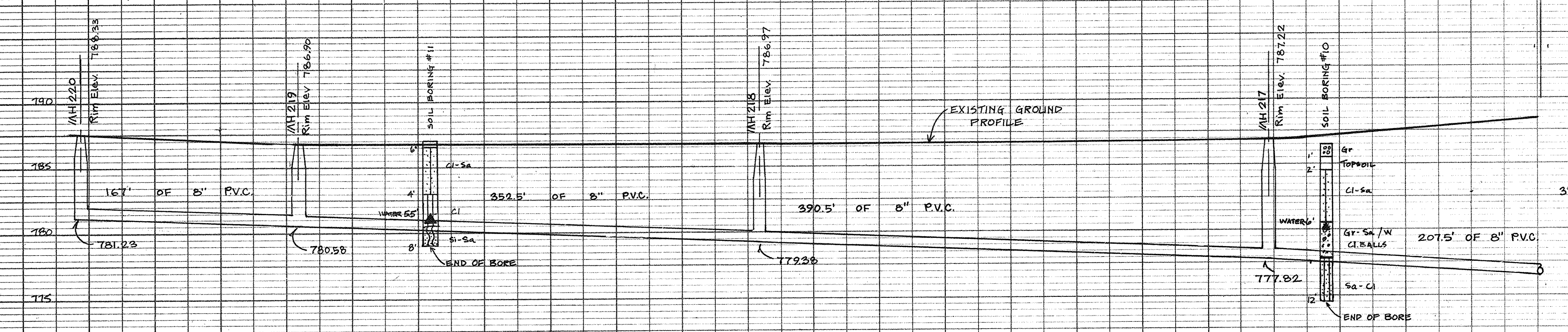
BENCH MARK # M-11  
TOP N.W. COR. CONC. STEP  
@ HSE. # 1804  
ELEV. 788.21

BENCH MARK # M-12  
TOP N.W. COR. CONC. STEP  
@ HSE. # 1952  
ELEV. 785.60

SCALE: 1" = 50'

SEWER LEAD	LOCATION FROM M.H.		DISTANCE FROM SEWER TO END OF LEAD	DEPTH FROM TOP OF POST
	DISTANCE FROM M.H.			
58	114-000-081-00	158' North of MH 219	44' West	5'
59	114-000-082-00	67' North of MH 219	44' West	5'
60	113-000-043-00	345' West of MH 218	56' Southwest	5'
61	113-000-044-00	28' West of MH 218	40' South	5'
62	113-000-045-00	256' West of MH 218	30' North	5'
63	113-000-046-00	172' West of MH 218	40' South	5'
64	113-000-047-00	106' West of MH 218	22' North	5'
65	113-000-048-00	89' West of MH 218	40' South	5'
66	113-000-049-00	388' West of MH 217	30' North	5'
67	113-000-050-00	365' West of MH 217	40' South	5'
68	113-000-051-00	314' West of MH 217	30' North	5'
69	113-000-052-00	198' West of MH 217	30' North	5'
70	113-000-053-00	154' West of MH 217	40' South	5'
71	113-000-054-00	124' West of MH 217	40' South	5'
72	113-000-055-00	8' West of MH 217	42' South	5'

SEWER LEAD	LOCATION FROM M.H.		DISTANCE FROM SEWER TO END OF LEAD	DEPTH FROM TOP OF POST
	DISTANCE FROM M.H.			
73	113-000-025-00	316' South of MH 219	42' East	5'
74	113-000-026-00	249' South of MH 219	35' West	5'
75	113-000-024-00	184' South of MH 219	43' East	5'
ALL LEADS ARE 6" P.V.C.				



UNION TOWNSHIP  
SANITARY SEWER SYSTEM  
MISSION CREEK AREA  
ISABELLA COUNTY, MICHIGAN

GOURDIE · FRASER & ASSOCIATES, INC.

124 WEST STATE STREET · TRAVERSE CITY, MICHIGAN 49684

ENGINEERING · SURVEYING · MAPPING

REFERENCE POINT  
THESE SELECTED POINTS ARE  
BASED ON THE 1985 DATUM  
AND ARE RECOMMENDED AS BASIC  
CONTROL FOR THE PROJECT  
CONFERRED BY PHOTOGRAMMETRIC METHODS  
BY  
ABRAMS AERIAL SURVEY CORPORATION  
LANSING, MICHIGAN

WILLOW STREET  
FROM 210' SOUTH ON  
BIRCHWOOD STREET TO 200'  
NORTH ON CYPRESS STREET

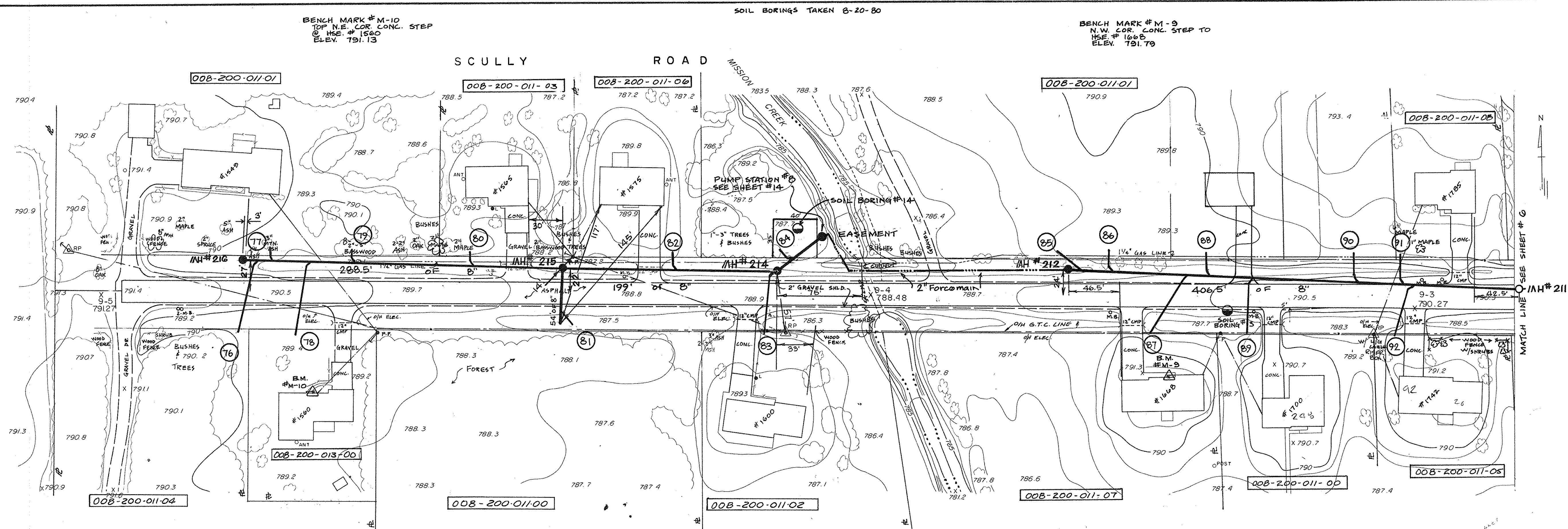
DRN 8-20-80  
CKD MPL  
APR RTH  
DATE 9-8-80  
REV 10-21-80  
SHEET 7

80006

A.A.S.C. 17287

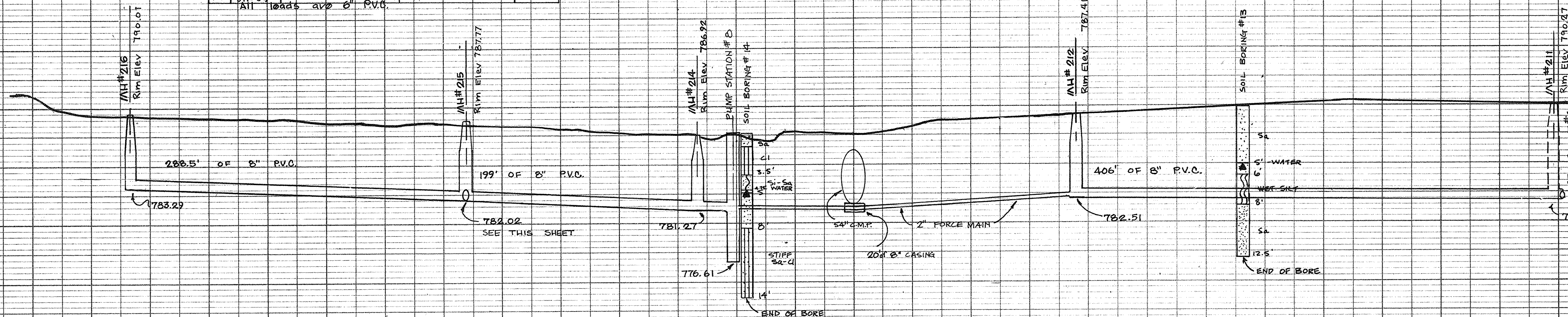
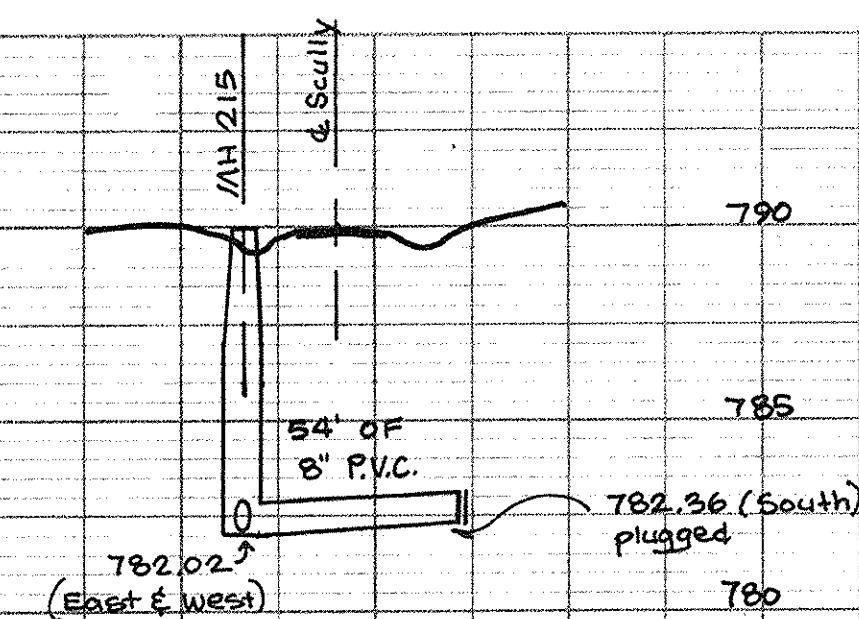
REV. JCS 10/22/80





SEWER LEAD	LOCATION FROM M.H.		DISTANCE FROM SEWER TO END OF LEAD	DEPTH FROM TOP OF POST
	DISTANCE FROM M.H.			
76	008-200-011-01	279' West of MH 215	68' South	8'
77	008-200-011-01	261' West of MH 215	14' North	5.5'
78	008-200-011-01	234' West of MH 215	67' South	6'
79	008-200-011-01	190' West of MH 215	12' North	7'
80	008-200-011-01	82' West of MH 215	15' North	6'
81	008-200-011-01	39' South of MH 215	12' Southeast	6'
82	008-200-011-01	99' West of MH 214	16' North	6'
83	008-200-011-01	5' West of MH 214	58' South	6'
84	008-200-011-01	Southwest of Pump Sta. #2	12' Northeast	6'
85	008-200-011-01	399' West of MH 211	21' Northwest	6'
86	008-200-011-01	362' West of MH 211	18' North	6'
87	008-200-011-01	390' West of MH 211	60' South	6'
88	008-200-011-01	234' West of MH 211	22' North	4'
89	008-200-011-01	248' West of MH 211	51' South	6'
90	008-200-011-01	151' West of MH 211	25' North	6'
91	008-200-011-01	111' West of MH 211	27' North	5'
92	008-200-011-01	92' West of MH 211	50' South	5'
		100' West of P.V.C.		

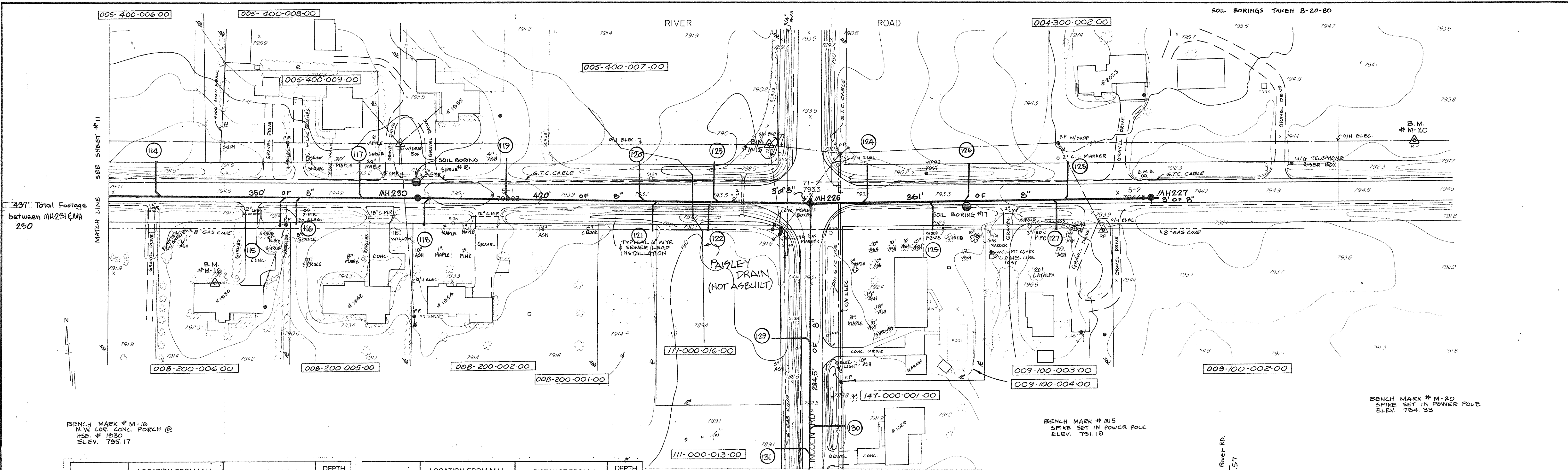
SCALE: 1" = 50'











437' Total Footage between MH 230 & MH 226

BENCH MARK # M-16  
N.W. COR. CONC. PORCH @  
HSE. # 1050  
ELEV. 795.17

BENCH MARK # M-15  
SPIKE SET IN POWER POLE  
ELEV. 791.18

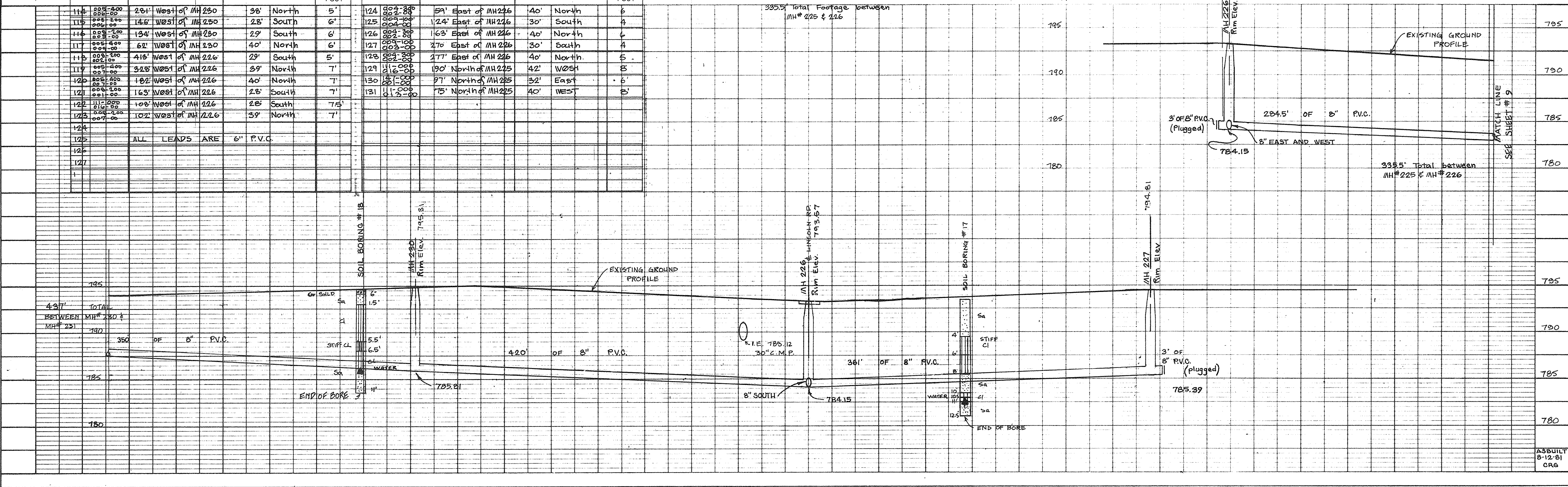
BENCH MARK # M-20  
SPIKE SET IN POWER POLE  
ELEV. 794.33

SEWER LEAD	LOCATION FROM M.H.		DISTANCE FROM SEWER TO END OF LEAD	DEPTH FROM TOP OF POST	SEWER LEAD	LOCATION FROM M.H.		DISTANCE FROM SEWER TO END OF LEAD	DEPTH FROM TOP OF POST
	DISTANCE FROM M.H.					DISTANCE FROM M.H.			
114	205' 00" 00"	281' West of MH 230	38' North	5'	124	004' 30" 00"	59' East of MH 226	40' North	6'
115	000' 00" 00"	148' West of MH 230	28' South	6'	125	000' 00" 00"	124' East of MH 226	30' South	4'
116	000' 00" 00"	134' West of MH 230	29' South	6'	126	004' 30" 00"	163' East of MH 226	40' North	6'
117	000' 00" 00"	62' West of MH 230	40' North	5'	127	004' 30" 00"	270' East of MH 226	30' South	4'
118	000' 00" 00"	418' West of MH 226	29' South	5'	128	004' 30" 00"	177' East of MH 226	40' North	5'
119	000' 00" 00"	328' West of MH 226	39' North	7'	129	010' 00" 00"	190' North of MH 225	42' West	8'
120	000' 00" 00"	182' West of MH 226	40' North	7'	130	001' 00" 00"	97' North of MH 225	32' East	5'
121	001' 00" 00"	163' West of MH 226	28' South	7'	131	012' 00" 00"	75' North of MH 225	40' West	8'
122	011' 00" 00"	108' West of MH 226	28' South	7.5'					
123	000' 00" 00"	102' West of MH 226	39' North	7'					
124									
125		ALL LEADS ARE	6" P.V.C.						
126									
127									

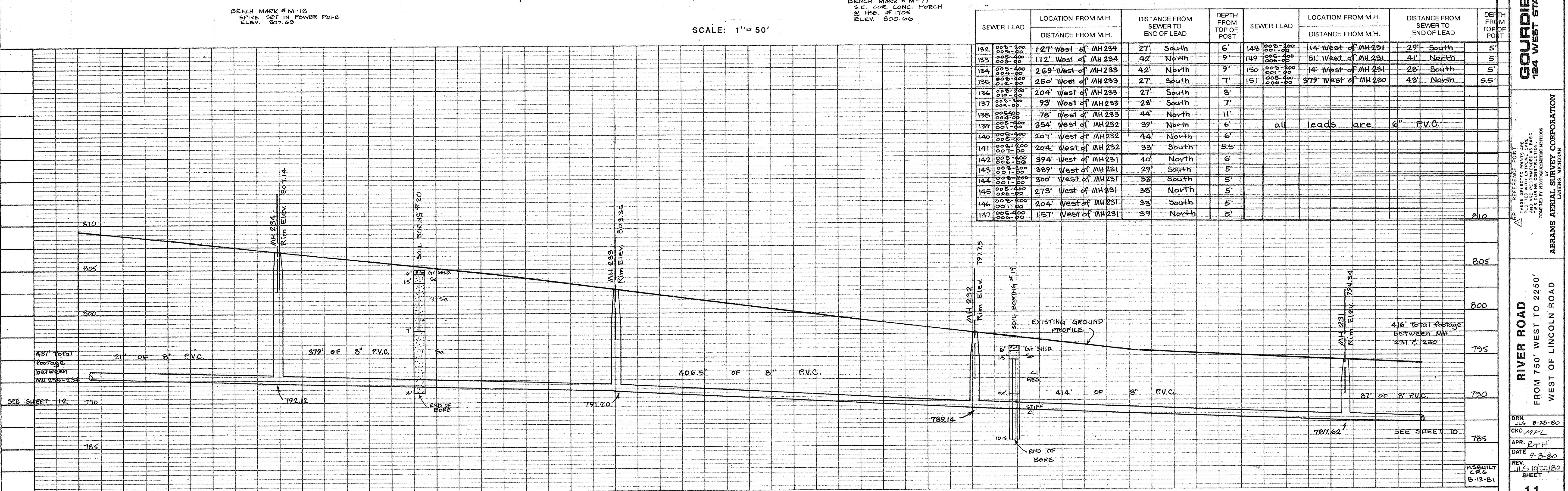
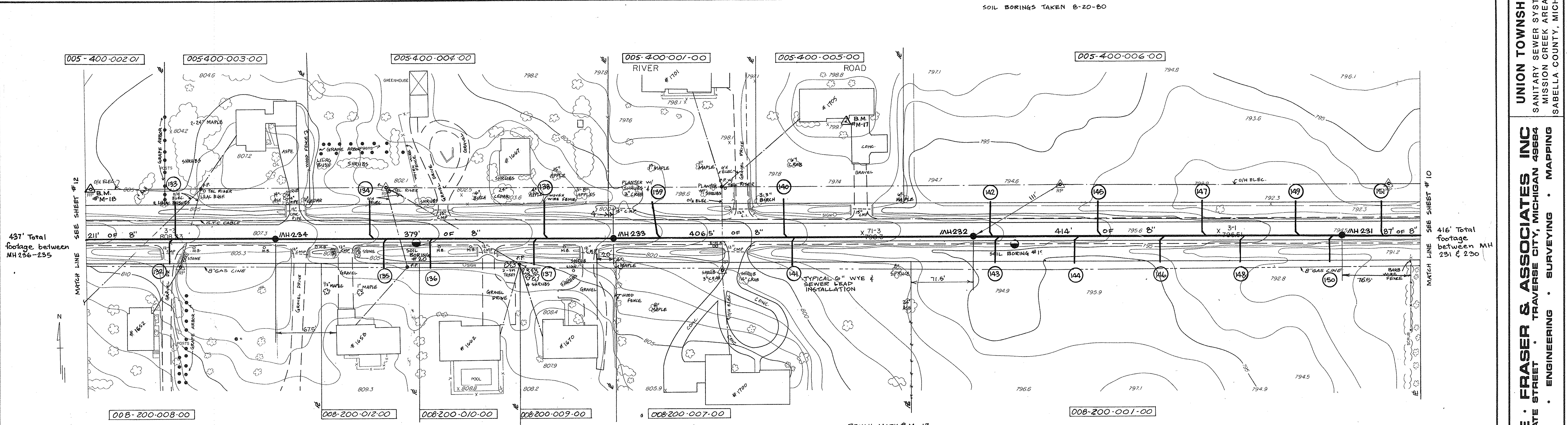
SEWER LEAD	LOCATION FROM M.H.		DISTANCE FROM SEWER TO END OF LEAD		DEPTH FROM TOP OF POST
	DISTANCE FROM M.H.				
124	90'2-38°	59' East of MH 226	40'	North	6
125	90'2-38°	124' East of MH 226	30'	South	4
126	90'2-38°	163' East of MH 226	40'	North	6
127	90'2-38°	270' East of MH 226	30'	South	4
128	90'2-38°	277' East of MH 226	40'	North	5
129	91'2-38°	190' North of MH 225	42'	West	8
130	91'2-38°	27' North of MH 225	32'	East	6
131	91'2-38°	75' North of MH 225	40'	West	8

335.5' Total Footage between MH # 225 & 226

SCALE: 1" = 50'



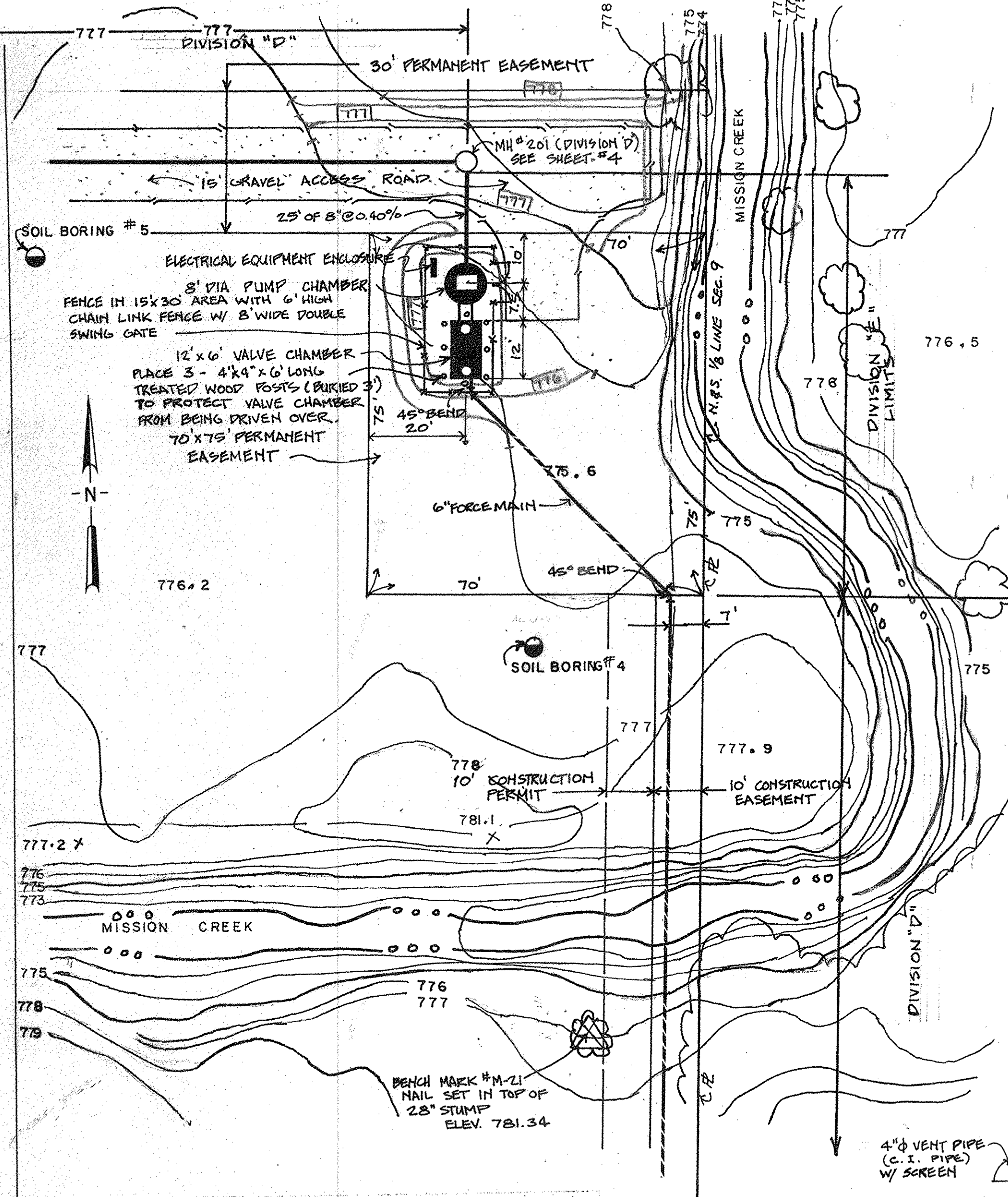






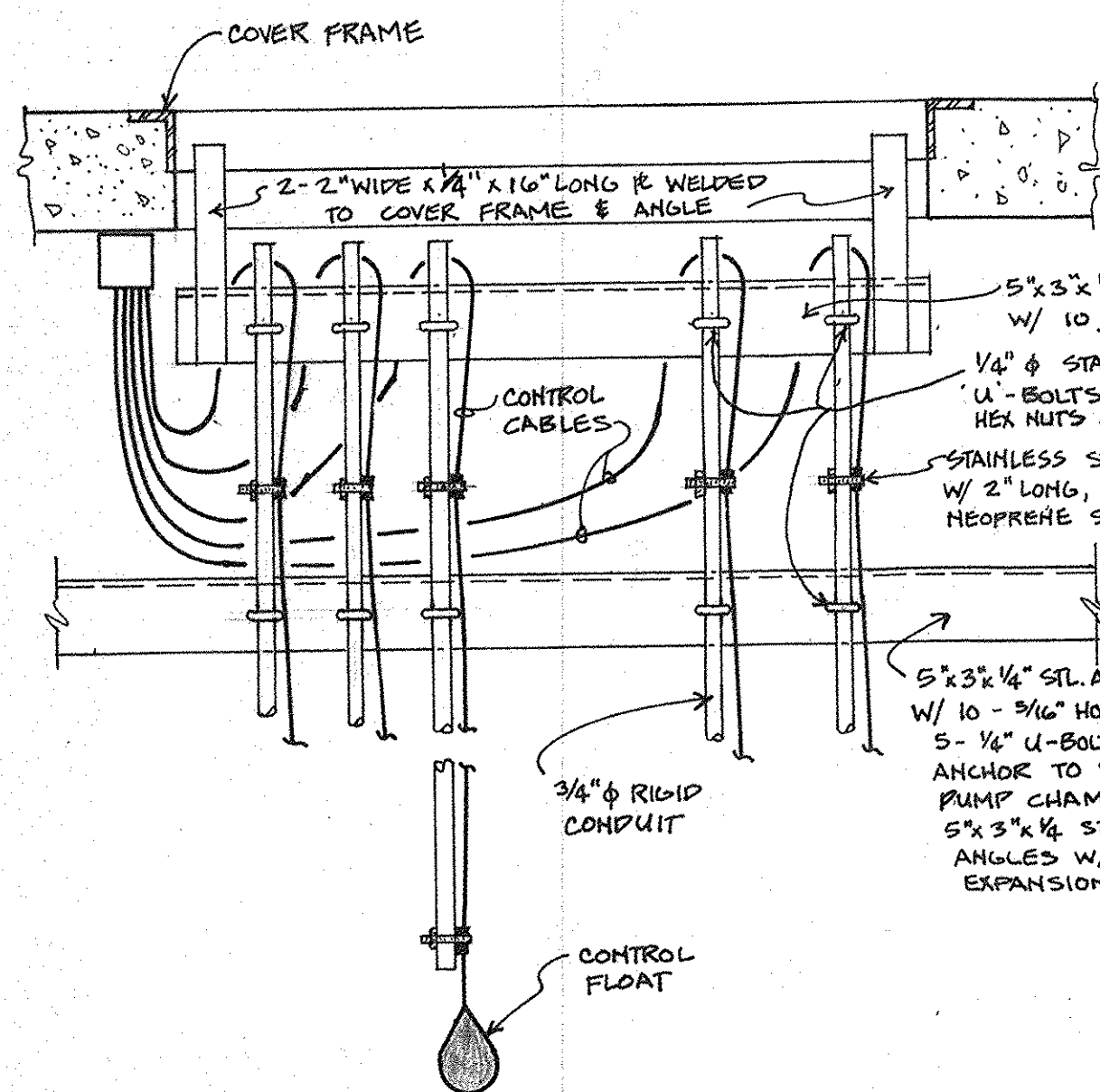






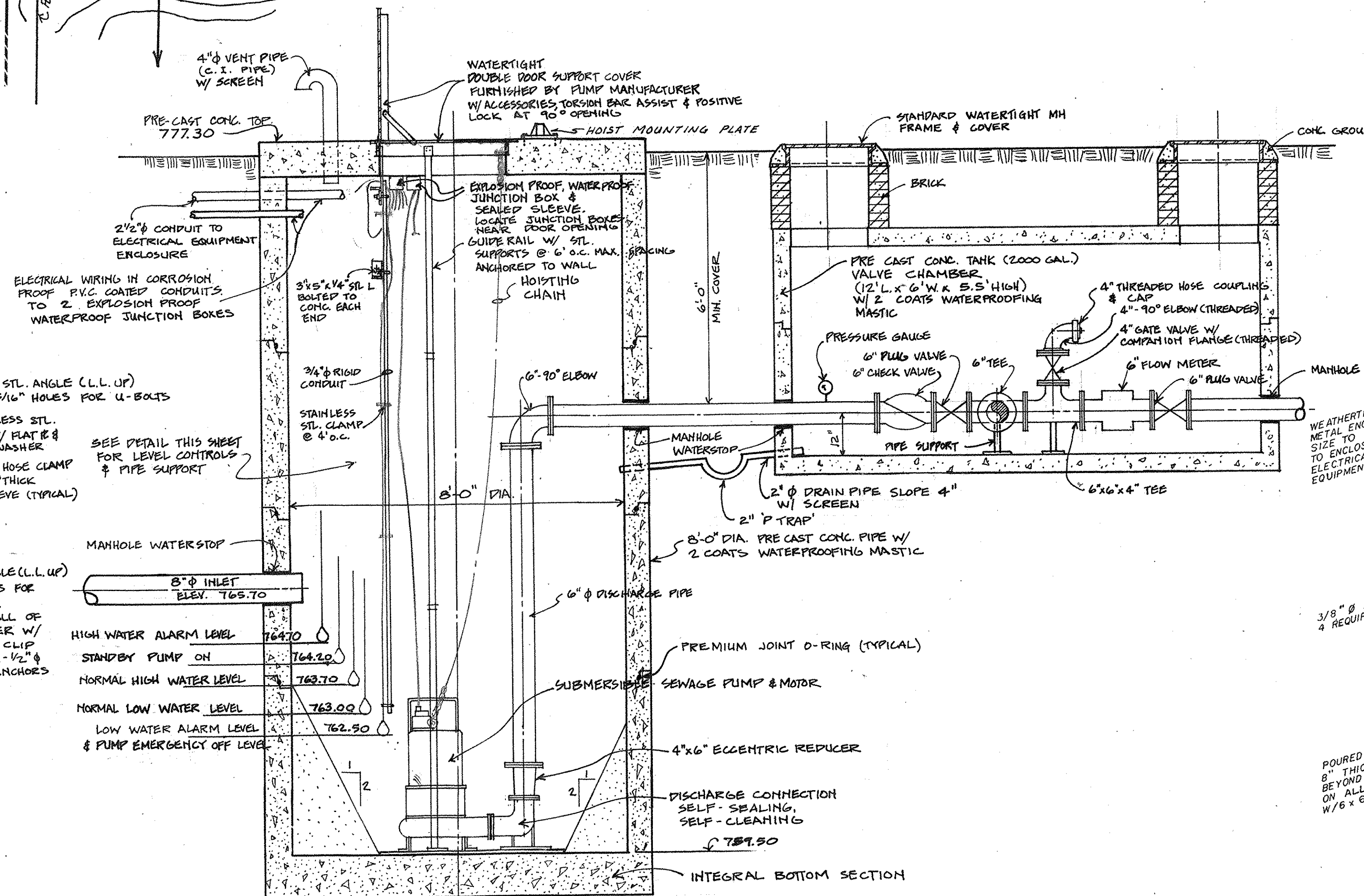
PUMP STATION SITE PLAN

SCALE 1"=20'



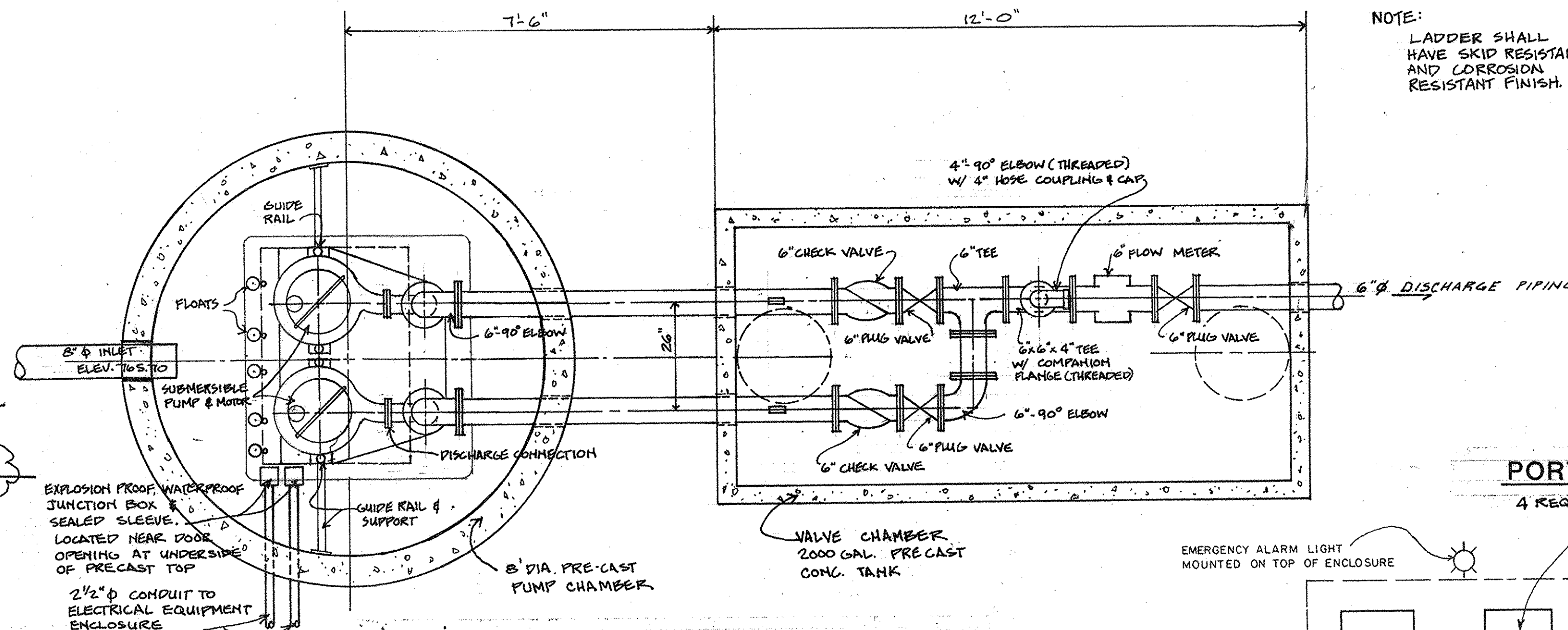
LEVEL CONTROL SUPPORT DETAIL

NO SCALE



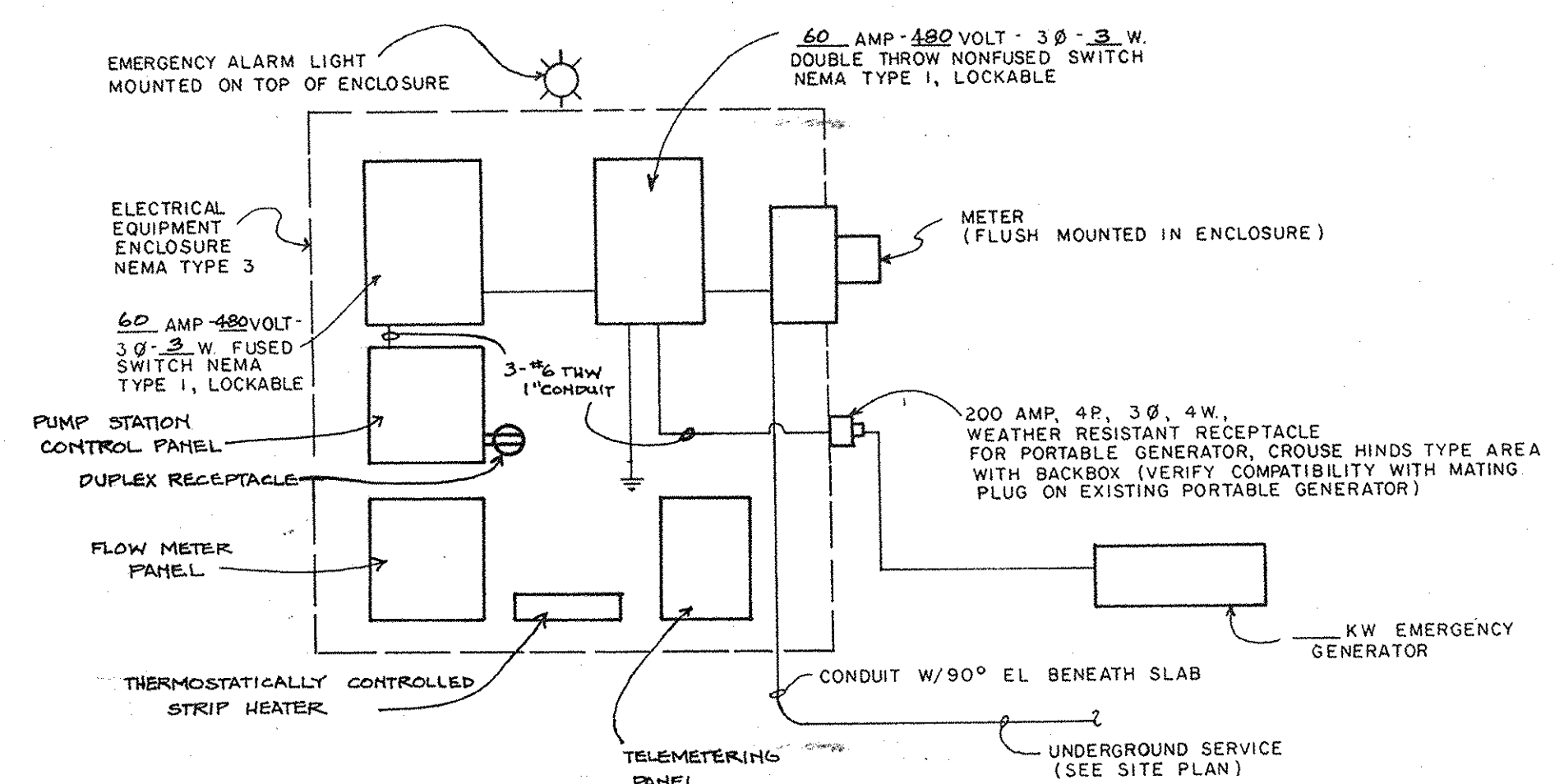
SECTION THRU PUMP STATION

NO SCALE

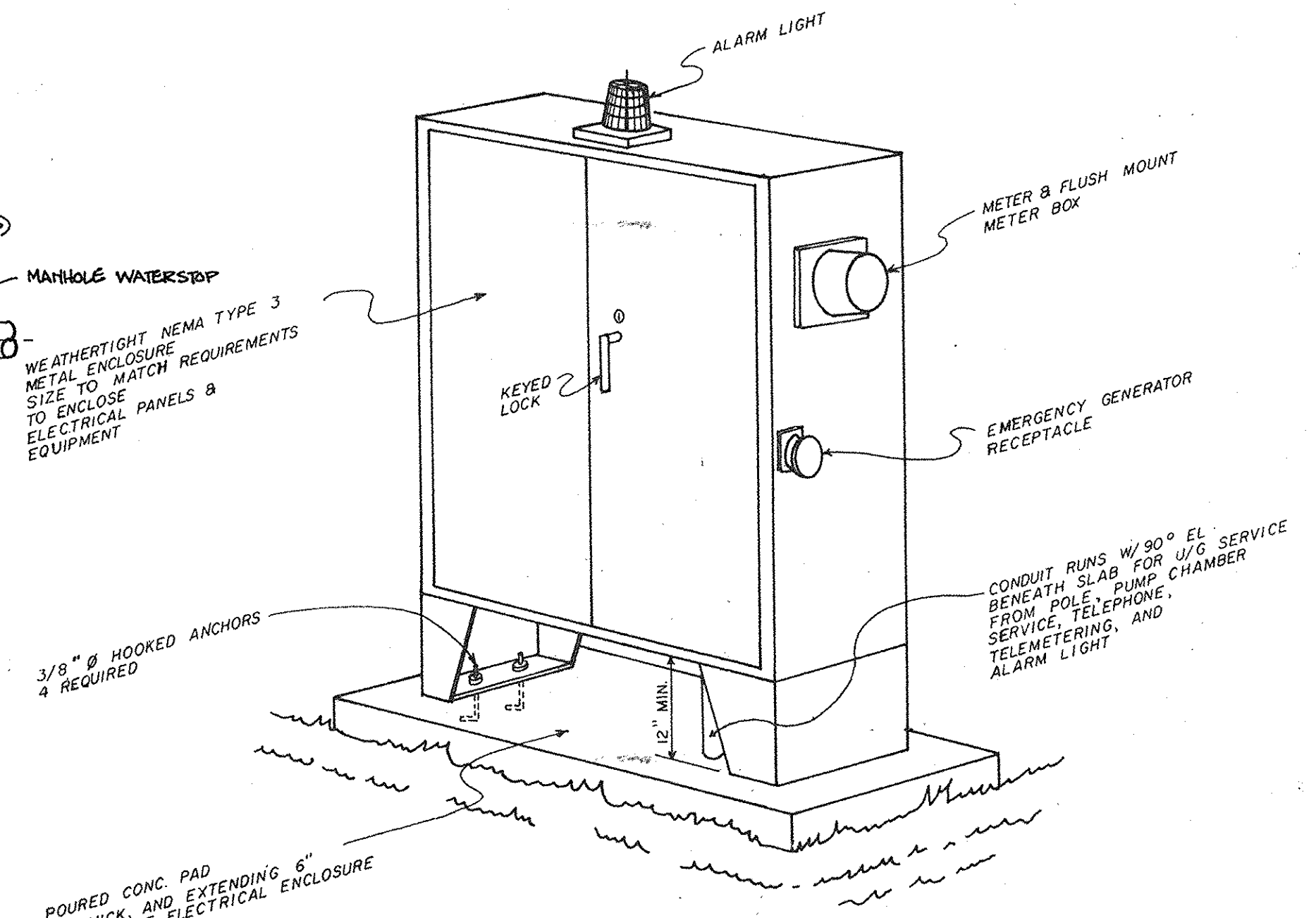


PLAN SECTION THRU PUMP STATION

NO SCALE

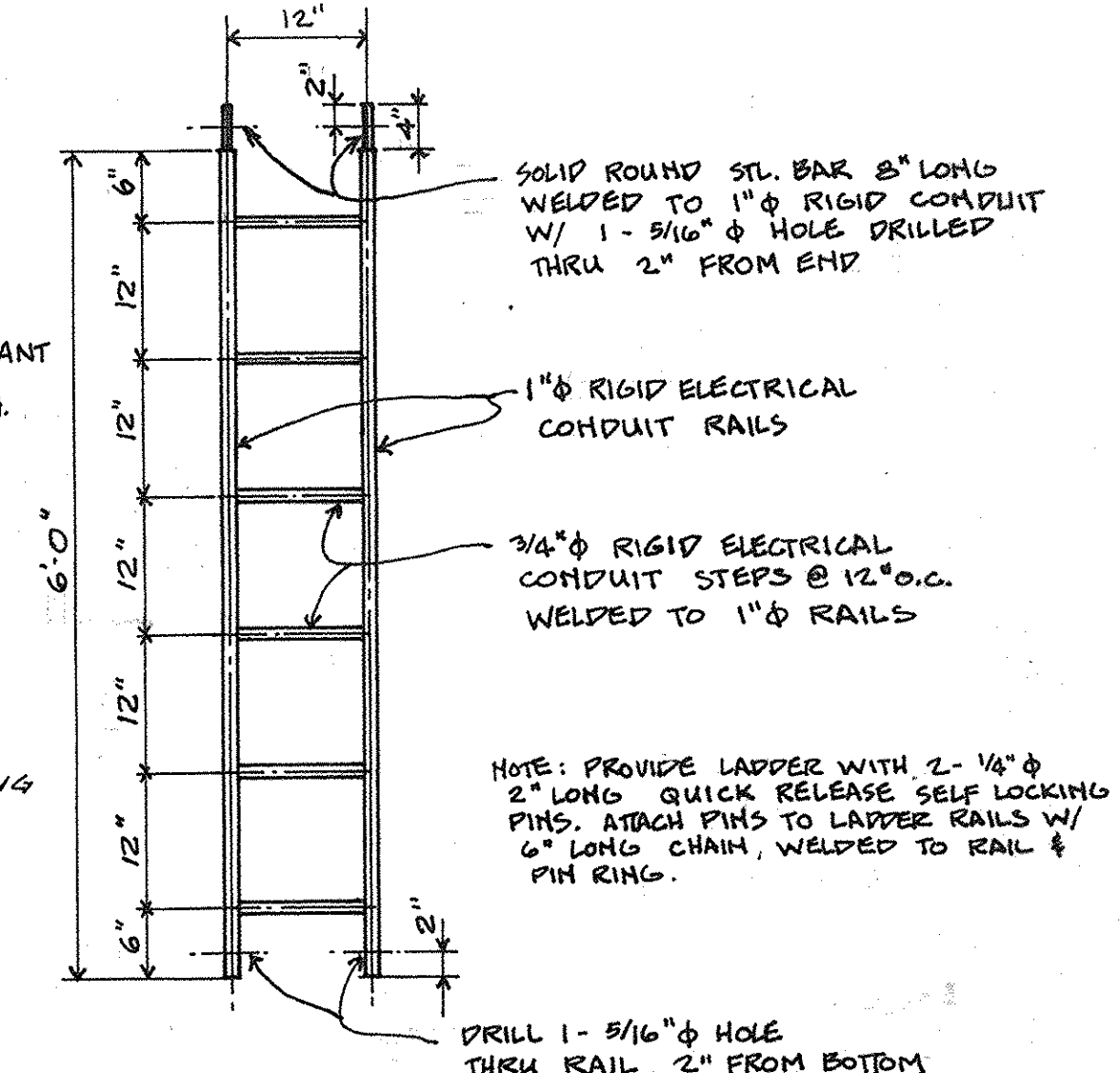


ELECTRICAL RISER DIAGRAM FOR PUMP STATION #7



ELECTRICAL EQUIPMENT ENCLOSURE DETAIL

(NO SCALE)



PORTABLE ACCESS LADDER

4 REQUIRED

NO SCALE



PROPRIETORS:  
**DOUGLAS F WALKER & TIMOTHY I WALKER**  
 5300 EAST BROOMFIELD ROAD  
 MT. PLEASANT, MICHIGAN 48858  
 PHONE (517) 772-4882

**PROPERTY DESCRIPTION:**

Part of the NE 1/4 of the SW 1/4, of Section 9, T.14N.-R.4W., Union Township, Isabella County, Michigan. More particularly described as beginning at a point on the N&S 1/4 line of Section 9, which is N.00°-29'-07"E., 1312.83 feet from the S.1/4 Corner of said Section 9, to a point of intersection with the S.-E.&W. 1/8 line; thence N.89°-55'-06"W., along said S.-E.&W. 1/8 line, 1324.14 feet to a point of intersection with the W.-N.&S. 1/8 line; thence N.00°-33'-00"E., along said W.-N.&S. 1/8 line, 673.24 feet; thence N.90°-00'-00"E., 205.46 feet; thence N.23°-56'-55"E., 95.54 feet; thence N.33°-04'-33"E., 36.44 feet; thence N.23°-48'-14"E., 108.91 feet; thence S.89°-32'-00"E., 18.28 feet; thence S.82°-13'-27"E., 48.88 feet to the SW. Corner of Lot 15, Bamber Estates No.2; thence N.86°-01'-40"E., along the South line of Lots 14 & 15, Bamber Estates No.2, 187.06 feet to the SE. Corner of Lot 14, Bamber Estates No.2; thence S.00°-25'-42"W., 150.00 feet; thence S.89°-51'-00"E., parallel with the South line of Bamber Estates No.1, 763.72 feet to a point on said N&S 1/4 line, which is S.00°-29'-07"W., 566.00 feet from the interior 1/4 Corner of said Section 9; thence S.00°-29'-07"W., along said N&S 1/4 line, 746.83 feet to the point of beginning. EXCEPT the Easterly 183.00 feet of the previously described parcel (Being the plat of 'Sunfield Estates') Containing 20.2 acres more or less and subject to easements and rights of way of record.

**BENCHMARK INFORMATION**

- BM#1  
NAIL IN POWER POLE.  
ELEV. 780.70'
- BM#2  
W. EDGE OF MANHOLE RIM.  
ELEV. 780.97'
- BM#3  
SET 3/8" RE-ROD.  
ELEV. 783.40'
- BM#4  
MANHOLE RIM.  
ELEV. 780.26'
- BM#5  
PK NAIL IN POWER POLE.  
ELEV. 783.00'
- BM#6  
W. EDGE OF MANHOLE RIM.  
ELEV. 782.96'
- BM#7  
NW. FLANGE BOLT.  
ELEV. 781.52'

**UTILITY INFORMATION**

- ELECTRIC POWER**  
 Consumers Energy Company  
 4141 E. Wilder Rd.  
 Bay City, MI 48706  
 Contact: Sally Town (517) 799-7110
- NATURAL GAS**  
 Consumers Energy Company  
 4141 E. Wilder Rd.  
 Bay City, MI 48706  
 Contact: Sally Town (517) 799-7110
- TELEPHONE/COMMUNICATION**  
 G.T.E. North, Inc.  
 345 Pine St.  
 P.O. Box 469  
 Alma, MI 48801  
 Contact: Don Holzhausen (517) 463-0224
- CABLE T.V.**  
 Omega Communications  
 Cable Vision, Inc.  
 915 E. Broomfield Rd.  
 Mt. Pleasant, MI 48858  
 (517) 772-0956
- UNION TOWNSHIP SEWER & WATER DEPARTMENT**  
 Union Township  
 Sewer & Water Department  
 4795 S. Mission Road  
 Mt. Pleasant, MI 48858  
 Phone: (517) 773-1454
- ISABELLA COUNTY ROAD COMMISSION:**  
 2281 E. Remus Road  
 Mt. Pleasant, MI 48858  
 Phone: (517) 773-7131
- ISABELLA COUNTY DRAIN COMMISSION**  
 Isabella County Building  
 200 N. Main Street  
 Mt. Pleasant, MI 48858  
 Phone: (517) 772-0911 EXT. 247
- ISABELLA COUNTY DEPARTMENT OF RESOURCE MANAGEMENT**  
 Isabella County Building  
 200 N. Main Street  
 Mt. Pleasant, MI 48858  
 Phone: (517) 772-0911 EXT. 226

**LEGEND**

- STORM SEWER  
 — SANITARY SEWER  
 — WATERMAIN  
 X PROP. STREET LIGHTING  
 FINAL LOCATION SUBJECT TO CONSUMERS ENERGY PLAN.

**ZONING INFORMATION**

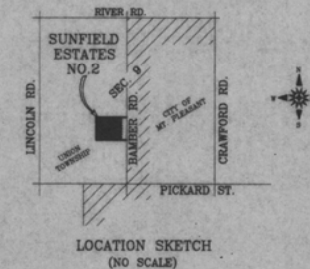
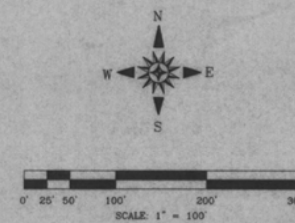
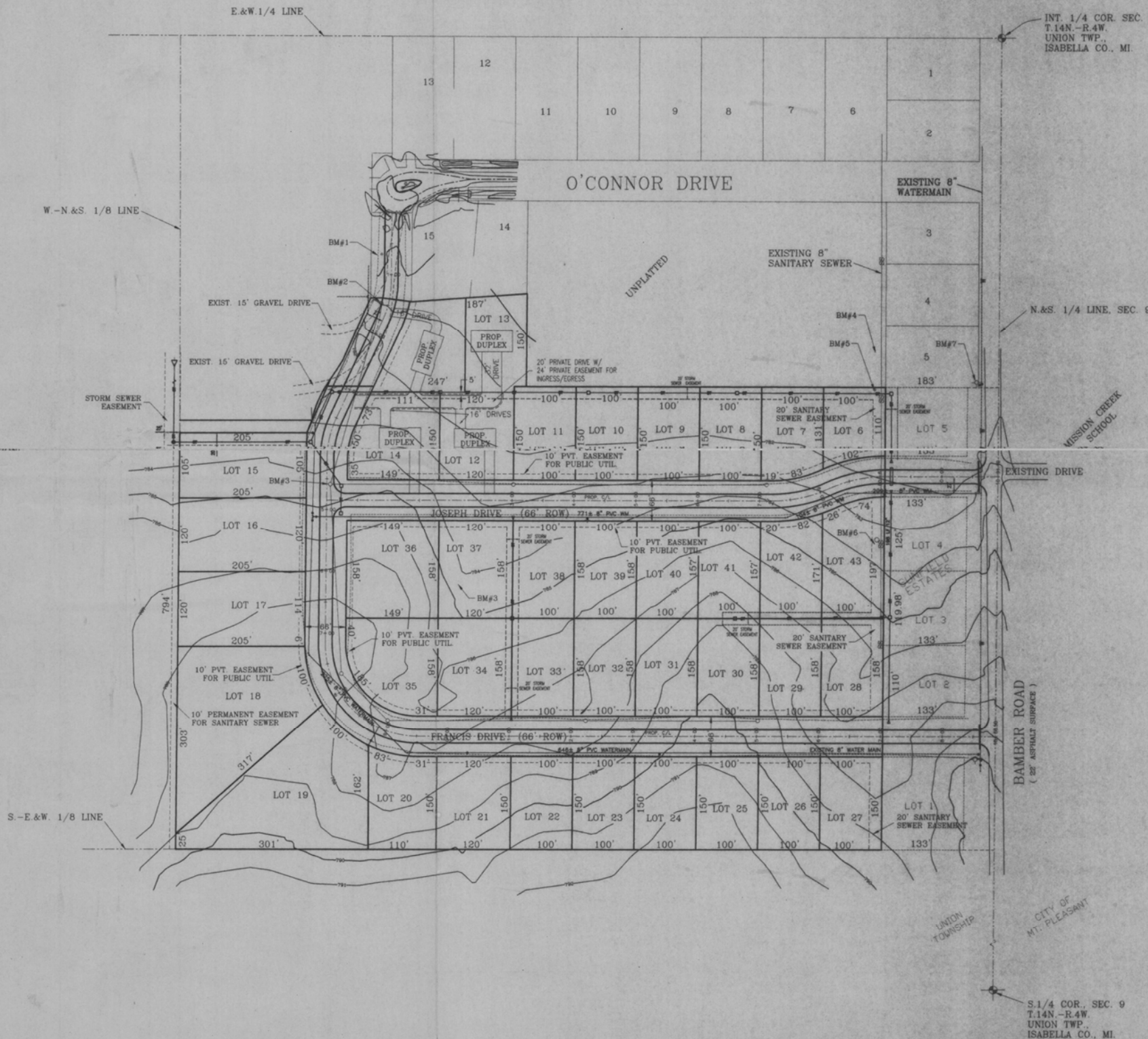
ZONED: R2A (ONE & TWO FAMILY, LOW DENSITY RESIDENTIAL DISTRICT)  
 SET-BACK REQUIREMENTS:  
 FRONT YARD 35'  
 SIDE YARD 10'  
 REAR YARD 35'  
 MIN. LOT SIZE: 12,000 SQ. FT.  
 MIN. LOT FRONTAGE: 80'

48 HOURS  
 BEFORE YOU DIG,  
 CALL MISS DIG  
 TOLL FREE  
 800-482-7171

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY  
 DRINKING WATER AND RAD. PROTECTION DIVISION  
 COMMUNITY WATER SUPPLY SECTION  
 970701 MAY 15 '97  
 EXAMINED AND APPROVED FOR COMPLIANCE  
 WITH ACT 305, P.A. 1976  
 J. C. White, P.E. Division Chief

**SHEET INDEX**

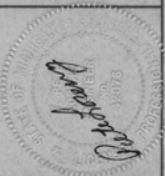
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 SHT. 2 - DETAILS  
 SHT. 3 - FRANCIS DRIVE - STA. 0+00 TO 10+00  
 SHT. 4 - FRANCIS DRIVE - STA. 10+00 TO 18+86.50  
 SHT. 5 - JOSEPH DRIVE - STA. 0+00 TO 10+91.18



PROJECT NUMBER: M960004  
 DRAWN BY: TPL/TPK  
 DATE: March 11, 1997  
 SCALE: 1" = 100'  
 REVISED DATE: May 9, 1997  
 REVISED BY: J. Kustra  
 CHECKED BY: JSP  
 SHEET 1 OF 5

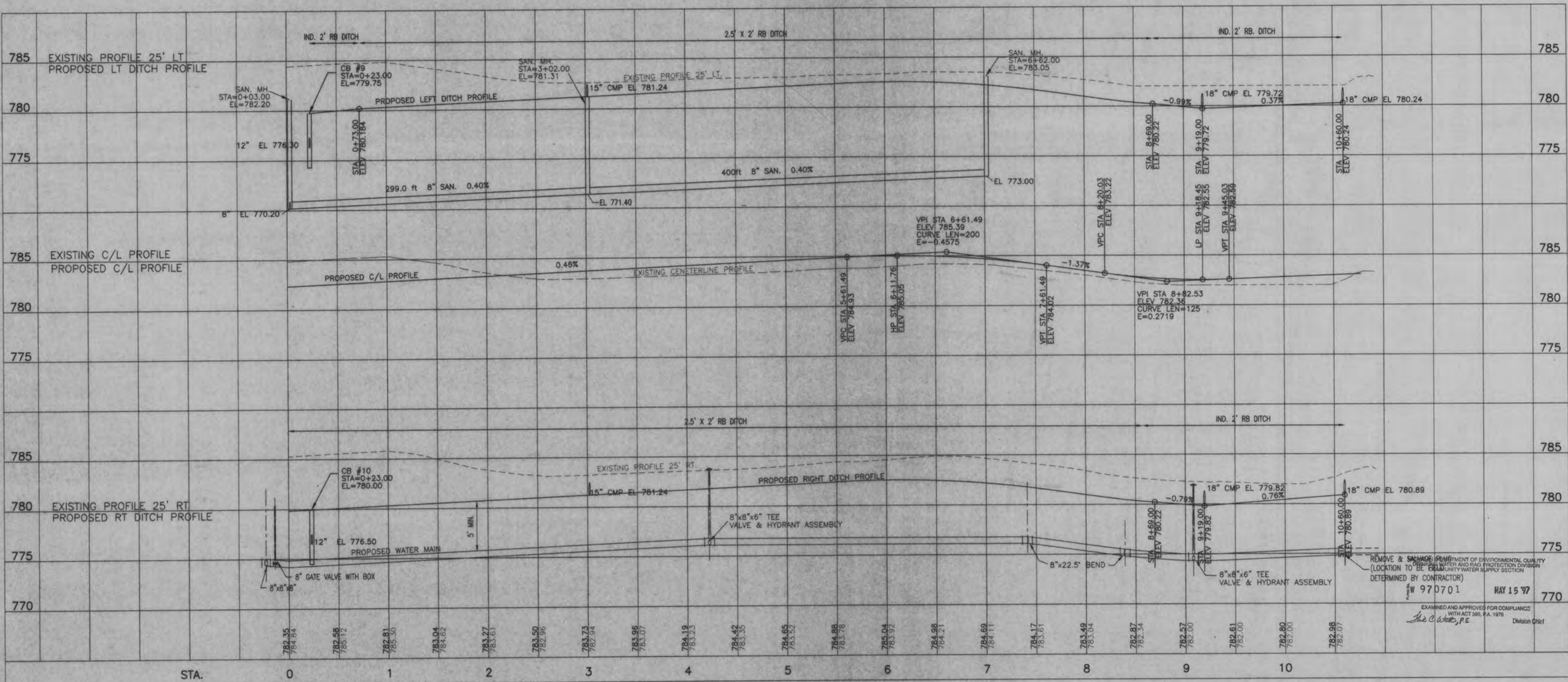
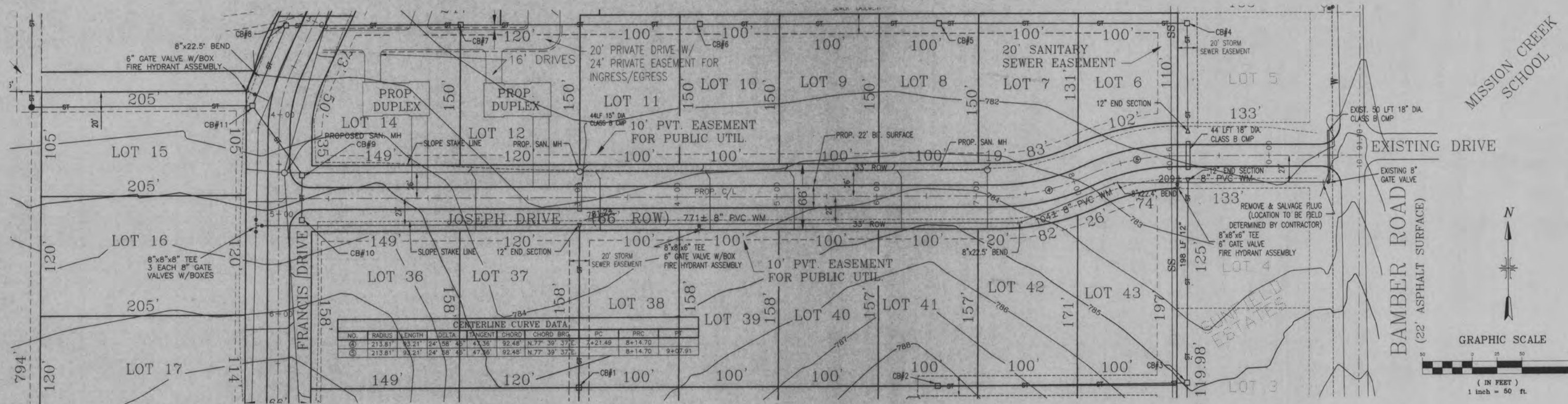
**PRELIMINARY PLAT OF:  
 SUNFIELD ESTATES NO. 2**

PART OF THE NE 1/4 OF THE SW 1/4, SECTION 9,  
 T.14 N.-R.4W., UNION TOWNSHIP, ISABELLA COUNTY, MICHIGAN.



**PAUL B. LAPHAM & ASSOCIATES, INC.**  
 AND SURVEYING CONSULTANTS  
 203 West Broadway Street  
 Mt. Pleasant, MI 48858  
 PH. (517) 772-2865  
 FAX (517) 772-3528  
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JOSEPH - STA. 0+00 TO 10+91.18

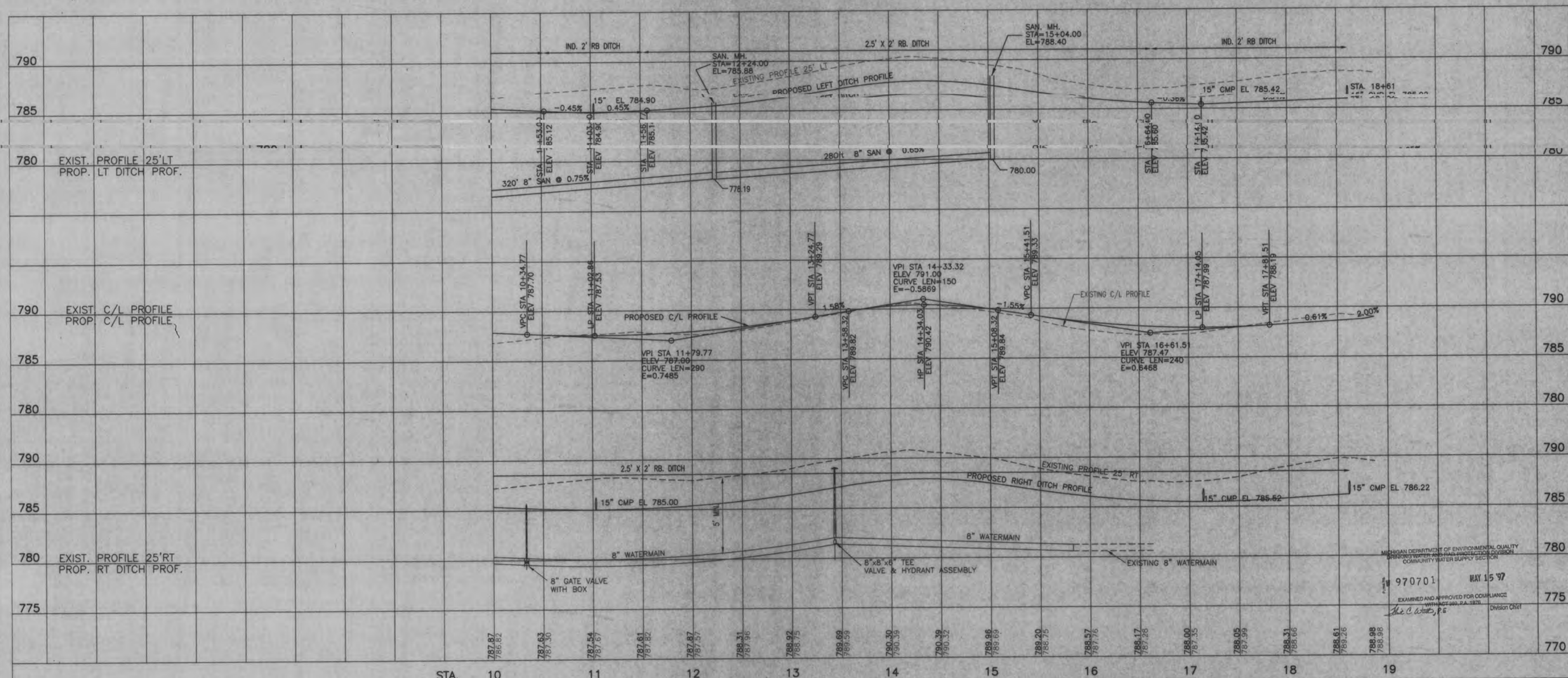
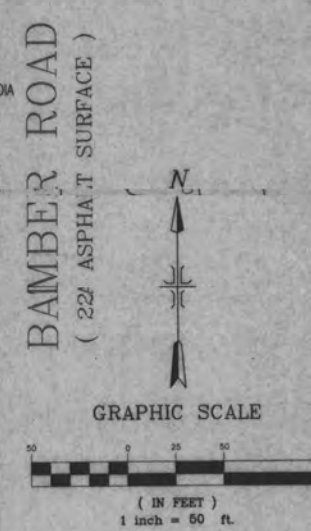
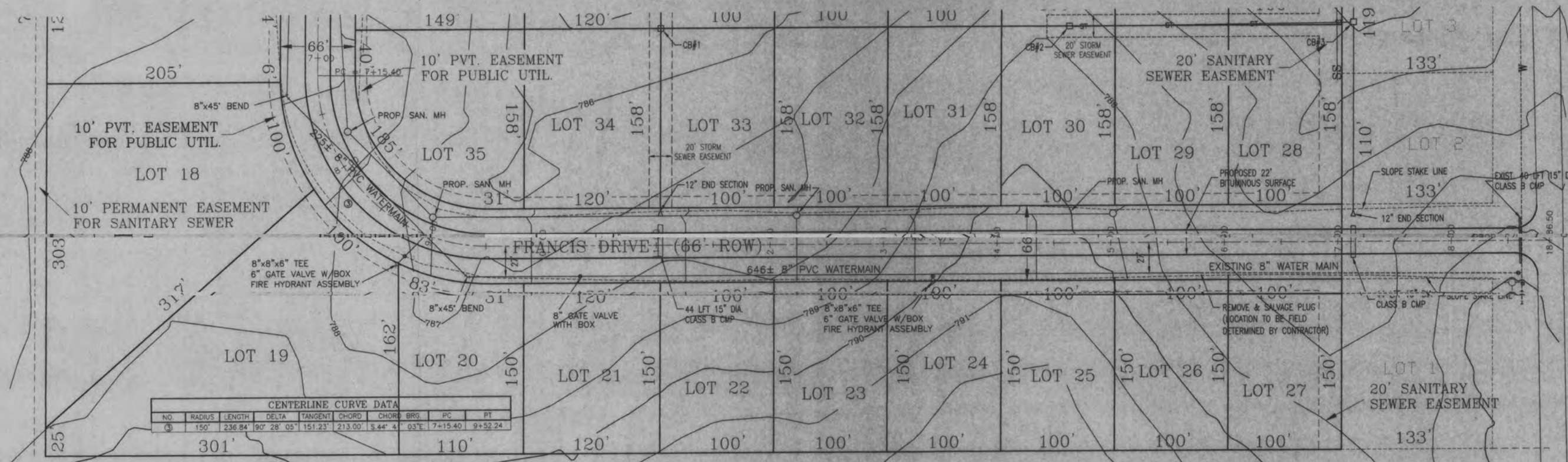
PROJECT NUMBER: M960004  
DRAWN BY: JPK/TPP  
DATE: March 19, 1997  
SCALE: 1" = 50'  
REVISOR: JPK  
REVISION DATE: May 13, 1997  
CHECKED BY: JSF  
SHEET 5 OF 5

DETAIL SHEET FOR:  
**SUNFIELD ESTATES NO. 2**  
PART OF THE NE 1/4 OF THE SW 1/4, SECTION 9,  
T.14N - R.14W, UNION TOWNSHIP, ISABELLA COUNTY, MICHIGAN.

**PAUL B. LAPHAM & ASSOCIATES, INC.**  
SURVEYING CONSULTANTS  
203 West Broadway Street  
Mt. Pleasant, MI 48858  
PH: (517) 772-2865  
FAX: (517) 772-3528  
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EXAMINED AND APPROVED FOR COMPLIANCE  
WITH ACT 390, P.A. 1979  
Division Chief





PROJECT NUMBER: M060004  
DRAWN BY: JPK/TPL  
DATE: March 19, 1997  
SCALE: 1" = 50'  
REVISED DATE: May 8, 1997  
REVISED BY: JPK  
CHECKED BY: JSF  
SHEET 4 OF 9

DETAIL SHEET FOR:

**SUNFIELD ESTATES NO. 2**  
P1 ST. OF THE NE 1/4 OF THE SW 1/4, SECTION 9,  
T 14N - R 4W, UNION TOWNSHIP, ISABELLA COUNTY, MICHIGAN.

**PAUL B. LAPHAM & ASSOCIATES, INC.**  
(AND SURVEYING CONSULTANTS)  
203 West Broadway Street  
ML Pleasant MI 48858  
PH (517) 772-2865  
FAX (517) 772-3528  
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970701 MAY 15 97  
EXAMINED AND APPROVED FOR COMPLIANCE  
WITH ACT 206, P.A. 1989  
DIVISION CHIEF

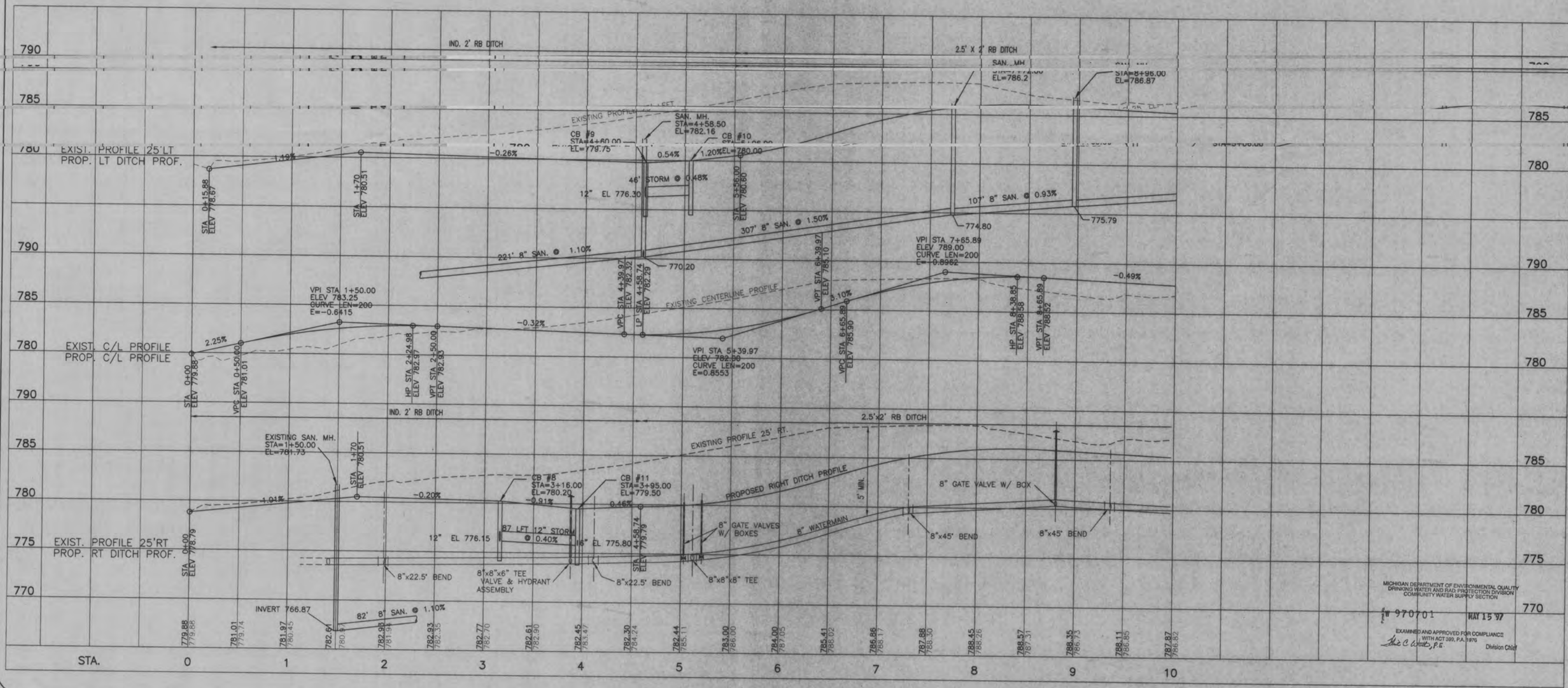
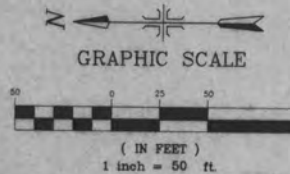
FRANCIS - STA. 10+00 TO 18+65.50



BAMBER  
ESTATES  
NO. 1

UNPLATTED

CENTERLINE CURVE DATA									
NO.	RADIUS	LENGTH	DELTA	TANGENT	CHORD	CHORD BRG.	PC	PT	DT
1	150'	64.69'	24° 42' 36"	32.86'	64.19'	S 12° 54' 18" W	34+51.77	4+16.46	



PROJECT NUMBER: M060004  
DRAWN BY: JPK/TPL  
DATE: March 19, 1997  
SCALE: 1" = 50'  
REVISED DATE: May 13, 1997  
CHECKED BY: JPK  
SHEET 3 OF 5

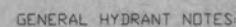
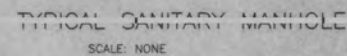
DETAIL SHEET FOR:  
**SUNFIELD ESTATES NO. 2**  
PART OF THE N. 1/4 OF THE SW 1/4, SECTION 9,  
T. 14N., R. 1W., UNID. C. TOWNSHIP, ISABELLA COUNTY, MICHIGAN.

**PAUL B. LAPHAM & ASSOCIATES, INC.**  
[and] **SUNSHINE CONSULTANTS**  
203 West Broadway Street  
Mt. Pleasant, MI 48858  
PH: (517) 772-2865  
FAX: (517) 772-3528  
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MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY  
DRINKING WATER AND RADIATION PROTECTION DIVISION  
COMMUNITY WATER SUPPLY SECTION  
970701 MAY 15 97  
EXAMINED AND APPROVED FOR COMPLIANCE  
WITH ACT 390, P.A. 1976  
Division Chief

FRANCIS DRIVE - STA. 0+00 TO 10+00

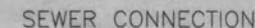
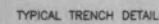




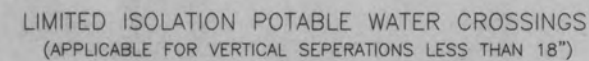
1. INSTALL HYDRANT MAINS TO BE INSTALLED ON OFFSHORE AT 36" DIA. TELEGRAPHICALLY MARKED MAINS WATER MAIN AND VALVE BOX TO ADJUST FOR PROPER LOCATION AND GRADE.
2. VERTICAL ANCHORAGES WILL BE REQUIRED ON ALL VERTICAL HYDRANT BENDS IN EXCESS OF 11 1/4'.
3. WHERE HYDRANTS ARE INSTALLED ON EXISTING MAINS THAT ARE TO BE PLACED BACK INTO SERVICE IMMEDIATELY, PLACE CONCRETE BLOCK OR BRICK TO UNDISTURBED SOIL AND ENCASE WITH CONCRETE.
4. ALL CONCRETE TO BE 3500 P.S.I. CONCRETE POURED AGAINST UNDISTURBED SOIL.

### STANDARD HYDRANT SETTING

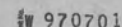
SCALE: NON



SCALE: NONE



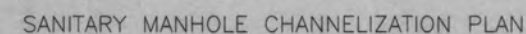
NOT TO SCALE



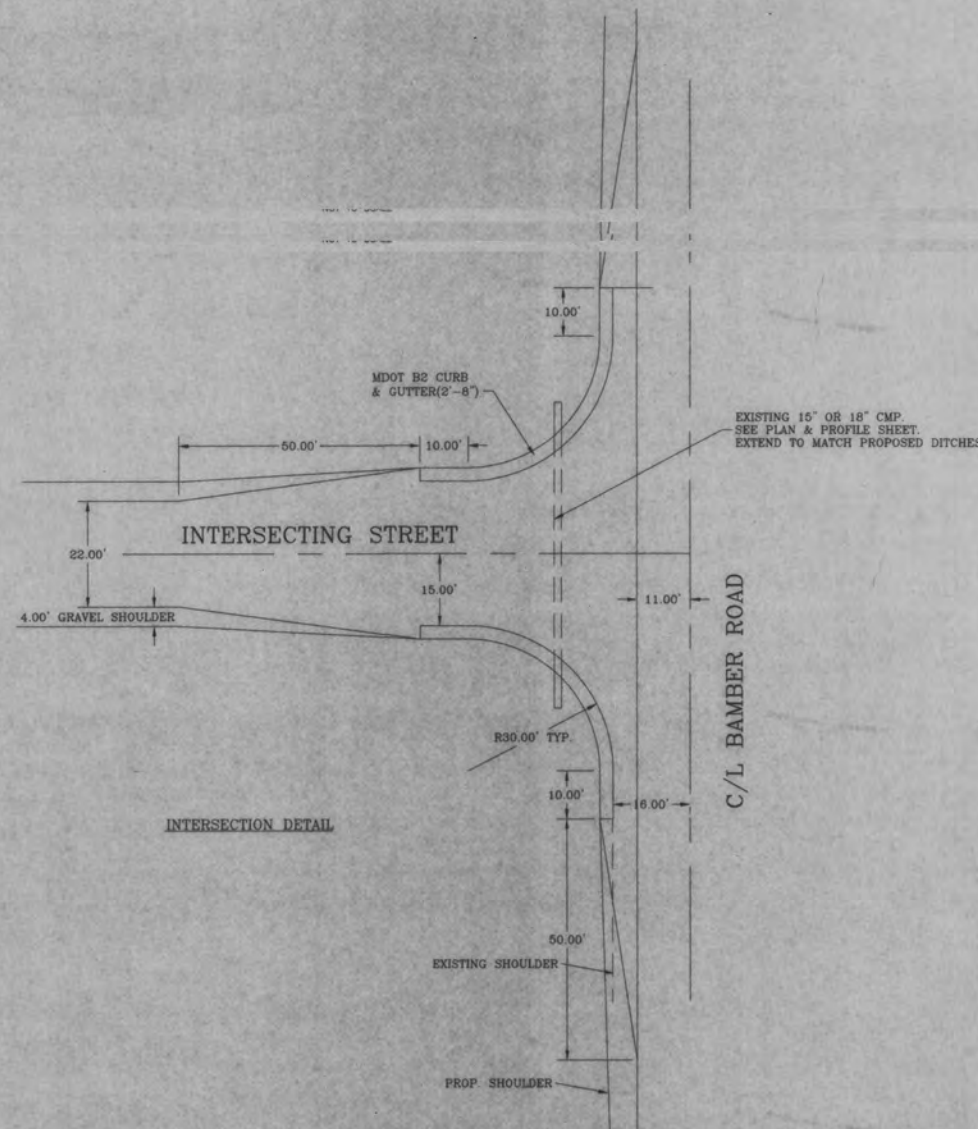
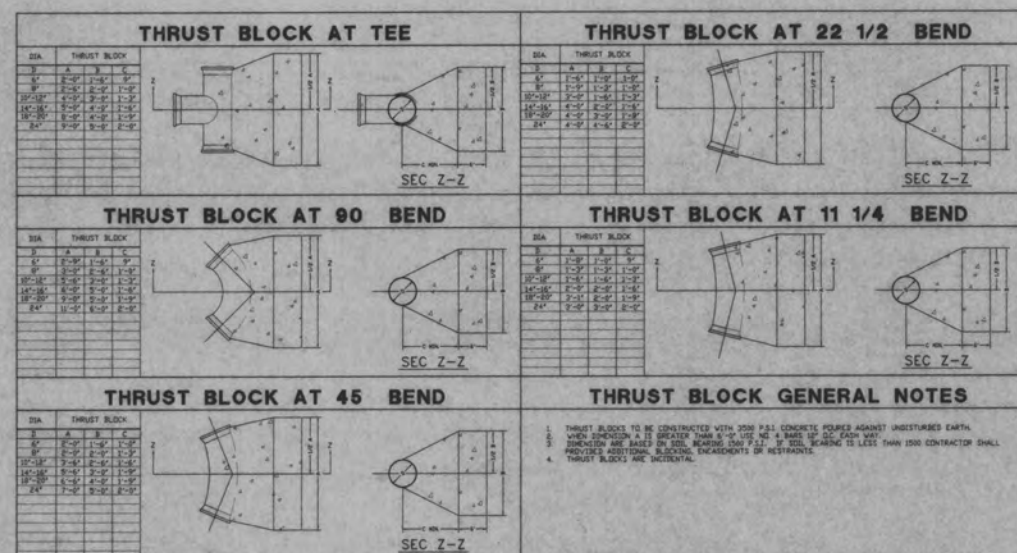
MAY 15 '97

EXAMINED AND APPROVED FOR COMPLIANCE  
WITH ACT 399, P.A. 1976  
*He C. White* P.E. Division

Division Chief



SCALE: NONE



C/L BAMBER ROAD

DETAIL SHEET FOR:

**SUNFIELD ESTATES NO. 2**

PART OF THE NE.1/4 OF THE SW.1/4, SECTION 9,  
T.14N.-R.4W., UNION TOWNSHIP, ISABELLA COUNTY, MICHIGAN.

PART OF THE NE.1/4 OF THE SW.1/4, SECTION 9,  
T.14N.-R.4W., UNION TOWNSHIP, ISABELLA COUNTY, MICHIGAN.

PAUL B. LAPHAM & ASSOCIATES, INC.

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