



REQUEST FOR PROPOSALS
South Airport Road Forcemain Replacement
Charter Township of Garfield, Grand Traverse County

Proposals Due:

9:00 AM Thursday, October 22, 2026

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

Sealed Bids will be received by the Charter Township of Garfield at the Township Offices located at 3848 Veterans Drive, Traverse City, MI 49684, until 9:00 AM local time on October 22, 2026. Envelopes shall be clearly marked "*South Airport Forcemain Replacement*" and at such time will be publicly opened and read aloud.

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

Address Proposals Questions to:

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

Scope of Services:

We have been asked by our client, the Charter Township of Garfield, to solicit this request to qualified contractors and request a proposal for replacement of existing forcemain along South Airport Road that services Pump Station No. 2 service area. The existing forcemain was originally constructed in the 1970s and is located under the west bound, northern lane of South Airport Road and runs from Logans Landing to Park Drive. This forcemain is approximately 1,400 linear feet and discharges into an existing manhole located at the northeast corner of Park Drive and South Airport Road intersection.

A portion of this forcemain recently experienced failures and emergency corrective repairs were implemented. Field investigations at the time identified areas of future concern related to material quality and depth of coverage. The Township wishes to pursue complete replacement of the forcemain using trenchless installation methods. Project also includes segment of asphalt replacement for two west bound lanes of South Airport Road.

Requirements - General:

- Work must comply with all applicable laws, regulations and specifications as identified in this RFP and on the plans.
- Contractor is responsible for bonding and insurance requirements for Grand Traverse County Road Commission permitting.
- Project shall be substantially complete by December 15, 2026, final completion (topsoil, seed, much) restoration to be completed by May 30, 2027.



- This project is a priority for the Township and there is a preference to have work completed as soon as feasible. In addition to qualifications and bid price submission, the Township will take into consideration actual timeline for completion and contractor availability as part of their bid evaluation process to aid with their selection process. Contractor should clearly identify completion date intended with associated bids.
- All work shall be coordinated with Township and their Engineer (GFA).
- Prospective bidders are strongly encouraged to conduct a site visit prior to bidding.
- Contractor shall demonstrate similar past work experience and provide three (3) references along with bid submittal. References to include scope of work completed, date and contact person.

Terms of Agreement:

General:

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

Insurance:

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

Bonds:

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

Shop Drawing Submittals:

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

Services / materials to be Provided:

Contractor shall provide all equipment and materials as necessary to complete the work outlined below and as identified in the attached drawings and specifications. They shall include, but are not limited to, the following not stated previously:

- Mobilization, demobilization, equipment, labor and materials to perform work.
- Traffic Control as required through GTCRC permit and contractor is responsible for all coordination with the road commission including, but not limited to, traffic control plan, as applicable.
- Forcemain Replacement Scope of work to include:
 - Installation of approximately 1200 LF 14" HDPE, DR 11 (DIPS) forcemain by method of Hydraulic Directional Drill (HDD) to cross South Airport Road and the Boardman River from Pump Station No. 2 and run east along South Airport Road to Park Drive.



- Installation of approximately 45 LF 14" HDPE, DR 11 (DIPS) forcemain by method of open cut near existing forcemain connection.
- Connect to existing forcemain with wye, including adapters, valves and boxes, fittings, reducers and appurtenances.
- Installation of standard sanitary manhole and approximately 120 LF 15" HDPE, DR 17 (DIPS) sanitary sewer by method of Hydraulic Directional Drill (HDD) across Park Drive.
- Doghouse manhole over existing 15" sanitary sewer on Park Drive including connections to existing sanitary sewer.
- Work to include all SESC controls, cleanup and restoration.
- South Airport Asphalt Replacement scope of work to include:
 - The (2) two west bound lanes of South Airport Road require replacement following the forcemain failure as required by GTCRC as follows:
 - Pulverize approximately 2350 square yards of existing asphalt surface.
 - Aggregate Base Conditioning
 - Approximately 600 ton asphalt, top and base, cross section to match existing.
- Dewatering is anticipated to be necessary to complete work as specified, contractor shall submit dewatering plan for review and approval, as applicable.
- Bypass pumping will be required, contractor responsible to provide bypass pumping plans including backup method (pump / haul) for review and approval by engineer and shall be implemented as coordinated with the Grand Traverse Department of Public Works.
- Contractor is responsible to provide temporary power supply as necessary to complete all work.
- Contractor responsible for Garfield Township SESC Permit application, including applicable fees.
- After new forcemain is placed into service contractor to perform cleaning and flushing of existing forcemain to allow owner to complete inspection of pipe.
- Restoration and site cleanup (including site grading, topsoil, seeding, and mulch) of any disturbed areas.

Township Services / materials to be Provided:

- EGLE Part 41 Permit, EGLE LWMD Permit & GTC Road Commission permit application – contractor responsible for all bonds, fees and coordination in compliance with permits.
- Material Testing and Inspection – 24 hour advance notice shall be provided. Inspection of new forcemain will include televising inspection provided by owner.
- Water supply is available along South Airport road for use as coordinated with GTC DPW. Contractor responsible to obtain meter and backflow prevention device from DPW.



Contractors Proposal Form:

Bidders are instructed to submit bids for this project on a lump sum basis and are tax inclusive.

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

No.	Item	Est. Quantity	Unit	Unit Price	Item Cost
A. Forcemain Replacement					
1	Mobilization, max 5%	1	LS		
2	Traffic Control	1	LS		
3	Dewatering	1	LS		
4	SESC Controls	1	LS		
5	Bypass Pumping / Pump & Haul, Forcemain	1	LS		
6	Bypass Pumping / Pump & Haul, Sanitary Sewer	1	LS		
7	Forcemain, 14" HDPE DR 11 (DIPS)	45	LF		
8	Forcemain, 14" HDPE DR 11 (DIPS), Directional Drill	1200	LF		
9	Sanitary Sewer, 15" HDPE DR 17 (DIPS), Directional Drill	120	LF		
10	Sanitary Manhole, 4' Dia.	1	EA		
11	Doghouse Manhole, 4' Dia.	1	EA		
12	Connect to Existing Forcemain	1	EA		
13	Connect to Manhole	3	EA		
14	Two Way Cleanout, 14"	3	EA		
15	Gate Valve & Box, 10"	2	EA		
16	Sidewalk Removal & Replacement	170	SF		
17	Site Restoration & Cleanup	1	LS		
B. South Airport Road Repair – Two West Bound Lanes					
1	Mobilization, max 5%	1	LS		
2	Traffic Control & Striping	1	LS		
3	Asphalt Surface, Pulverize	2350	SY		
4	Aggregate Base Conditioning	2350	SY		
5	Asphalt, Top & Base	600	TN		
				TOTAL BID	\$



Bidders Signature

Printed Name:

Business Name:

Address:

MI Contractor License No.:

Telephone:

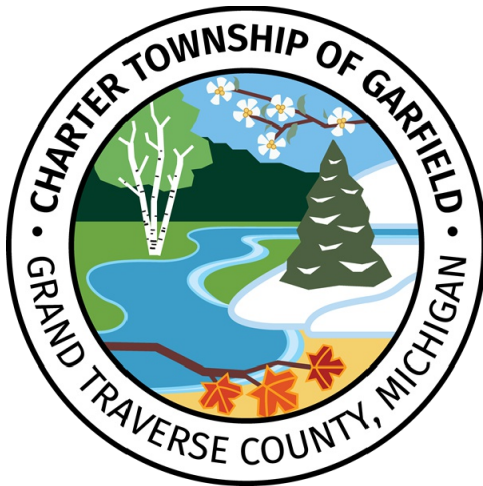
Email:

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

PLANS PREPARED FOR: CHARTER TOWNSHIP OF GARFIELD SOUTH AIRPORT ROAD FORCE MAIN REPLACEMENT

CLIENT / AGENCY

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



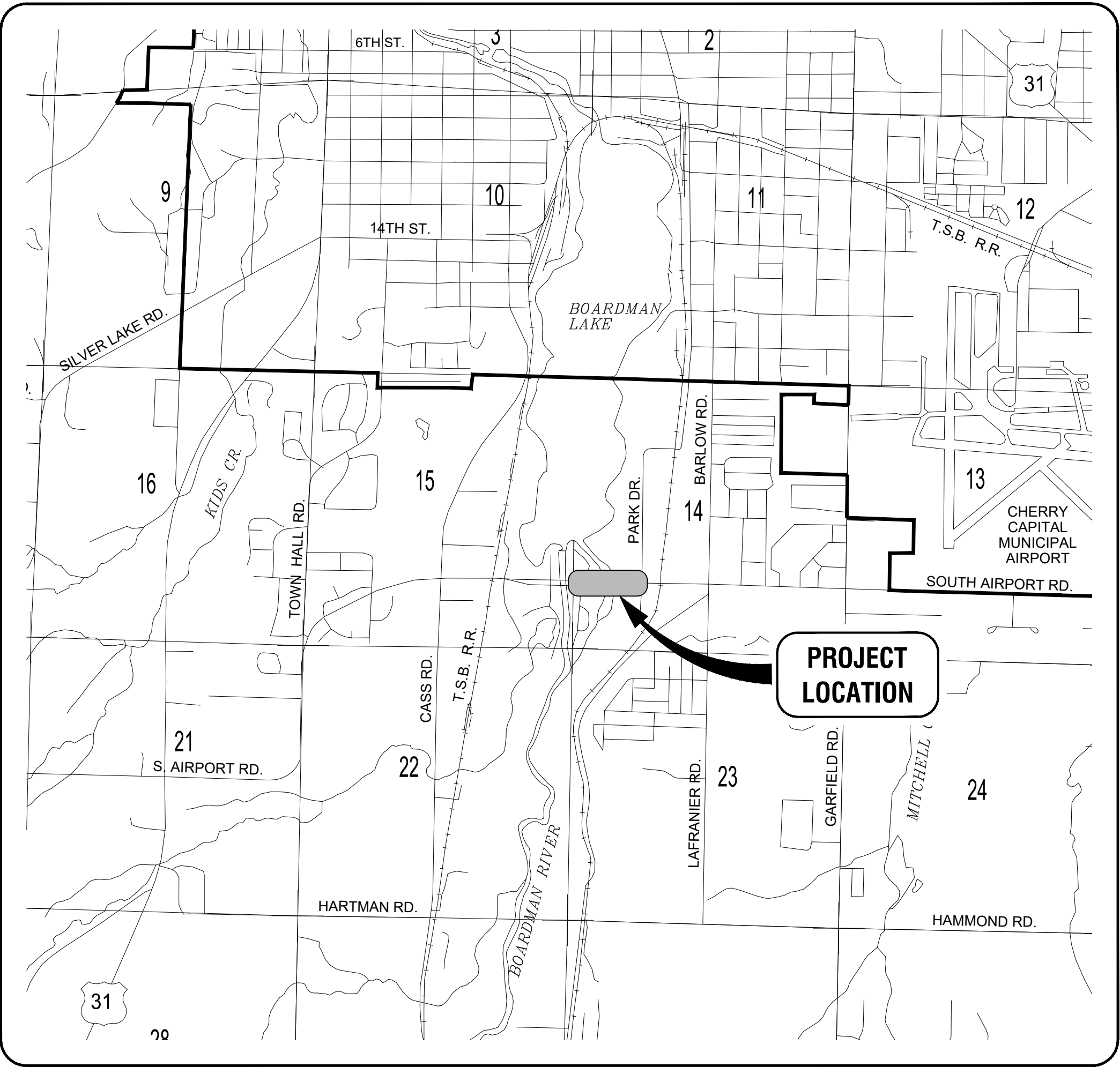
ENGINEER

ENGINEERING
SURVEYING
TESTING & OPERATIONS

1820 Oak Hollow Drive
Traverse City, MI 49686



231.946.5874 (p)
<http://gfa.tc>



LOCATION MAP

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

PUBLIC AGENCIES AND UTILITIES

PUBLIC AGENCIES

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

UTILITY AGENCIES

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

EMERGENCY SERVICES

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

SHEET INDEX

C1.1	COVER SHEET
C1.2	GENERAL NOTES/LEGEN
C2.1	PLAN AND PROFILE SHEET
C3.1	SANITARY SEWER DETAILS

CHARTER TOWNSHIP OF GARFIELD:
SOUTH AIRPORT ROAD FORCE MAIN REPLACEMENT

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



ALL ELEVATIONS ARE BASED ON NAVD 88 DATUM.

SPECIAL CARE SHALL BE TAKEN IN EXCAVATING IN THE VICINITY OF ALL UNDERGROUND UTILITIES AND STRUCTURES. 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 SAFEGUARD ALL DAMAGE TO ALL UTILITIES, WHETHER PRIVATE OR PUBLICLY OWNED, ABOVE OR BELOW GROUND SURFACE, WHICH MAY BE ENCOUNTERED DURING CONSTRUCTION, AT NO ADDITIONAL COST TO THE OWNER.

THE LOCATION OF EXISTING PUBLIC UTILITIES AND UNDERGROUND STRUCTURES SUCH AS PIPE LINES, ELECTRIC CONDUITS, SEWERS AND WATER LINES, OF RECORD ARE SHOWN ON THE PLANS. THE INFORMATION SHOWN IS BELIEVED TO BE REASONABLY CORRECT AND COMPLETE. HOWEVER, THE CONTRACTOR ASSUMES NO THE COMPLETENESS OF SUCH INFORMATION IS GUARANTEED. PRIOR TO THE START OF ANY OPERATIONS IN THE VICINITY OF ANY UTILITIES, THE CONTRACTOR SHALL NOTIFY THE UTILITY COMPANIES AND MISS DIG AND RECORD THAT HE WILL TAKE OUT THE LOCATIONS OF THE UTILITIES IN QUESTION. THE CONTRACTOR SHALL COORDINATE THE RELOCATION OF ANY UTILITIES WITH THE UTILITY PROVIDER. COST OF REPAIR FOR ANY DAMAGE TO UTILITY LINES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

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

FOR PROTECTION OF UNDERGROUND UTILITIES AND IN CONFORMANCE WITH PUBLIC ACT 53, 1974, THE CONTRACTOR SHALL DIAL 1-800-488-48777 A MINIMUM OF 48 HOURS BEFORE ANY EXCAVATION BEGINS ON MONDAYS, SUNDAYS, AND HOLIDAYS PRIOR TO BEGINNING EACH EXCAVATION IN AREAS WHERE PUBLIC UTILITIES HAVE NOT BEEN PREVIOUSLY LOCATED. MEMBERS WILL, THUS BE CAUTIONED THAT THE CONTRACTOR DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY NOTIFYING UTILITY AGENS WHO MAY NOT BE PART OF THE "MISS DIG" ALERT SYSTEM.

1. ALL CONSTRUCTION MATERIALS AND PROCEDURES MUST CONFORM WITH CURRENT DPW STANDARDS, SPECIFICATIONS AND DETAILS.
2. ALL FORCE MAIN SHALL BE HDPE DR11 AND ALL SANITARY SEWER SHALL BE HDPE DR17 AND MEET THE ASTM D 3034 REQUIREMENTS UNLESS OTHERWISE NOTED. ALL PIPING TO BE INSTALLED WITH TRACER WIRE TO PROVIDE CONTINUOUS CONDUCTOR BETWEEN ACCESS POINTS.
3. THE CONTRACTOR SHALL NOTIFY THE ENGINEER 48 HOURS PRIOR TO THE START OF CONSTRUCTION OF THE SANITARY SEWER. CONTRACTOR SHALL ISSUE A WORK SCHEDULE TO THE ENGINEER PRIOR TO THE START OF SANITARY SEWER CONSTRUCTION.
4. NO CONNECTION RECEIVING STORM WATER OR GROUND WATER SHALL BE MADE TO SANITARY SEWERS.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADJUSTING THE MANHOLE RIMS TO THE FINISH GRADE ELEVATIONS. THE ELEVATIONS SHOWN ARE BASED UPON PLAN GRADES AND ARE SUBJECT TO CHANGE.
6. THE ALIGNMENT OF THE PROPOSED SANITARY SEWER/FORCE MAIN AND BORE PIT LOCATIONS ARE SHOWN FOR REFERENCE ONLY. CONTRACTOR MAY DEVIATE/DEFLECT AS NECESSARY TO AVOID CONFLICTS FOR EASIER CONSTRUCTION. COSTS FOR ADDITIONAL PIPING, FITTINGS, ETC. SHALL BE INCLUDED IN THE COST OF THE PROJECT.
7. CONTRACTOR MUST MAINTAIN A MINIMUM HORIZONTAL SEPARATION OF TEN (10) FEET FROM ALL WATER MAIN WHEN INSTALLING THE SANITARY SEWER/FORCE MAIN, AS MEASURED FROM OUTSIDE TO OUTSIDE.
8. CONTRACTOR MUST MAINTAIN A MINIMUM VERTICAL SEPARATION OF EIGHTEEN (18) INCHES AT ALL WATER MAIN CROSSINGS WHEN INSTALLING THE SANITARY SEWER/FORCE MAIN, AS MEASURED FROM OUTSIDE TO OUTSIDE.
9. CONTRACTOR SHALL MAINTAIN A MINIMUM FIVE (5) FEET OF COVER OVER GRAVITY SANITARY SEWER AND SIX (6) FEET OF COVER OVER FORCE MAIN UNLESS OTHERWISE NOTED.
10. IF THE CONTRACTOR CREATES HIGH POINTS IN THE FORCE MAIN DUE TO CONSTRUCTION METHODS, THE CONTRACTOR IS TO INSTALL ADDITIONAL AIR RELEASE STRUCTURES, AS PER SPECIFICATIONS, AT NO ADDITIONAL COST TO THE PROJECT.
1. CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFYING EXISTING SANITARY SEWER/FORCE MAIN (LOCATION, SIZE, AND MATERIAL) PRIOR TO MAKING ANY CONNECTIONS.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR PERFORMING ANY BY-PASS PUMPING AT NO ADDITIONAL COST TO PROJECT. CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR HAVING A BACKUP METHOD IN THE EVENT THE PRIMARY BY-PASS PUMPING METHOD FAILS.
3. ALL WORK TO BE COORDINATED WITH THE DPW AND ENGINEER.

CONTRACTOR TO SUBMIT A CONSTRUCTION SCHEDULE AND SCHEDULE FOR APPROVAL PRIOR TO PERFORMING ANY WORK.

CONTRACTOR SHALL MAINTAIN SEWER FLOWS AT ALL TIMES. PUMPING AND HAULING WILL BE REQUIRED TO TRANSFER FLOWS DURING CONNECTION TO EXISTING SANITARY SEWER/FORCE MAIN. STATION EXPERIENCES WITH FLOWS UP TO 450 GPM AND EXISTING NETWORK HAS AVAILABLE HOLDING CAPACITY OF APPROXIMATELY 1,000 GALLONS, CONTRACTOR MUST VERIFY RATES AND COORDINATE WITH D.P.W. ALL COSTS FOR HAULING/TRANSFERRING FLOWS ARE TO BE INCLUDED IN THE COST OF THE PROJECT.

NO CONNECTION TO THE EXISTING SANITARY SEWER/FORCE MAIN SHALL BE MADE UNTIL THE NEW SEWER AND FORCE MAIN HAS BEEN INSTALLED, TESTED, INSPECTED, AND APPROVED BY THE ENGINEER AND THE DPW.

PROPOSED SEQUENCE OF CONSTRUCTION

- a. EXISTING FORCE MAIN TO REMAIN IN SERVICE THROUGHOUT CONSTRUCTION AND TESTING OF THE NEW FORCE MAIN
- b. INSTALL DOUBLE WALL SILT FENCE AND OTHER SSC MEASURES TO PROTECT ADJACENT WETLANDS, FLOODPLAIN, AND STREAM FROM ANY SEDIMENTATION DURING CONSTRUCTION OF DRILLING FLUIDS.
- c. CONSTRUCT NEW FORCE MAIN/SANITARY SEWER AND PRESSURE TEST.
- d. COORDINATE WITH THE DPW FOR APPROVAL/ACCEPTANCE. DPW TO PROVIDE CCTV INSPECTION OF NEW FORCE MAIN PRIOR TO ACCEPTANCE.
- e. BY-PASS PUMP OVER EXISTING FOR CONSTRUCTION OF PROPOSED MH #2 REQUIRED 15" SANITARY SEWER. ALL CONNECTIONS TO SANITARY SEWER TO BE COMPLETED BEFORE DECOMMISSIONING OF BY-PASS PUMPING.
- f. CONNECT NEW FORCE MAIN TO EXISTING VIA DOGHOUSE MH, OUT AND CAP EXISTING LOCATION IN EXISTING DOGHOUSE MANHOLE, AND PLACE NEW FORCE MAIN IN TO SERVICE.
- g. CONTRACTOR TO PROVIDE CLEANING OF EXISTING FORCE MAIN AND TO COORDINATE WITH THE DPW FOR CCTV INSPECTION OF EXISTING FORCE MAIN.
- h. CONTRACTOR IS RESPONSIBLE TO REMOVE ALL SSC MEASURES AND RESTORE ALL WORK AREAS TO EXISTING CONDITIONS OR BETTER.

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

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

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

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

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

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

A MINIMUM OF TWO (2) FEET OF COVER FROM FINISHED ELEVATIONS SHALL BE MAINTAINED OVER ALL STORM DRAIN PIPES.

8. ALL DRAINAGE PIPES THAT OUTLET AT GROUND SURFACE SHALL INCLUDE END SECTIONS.

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

10. EXISTING STORM DRAINAGE DITCHES SHALL BE REBUILT, IF FILLED IN OR REMOVED DURING CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO REPAIR OR REPLACE, AS REQUIRED, ALL DRAINAGE CULVERTS DAMAGED DURING CONSTRUCTION AND SHALL BE CONSIDERED INCIDENTAL TO THE PROJECT.

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

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

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

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

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

DESCRIPTION	
FND IRON (AS NOTED)	●
FND MONUMENT (AS NOTED)	○
FND NAIL	⬮
BENCHMARK	BM
GOVERNMENT CORNER (AS NOTED)	⚡
SET IRON (AS NOTED)	○
SET NAIL (PROPERTY CORNER)	⬮
SET MONUMENT (AS NOTED)	○
RECORD	(R)
MEASURED	(M)
SET NAIL (TRAVERSE PT)	□
SET STAKE/LATH	⊠
FND STK	■
FND "X"	✕
SET X	✕
CONTROL PT	⊙
FND GPS PT	⊙
SET GPS PT	⊙

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

NORTH	N
SOUTH	S
EAST	E
WEST	W
DEGREES	°
FEET OR MINUTES	'
INCHES OR SECONDS	"
SQUARE	SQ.
FEET	FT.
LIBER	L.
PAGE	P.
CALCULATED	C
RECORD	(R)
RIGHT-OF-WAY	R/W
CENTERLINE	C/L
TITLE	T
INDICATES A LINE NOT RECORDED	<i>f</i>

DESCRIPTION	EXISTING
SECTION LINE/QUARTER LINE	_____
RIGHT-OF-WAY LINE	_____
RIGHT-OF-WAY CENTERLINE	_____
PHYSICAL CENTERLINE	_____
EASEMENT LINE	_____
PROPERTY LINE	_____
LOT LINE	_____
SETBACK LINE	_____
BUILDING	_____
MINOR BUILDING STRUCTURE	_____
SHEET PILE	_____x_____x_____x_____x_____
FENCE LINE	_____x_____x_____x_____x_____
GUARD RAIL	_____o_____o_____o_____o_____
SILT FENCE	_____o_____o_____o_____o_____
DITCH	_____o_____o_____o_____o_____
WETLANDS	_____x_____x_____x_____x_____
SHORELINE/EDGE OF WATER	_____o_____o_____o_____o_____
CONTOURS	_____100_____
TREE/WOODS LINE	_____o_____o_____o_____o_____
TREE/WOODS LINE	_____o_____o_____o_____o_____
DECIDUOUS TREE (AS NOTED)	
CONIFEROUS TREE (AS NOTED)	
BIG ROCK	
SPOT ELEVATION	
DRAINAGE FLOW	
GRADING LIMITS	
WOOD POST/GUARD POST	
TRAFFIC SIGN (AS NOTED)	
STGN	
FLAG POLE	
MAIL BOX	
PARKING METER	
SATELLITE DISH	
STUMP	
U/G TANK COVER	
SOIL BORING	
PINFLAG (AS NOTED)	

DESCRIPTION	EXISTING
GRAVEL SURFACE	
ASPHALT SURFACE	
CONCRETE SURFACE	
BRICK SURFACE	
RIP-RAP	
BUILDING	
FLOODPLAIN ZONE	

DESCRIPTION	EXISTING
WATER MAIN	
WATER SERVICE LEAD	
HYDRANT ASSEMBLY	
VALVE	
BLOW-OFF ASSEMBLY	
CURB STOP	
POST INDICATOR VALVE	
WATER SHUT OFF VALVE	
WELL	
SPRINKLER	
IRRIGATION CONTROL	
MONITORING WELL	
FIRE HYDRANT NUMBER	
VALVE NUMBER	

DESCRIPTION	EXISTING	PROPOSED
SANITARY SEWER	---	←
FORCE MAIN	---	←
SANITARY SERVICE LEAD	---	---
SANITARY MANHOLE	⊙	⊙
CLEAN OUT	⊕	⊕
AIR RELEASE STRUCTURE	○	
UNKNOWN MH	⓪	
U/G SAN PINFLAG	7	

DESCRIPTION	EXISTING
STORM SEWER	-----
STORM MANHOLE	⊙
CATCH BASIN	⊗
CURB INLET	⊞
END SECTION	)

DESCRIPTION	EXISTING
ASPHALT	_____
CONCRETE	_____
GRAVEL	_____
BRICK	_____
RAILROAD	+ + + + +
AVEMENT MARKINGS	_____
CURB	_____
SIDEWALK	_____
TWO-TRACK/TRAIL	_____

DESCRIPTION	EXISTING
OVERHEAD ELECTRIC	—— — — — — ONE
UNDERGROUND ELECTRIC	—— — — — — USE
UTILITY POLE	
GUY POLE	
GUY ANCHOR	
LIGHT POLE	
LIGHT	
TRANSFORMER	
ELECTRIC RISER	
ELECTRIC PANEL/METER	
ELECTRIC MANHOLE	

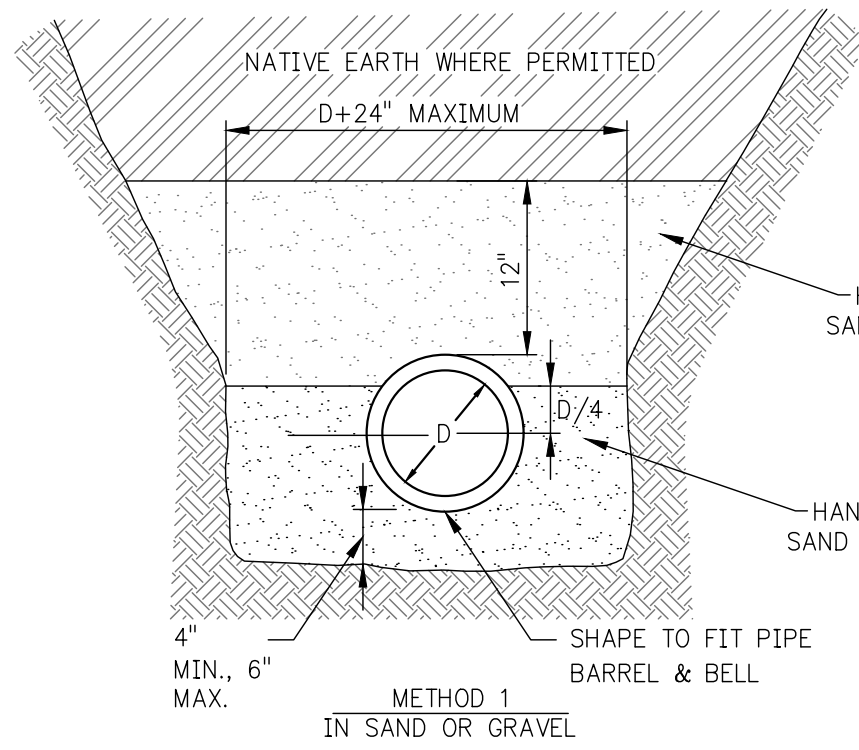
DESCRIPTION	EXISTING
OVERHEAD TELEPHONE	_____ GHT _____
UNDERGROUND TELEPHONE	_____ UGT _____
FIBER OPTIC	_____ FOPT _____
CABLE TELEVISION	_____ CATV _____
TELEPHONE RISER (AS NOTED)	☒
CATV RISER (AS NOTED)	☒
FIBER OPTIC SIGN	☒
TELEPHONE MANHOLE	☒

DESCRIPTION	EXISTING
OVERHEAD TELEPHONE	
GAS SIGN	⌋
GAS VALVE	⌋
GAS METER	⌋
TEST LEAD	⌋
GAS MANHOLE	○

1: PROJECT NO. 2022-01-001, 2: SECTION 14, 3: T.27 N., R.11 W., 4: GARFIELD TOWNSHIP, GRAND TRAVERSE COUNTY, MICHIGAN

NOTE:

ALL BACKFILL MATERIAL SHALL CONFORM TO ASTM D2321 STANDARDS

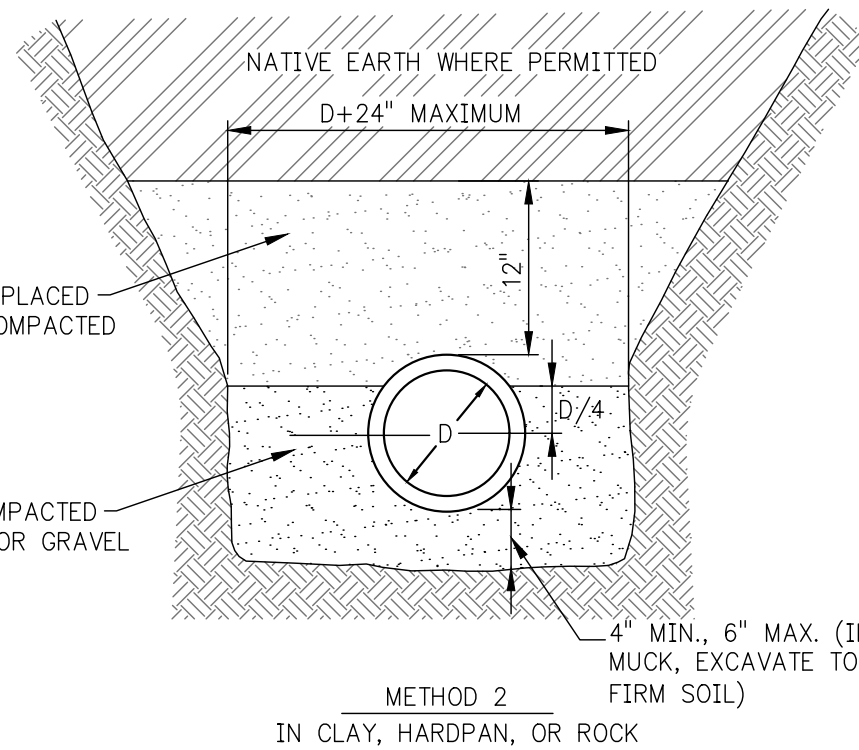


PIPE BEDDING DETAIL

(CLASS A) NO SCALE

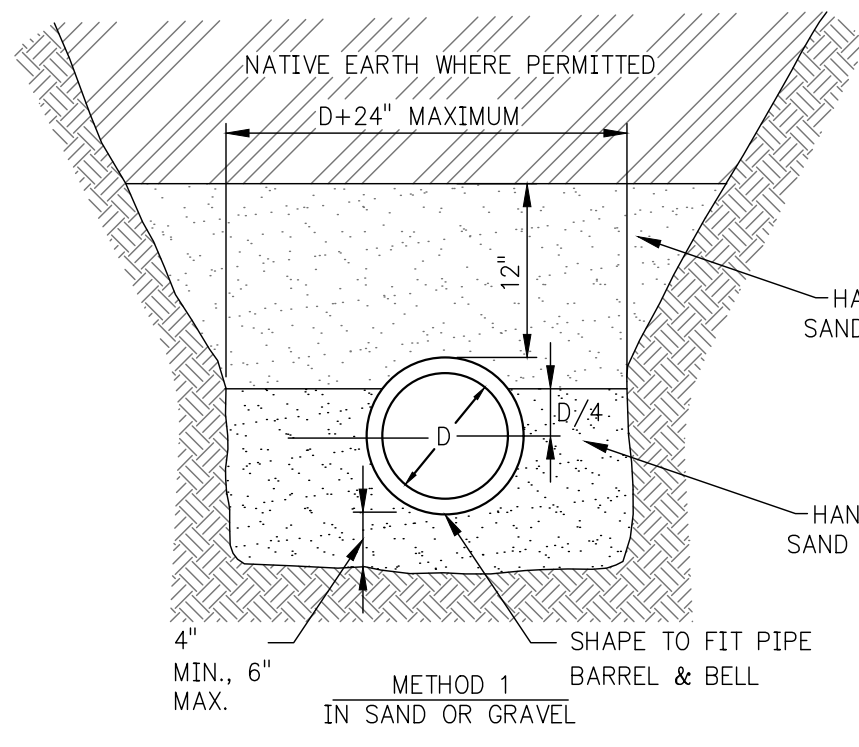
NOTE:

SANITARY SEWER TRENCHES NEED TO PROVIDE A MINIMUM WIDTH OF PIPE DIAMETER PLUS 16 INCHES FOR 8 INCH TO 18 INCH DIAMETER PLASTIC/FLEXIBLE PIPE MATERIALS. FOR 18 INCH AND LARGER PIPE DIAMETERS, THE MINIMUM TRENCH WIDTH IS 1.25 TIMES THE PIPE DIAMETER PLUS 12 INCHES FOR PLASTIC/FLEXIBLE PIPE MATERIALS.



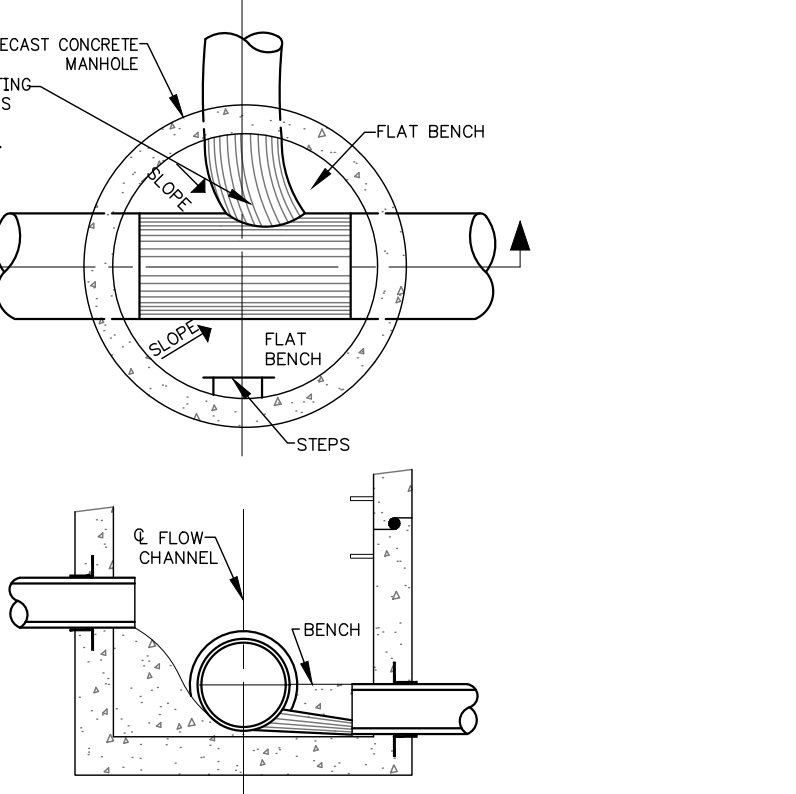
NOTE:

ALL BACKFILL MATERIAL SHALL CONFORM TO ASTM D2321 STANDARDS

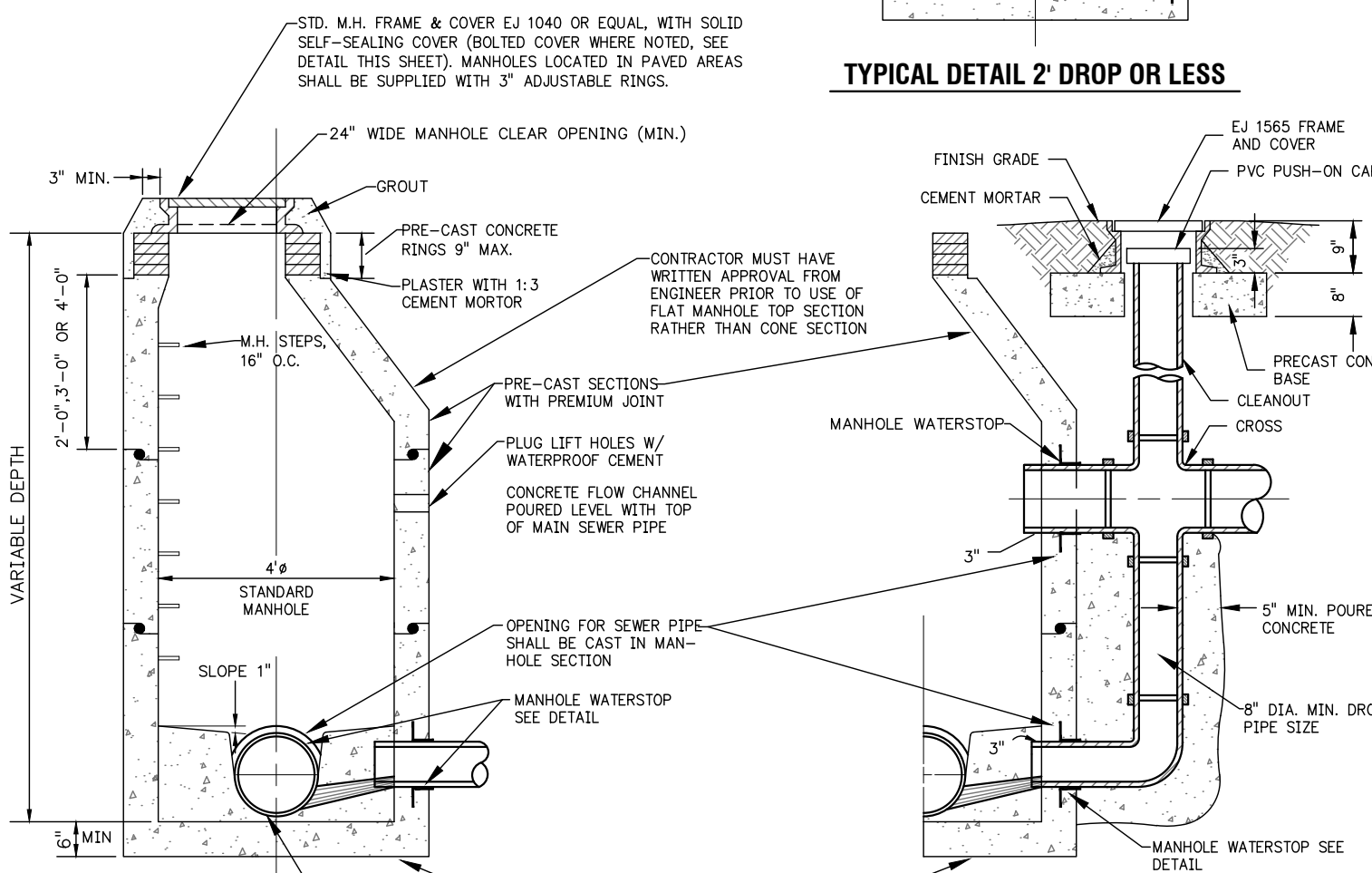
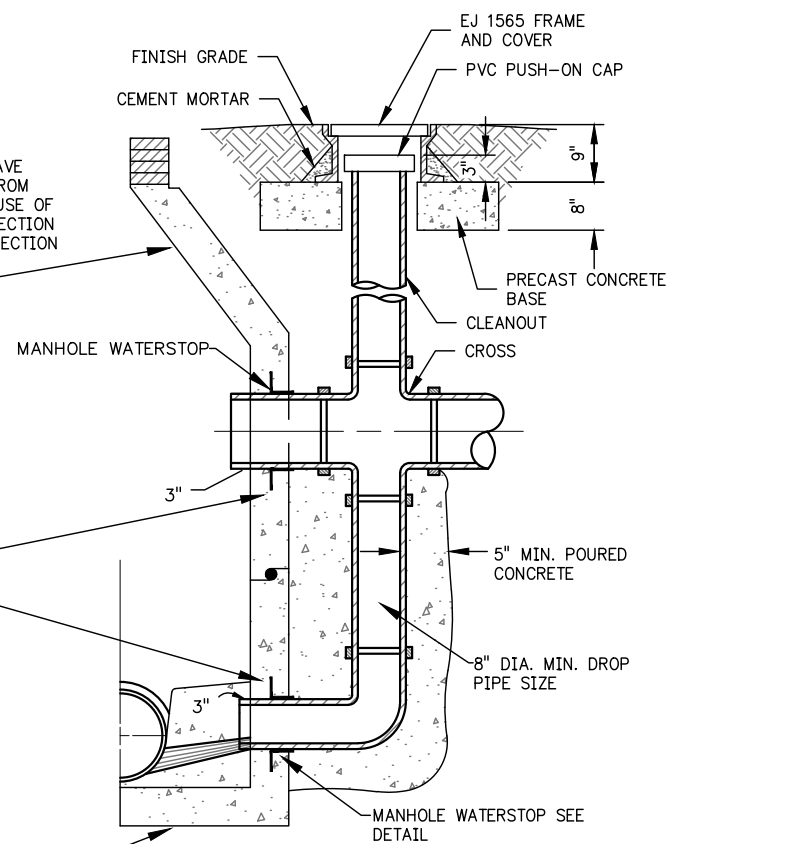


PIPE BEDDING DETAIL

(CLASS B) NO SCALE

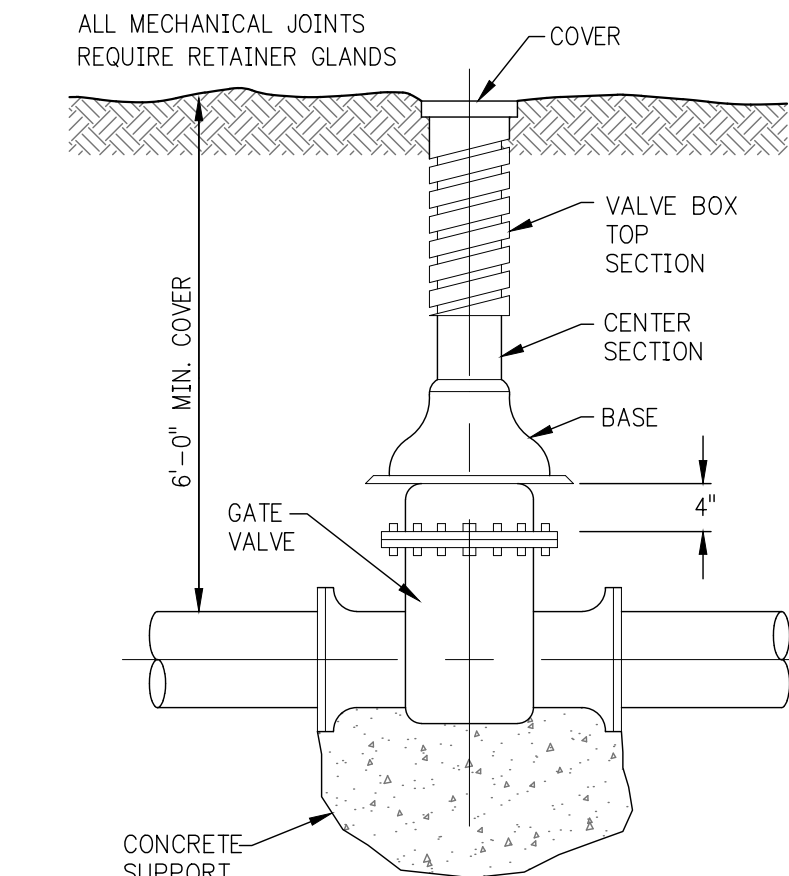


TYPICAL DETAIL 2' DROP OR LESS



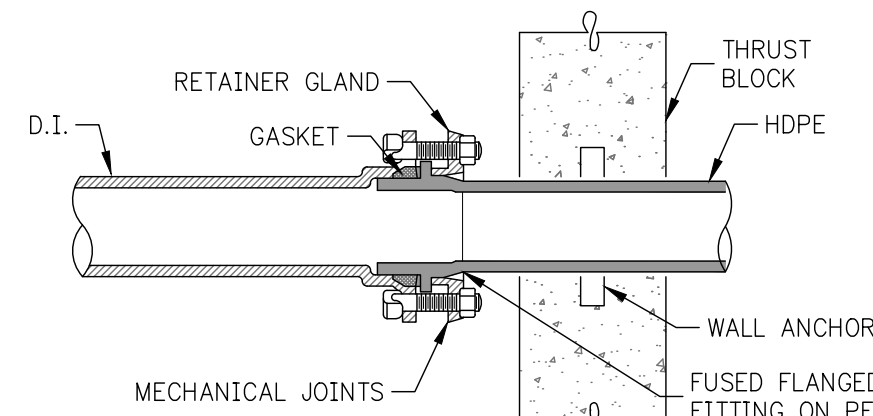
DETAIL - STANDARD MANHOLE

NO SCALE



VALVE BOX INSTALLATION DETAIL

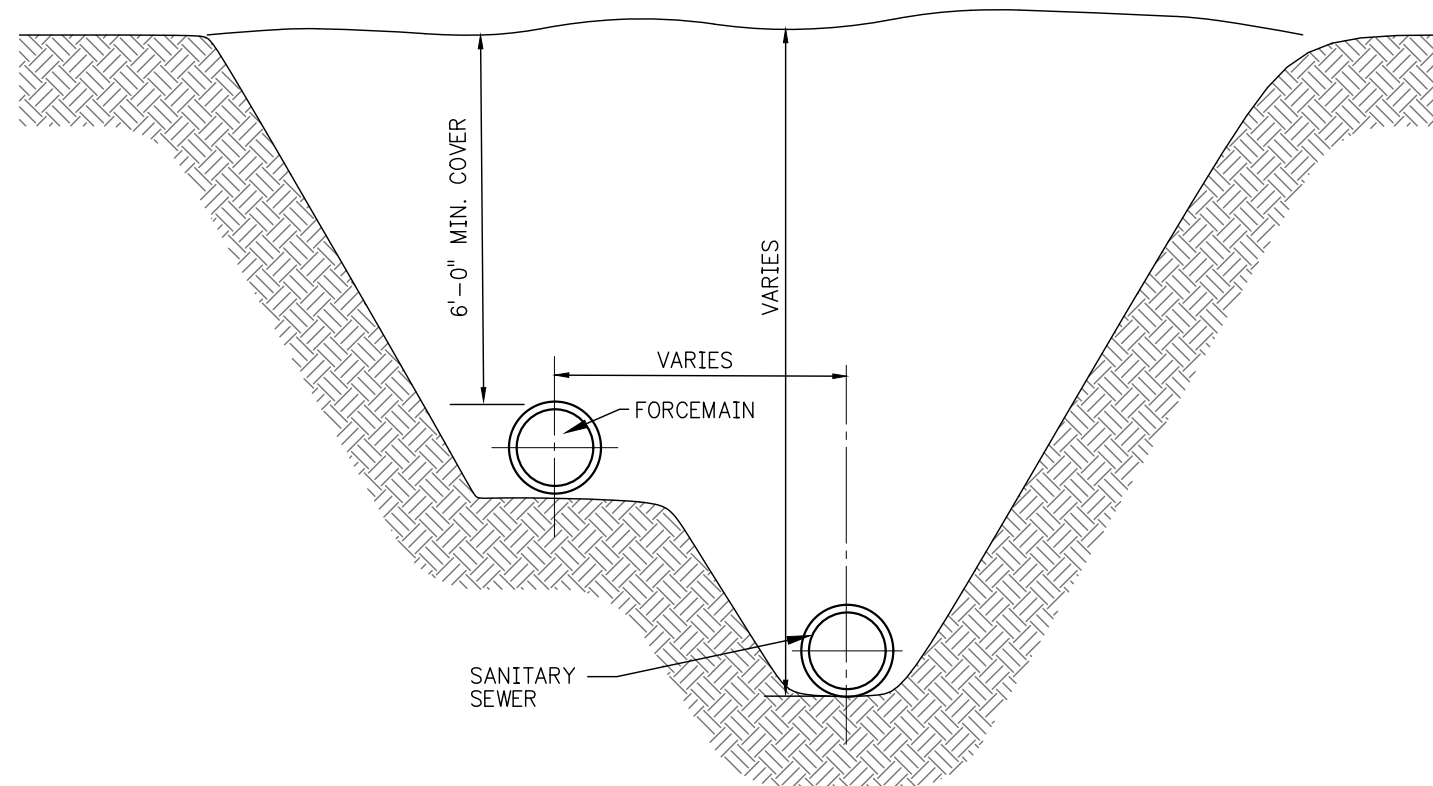
NO SCALE



NOTES:
1. ALL MECHANICAL JOINTS REQUIRE RETAINER GLANDS.
2. INSTALL FIELD LOCKS ON THREE ADJACENT DI PIPE JOINTS

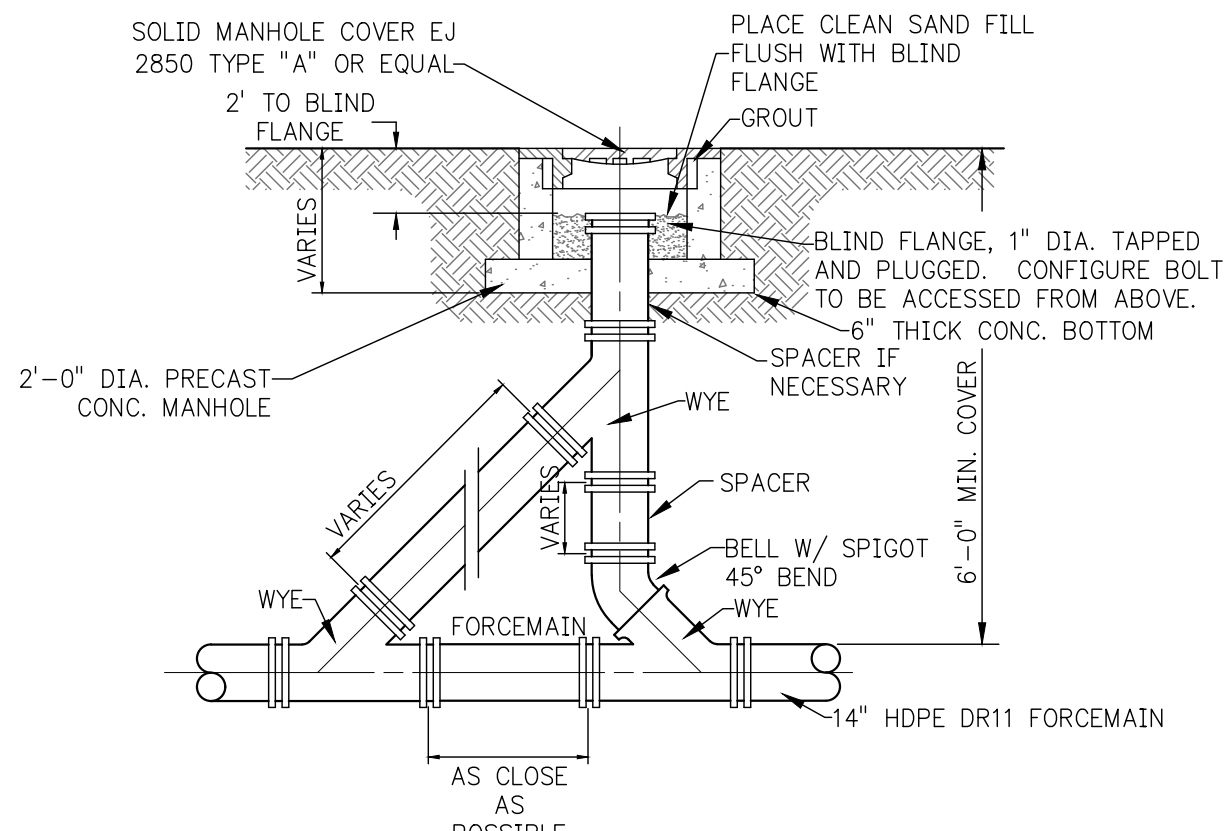
HDPE TO DI (MJ) ADAPTER DETAIL

NO SCALE



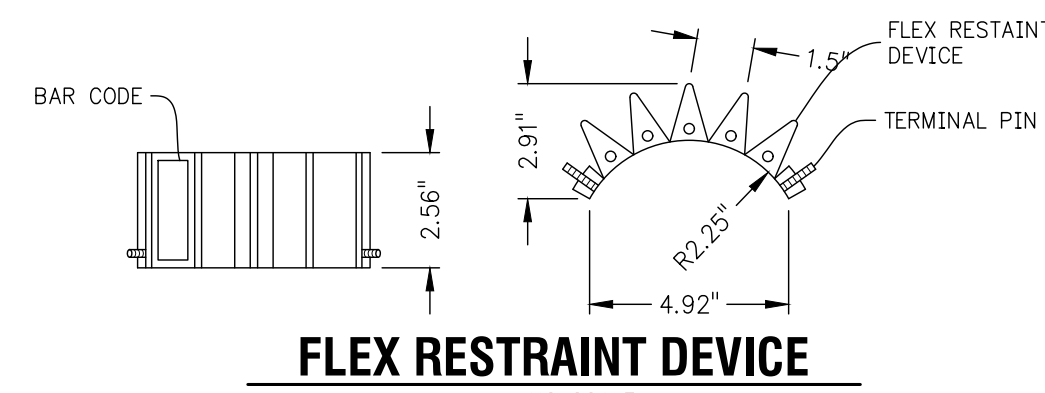
2 PIPE TRENCH DETAIL

NO SCALE



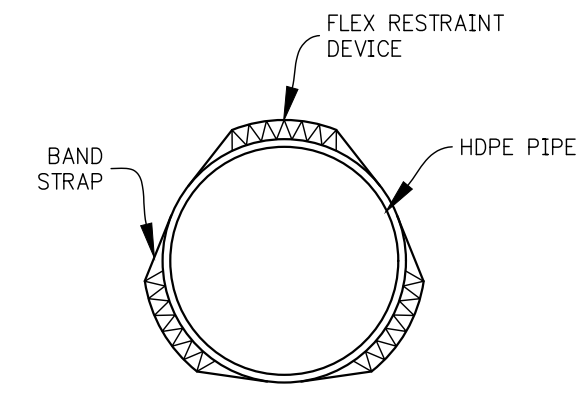
TWO WAY FORCEMAIN CLEANOUT DETAIL

NO SCALE



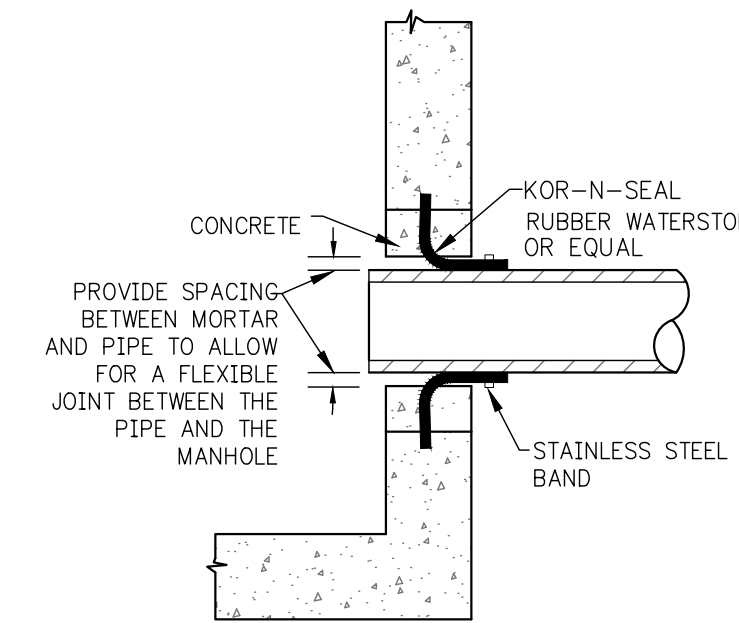
FLEX RESTRAINT DEVICE

NO SCALE



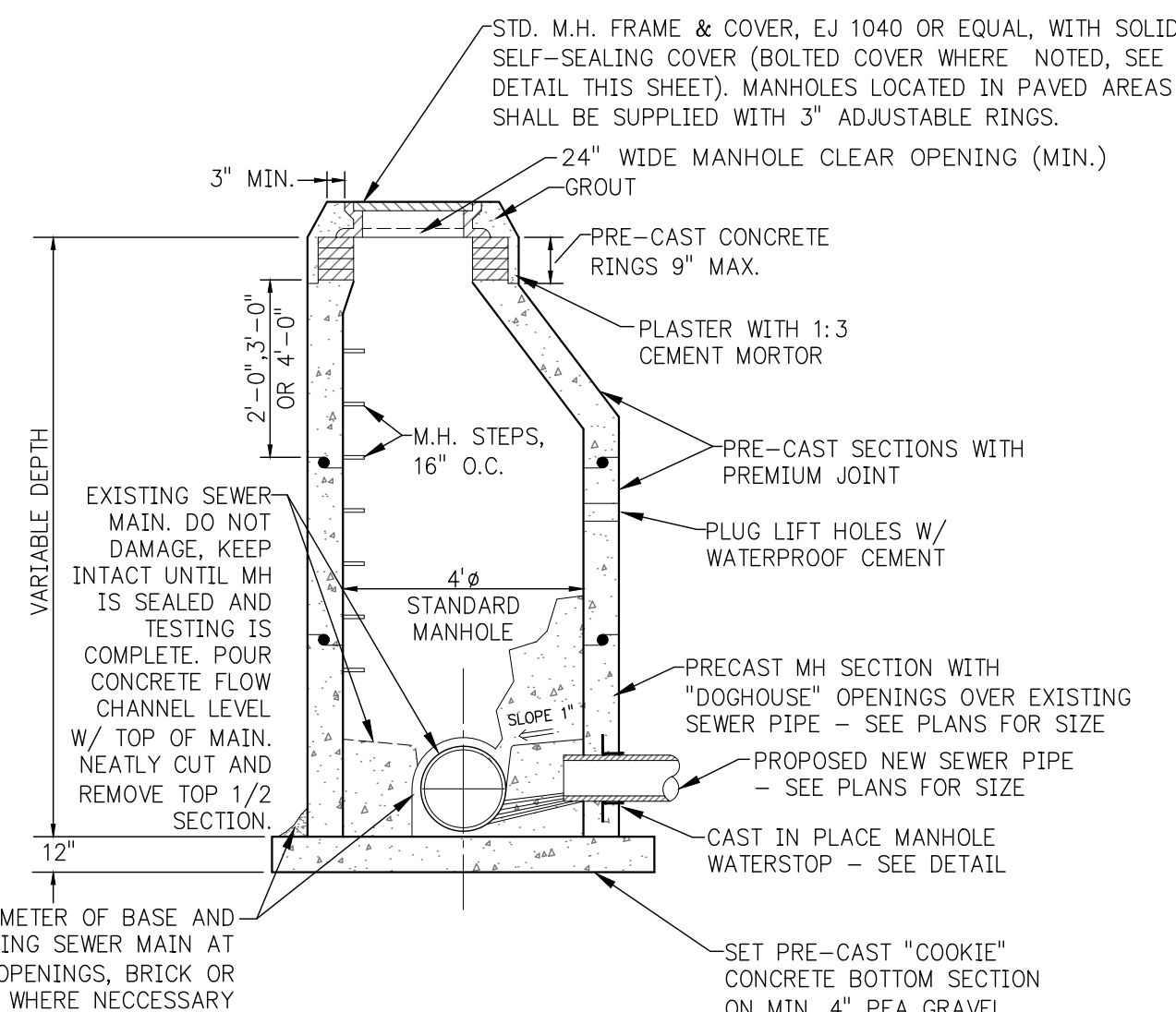
PIPE RESTRAINT DETAIL

NO SCALE



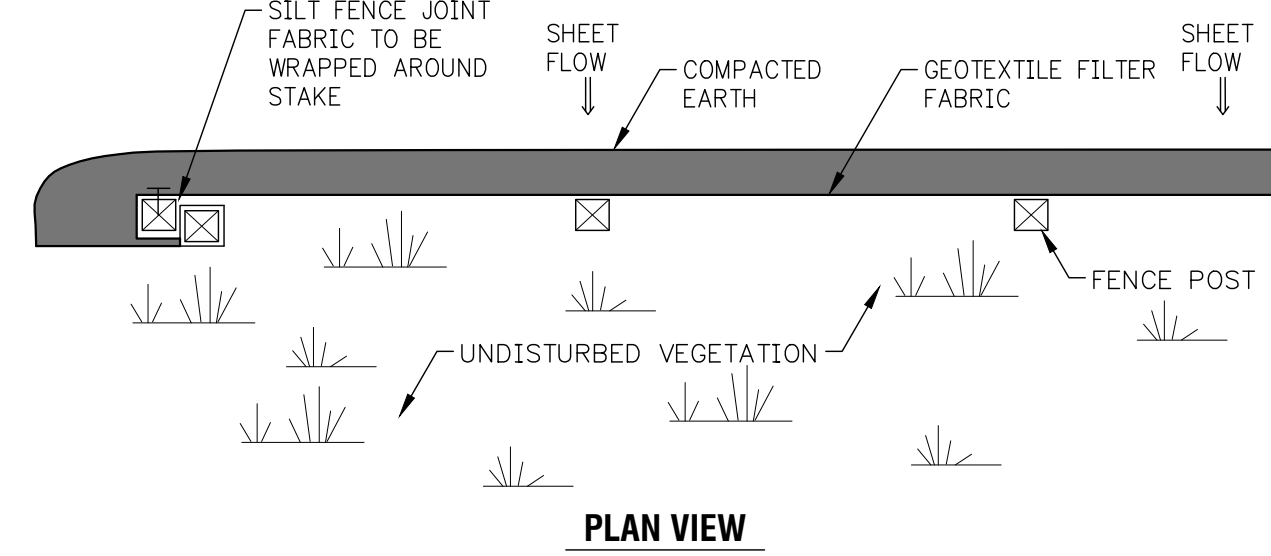
MANHOLE/WETWELL WATERSTOP DETAIL

NO SCALE

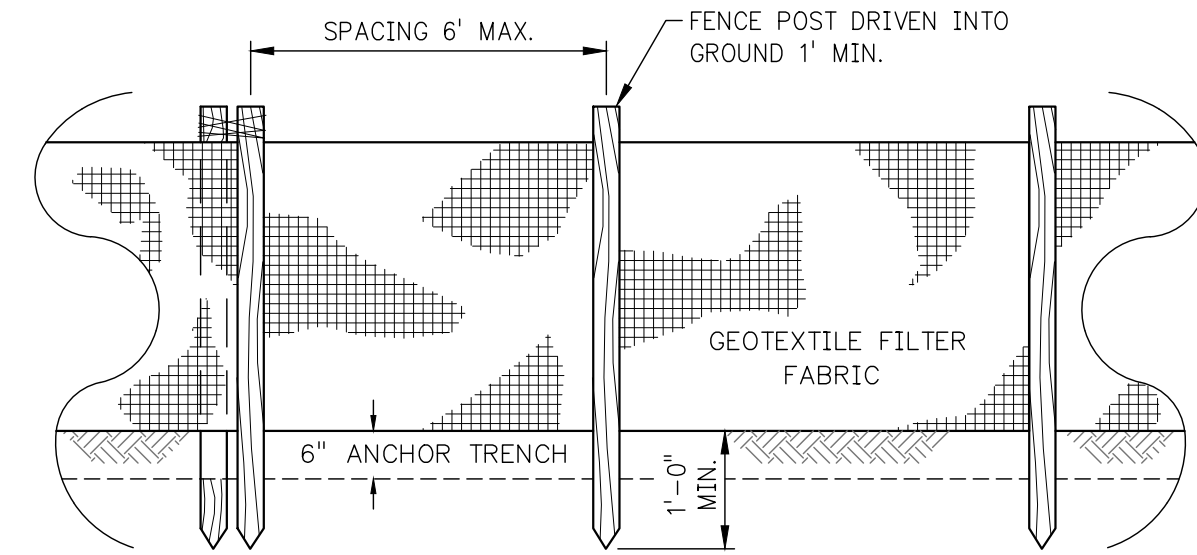


MANHOLE OVER EXISTING SEWER DETAIL (DOGHOUSE)

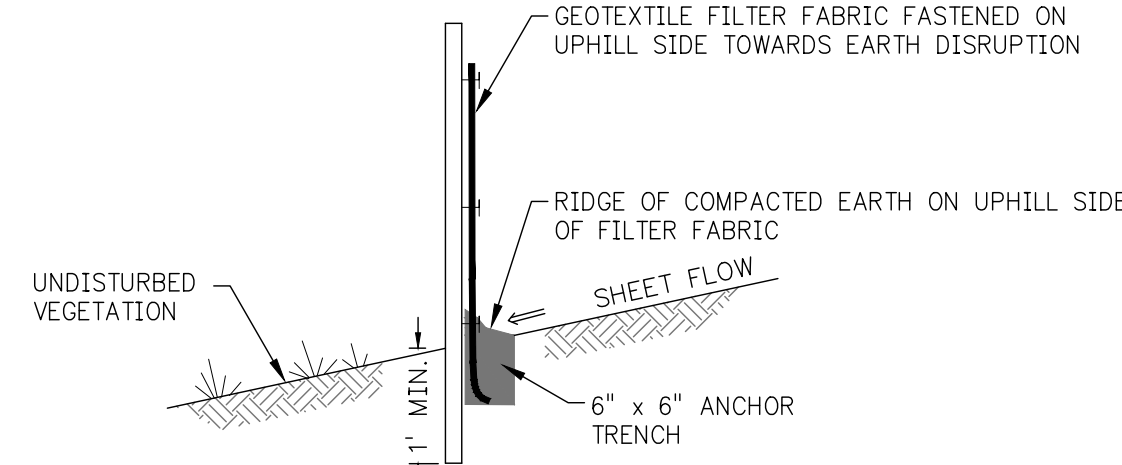
NO SCALE



PLAN VIEW



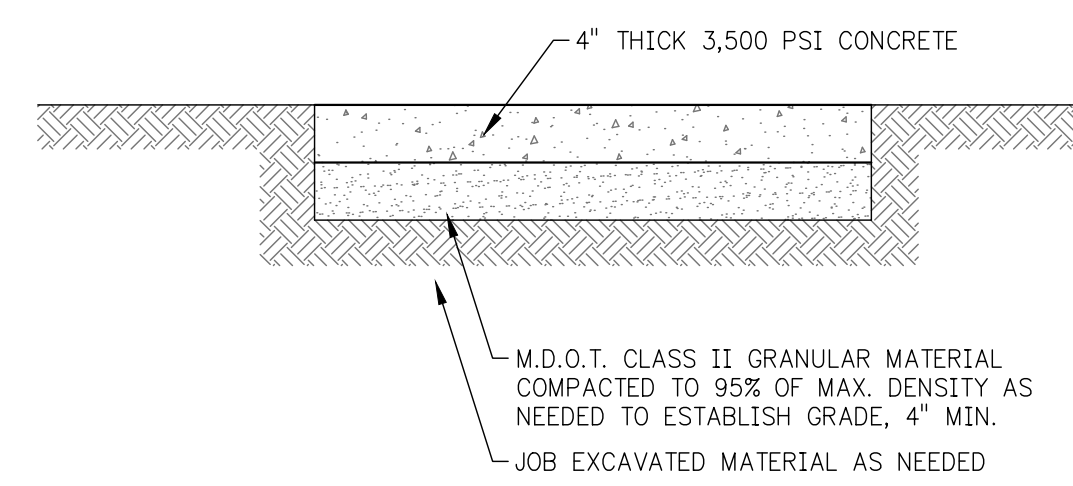
FRONT ELEVATION



SECTION VIEW

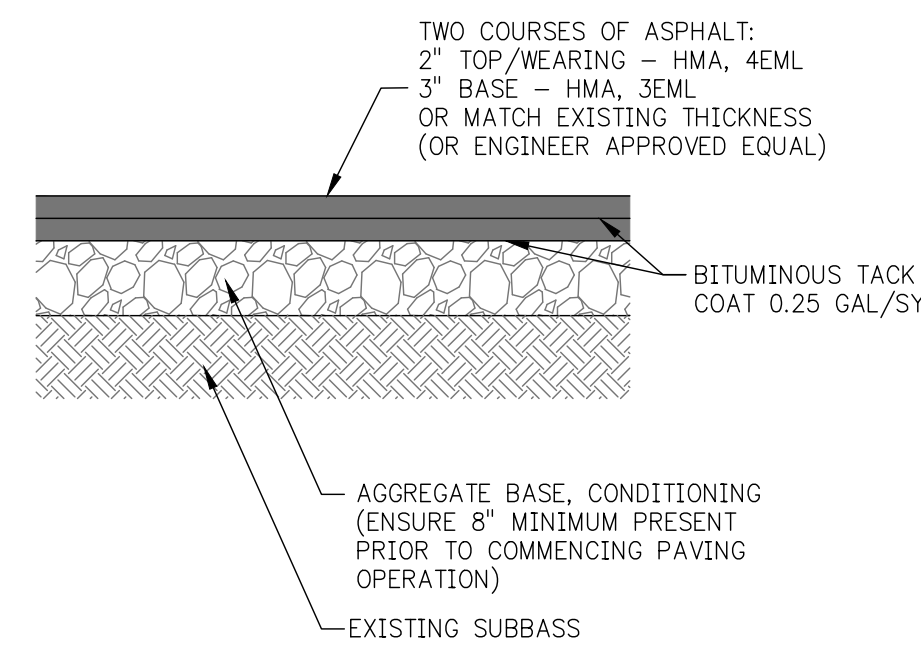
SILT FENCE DETAIL

NO SCALE



4" THICK STANDARD CONCRETE WALK DETAIL

NO SCALE



ASPHALT PAVING DETAIL

NO SCALE

231.946.587.4 (p)
http://gfa.io



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

REV# DATE BYN ISSUED FOR PERMITS/ISSUES

CHARTER TOWNSHIP OF GARFIELD
SOUTH AIRPORT ROAD FORCE MAIN REPLACEMENT
SANITARY SEWER/CONSTRUCTION DETAILS
SECTION 14, T.27 N., R.11 W.
GARFIELD TOWNSHIP, GRAND TRAVERSE COUNTY, MICHIGAN

PAL: JENNIFER GRADHAM P.E.
OR: C. BALLANCE
JOB NO.: 26273
C3.1

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



Engineering
Surveying
Testing &
Operations

820 Oak Hollow Drive
Traverse City, Michigan 49686
231.946.5874 
231.946.3703 

TECHNICAL SPECIFICATIONS FOR:

SOUTH AIRPORT ROAD FORCEMAIN REPLACEMENT



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

GFA PROJECT NO.: 26273
DATE: OCTOBER 2026

PROJECT SPECIFICATIONS

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02080	DIRECTIONAL DRILLING
02240	DEWATERING

STANDARD DPW / TOWNSHIP SPECIFICATIONS

Section

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SECTION 2	STANDARDS AND REGULATIONS
SECTION 3	PROJECT CLOSE OUT
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SECTION 5	CONCRETE WORK
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SECTION 7	SANITARY SEWER AND APPURTENANCES
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SECTION 01150 – REGULATORY REQUIREMENTS

PART 1 – GENERAL

1.01 RELATED SECTIONS

- A. SECTION 2 – STANDARDS AND REGULATIONS (Grand Traverse County DPW Specification)

1.02 PERMITS

- A. Owner's Responsibility: The owner will obtain the following permits where applicable.
 - 1. EGLE Sanitary Sewerage Systems Construction permit in accordance with Part 41, Sewerage Systems, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended.
 - 2. EGLE / USACE Joint Permit Application for Floodplain and Stream crossings work.
 - a. All excavated material to be disposed upland.
 - b. No placement of fill or excess material in floodplain or wetland.
 - 3. Use of Right of Way Permit from Grand Traverse County Road Commission (GTCRC).
- B. Contractor's Responsibility:
 - 1. Meet provisions and requirements of all permits obtained by the Owner.
 - 2. Use of Right of Way Permit from Grand Traverse County Road Commission (GTCRC) to be obtained by Owner. The contractor shall be responsible to pay for all incurred costs related to all permits obtained for this project as mandated by the regulatory agencies, including but not limited to the GTCRC. These costs may include monitoring, bonds, and Protective Liability. The contractor is responsible for contacting the agencies to determine what is required and the cost.
 - 3. Soil Erosion and Sedimentation permit from Garfield Township.

1.03 APPLICABLE CODES

- A. All references to codes, specifications, and standards shall refer to the latest edition, amendment.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01150

SECTION 01160 - EROSION AND SEDIMENTATION CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. On-land silt fence.
 - 2. Anchoring devices.
 - 3. Accessories.

1.2 SUBMITTALS

- A. Product Data: Submit data on on-land silt fence, shallow turbidity curtain, erosion control blanket, admixtures, concrete materials, reinforcement, and aggregates, curing compounds, geotextiles, joint fillers and sealers, and pipe materials.
- B. Submit name and applicable experience of soil erosion and sediment control manager according to Section 1.5 E.

1.3 QUALITY ASSURANCE

- A. Prepare and submit the SESC permit to Garfield Township regulations.
- B. Perform Work according to Garfield Township, EGLE, and Grand Traverse County standards.
- C. Perform work in accordance with all applicable permit requirements.
- D. Progress Schedule:
 - 1. Clearly outline intended maintenance of traffic, locations where temporary and permanent soil erosion and sediment control measures will be installed, and such other information as required.
 - 2. Provide special consideration to sensitive areas such as wetlands and waterways.
 - 3. Contractor to maintain double row silt fence in accordance with Part 301 / 31 Permit requirements.
- E. Soil Erosion and Sediment Control Manager:
 - 1. Assign to the Project a supervisory-level employee to serve in the capacity of soil erosion and sediment control manager. Submit the name and experience of this employee to the Engineer and Construction Manager.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Perform Work according to:
 - 1. EGLE LWMD Permit standards and conditions.
 - 2. Garfield Township SESC Permit standards and conditions.

2.2 ON-LAND SILT FENCE

- A. Provide a woven fabric comprised of high-tenacity polypropylene yarns and a plastic net backing, square hardwood posts, and connection hardware or aluminum wire.
- B. Provide prefabricated commercial silt fence; may be substituted for built-in-field fence.

2.3 EROSION CONTROL BLANKETS

- A. Erosion Control Blankets: 100 percent agricultural straw fiber matrix, 0.5 lb./sq. yd., stitch bonded with degradable thread between two photodegradable polypropylene nettings.
- B. Securement: Staples used to anchor erosion control blankets should be U-shaped, 11-gage or heavier steel wire, having a span width of 1 inch and a length of 6 inches or more from top to bottom after bending.

2.4 ANCHORING DEVICES

- A. Staples: Must be No. 8 gage steel wire, bent U-shapes with throat width equal to 1 to 2 inches, and effective driving depth of 6 inches or as suggested by the manufacturer.
- B. Sandbags: Must be of proper size to temporarily stabilize fabric; number and weight sufficient to withstand wind speeds of 50 mph.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, installation tolerances and other conditions affecting performance of the Work.
- B. Verify compacted subgrade, granular base, or stabilized soil is acceptable and ready to support devices and imposed loads.

3.2 PROJECT REQUIREMENTS

- A. The Contractor is responsible for the timely installation and maintenance of all sedimentation control and dewatering devices. Measures listed here and on the Drawings are required to be installed, maintained, removed, and cleaned up at the expense of the Contractor.

3.3 INSTALLATION OF SILT FENCE

- A. Position sediment fences as indicated and to prevent off-site movement of sediment produced by construction activities as directed by Construction Manager. Provide areas beyond limits of silt fence undisturbed or stabilized.
- B. Dig trench approximately 6 inches wide and 6 inches deep along proposed fence lines.
- C. Drive stakes maximum 10 feet on center at back edge of trenches. Drive stakes minimum 2 feet into ground.
- D. Hang filter fabric on posts carrying to bottom of trench with about 4 inches of fabric laid across bottom of trench. Stretch fabric taut along fence length and maintain secure both ways.
- E. Backfill trench with excavated material and tamp.
- F. Install prefabricated silt fence according to manufacturer's instructions.

3.4 SITE STABILIZATION

- A. Incorporate erosion control devices indicated into the Project at the earliest practicable time.
- B. Construct, stabilize, and activate erosion controls before Site disturbance within tributary areas of those controls.
- C. Stabilize any disturbed area of affected erosion control devices on which activity has ceased and which will remain exposed for more than 20 days.
- D. Stabilize diversion channels, sediment traps, and stockpiles immediately.

3.5 FIELD QUALITY CONTROL

- A. Inspect erosion control devices on a weekly basis and after each runoff event. Make necessary repairs to ensure erosion and sediment controls are in good working order.

3.6 CLEANING

- A. When sediment accumulation in sedimentation structures has reached a point one-third depth of sediment structure or device, remove and dispose of sediment.
- B. Do not damage structure or device during cleaning operations.

- C. Do not permit sediment to erode into construction or Site areas or natural waterways.
- D. Clean channels when depth of sediment reaches approximately one-half channel depth.†
- E. Clean, sweep driveways and public roadways daily if needed to remove construction debris.

END OF SECTION 01160

SECTION 01270 – MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 SUMMARY

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

1.02 APPLICATION FOR PAYMENT

- A. Pay period: Begins on the 1st of the month and continues through the end of the following month.
- B. Payment requests shall be submitted on the forms included in the Specifications and shall be submitted no later than 25th of each month.

1.03 SUBMITTALS

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

1.04 PAY ITEM DESCRIPTIONS

A. Forcemain Replacement

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

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

3. Dewatering: The completed work for dewatering as shown on the plans and detailed in the specifications, will be paid for at the contract unit price lump sum (LS). Payment shall include, but not limited to, setup, removal, disposal, permitting including applicable fees, and backup power supply including fuel, for the duration necessary to complete the work according to the plans and specifications.
4. SESC Controls: The completed work for SESC controls will be paid for at the contract unit price lump sum (LS) as quoted in the proposal. Payment shall include, but not limited to, all labor, equipment and materials to install erosion control silt fencing, fabric inlet protection, street sweeping, dewatering measures and other temporary measures as mandated by EGLE and Township and as shown on the plans or as required by the Engineer.
5. Bypass Pumping / Pump & Haul, Forcemain: The completed work for forcemain bypass pumping, as shown on the plans and detailed in the specifications, will be paid for at the contract price per lump sum (LS). Payment shall be based on the completion of the work in accordance with the plans and specifications. Price shall be payment in full for all labor, materials, and equipment required to set up, operate, and ensure uninterrupted sewer service during bypass pumping and/or pump and haul operation as necessary to maintain sewer service to users and to divert the flow of sewage around the area at which construction will occur. This pay item shall include, but is not limited to, bulkheads, pumping equipment capable of handling the anticipated flows, stand-by pumps, piping, valves, joints, fittings, thrust and restraint blocks, pumper trucks, temporary bypass structures, cost for electrical, fuel costs, back-up holding trucks for offsite disposal, handling fees, standby power source, pump operators available 24-hours a day, barricading, restoration, cleanup, and other related appurtenances necessary to complete the job, whether specifically mentioned or implied.
6. Bypass Pumping / Pump & Haul, Sanitary Sewer: The completed work for sanitary sewer bypass pumping, as shown on the plans and detailed in the specifications, will be paid for at the contract price per lump sum (LS). Payment shall be based on the completion of the work in accordance with the plans and specifications. Price shall be payment in full for all labor, materials, and equipment required to set up, operate, and ensure uninterrupted sewer service during bypass pumping and/or pump and haul operation as necessary to maintain sewer service to users and to divert the flow of sewage around the area at which construction will occur. This pay item shall include, but is not limited to, bulkheads, pumping equipment capable of handling the anticipated flows, stand-by pumps, piping, valves, joints, fittings, thrust and restraint blocks, pumper trucks, temporary bypass structures, cost for electrical, fuel costs, back-up holding trucks for offsite disposal, handling fees, standby power source, pump operators available 24-hours a day, barricading, restoration, cleanup, and other related appurtenances necessary to complete the job, whether specifically mentioned or implied.
7. Forcemain, 14" HDPE DR 11 (DIPS): The completed work for forcemain installation by method of open cut and testing of the size as shown on the plans and specifications, will be paid for at the contract unit price per linear foot (LF). Payment shall be based on the horizontal field measurements from the point of beginning at existing forcemain connection to the point where the directional drilled forcemain begins. In addition, payment shall also include, but not be limited to, all fittings, pressure testing, clearing and grubbing, all

- excavation, trench box / sheet piling, field exploration, potholing, backfilling, stone bedding, density of backfilled materials, tracer wire, labor, equipment, furnishing all materials, accessories and all related items not paid for separately necessary to complete the installation according to the plans and approved methods. (See Standard Details in the plans).
8. Forcemain, 14" HDPE DR 11 (DIPS), Directional Drill: The completed work for forcemain installation by method of directional drilling and testing of the size as shown on the plans and specifications, will be paid for at the contract unit price per linear foot (LF). Payment shall be based on the horizontal field measurements from the point of beginning to the point where the new forcemain ends and discharges to proposed manhole. In addition, payment shall also include, but not be limited to, all fittings, pressure testing, clearing and grubbing, all excavation, trench box / sheet piling, field exploration, potholing, backfilling, stone bedding, density of backfilled materials, tracer wire, labor, equipment, furnishing all materials, accessories and all related items not paid for separately necessary to complete the installation according to the plans and approved methods. (See Standard Details in the plans).
 9. Sanitary Sewer, 15" HDPE DR 17 (DIPS), Directional Drill: The completed work for sanitary sewer installation and testing of the size as shown on the plans and specifications, will be paid for at the contract unit price per linear foot (LF). Payment shall be based on the horizontal field measurements from the point of beginning (at connection to manhole MH-#1849) to the point where bore and jack ends at the proposed doghouse manhole (MH-#1850). In addition, payment shall also include, but not be limited to, all fittings, pressure testing, clearing and grubbing, all excavation, trench box / sheet piling, field exploration, potholing, backfilling, stone bedding, density of backfilled materials, tracer wire, labor, equipment, furnishing all materials, accessories and all related items not paid for separately necessary to complete the installation according to the plans and approved methods. (See Standard Details in the plans).
 10. Sanitary Manhole, 4' Dia.: The completed work for sanitary manhole, 4-foot diameter will be paid for at the contract unit price per each (EA) as quoted in the proposal. Payment shall be based on the actual number of manholes, which includes, but is not limited to, materials shown in plans and in the detail for manholes. The unit price shall include, but not be limited to, all excavation, dewatering, trench box, tight sheeting, bulkheading, backfilling, trucking of materials on and off site, stone bedding, density of backfilled materials, trench box / sheet piling, manhole frame and cover, water stop, construction of flow channel, waterproofing, traffic control, labor, equipment, accessories and all related items not paid for separately necessary to complete the installation according to the plans and specifications.
 11. Doghouse Manhole, 4' Dia.: The completed work for doghouse manhole, 4-foot diameter will be paid for at the contract unit price per each (EA) as quoted in the proposal. Payment shall be based on the actual number of manholes, which includes, but is not limited to, materials shown in plans and in the detail for manholes. The unit price shall include, but not be limited to, all excavation, dewatering, trench box, tight sheeting, bulkheading, abandoning sewer, connections to existing sanitary sewer (typ of 2), backfilling, trucking of materials on and off site, stone bedding, density of backfilled materials, trench box / sheet piling, manhole frame and cover, water stop, construction of flow channel, waterproofing, traffic control, labor, equipment, accessories and all related items not paid for separately necessary to complete the installation according to the plans and specifications.

12. Connect to Existing Forcemain : The completed work for the connection to the existing forcemain shall be paid for at the contract unit price per each (EA). Payment shall be based on the actual number of new connections made. The unit price shall include, but not be limited to, all connections to existing valves, mechanical joint, HDPE to DI adaptor, field verification of existing forcemain, excavation, dewatering, backfilling, stone bedding, density of backfilled materials, trench box / sheet piling, thrust blocks, labor, equipment, traffic control, contractor shall verify type of pipe connection in the existing valve, accessories and all related items, not paid for separately, necessary to complete the installation according to the plans and specifications.
13. Connect to Manhole: The completed work for the connection to manholes will be paid for at the contract unit price each (EA). Payment shall be based on the actual number of forcemain and sanitary sewer (gravity) connections made at manholes MH-#1849 and MH-#1850 as indicated on the plans or as directed by the Engineer and not included in other line items. The unit price shall include pressure testing, all fittings, and accessories necessary to complete the work according to the plans and specifications.
14. Two Way Cleanout, 14": The completed work for installation and testing of two way cleanout of the size and type, as shown on the plans and detailed in the specifications, will be paid for at the contract unit price per each (EA) and shall be based on the actual quantity installed. Payment shall include, but not be limited to, procurement and installation of two way cleanouts as indicated on plans, all excavation, backfilling, stone bedding, density of backfilled materials, testing, labor, equipment, furnishing all materials, accessories and all related items not paid for separately necessary to complete the installation according to the plans and approved methods.
15. Gate Valve & Box, 10": The completed work for installation and testing of gate valve and box as shown on the plans and detailed in the specifications, will be paid for at the contract unit price per each (EA). Payment shall be based on the actual quantity constructed of the size and type specified. Payment shall include, but not be limited to, all excavation, backfill, labor, equipment, furnishing of materials and accessories and all related items not paid for separately necessary to complete the installation according to plans and approved methods.
16. Sidewalk Removal & Replacement: The completed work for the concrete walk will be paid for at the contract unit price square yard (SYD) on the basis of the actual quantity constructed within the limits of the plans. The unit price shall include, but is not limited to, concrete, forms, structural rebar, ADA accessible ramps, detectable warning surfaces, ADA landings, aggregate and sand subbase, as well as all other labor, materials, and equipment necessary to complete the work according to the plans and specifications.
17. Site Restoration and Clean-up: The completed work for restoration and clean-up will be paid for at the contract lump sum (LS) price. Payment shall be payment in full for soil erosion control measures, landscape repair/replacement, existing ditch and check dam repair / replacement, culvert replacement, raking, seedbed preparation, providing seed, fertilizer, mulch, topsoil and any labor or equipment necessary to complete the work as per the plans and specifications. If spring seeding is necessary, spring seeding will be required and included in the cost of this item.

B. South Airport Road Replacement – Two (2) West Bound Lanes

This cost is for the work that is needed as a direct result of the replacement of South Airport Road.

1. Mobilization: The completed work for mobilization will be paid for at the contract lump sum (LS) price. This payment shall be payment in full for equipment and material delivery, transportation and storage, bonds, insurances, all coordination with the GTCRC, MDOT, EGLE, Township, Engineers, public and all other labor and materials.
2. Traffic Control & Striping: The completed work for traffic control and striping will be paid for at the contract lump sum (LS) price. This payment shall be payment in full for temporary signage, flagging, re-routing of traffic, traffic painting as directed by the GTCRC and all coordination with the GTCRC, Township, Engineers, and public and all other labor and materials. The proposed traffic control to be implemented shall comply with 2020 MDOT Specifications.
3. Asphalt Surface Pulverize: The completed work for asphalt surface pulverizing shall be paid for at the contract unit price by the square yard (SY) on the basis of the actual quantity removed as indicated on plans. This unit price shall include, but not be limited to, pavement sawcuts, pavement removal and pulverization, disposal, and all other labor, materials, and equipment necessary to complete the work according to the plans and specifications. Any damage outside of the limits defined on the drawings will be repaired/replaced at no additional cost to the project.
4. Aggregate Base Conditioning: The completed work for aggregate base conditioning shall be paid for at the contract unit price by the square yard (SY) on the basis of the actual quantity conditioned as indicated on plans. This unit price shall include, but not be limited to, all excavation, crushing, shaping, grading aggregate base, subbase preparation, and all other labor, materials, and equipment necessary to complete the work in accordance with the plans and specifications. Any damage outside of the limits defined on the drawings will be repaired/replaced at no additional cost to the project.
5. Asphalt, Top & Base: The completed work for HMA top and base will be paid for at the contract unit price per ton (TN) basis as quoted in the bid and shall include all work as shown on the plans and in accordance with MDOT 2020 Standard Technical Specification and as directed by GTCRC. The price shall include but is not limited to aggregate base, bituminous surfacing, pavement joints, tack coating, asphalt pavement, and all other labor, materials and equipment necessary to complete the work in accordance with plans and specifications. Any damage outside of the limits defined on the drawings will be repaired/replaced at no additional cost to the project.
6. Site Restoration and Clean-up: The completed work for restoration and clean-up will be paid for at the contract lump sum (LS) price. Payment shall be payment in full for soil erosion control measures, landscape repair/replacement, existing ditch and check dam repair / replacement, culvert replacement, raking, seedbed preparation, providing seed, fertilizer, mulch, topsoil and any labor or equipment necessary to complete the work as per the plans and specifications. If spring seeding is necessary, spring seeding will be required and included in the cost of this item.

END OF SECTION 01270

SECTION 01543 PROTECTION OF ENVIRONMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. Contractor in executing work is to maintain work areas, on-and-off site in accordance with federal, state, or local regulations.
- B. The Contractor is responsible for any, and all clean-up of any hazardous waste that may be necessary, including all applicable costs for clean-up and disposal.

1.02 RELATED SECTIONS

- A. Section 01150 – Regulatory Requirements

1.03 LAWS AND REGULATIONS

- A. Environmental regulations may be met with different available technologies. It is the Contractor's sole responsibility to comply with these and all applicable environmental regulations.
- B. If a release occurs work will stop until corrective actions are complete as determined by the appropriate regulatory agency.

1.04 PROTECTION OF SEWERS

- A. Take adequate measures to prevent impairment of operation of existing sewer system. Prevent construction material, pavement, concrete, earth, or other debris from entering sewer or sewer structure.

1.05 PROTECTION OF WATERWAYS

- A. Observe rules and regulations of local and state agencies, and agencies of U.S. government prohibiting pollution of any lake, stream, river, or wetland by dumping of refuse, rubbish, dredge material, or debris therein.
- B. Provide containment that will divert flows, including storm flows and flows created by construction activity, to prevent loss of residues and excessive silting of waterways or flooding damage to property.
- C. Comply with procedures outlined in U.S. EPA manuals entitled "Guidelines for Erosion and Sedimentation Control Planning and Implementation," Manual EPA-72- 015 and "Processes, Procedures, and Methods to Control Pollution Resulting from all Construction Activity," Manual EPA 43019-73-007.
- D. Comply with EGLE / USACE Joint Permit for Inland Lakes and Streams, Great Lakes, Wetlands, Floodplains, Dams, Environmental Areas, High Risk Erosion Areas and Critical Dune Areas requirements and regulations.

1.06 DISPOSAL OF EXCESS EXCAVATED AND OTHER WASTE MATERIALS

- A. Dispose of waste material in accordance with federal and state codes, and local zoning ordinances.

- B. Unacceptable disposal sites include, but are not limited to, sites within wetland or critical habitat, and sites where disposal will have detrimental effect on surface water or groundwater quality.
- C. Make arrangements for disposal, subject to submission of proof to Engineer that Owner(s) of proposed site(s) has valid fill permit issued by appropriate government agency and submission of haul route plan, including map of proposed route(s).
- D. Provide watertight conveyance for liquid, semi-liquid, or saturated solids that have potential to leak during transport. Liquid loss from transported materials is not permitted, whether being delivered to construction site or hauled away for disposal. Fluid materials hauled for disposal must be specifically acceptable at selected disposal site.
- E. Project site is considered unacceptable disposal site due proximity to surface waters, floodplains and wetland areas.

1.07 PROTECTION OF AIR QUALITY

- A. Contain paint aerosols and VOCs by acceptable work practices.
- B. Minimize air pollution by requiring use of properly operating combustion emission control devices on construction vehicles and equipment used by Contractor, and encouraging shutdown of motorized equipment not actually in use.
- C. Trash burning not permitted on construction site.
- D. If temporary heating devices are necessary for protection of work, they are not to cause air pollution.

1.08 PROTECTION FROM FUEL AND SOLVENTS

- A. Protect the ground from spills of fuel, oils, petroleum distillates, or solvents by use of containment system.
- B. Total paint, thinner, oils, and fuel delivered to and stored on-site cannot exceed supplied capacity of spill containment provided (i.e. fuel and oil to be sized to exceed possible spill).
- C. Provide proper containment unit under fuel tank and oil reservoirs for all equipment and fuel storage tanks.
- D. Barrels of solvents, even for cleaning, are prohibited. Do not deliver paint thinners in containers greater than five (5) gallons.
- E. Disposal of waste fluids are to be in conformance with federal, state, and local laws and regulations.

1.09 USE OF CHEMICALS

- A. Chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant, or of other classification, must show approval of U.S. EPA, U.S. Department of Agriculture, state, or other applicable regulatory agency.
- B. Use of such chemicals and disposal of residues are to be in conformance with manufacturer's written instructions and applicable regulatory requirements.

1.10 NOISE CONTROL

- A. Conduct operations to cause least annoyance to residents in vicinity of work and comply with applicable local ordinances.
- B. Equip compressors, hoists, and other apparatus with mechanical devices necessary to minimize noise and dust. Equip compressors with silencers on intake lines.
- C. Equip gasoline or oil-operated equipment with silencers or mufflers on intake and exhaust lines.
- D. Route vehicles carrying materials over such streets as will cause least annoyance to public and do not operate on public streets between hours of 6:00 P.M. and 7:00 A.M., or on Saturdays, Sundays, or legal holidays unless approved by Owner.

PART 2 - PRODUCTS

(Not Applicable)

PART 3 - EXECUTION

3.01 HAZARDOUS MATERIALS PROJECT PROCEDURES

- A. Applicable Regulations:
 - 1. RCRA, 1976 – Resource Conservation and Recovery Act: This federal statute regulates generation, transportation, treatment, storage and disposal of hazardous wastes nationally.
 - 2. Act 64, 1979 – Michigan’s Hazardous Waste Management Act: This statute regulates generation, transportation, treatment, storage, and disposal of hazardous wastes.
 - 3. Act 451, 1994 – Natural Resources and Environmental Protection Act: This statute regulates discharge of certain substances into the environment, regulates use of certain lands, waters and other natural resources.
 - 4. Act 641 as amended 1990 – Michigan’s Solid Waste Act: This statute regulates generation, transportation, treatment, storage and disposal of solid wastes.
- B. Use the Uniform Hazardous Waste Manifest (shipping paper) to use an off-site hazardous waste disposal facility.
- C. Federal, State and local laws and regulations may apply to the storage, handling and disposal of hazardous materials and wastes. The list below includes the regulations which are most frequently encountered:

TopicAgency and Telephone Number

Small quantity hazardous waste management, including hazardous waste stored in tanks

Hazardous Waste Division, EGLE
(517) 373-2730 in Lansing, or District
Office Certified County Health
Department

Hazard Communication Standards (for chemical in the workplace)	Occupational Health Division, Michigan Department of Consumer and Industrial Services (517) 373-1410
Burning of waste oil and other discharges to the air	Air Quality Division, EGLE (517) 322-1333 in Lansing, or District Office
Local fire prevention regulations and codes (including chemical storage requirements)	Local fire chief or fire marshal

D. Department of Environment, Great Lakes, and Energy
Hazardous Waste Division
Compliance Section District Offices

Cadillac District Office
120 W. Chaplin St.,
Cadillac, MI 49601
(231) 775-3960

SECTION 02080 – DIRECTIONALLY DRILLED SANITARY FORCEMAIN & GRAVITY SEWER

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section includes work required to place a specified size and type of pipe under an existing structure, roadway, wetland, body of water, railroad or as specified on the Engineering Drawings by horizontal directional drilling without disturbing their condition or use.

1.02 SUBMITTALS

- A. Type of Equipment and Materials.
 - 1. Pipe material certification.
 - 2. Evidence of an environmentally safe drilling fluid.
 - 3. Material Safety Data Sheets (MSDS) for all materials used.
- B. Permits:
 - 1. Supply written verification that all directional boring equipment and materials are in compliance to applicable permit requirements.
 - 2. Submit this verification for the Engineer's approvals prior to beginning this work.
 - 3. Obtain any required permits for the legal and proper directional boring operation under the existing obstacle.

1.03 JOB CONDITIONS

- A. General: Refer to Instructions to Bidders.
- B. Other Jurisdictions: Comply with all permit requirements.
- C. Launching and Receiving Areas: Arrange for necessary area with Owner. All work to be completed within the limits of the Right-of-Way and/or Township owned property as designated on plans.
- D. It shall be the Contractor's responsibility to verify any subsurface investigation information provided and perform all investigation as deemed necessary.

1.04 SCHEDULING

- A. General: Coordinate with Engineer and Owner.
- B. Special Conditions: Where special use or conditions of an overlaying obstacle exist, schedule the work so as not to alter, interfere, or endanger the obstacle.
- C. Permit Scheduling: Conduct the work in such a manner as to comply with any permit scheduling requirements.
- D. Restoration: Restore area promptly after completion of the backfill operation.

1.05 WARRANTIES

- A. General: Refer to General Conditions.
- B. Permit Obligations: Uphold all warranties spelled out and implied in the conditions of the applicable permits.

1.07 START-UP

- A. General: provide written scheduling notification to the Engineer, prior to start-up.
- B. Obtain written approval from the Engineer of acquisition and compliance with all applicable permits by the Contractor prior to start-up.
- C. Provide all equipment, materials, and personnel necessary for non-stop completion of the directional boring operation prior to start-up, including all equipment and materials for safety.

PART 2- PRODUCTS

2.01 MATERIALS

- A. Boring Device: Provide mechanical means or equipment to complete boring operation through any potential soil type.
- B. Drilling Fluid: Provide sufficient drilling fluid to allow for flowable slurry capable of maintaining the integrity of the bore hole.
- C. Pipe:
 - 1. Forcemain : High Density Polyethylene (HDPE), DR 11, (DIPS) ASTM D3350, Class 3408 for sanitary forcemains.
 - 2. Gravity Sewer: High Density Polyethylene (HDPE), DR 17, (DIPS) ASTM D3350, Class 3408 for gravity sewer.
- E. Tracer Wire: Refer to Standard Technical Specifications, Section 8 "Forcemains".
 - 1. Installed for both forcemain and gravity sewer.

PART 3-EXECUTION

3.01 PREPARATION

- A. Clearing: Clear all areas as necessary.
- B. Drilling Fluid Pits:
 - 1. Line pits with necessary lining to prevent seepage into native soils.
 - 2. Comply with applicable codes and regulations.

3.02 LAUNCHING

- A. Allow for connection to existing/proposed utility with necessary cover and/or grade.
- B. Penetration Angle:
 - 1. Acceptable Range-8°-20° measured from horizontal.
 - 2. Comply with drilling equipment manufacturer's recommendations.

3.03 TRACKING

- A. Monitor Progress of Drilling Unit:
 - 1. Maintain scheduled line and grade within 0.5 ft. on vertical and ± 1 ft. on horizontal.
 - 2. **Maintain scheduled line and grade within 0.02 ft. on vertical and 0.2 ft. on horizontal for the gravity sewer portion to be directionally drilled only.**
 - 3. Adjust pipe location (horizontal and vertical) accordingly throughout the process to maintain tolerances.
- B. Isolated High Points: Not acceptable.

3.04 RECEIVING

- A. Exit angle to be between 5° and 12° measured from horizontal.

3.05 ACCURACY

- A. If greater than 10 lineal feet to right or left, or more than 10 lineal feet short or 50 feet long, consult Owner and Engineer for approval.

3.06 FIELD QUALITY CONTROL

- A. Consult applicable Section of Specifications for utility being placed.
- B. The directionally-drilled gravity sewer shall be deflection tested, either by a go-no go, mandrel test or another suitable method approved by EGLE.
- C. The directionally-drilled gravity sewer pipe shall be visually checked to verify that the tolerances have been maintained throughout the bore.

END OF SECTION 02080

SECTION 02240 - DEWATERING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes construction dewatering.

1.2 PERFORMANCE REQUIREMENTS

- A. Dewatering Performance: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.
- B. Contractor is responsible to obtain authorization under Part 327 of Act 451 for any new or increased quantity withdrawal exceeds 100,000 gallons per day. Contractor is also responsible to obtain Part 327 permit for new or increased flows over 2,000, 000 gallons per day.

1.3 SUBMITTALS

- A. Shop Drawings: For dewatering system. Show arrangement, locations, and details of wells and well points; locations of risers, headers, filters, pumps, power units, discharge lines, piezometers, and flow-measuring devices; and means of discharge, control of sediment, and disposal of water.
- B. Delegated-Design Submittal: For dewatering system indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with governing EPA, EGLE, and local SESC notification regulations before beginning dewatering. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Preinstallation Conference: Conduct conference at location of dewatering system installation a minimum of forty-eight (48) hours prior to start of installation.

1.5 PROJECT CONDITIONS

- A. During dewatering, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations for comparison with original elevations. Promptly notify Engineer if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction.

PART 2 - EXECUTION

2.1 INSTALLATION

- A. Provide temporary grading to facilitate dewatering and control of surface water.
- B. Monitor dewatering systems continuously.
- C. Protect and maintain temporary erosion and sedimentation controls during dewatering operations.
- D. Install dewatering system utilizing wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.
 - 1. Space well points or wells at intervals required to provide sufficient dewatering.
 - 2. Use filters or other means to prevent pumping of fine sands or silts from the subsurface.
- E. Before excavating below ground-water level, place system into operation to lower water to specified levels. Operate system continuously until drains, sewers, and structures have been constructed and fill materials have been placed or until dewatering is no longer required.
- F. Provide an adequate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Install sufficient dewatering equipment to drain water-bearing strata above and below bottom of foundations, drains, sewers, and other excavations.
 - 1. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.
- G. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations.
 - 1. Maintain piezometric water level a minimum of 24 inches below surface of excavation.
- H. Provide standby equipment on site, installed and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails. If dewatering requirements are not satisfied due to inadequacy or failure of dewatering system, restore damaged structures and foundation soils at no additional expense to Owner.
 - 1. Remove dewatering system from Project site on completion of dewatering. Plug or fill well holes with sand or cut off and cap wells a minimum of 36 inches below overlying construction.

END OF SECTION 02240

GENERAL REQUIREMENTS

1.01 PROJECT DESCRIPTION

Work includes the following major items:

- Forcemain Replacement Scope of work to include:
 - Installation of approximately 1200 LF 14" HDPE, DR 11 (DIPS) forcemain by method of Hydraulic Directional Drill (HDD) to cross South Airport Road and the Boardman River from Pump Station No. 2 and run east along South Airport Road to Park Drive.
 - Installation of approximately 45 LF 14" HDPE, DR 11 (DIPS) forcemain by method of open cut near existing forcemain connection.
 - Connect to existing forcemain with wye, including adapters, valves and boxes, fittings, reducers and appurtenances.
 - Installation of standard sanitary manhole and approximately 120 LF 15" HDPE, DR 17 (DIPS) sanitary sewer by method of Hydraulic Directional Drill (HDD) across Park Drive.
 - Doghouse manhole over existing 15" sanitary sewer on Park Drive including connections to existing sanitary sewer.
 - Work to include all SESC controls, cleanup and restoration.
- South Airport Asphalt Replacement scope of work to include:
 - The (2) two west bound lanes of South Airport Road require replacement following the forcemain failure as required by GTCRC as follows:
 - Pulverize approximately 2350 square yards of existing asphalt surface.
 - Aggregate Base Conditioning
 - Approximately 600 ton asphalt, top and base, cross section to match existing.

1.02 DEFINITIONS

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

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

1.02 QUALIFICATIONS

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

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

PRECONSTRUCTION CONFERENCE

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

1.03 LINES AND GRADES FOR CONSTRUCTION

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

1.04 PROGRESS SCHEDULE

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

1.05 INTERFERENCE WITH EXISTING WATER AND/OR SEWAGE SYSTEM

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

1.06 RELATIONS TO OTHER CONTRACTORS AND UTILITY FORCES

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

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

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

1.07 PERMITTING AGENCIES

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

1.08 ACCESS TO WORK

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

1.09 SUBMITTALS

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

1.10 STREAM CROSSINGS

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

1.11 DUST AND NOISE REDUCTION

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

1.12 MATERIAL CERTIFICATION

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

1.14 MAINTENANCE BOND REQUIREMENTS

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

1.15 INSURANCE REQUIREMENTS

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

1.16 ESCROW FOR TELEMETRY REQUIREMENTS

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

SECTION 2

STANDARDS AND REGULATIONS

2.01 REFERENCE STANDARDS

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

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

2.02 REGULATORY REQUIREMENTS

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

PROJECT CLOSE OUT

3.01 CLEANUP

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

3.02 OPERATING AND MAINTENANCE DATA

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

A. Pumps

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

B. Control Panel Operation and Maintenance Manual

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

C. Electrical Wiring

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

3.03 GUARANTEE

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

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

3.04 FINAL COMPLETION/ACCEPTANCE OF PROJECT BY TOWNSHIP

A. Township Projects

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

B. Private Projects

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

C. Closeout Documents (As applicable)

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

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

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

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

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

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

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

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

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

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

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

Table 3.1

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

Table 3.2

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

GRAND TRAVERSE COUNTY

WATER/SEWER SYSTEM CLOSEOUT CHECKLIST

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

Check If Completed:

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

SECTION 3
PROJECT CLOSE OUT

25	Completion of Punch List Items	3.04. C.1	
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SECTION 4

EXCAVATION, TRENCHING AND BACKFILLING

4.01 SCOPE OF WORK

The work covered by this section shall consist of furnishing all materials, equipment and labor for the excavating, trenching, backfilling, and bore and jack required to install or repair sanitary sewers, water mains and other structures as shown on the plans and referred to in these specifications.

4.02 MATERIALS

A. Backfill Material

All backfill material shall be free from cinders, ashes, refuse, sod, frozen lumps, vegetable or organic material, clumps of clay, boulders, rocks or stones or other material which, in the opinion of the Design Engineer, is unsuitable. However, from one foot above the top of the pipe to the subgrade of the pavement, material containing stones up to three (3) inches in their greatest dimension may be used.

Where the type of backfill material is not specified, the Contractor may backfill with the excavated material provided that such material meets the requirements described above. Where excavated material is to be used for backfill and there is a deficiency due to a rejection of part thereof, the Contractor shall furnish the required amount of sand, gravel or other approved material at no additional cost.

B. Bore and Jack Materials

1. Steel Pipe

Jacked in place steel pipe shall meet the requirements of either ASTM A53, Type E or S, Grade B or ASTM A139, Grade B.

The ends of all steel pipe to be jacked shall be field welding at joints.

The nominal outside diameter and minimum wall thicknesses of steel pipe to be jacked in place shall be as shown below. Minimum wall thickness for railroad crossings may be reduced by 0.063 inch if cathodic protection is provided per railroad specifications.

SECTION 4
EXCAVATION, TRENCHING AND BACKFILLING

Nominal Size	Nominal Outside Diameter (inches)	Minimum Wall Thickness Required (inches)	
		M.D.O.T.	Railroads
2"	2.375	0.154	0.251
4"	4.500	0.188	0.251
6"	6.625	0.188	0.251
8"	8.625	0.188	0.251
10"	10.750	0.188	0.251
12"	12.750	0.188	0.251
14"	14.000	0.250	0.282
16"	16.000	0.250	0.282
18"	18.000	0.250	0.313
20"	20.000	0.250	0.344
22"	22.000	0.250	0.375
24"	24.000	0.250	0.407
26"	26.000	0.312	0.438
28"	28.000	0.312	0.469
30"	30.000	0.312	0.469
34"	34.000	0.312	0.532

2. Grout:

Grout shall consist of a mixture of Portland cement and sand which does not have more than 50 percent sand by volume.

C. Directional Drill Materials

1. Refer to Sections 8 and 9.

4.03 EXECUTION

A. Excavation

Excavation includes clearing the site of the proposed work and removal of all materials to a depth which is sufficient to permit the construction of the structure or utility in accordance with the plans. Excavated materials may be temporarily stored along the trench in a manner that will not cause damage to trees, shrubbery, or other properties and that will not endanger the banks of the trench by imposing too great a load thereon.

B. Length and Width of Trench

Not more than 200 feet of open trench will be permitted at a time without approval from the Design Engineer and Township Engineer, unless

pedestrian bridges are maintained at 200-foot intervals and vehicular crossings of at least one lane are maintained at 300 foot intervals.

Streets shall not be completely blocked without written permission from the Design Engineer and roadway officials. All fire alarm boxes and fire hydrants must be kept clear and accessible at all times.

The width of the trench shall be ample to permit the pipe to be laid and joined properly and the backfill to be placed and compacted as specified.

In order to limit excessive loads on the pipe, the maximum width of trench shall not be more than two feet greater than the nominal inside diameter of the pipe. This limitation shall apply to the width of the trench at the top of the pipe. Trenches shall be of such extra width, when required, as will permit the convenient placing of timber supports, sheeting and bracing and handling of special conditions.

C. Bracing, Sheeting and Shoring

Open cut trenches shall be sheeted and braced as required by any governing federal or state laws and municipal ordinances and as may be necessary to protect life, property or the work. When close sheeting is required, it shall be so driven as to prevent adjacent soil from entering the trench either below or through such sheeting. Where sheeting and bracing are used, the trench width shall be increased accordingly. An approved pipe laying trench box may be used in lieu of sheeting where safety of the workmen and/or protection of the work is the sole consideration, if allowed by governing authorities.

Sheeting and bracing left in place must be removed for a depth of three (3) feet below the established finish grade or the existing surface, whichever is lower.

Trench bracing, except that which must be left in place, may be removed when the backfilling has reached the respective levels of such bracing. Sheeting, except that which has been ordered left in place, shall be removed as the backfilling progresses.

D. Dewatering

The Contractor shall provide and maintain adequate dewatering facilities for removal and disposal of water from trenches or other excavations. The Contractor shall provide dewatering facilities for bulkheaded sewer sections and shall operate same until bulkheads have been removed or construction is completed, if bulkheads are to be left in place. The dewatering system must be maintained until the pipe has been covered with sufficient backfill material to prevent floating of the installed pipe sections.

Where work is in ground containing an excessive amount of water, the Contractor shall provide, install and maintain a suitable dewatering system and shall so operate it to insure proper construction of the work. Monitoring wells shall be provided as necessary to determine the groundwater levels along the alignment and shaft locations. The determination of whether an excessive groundwater condition exists, that is, or might be detrimental to the sewer or water main construction will be made by the Design Engineer. Proper disposal of the dewatering discharge (necessary easements, permits, erosion control, etc.) shall be the responsibility of the Contractor. Dewatering operations shall conform to the requirements of all federal, state, and local agencies having jurisdiction. Dewatering water discharged to streams, drains or sewers may require permits from federal, state or local agencies having jurisdiction. The CONTRACTOR shall comply with all water quality requirements prior to discharging dewatering water. The CONTRACTOR shall be responsible for all testing and treatment required to meet water quality requirements prior to discharge. CONTRACTOR must take all steps necessary, during dewatering, 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. Contractor shall not discharge or allow any groundwater to enter existing sanitary sewage system. Any water which does enter the existing sewage system shall be the Contractor's responsibility and he will pay any and all transporting and treatment costs involved with this water according to the local municipal authority. Cost of pumping, bailing and draining shall be incidental to and included in the price of the pipe or structure placed in the excavation.

The Contractor shall provide a proposed dewatering plan for the Engineer and Owner to approve prior to implementing. Contractor is responsible to obtain authorization under Part 327 of Act 451 for any new or increased quantity withdrawal exceeds 100,000 gallons per day. Contractor is also responsible to obtain Part 327 permit for new or increased flows over 2,000, 000 gallons per day.

E. Excavation to Grade

The trench shall be excavated to the depth required so as to provide a uniform and continuous bearing and support for the pipe barrel. The Contractor shall excavate the last four inches of depth to grade using hand tools.

Any part of the bottom of the trench excavated below the specified grade shall be refilled with approved materials and thoroughly compacted to a minimum of 95% of the maximum dry density as determined by ASTM D698 or the Michigan Cone Method. The finished subgrade shall be prepared accurately by means of hand tools. Blocking to bring the pipe to grade will not be permitted. Bell holes in the subgrade must be provided to allow for continuous support of the pipe barrel when bell type pipe is used.

If, in the opinion of the Design Engineer (with concurrence of the Township Engineer), subgrade pipe support conditions at some locations are found to be unsatisfactory, they shall have the authority to order subgrade preparation at these locations in accordance with the provisions for special foundations in clay, rock or poor soils.

F. Special Foundation in Clay or Rock

Subgrade consisting of clay or rock shall be excavated to at least four inches and not more than six (6) inches below the specified grade. Before the pipe is laid, the subgrade shall be prepared by backfilling with an approved granular material in three inch compacted layers. The layers shall be thoroughly tamped as directed by the Design Engineer so as to provide a uniform and continuous bearing and support for the pipe barrel with a minimum compaction of 95% of the herein defined maximum dry density. The Contractor will not be allowed extra compensation for this work.

G. Special Foundations in Poor Soil

Where the bottom of the trench at subgrade is found to consist of unstable material which will, in the opinion of the Design Engineer, not provide adequate pipe support, the Design Engineer shall have authority to require either the removal of the unstable material and replacement with approved materials or require the Contractor to construct a foundation for the pipe consisting of piling timber or other materials in accordance with plans prepared by the Design Engineer. The use of stone bedding by the Contractor to reduce dewatering requirements will not be paid as an extra.

H. Backfilling around Pipes

From the bottom of the trench to a depth of one (1) foot above the top of the pipe, the trench shall be backfilled by hand with sand or approved excavated materials and tamped to a minimum of 95% of the herein defined maximum dry density.

The Contractor shall use care in placing this portion of the backfill to make sure sufficient material has been worked under the pipe and also avoid damaging or moving the pipe. Backfilling around PVC pipe shall be done in accordance with ASTM D2321 "Standard Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe".

I. Backfilling to Natural Grade

From one (1) foot above the pipe to the grade shown on the drawing or specified herein, the trench shall be backfilled by mechanical methods approved by the Design Engineer. A minimum compaction of 85% of maximum unit weight is required, unless otherwise noted.

Provide 30 inches of cover above the top of the pipe before application of wheel loading and 48 inches before use of heavy compactors.

J. Backfill under Structures

Where the excavation is made through or under existing or proposed pavement, curb, shoulders, driveways or sidewalks or where such structures are undercut by the excavation or where noted on the plans, the entire backfill to the subgrade of the structure shall be made with granular material. The granular material backfill shall be placed in layers and compacted to 95% of the herein defined maximum dry density throughout. This requirement shall apply to any trench that is within a one-on-three slope beneath the road from the shoulder point or back of curb line. Extra compensation will not be allowed for this work.

Granular material is defined as a material meeting granular material Class II as defined in M.D.O.T. Standard Specifications.

K. Special Backfilling Requirements

The Contractor will be required to comply with the regulations of the State Highway, Municipal or County Road Engineering Departments with regard to backfilling in their respective right-of-ways and beneath the roads, and shall be responsible for determining these regulations prior to bidding.

L. Compaction Testing

Compaction testing may be periodically performed by a source and method approved by the Township Engineer to insure that compaction requirements are being met. Compaction percentage is based on the maximum dry density as determined by ASTM D698 or the Michigan Cone Method.

M. Boring and Jacking

The following provisions apply to the construction of sewers, force mains, water mains and house leads which cross pavements under the control of the Michigan Department of Transportation, County Road Commission, or under railroads. The Contractor will be required to comply with the regulations of the State Highway, Municipal and/or or County Road Engineering Departments.

1. General

Steel pipes shall be jacked in place under highways as specified in the current standards published by the Michigan Department of Transportation. Pipe jacked in place under railroads shall meet the current standards established by the affected railroad. The Design Engineer shall incorporate bore and jack requirements into the contract documents. After the pipe has been installed in the steel casing pipe, the casing pipe shall be pressure grouted with an MDOT approved flowable fill or blown full of pea stone and the ends sealed with concrete.

2. Location of Jacking Pits:

a. State Highways

The minimum distance of the jacking pit to the edge of pavement will be specified by the M.D.O.T. and placed on the plans or contract documents by the Design Engineer.

b. County Roads

On all highways, a minimum distance of 15 feet shall be provided from edge of pavement to the face of boring pits. Any variances from these distances will require tight sheeting or other means as approved by MDOT and if a traffic hazard, permanent guard rail will be required.

c. Railroads

The location of the jacking pit will be specified by the Railroad and/or the Design Engineer.

3. The boring machine shall be capable of assuring a crossing with no voids.

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EXCAVATION, TRENCHING AND BACKFILLING

- a. In solid clay soils the cutting head or the auger, if no head is used, may be allowed to within one inch of the front of the casing.
- b. In sandy soils the cutting head or the auger, if no head is used, must be inside the casing at least 1/2 the diameter of the casing.
- c. If the soil is both clay and sand, the same procedure as for sand shall apply.
- d. In wet, sandy or gravelly type soils that have a tendency to move or run, the cutting head and/or auger shall be pulled back to at least three feet from the front of the casing.
- e. When boring is used to facilitate jacking pipe in place, the minimum diameter of the lead auger section shall be 1/2 inch smaller than the inside diameter of the pipe being jacked.
- f. Trenchless pipe placement - methods such as trenchless pneumatic piercing tools utilized to perform horizontal bores must be approved by the Township Engineer prior to its use.

N. Directional Drilling

This Section includes work required to place a specified size and type of pipe under an existing structure, roadway, wetland, body of water, railroad or as specified on the Engineering Drawings by horizontal directional drilling, or Bore & Jack without disturbing their condition or use.

1. Preparation

- A. Clearing: Clear all areas as necessary.
- B. Drilling Fluid Pits:
 - 1. Line pits with necessary lining to prevent seepage into native soils.
 - 2. Comply with applicable codes and regulations.

2. Launching

- A. Allow for connection to existing/proposed utility with necessary cover and/or grade.

B. Penetration Angle:

1. Acceptable Range-8°-20° measured from horizontal.
2. Comply with drilling equipment manufacturer's recommendations.

3. Tracking

A. Monitor Progress of Drilling Unit:

1. Maintain scheduled line and grade within 0.5 ft. on vertical and ± 1 ft. on horizontal.
2. Maintain scheduled line and grade within 0.02 ft. on vertical and 0.2 ft. on horizontal for the gravity sewer portion to be directionally drilled only
3. Adjust pipe location (horizontal and vertical) accordingly throughout the process to maintain tolerances.

B. Isolated High Points: Not acceptable.

4. Receiving

- A. Exit angle to be between 5° and 12° measured from horizontal.

5. Accuracy

- A. If greater than 10 lineal feet to right or left, or more than 10 lineal feet short or 50 feet long, consult Owner and Engineer for approval.

SECTION 5

CONCRETE WORK

5.01 SCOPE OF WORK

The work under this section shall include all materials, labor and equipment necessary to achieve a finished product, including but not limited to the items in these specifications and those shown on the working drawings. Work includes, but is not limited to foundations, ballasts, building footings, floor slabs, sidewalks, curb and gutter, driveways, etc.

All procedures and materials shall be in accordance with the American Concrete Institute "Building Code Requirements for Structural Concrete" (ACI 318) and "Specifications for Structural Concrete" (ACI 301).

5.02 MATERIALS

- A. Cement: Portland cement shall conform to "Specification for Portland Cement" (ASTM C150).
- B. Aggregates: Concrete aggregates shall conform to "Specification for Concrete Aggregates" (ASTM C33). Maximum coarse aggregate size for all members less than eight (8) inches in thickness shall be 3/4 inch. For members with thicknesses greater than or equal to eight (8) inches, the maximum coarse aggregate size shall be 1-1/2 inches.
- C. Mixing Water: All water used in concrete shall be from a potable water supply.
- D. Concrete Mix Proportions

ACI 318 shall be used for selecting concrete proportions. The Contractor shall furnish, for the Engineer's approval, all information necessary to show compliance with ACI 318.

5.03 EXECUTION

- A. Product

The Contractor shall be responsible to verify soil conditions and water table to demonstrate ballast is adequate sized and construct at no additional cost to project.

- B. Concrete Quality

All concrete shall meet the requirements of ACI 318 and shall have a minimum compressive strength of 4000 psi

Air entrainment for exposed concrete shall be per ACI 318 for Severe Exposure.

The concrete shall be of a consistency to work easily into corners, angles of forms and around reinforcement.

B. Mixing and Placing Concrete

1. Preparation of Equipment and Place of Deposit:

- a. Before placement, all equipment for mixing and transporting the concrete shall be cleaned and all debris and ice shall be removed from the places to be occupied by the concrete.
- b. Water shall be removed from place of deposit before concrete is placed. All latents and other unsound material shall be removed from hardened concrete before additional concrete is added.
- c. Expansion joint material shall be placed at all locations where concrete is placed against a structure.

2. Mixing:

- a. Concrete shall be mixed and delivered in accordance with the "Specification for Ready Mixed Concrete" (ASTM C94).
- b. For job mixed concrete, the mixer shall be rotated at a speed recommended by the manufacturer. If mixer performance tests are not made, each batch of 1 cubic yard or less shall be mixed for at least 1 minute after all materials are in the mixer. The mixing time shall be increased 15 seconds for each additional cubic yard or fraction thereof. The entire batch shall be discharged before the mixer is recharged.

3. Conveying:

- a. Concrete shall be conveyed from the mixer to the place of final deposit by methods that will prevent separation or loss of materials.
- b. Conveying equipment shall be of such size and design as to ensure a nearly continuous flow of concrete at the delivery point without separation of materials or loss of plasticity.

4. Depositing:

- a. Concrete shall be deposited as nearly as possible in its final position to avoid segregation due to rehandling or flowing. Concrete shall be placed at such a rate that it is at all times plastic and flows readily. No concrete contaminated by foreign material shall be used nor shall retempered concrete be used.
 - b. When placing is started, it shall be carried on as a continuous operation until placement of a well defined section is completed.
 - c. All concrete shall be thoroughly consolidated during placement. It shall be thoroughly worked around embedded fixtures and into the corners of the forms.
5. Hot & Cold Weather Requirements:
- a. Concrete placement during hot weather shall be in accordance with "Hot Weather Concreting" (ACI 305). Concrete placement during cold weather shall be in accordance with "Cold Weather Concreting" (ACI 306).

SECTION 6

SANITARY SEWER MAIN

6.01 SCOPE

The work covered by this section of the specifications consists of the furnishing of all plant, labor, materials, equipment and supervision and performing all operations involved in the construction of sanitary sewer mains in accordance with the provisions of the Plans and Specifications and subject to the terms and conditions of the Contract Documents.

Sanitary sewer leads and sewer appurtenances are covered under Section 7 of these specifications.

6.02 MATERIALS

A. Sewer Pipe

1. General

- a. Sewer pipe, unless otherwise indicated on the plans or authorized in writing by the Township, shall be new, unused material of the size and type shown on the plans and shall conform to the requirements of these specifications.
- b. Pipe, materials and accessories offered by the Contractor shall be the standard products of reputable manufacturers normally engaged in the manufacturing of the particular item in question. The Township Engineer shall have the final approval of a pipe manufacturer.

2. Sewer Pipe Selection

The sanitary sewer pipe used at a particular location shall be based on depth of bury as shown in Table 6-1.

If the depth of cover over the sewer changes during construction or is different than the depths shown on the approved project plans, it shall be the responsibility of the Design Engineer to ensure that the correct material is utilized.

TABLE 6-1 Determination of Sanitary Sewer Pipe Material

Depth of Bury	Sanitary Sewer Pipe Allowed
0' to 16.00'	PVC SDR 35, Truss Pipe, Ductile Iron
16.01' & over	Truss Pipe, Ductile Iron, PVC SDR 26

An entire sewer segment must be constructed of the same pipe material. If greater than 50% of the sewer pipe in a given segment has a depth of bury of 16.01' or greater, then the heavier pipe material shall be used.

3. PVC Sewer Pipe

PVC sanitary sewer pipe 15 inches in diameter and smaller shall meet the requirements of ASTM Designation D-3034, "Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings". The minimum wall thickness shall conform to SDR-35 for depth of bury less than 16'. The minimum wall thickness shall conform to SDR-26 for depth of bury over 16', as noted in 6.02.A.2. Sewer lead pipe shall be Schedule 40 PVC.

PVC sanitary sewer pipe 18 inches to 27 inches in diameter shall meet the requirements of ASTM Designation F-679 , "Standard Specification for Polyvinyl Chloride (PVC) Large Diameter Plastic Gravity Sewer Pipe and Fittings". The minimum wall thickness shall conform to ASTM Designation T-1.

The use of PVC sewer pipe requires special attention to proper subgrade and backfilling procedures as specified in Section 4 – Excavation, Trenching and Backfilling. Failure of the Contractor to provide proper construction will result in probable excessive deflection of the PVC pipe and require replacement by the Contractor at no additional cost to the Owner.

4. Ductile Iron Pipe

Ductile iron pipe shall meet the requirements of ANSI A21-50 A21-51, and AWWA C151, and shall be of the design thickness classification as indicated on the plans.

5. Composite Sewer Pipe (Truss Pipe)

Composite sanitary sewer pipe shall meet the requirements of ASTM Designation D 2680. The thermoplastic linings may be ABS or PVC.

B. Pipe Joints

1. For PVC Sewer Pipe: PVC sewer pipe joints shall be elastomeric gasket type, in accordance with ASTM D3212 (elastomeric gasket type).
2. For Ductile Iron Pipe: Ductile iron pipe joints shall conform to the following:
 - a. Flange joints shall meet ANSI B 16.1, Class 125.
 - b. Mechanical joints shall meet ANSI A21.11, and AWWA C111, or Federal Specification WW-P-421.
 - c. Rubber gasket joints shall be of a bell and spigot type "TYTON", "SUPER BELL-TITE" or equal.
3. For Composite Sewer Pipe (Truss Pipe): Composite Sewer Pipe (Truss Pipe) joints shall be bell and spigot type gasketed joints meeting ASTM D3212.

C. Pipe Fittings

Pipe fittings in sewer lines shall correspond in type, size, class, joints and all other respects with the type of pipe used as specified above including the applicable ASTM requirements. Where linings and coatings are specified for pipe, the fittings to be used in conjunction therewith shall have the same lining and coating.

Fittings shall be used in ductile iron pipe lines as required, whether specifically called for or not, according to the best practice in installation of these lines. A manhole water stop shall be provided at each manhole connection as shown in the standard details.

As approved by the Township Engineer, specifically designed adapters shall be used to connect pipes of different materials of construction. The adapters shall be constructed of flexible materials and clamped onto the pipe with stainless steel bands. Use mastic, solvent weld or rubber gasket seals and encase in concrete to prevent displacement. Fittings shall not be used to connect pipes of different diameters.

6.03 EXECUTION

A. Excavation

As specified in "Excavation, Trenching and Backfilling".

B. Laying Sewer Main

Thermoplastic sewer pipe shall be installed per ASTM designation D 2321 unless otherwise indicated in these specifications. Rigid pipe types (DIP) shall conform to ASTM C12. Embedment material shall conform to ASTM D2321 standards unless otherwise indicated herein, or in the standard details.

Pipes located inside structures or above ground shall be rigidly supported as shown on the plans or as specified herein. The full length of each section of underground pipe shall rest solidly upon the prepared bed of undisturbed earth or compacted backfill with recesses only to accommodate pipe bells and joints. Any pipe which has its grade, alignment or joints disturbed after laying shall be taken up and re-laid. The interior of all pipe shall be thoroughly cleaned of all foreign matter before being lowered into the trench and shall be kept clean during laying operations.

The pipe shall not be laid in water or when trench or weather conditions are unsuitable for work. Water shall be kept out of the trench until the joints and backfilling are completed. When the work is not in progress, open ends of pipe and fittings shall be securely closed so that no water, earth or other foreign substances can enter the line.

All sanitary sewer main shall be laid using a pipe laser for alignment and grade. The Contractor shall be responsible for checking their work using the hubs, stakes, and/or benchmarks provided by the Owner and/or Design Engineer. Any sewer found to have a grade or alignment that varies by more than 10% from the plan grade or elevation will be considered deficient. Variations up to 10% will not be accepted if this variation results in a pipe that is below the minimum slope as defined for that pipe diameter in the latest version of Recommended Standards for Wastewater Facilities (Ten State Standards). The Design Engineer and Township Engineer will determine if the deficiency is serious enough to affect the objective of the project. The Contractor shall remove and re-lay any deficient sewer, if directed by the Design Engineer or Township Engineer, at no additional cost to the Owner or Township.

Any section of pipe found to be defective, either before or after laying, shall be replaced with new pipe at the Contractor's expense. If repairs are necessary, Fernco adaptors will NOT be allowed for main line pipe, unless approved by the Township Engineer. The same pipe material must be used including a PVC sleeve for all repairs.

The Township Engineer shall be notified at least 48 hours prior to the start of laying sewer main.

C. Placement within Easements

Where sewer lines are shown crossing private property, the alignment of the sewers shall be as shown on the plans and as directed by the Engineer and extra care must be taken to ensure that the sewer is centered in the easement and all work is done within the construction easements.

D. Handling

The sewer pipe shall be handled at all times in such a manner as to ensure delivery to the site and installation in a sound, undamaged condition. Any damaged or defective pipe or other materials will not be accepted. PVC pipe shall not be stored or handled in a manner which will permit exposure to sunlight for extended periods of time.

E. Horizontal and Vertical Separation

Sewers shall be laid at least 10 feet horizontally from any existing or proposed water mains, water service leads, 50 feet from private residential potable wells, 75 feet from public type IIb/III potable wells, and 200 feet from public type I/IIa potable wells. This distance shall be measured edge to edge. Should local conditions exist which do not allow for this separation, the Township Engineer and the Michigan Department of Environment, Great Lakes and Energy, Water Resources Division and the Office of Drinking Water and Municipal Assistance need to approve any special construction methods proposed (casing, sleeving, etc.).

Sewers crossing water mains shall be laid to provide a minimum vertical distance of 18 inches between the outside of the pipes. This shall be the case where the water main is either above or below the sewer. The crossing shall be arranged so that one full length of sewer pipe shall be centered with respect to the water pipe. Where a water main crosses a sewer, adequate structural support shall be provided to prevent damage. If the 18-inch isolation distance cannot be maintained due to site constraints, then approval from the EGLE Water Resources Division will be required for the special construction method proposed (casing, sleeving, etc.)

When it is impossible to obtain proper horizontal and vertical separation as stipulated above, the sewer shall be designed and constructed equal to water pipe and shall be pressure tested to assure watertightness prior to backfilling.

Sewer mains shall maintain appropriate distance from buildings and/or structures to ensure ability to provide trench with 1:1 slope in the case of maintenance / replacement of main without impacting the building. Landscaping is not allowed over sewer main and shall maintain a 10 ft minimum distance from all main.

In all cases, state and local permit requirements shall be adhered to.

F. Placement of Sewer Pipe

The pipe shall be placed as soon as possible after the trench excavation has been made. The pipe shall be carefully laid to the required grade in a prepared trench, up-grade from structure to structure, with the bell or groove end of the pipe up-grade. Each section shall have a firm bearing throughout its length with recesses only to accommodate pipe bells and joints. Any pipe which has its alignment, grade or joints disturbed after laying shall be removed and re-laid. The joints and interior of all pipe shall be thoroughly cleaned of all foreign matter before being lowered into the trench and shall be kept clean during the laying operations. Starting sewer construction in the middle of a project must be approved in writing by the Township Engineer.

Water shall be kept out of the trench until the material of the joints has hardened and the trench partially backfilled to prevent floating of the pipe. When work is not in progress, open ends of pipe and fittings shall be securely closed so that no trench water, earth or other foreign substance can enter the line.

G. Joints

Joints shall be of the material specified and shall be placed in accordance with the manufacturer's specifications.

H. Backfilling

As specified in Section 4 - "Excavation, Trenching and Backfilling".

I. Cleaning Sewers

The sanitary sewer main must be clean at the time of acceptance. If, at any time, there is an accumulation of earth or silt in the pipe, the Contractor shall clean out and remove such deposits at their own expense.

J. Acceptance Tests

1. Air Testing

All new sewers shall be subjected to air, infiltration or exfiltration tests or a combination of same prior to acceptance by the Owner. All tests for acceptance of the sewer line shall be witnessed by the Township Engineer. All sewers where the groundwater level above the crown of the sewer at the upstream manhole is over seven (7) feet shall be

subjected to air tests or infiltration tests. If an exfiltration test is performed, the maximum exfiltration rate shall be the same as that permitted from infiltration. For the purposes of exfiltration testing, the internal water level shall be equal to the external water level plus seven (7) feet as measured from the crown of the pipe at the upstream manhole.

No sewer lines will be accepted until testing has been satisfactorily completed and approved. Testing shall be completed within 30 days of laying operations.

Where groundwater conditions require dewatering operations in order to construct sewers, the Contractor may, at his option, perform preliminary air tests after backfilling and while the dewatering equipment is still operating. After dewatering operations have ceased and the groundwater has stabilized at its normal level seven (7) feet or less above the sewer and if the preliminary air test was satisfactory, the preliminary air test may be accepted as final.

Maximum allowable infiltration shall not exceed 100 gallons per inch of diameter per mile of pipe per 24 hours for any individual run between manholes.

The procedure for air testing of rigid pipes such as DIP must conform to ASTM C828 (VCP) or ASTM C924 (concrete) as determined and approved by the engineer or as otherwise recommended by the pipe manufacturer.

The procedure for air testing of PVC (flexible/plastic pipe) sewers shall conform to ASTM F1417 and be as follows:

The sewer line shall be tested in increments between manholes. All leads and wyes shown on the plans must be in place prior to testing. The lines shall be cleaned and plugged at each manhole. Such plugs shall be designed to hold against the test pressure, be braced in place, and shall provide an air tight seal. There shall be no standing water in the pipe during testing operations. One of the plugs shall have an orifice through which air can be introduced into the sewer. An air supply line shall be connected to the orifice. The air supply line shall be fitted with suitable control valves and a pressure gauge for continually measuring the air pressure in the sewer. The pressure gauge shall have a minimum diameter of 3-1/2 inches and a range of 0-10 PSIG. The gauge shall have minimum divisions of 0.10 PSIG and an accuracy of ± 0.04 PSIG.

The sewer shall be pressurized to 4 PSIG greater than the greatest back pressure caused by groundwater over the top of the sewer pipe. Greatest back pressure is determined by averaging groundwater

depth over the top of the pipe averaged at each manhole and multiplying by 0.433 to obtain psi. At least two (2) minutes shall be allowed for the air pressure to stabilize between 3.5 and 4 PSIG. If necessary, air shall be added to the sewer to maintain a minimum pressure of 3.5 PSIG during the stabilization period.

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 less than 3.5 PSIG or such other pressure as is necessary to compensate for groundwater level.

The air test shall be performed for the duration shown in Table 6-2. The air pressure shall not drop over 1.0 psi during this test period.

TABLE 6-2 Required Test Time for Air Pressure Testing

Pipe Diameter In Inches	Duration of Air Test in Minutes per 100 ft. of Sewer Pipe Length (minutes)
6	3.0
8	4.0
10	5.0
12	5.5
15	7.5
18	8.5
21	10.5
24	11.5

If a sewer segment fails to pass the air pressure test, the Contractor shall determine the location of the deficiency, repair them and retest the sewer. The sewer will not be accepted until satisfactory results are obtained.

The actual groundwater level for sanitary sewers subject to air tests shall be determined by the Township Engineer or Resident Project Representative.

The air test pressure shall be adjusted to compensate for the maximum probable groundwater level above the top of the sewer pipe that is being tested.

The method of testing and measurement shall be approved by the Township Engineer. The Contractor shall provide the necessary equipment and labor for making tests and the cost of same shall be included in the unit price bid for completed sewer.

Chemical grouting will be considered an acceptable method of

repairing leaking pipe joints. Before this type of repair is undertaken, the Contractor shall obtain approval of the Township Engineer to hire a pipe grouting firm for making such repairs. Additionally, if chemical grouting of pipe joints is necessary, this operation must be performed under the observation of the Township Engineer and a complete report of all grouting operations shall be furnished to the Township Engineer upon completion.

2. Deflection Testing of Thermoplastic Sewer Pipe

Thermoplastic sewer pipe shall be tested for vertical deflection. **Deflection tests shall be performed on 100 percent of the total footage of PVC sewer.**

Truss sewer pipe will also require testing for deflection.

This testing shall be carried out under the observation of the Township Engineer using a Go-No-Go device (mandrel) approved by the Township Engineer and furnished by the Contractor. The deflection testing shall be performed at least thirty (30) days after final backfill of the trench. The maximum allowable vertical deflection of the cross section of the pipe will be five percent (5%) of the actual internal pipe diameter. If the results show the deflection of any sewer to be in excess of allowable, then the Contractor shall make repairs by re-excavation and compaction or replacement prior to acceptance.

The deflection testing must be satisfactorily completed prior to final acceptance of the sewer. There will be no additional payment for deflection testing performed while the sanitary sewer is in service if the Township executes their right to utilize the sewer upon Substantial Completion. The Township Engineer shall be notified at least 24 hours prior to deflection testing of the sewer.

3. Television Inspection

All new sewers shall be inspected after installation by means of closed circuit television. Video taping equipment shall have a running footage indication for aiding in locating all wyes, defects, etc. which is displayed and permanently recorded on the video tape of the section being filmed. The complete system shall be permanently recorded using video tape along with handwritten documentation indicating all information such as wye location, defects, infiltration and cleanliness. Immediately upon completion of the filming, the finished videos shall be turned over to the Township Engineer on a flash drive or CD. Wyes and laterals shall be in place prior to the television inspection. This television

inspection work will be done under the direction and observation of the Township Engineer. The Contractor shall notify the Township Engineer at least 24 hours prior to the television inspection.

The television inspection shall be completed prior to the final acceptance of the sewer section. The Township may exercise their option to use the sewer upon substantial completion. No additional payment will be made for televising the sewer under live conditions.

Any defect in the sewer construction observed during the television inspection such as poor grade, cracked or leaking pipe sections or excessive amounts of debris shall be corrected by the Contractor immediately. Sections with defects will have to be re-televised after the repairs are made.

4. Visual Observation

Any observed defects in the sewer or groundwater flowing in the sewer shall be repaired by the Contractor prior to final acceptance.

K. Certification

The manufacturer of pipe and fittings shall furnish a certification statement that all pipe and fittings furnished to the project have been inspected and tested in accordance with the applicable specifications. Pipe will be subject to inspection and approval upon delivery and no cracked, broken, damaged or defective pipe or fitting shall be laid in the work. Any piece that is found to be defective after it has been laid shall be removed by the Contractor and replaced by a sound and perfect piece. Material certifications must be received prior to final acceptance and/or final payment for the work.

SANITARY SEWER APPURTENANCES

7.01 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 as shown on the Project Plans or Standard Details. This work includes, but is not limited to, the following items:

1. Sewer Manholes
2. Connection to Existing Sewers
3. Sewer Wyes and Leads

A. 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 Township 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 4' in diameter. Manholes shall be delivered to the project in an undamaged condition. Any manhole, which shows visible 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 meeting ASTM C923. The waterstop shall be of a design acceptable to the Engineer and the pipe manufacturer. Waterstops shall be KOR-N-SEAL as manufactured by Telleborg; 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 and watertight. 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 the interior or the exterior.
 - a. Interior Manhole Waterproofing Material: The materials to be used for interior manhole waterproofing shall be "Drycon" as manufactured by IPA Systems, Inc., "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 steel-reinforced plastic. Steps shall not be aligned over the pipe and shall align over opening for easier access. Polypropylene plastic, steel reinforced, manhole steps shall also be furnished, minimum width 12". They shall be #PS1-PF manhole steps as manufactured by M.A. Industries, Inc., of Peachtree City, Georgia or equal.
4. 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 similar to an EJIW#1040 with Type A solid cover or equal. Manholes located within existing or proposed pavement areas shall also be installed with a 3" metal adjusting ring between the frame and cover. Metal adjustment rings shall be tack welded in at least 6 locations inside and out to secure the ring to the frame.

Hinged Manhole units may be used for certain applications. Openings must meet the same specifications as above. The use of this type of Manhole frame and covers must be approved by Township Engineer and the Owner.

B. Sewer Wyes and Sewer Leads

Sewer leads shall be Schedule 40 Polyvinyl Chloride (PVC) with solvent welded joints as defined in ASTM D-2672 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).

Refer to attached Appendix for IPP Manhole Policy Guide

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. Clean-outs will be allowed at the end of a sanitary sewer main stub where a future extension is anticipated, if there are no service connections. Otherwise, a manhole will be required, if there are sewer leads installed on the sewer main.

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 utilizing butyl sealant strips as approved by the concrete manufacturer. The sealant 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 Township 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.

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

In high ground water applications it may be required to utilize WrapidSeal (or equal). This shrinkable material shall create a barrier to water infiltration to protect the manhole support and structure from ground moisture.

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 installing a waterstop.

When a new manhole is to be installed over an existing line, it shall be initially placed without cutting into the existing pipe. The existing pipe shall not be cut into 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 Standard details in the plans.

The sewer lead is defined as the sewer pipe (including the wye), between the sewer main installation to the property/easement line 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 (provided by the Design Engineer) or as staked in the field by the Design Engineer or Engineering 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 Engineering Representative, Design Engineer, or Township 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 in one (1) location at its termination, at the plug (see the Standard Detail) with a treated wood post.. The post at the end of the stub it must be installed from the bottom of the stub to 18" above grade and approximately 4 ½' deep. For leads deeper than 12', use wood post that provides an 18" (±) 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 Engineering Representative. The Contractor shall allow the Engineering Representative to obtain necessary record measurements on the lead installation prior to backfilling. If the sewer leads are backfilled without notification to the Engineering 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 Lead Cleanouts

Sewer lead 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.

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 8

FORCE MAINS

8.01 SCOPE OF WORK

The work covered by this section of the specifications consists in the furnishing of all plant, labor, materials, equipment and/or in performing all operations necessary for the installation of the force mains, valves and fittings, complete, in accordance with these specifications and applicable drawings.

When selecting pipe materials for force main the design engineer should clearly understand that the Township Engineer that reviews the final plans, and the Michigan Department of Environment, Great Lakes, and Energy (EGLE) , will have the final say as to which type is preferred for any given location

8.02 MATERIALS

A. Pipe Materials

1. Ductile Iron Pipe and Fittings shall be designed in accordance with the latest revision of ANSI specifications A 21.50 and A 21.51 and AWWA C151. The pipe shall be designed to withstand a minimum working pressure of 150 psi and a minimum hydrostatic test pressure of 300 psi. The pipe shall also be designed for a minimum laying depth of 6'.

All ductile iron pipe and fittings shall be coated on the outside with a bituminous coating of either coal tar or asphalt base one mil thick at the point of manufacture in accordance with the specifications of the American Water Works Association. All ductile iron pipe shall be cement lined, standard thickness, in accordance with ANSI A 21.4. The spigot ends of all pipe lengths which have been cut in the field shall be ground to a smooth surface, tapered back about 1/8" at an angle of 30 degrees with the pipe centerline, and painted with two coats of asphaltum metal protective paint.

Ductile iron pipe shall conform to the dimensions set forth in the table below. Tolerances permitted in ANSI specifications listed above will apply. Pipe classes shown on the plans shall control. Ductile iron pipe shall be utilized for all force mains larger than 3". An alternate material may be allowed on a case by case situation subject to Township approval.

Pipe Size Nominal Inside Diameter in Inches	Outside Diameter In Inches	Pipe Barrel Thickness in Inches	Thickness Class
4"	4.80	0.26	51
6"	6.90	0.25	50
8"	9.05	0.27	50
10"	11.10	0.29	50
12"	13.20	0.31	50
14"	15.30	0.36	51
16"	17.40	0.37	51
18"	19.50	0.41	52
20"	21.60	0.42	52

2. Polyvinyl chloride (PVC) pipe shall meet the requirements for Type 1, Grade 1 (PVC 1120) of ASTM Specification D-1784 and ASTM D-2241, Standard Specification for PVC pipe (SDR-PR). PVC pipe shall be a minimum rating of Class 200, SDR 21.
3. High Density Polyethylene Pipe (HDPE) for directional drilled applications shall be Ductile Iron Pipe Size (DIPS) and shall meet either of the following two (2) pressure class rating systems:

AWWA C906 or ASTM F714

Working pressure of at least 200 psi

Working pressure and Surge Pressure of at least 300 psi

All HDPE pipe shall be joined by heat fusion per manufacturer's requirements. HDPE sections shall be pressure tested independently of other Force main. See Section 8.04 of these specifications. This method and locations must be approved by the Township Engineer. Refer to standard details for the connection of ductile iron pipe to HDPE. The use of HDPE requires special attention as specified in Section 4 – Excavation, Trenching and Backfilling.

HDPE pipe shall be inspected prior to installation by a qualified person or by the Township Engineer. If damage is found to be unacceptable according to the manufacturer, then suitable efforts shall be made to repair the damaged pipe or the pipe shall be rejected from use.

4. Fusible Polyvinyl Chloride Pipe (FPVC) for directionally drilled applications shall be DR 14, Class 12454 per ASTM D1784 as

supplied by Underground Solutions, or equal, and meet the following conditions.

Pipe Size Standard	Dimension Ratio (DR)	Working Pressure	Working Pressure + Surge Pressure
DIPS	14	200 psi	300 psi

All Fusible PVC pipe shall be joined by heat fusion per manufacturer's requirements. River crossing section shall be pressure tested independently of other force main. See Section 8.04 of these specifications. This method and locations must be approved by the Township Engineer. Refer to standard details for the connection of ductile iron pipe to Fusible PVC.

The use of PVC C900 shall be as specified in Section 4 – Excavation, Trenching and Backfilling.

Fusible PVC pipe shall be inspected prior to installation by a qualified person or by the Township Engineer. If damage is found to be unacceptable according to the manufacturer, then suitable efforts shall be made to repair the damaged pipe or the pipe shall be rejected from use.

B. Pipe Joints

1. Flanged joints shall be made with flanges, bolts, nuts, washers and gaskets, conforming to ANSI Standard B 16.1, Class 125.
2. Mechanical joints for cast and ductile iron pipe shall conform to ANSI Standard A21.11 and AWWA C111 or to Federal Specifications WW-P-421.
3. Rubber gasket joints for cast and ductile iron pipe shall be of a bell and spigot type conforming to ANSI Standard A21.11. These joints shall be similar to "TYTON" as manufactured by the U.S. Pipe and Foundry Co., "SUPER BELL TITE" as manufactured by James B. Clow & Sons, Inc. or equal.
4. Rubber gasket joints for PVC pipe shall be of bell and spigot type meeting ASTM D3139 requirements. The pipe shall be jointed by the means of rubber ring, which shall be an integral and homogeneous part of the pipe barrel.

C. Valves and Appurtenances

1. Gate valves shall meet the requirements of AWWA Standard C500 or C515 of the American Water Works Association. Valves shall be designed for not less than 150 psi working pressure and shall be tested for leakage and distortion under a hydraulic pressure of not less than 150 psi. Under such pressure, the valves shall show no leakage or distortion.

All gate valves shall be cast iron body, fully bronze mounted, bronze stem double disc gate valves or resilient seated gate valves. Each valve shall have a clear waterway equivalent in area, when open, to that of the connecting pipe. Valves shall be made to close when turned to the right or clockwise. All valves shall be operated by non-rising stems and shall have square wrench nuts, or hand-wheel operators with an opening arrow cast in the metal.

2. Plug valves shall be 100% port eccentric with ¼ turn feature . Valve bodies shall be suitably marked to indicate whether the valve is open or closed.

Valves shall provide full size top access cover with adjustable packing that is removable to facilitate maintenance without valve removal. Valve body and cover shall be ductile iron, ASTM Standard A126, with ANSI class 125 flanges. The interior and exterior of the body shall be epoxy-coated. Valves shall be provided with ductile iron plug that is fully encapsulated with molded rubber and include 2" operating nut with adjustable/removable lever handle.

- a. The valves shall be rated for 175 psi. Valves shall be Valmatic Cam-centric; or engineer approved equal.

3. Ball valves shall allow a straight through flow to minimize Turbulence and pressure loss and utilized as isolation valves in meter / bypass chamber. Valve body and cover shall be ductile iron, ASTM Standard A126, with ANSI class 125 flanges. The interior and exterior of the body shall be epoxy-coated. Valves shall be provided with a PTFE infused stainless steel ball with a 304 stainless steel stem blowout-proof stem. PTFE seats and seals. The stem seal shall be PTFE, externally adjustable chevron type. Shall be provided with a 2" operating nut with adjustable/removable lever handle. Valve shall provide bi-directional, tight shutoff with ¼ turn feature. The valves shall be rated for 150 psi. Valve bodies shall be marked to indicate whether valve is open or closed. All ball valves shall be designed to operate drip free with a pressure of 50 psi on both sides, or either side of the valve.

- a. Ball valves shall be American, Series 4000; or engineer approved equal.

4. Check valves shall be

AWWA C508 Resilient Hinge

Swing Check Valve and have a ASTM A536 ductile iron body with a minimum non-shock W.O.G. working pressure of 250 psi. Seats shall be Buna-N mounted on the disc and shall provide leak-proof closing. The flexible disc shall be one piece and precision molded with alloy steel and Nylon reinforcement and an integral O-ring style seat for drip tight seating at low pressure. An internal 316 Stainless Steel spring assist for rapid closure shall be provided. Valves shall be for mounting between ANSI 125 pound standard drill flat faced flanges unless otherwise specified or shown on the drawings. Valve shall be provided to incorporate a bottom threaded port with be provided / installed with a backflow device to accommodate flushing. The device shall be "rising stem" style and constructed of brass/stainless steel. Valve shall incorporate a mechanical position indicator to provide a visual indication of the disc location.

4. Valve operators shall be provided for all sewage and sludge valves of a type as indicated on the plans. Valve operators shall be of sufficient size and strength to overcome expected maximum operating torque. Valve operators found to be inadequate strength will be replaced by the Contractor at no expense to the Owner or the Township.

All valves 8" and larger are to have a crank, handwheel, chain wheel or square nut for buried service, totally enclosed, weatherproof worm gear or traveling screw-type operators with indicators.

For automatic (if required by the drawings) operation, cylinder, rotary or similar types of electric or pneumatic actuators may be used regardless of valve size. Various accessories shall be used, depending on the application, such as positioners, limit switches, solenoid valves, speed controls and failsafe assemblies.

5. Valve boxes shall be cast-iron, three piece, adjustable type with a 5-1/4" shaft. Covers shall be furnished with fingerholes and marked "SEWER". Valve boxes shall be similar to that as manufactured by the East Jordan Iron Works, Clow Corporation or equal.
6. Pipe supports, where required, shall be of the adjustable type made to support cast iron type pipe.

8.03 INSTALLATION OF PIPE AND FITTINGS FOR FORCE MAIN

All pipe and fittings shall be installed in strict accordance with the recommendations of the manufacturer. Piping and fittings for force mains shall be of the types and materials hereinbefore specified. The pipe and accessories shall be new and unused.

The interior of the pipe and fittings shall be thoroughly cleaned of foreign matter before being lowered into the trench and shall be kept clean during laying operations by plugging the ends or other approved methods. When work is not in progress, open ends of pipe and fittings shall be securely closed so that no trench water, earth, animals or other substance will enter the pipes.

No pipe or fittings shall be laid in water or when the trench or weather conditions are unsuitable for work, except by permission of the Township Engineer.

The full length of each section of pipe shall rest solidly upon the pipe bed with recesses provided to accommodate the bells and joints. Deflections from a straight line or grade, as required by vertical curves, horizontal curves or offsets, shall not exceed 1" per lineal foot of pipe for pipe less than 10" in diameter between the centerlines extended of any two connecting pipes. If the alignment requires deflections in excess of these limitations, special bends or a sufficient number of shorter lengths of pipe shall be furnished to provide the angular deflection required.

When pipe is cut in the field, the outside of the cut end shall be tapered back about $\frac{1}{8}$ " at an angle of 30 degrees with the centerline of pipe to remove any sharp, rough edges and painted with two coats of asphaltum metal protective paint.

Fittings at bends in the pipeline shall be firmly wedged against the undisturbed, vertical face of the trench to prevent the fittings from being blown off the lines when under pressure. Concrete thrust blocks shall be installed at all deflections as shown on the drawings or as directed by the Township Engineer.

Where pipe ends are left for future connections, they shall be valved, plugged or capped as called for on the drawings. Where connections are made between new work and existing mains, the connections shall be made by using specials and fittings required to suit the actual conditions.

All PVC or HDPE force main shall be laid with a continuous tracer wire, per Section 8.10. Tracer wire shall be laid six inches (6") above force main. Tracer wire shall terminate in a tracer wire box. Tracer wire box shall be placed at each clean-out or approximately every four hundred feet (400').

8.04 DIRECTIONALLY DRILLED FORCE MAIN

A. Description

This work shall consist of constructing underground crossings of rivers or wetlands using the directional drilling method of placing pipe to serve as carrier pipe.

B. Depth of Bore

The minimum depth of drill using this method shall be 6' of cover below existing grade, and a minimum depth of 3' under any existing stream.

C. Construction Method

This method consists of auguring or jacking a steerable rod; then pulling back a cone that expands the soil or a wing cutter, which cuts a hole big enough to obtain the desired diameter. The diameter of the reamer or wing cutter is not to exceed the diameter of the pipe being placed plus 2".

A drilling fluid of water and bentonite may be used in all operations of a directional drill. The use of a polymer for lubrication in the drilling fluid is acceptable.

Connection to HDPE and PVC Pipe shall not be made immediately after the pipe has been installed. It is recommended to wait overnight so that the pipe can approach an equilibrium temperature with its surrounding environments. Linear dimensions will vary with temperature changes. A tracer wire, adequate for future location of the pipe, shall be installed with all HDPE and PVC projects, in accordance with Section 8.09 of these Specifications.

8.05 HYDROSTATIC TESTS FOR FORCE MAIN

The force main or sections thereof shall be tested by the Contractor in the presence of the Township Resident Project Representative and all leaks shall be made tight to meet the requirements below. The Contractor shall furnish all piping, bulkheads, pumps, gauges and other equipment required to carry out the testing.

The section of main to be tested shall be filled with water at least 24 hours prior to starting the test.

At the start of testing, the main shall be pumped up to a pressure of 150 psi and the test period shall start immediately thereafter. The line shall then be maintained under this test pressure for a continuous period of two hours by pumping water into the line at frequent intervals. The volume of water so added shall be measured and considered to represent the leakage from the line under test during the interval. In calculating leakage, the Township Engineer will make allowance for added joints in the line over the normal for unit lengths of pipe. The leakage per 1,000' under the conditions of test shall not exceed the values shown in the

following table, in accordance with AWWA Standard C600 for Ductile Iron and C605 for Plastic Pipe:

Hydrostatic testing allowance per 1,000 ft of pipeline-gph
Test Pressure 150 psi

Nominal Pipe diameter	Maximum Leakage Gallons Per Hour Per 1,000 Feet of Pipeline
6"	0.50
8"	0.66
10"	0.83
12"	0.99
14"	1.16
16"	1.32
18"	1.49
20"	1.66
24"	1.99

In the event that the leakage exceeds the specified amount, the joints in the line shall be carefully inspected for leaks and repaired where necessary. Any pipes or special casting found to be cracked shall be removed and replaced by new pieces by the Contractor. After this work has been done, the test shall be repeated. Final acceptance of the lines will not be made until satisfactory tests have been passed.

8.06 MARKING PIPE

Each piece of cast iron pipe and each cast iron fitting shall have its weight and class designation conspicuously painted or cast on it. All other pipe materials shall have the class designation painted thereon. Where required, other designation marks shall be painted on the pipe or fittings to indicate correct location of the pipe section in conformity to a detailed layout plan.

8.07 PAINTING

All pipe, valves, bolts and any other portions of force main exposed inside manholes and other structures shall be painted per the table below. If necessary, heat shall be provided to maintain good drying conditions. All items to be painted shall be dry and clean before application of the paint. Any rust or scale shall be removed by wire brushing or scraping. All piping must be painted prior to operating the system with color selection by DPW.

1 Coat - "Kopper's Plug Primer" or equal
(350 S.F./Gal.)

2 Coats - "Kopper's Rustamor 500" or equal
(500 S.F./Gal.)

8.08 THRUST BLOCKS

Concrete thrust blocks shall be poured on hand excavated, undisturbed soil bearing surfaces, of a minimum size as shown on the Standard Details, or increased in size according to the actual bearing values of the soil in each location, or as directed by the Township Engineer.

Thrust blocks shall be made of 3,000 psi concrete, wet mix. Concrete thrust blocks shall be placed at all 22-1/2 degree bends or greater, dead ends, tees, reducers, hydrants, and crosses as required. Pre-cast thrust blocks may be utilized for certain applications if approved by the Township Engineer. Retainer glands shall be utilized on all mechanical joint fittings.

8.09 EXCAVATION, TRENCHING AND BACKFILLING

Excavation, trenching and backfilling shall conform to Section 4

8.10 PIPE LOCATOR

Directional Drilled

A continuous 1/4" diameter stainless steel cable shall be installed along with the plastic pipe for use as a locator wire on all directionally drilled projects. Contractor shall verify continuity of the locator wire prior to acceptance by the engineer. The 1/4" stainless steel cable locator wire shall be looped at 400' intervals and installed within a tracer wire access box. This tracer wire box shall be made of cast iron with a permanently attached 3"x12" ABS tube with a flared end to secure it in the ground. It shall be tamper resistant, with a cast iron locking lid and stainless steel terminal connections on the bottom side to which the tracer wires/cables are attached. Lid will open using a standard AWWA pentagon key. Tracer wire access box as distributed by USA Blue Book shall be utilized or equal. Located at each tracer wire access box a flexible rebounding marking post must be installed. This marking post must be able to snap back to its normal position when hit. It must extend at least 3' above ground for visibility and have a width of 4". This flexible green rebounding marking post must have a permanent decal applied indicating "Warning Force Main Pipeline". This marker size and type must be approved by the owner.

Open-Cut

Tracer wire (#10 solid copper insulated trace wire) must be brought up into all valve boxes,, metering houses and metering pits. The locator wire shall be looped at 400' intervals and installed within a tracer wire access box. This tracer wire box shall be made of cast iron with a permanently attached 3"x12" ABS tube with a flared end to secure it in the ground. It shall be tamper resistant, with a cast iron locking lid and stainless steel terminal connections on the bottom side to which the tracer wires/cables are attached. Lid will open using a standard AWWA pentagon key. Tracer wire access box as distributed by USA Blue Book shall be utilized or

equal. Located at each tracer wire access box a flexible rebounding marking post must be installed. This marking post must be able to snap back to its normal position when hit. It must extend at least 3' above ground for visibility and have a width of 4". This flexible green rebounding marking post must have a permanent decal applied indicating "Warning Force Main Pipeline". This marker size and type must be approved by the owner. All underground splices shall be butt spliced, sealed, and waterproofed. This will be done using the heat shrink method and electrical coating, or approved equal. Wire nuts and black tape will not be allowed. Underground caution tape must also be used. Must read "Caution Force Main Buried Below". This must be at a minimum depth of 1' and no more than 2' below finished grade.

8.11 AIR RELEASE VALVES AND MANHOLES

Air release valves and manholes shall be constructed as detailed on the detail drawings.

8.12 FORCE MAIN CLEANOUTS

Force main cleanouts shall be constructed as shown on the detail drawings.

8.13 CERTIFICATION

The manufacturer of pipe and fittings shall furnish a certified statement that all pipe and fittings furnished by him have been inspected and tested in accordance with the applicable specifications. Pipe will be subject to inspection and approval upon delivery and no cracked, broken, damaged or defective pipe or fittings shall be laid in the work. Any piece that is found to be defective after it has been laid shall be removed by the Contractor and replaced by a sound and perfect piece at no additional cost to the Owner or Township.

REPLACEMENT AND CLEANUP

13.01 SCOPE OF WORK

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

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

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

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

13.02 PAVEMENT RESTORATION

A. General

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

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

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

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

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

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

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

B. Bituminous Patching

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

C. Gravel Roads, Driveways and Shoulders

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

D. Concrete Pavement, Sidewalk and Driveways

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

13.03 GRASS AREA

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

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

A. Topsoil

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

B. Seeding and Fertilizing

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

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

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

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

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

C. Mulching

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

D. Mulching Anchoring

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

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

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

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

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

13.04 DITCHES

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

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

Catch basins shall be reconstructed, if removed or damaged.

13.05 FENCE REPLACEMENT

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

13.06 COMMERCIAL SIGNS

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

13.07 BUILDING SEWERS

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

13.08 OTHER DEBRIS

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

13.09 TREES

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

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

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

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