2.03 FLOWABLE FILL:

A. Flowable fill shall be low strength, lean mix, flowable mortar meeting the specifications in Article 3.05 SCHEDULES.

PART 3 - EXECUTION

3.01 PREPARATION:

A. Alignment and Grade:
   1. Deviations: Notify OWNER's ENGINEER and obtain instructions to proceed where there is a grade discrepancy or an obstruction not shown on the plans.
   2. Laser Beam Control: Provide.
   3. Check grade: At set-up point, 25 foot, 50 foot, 100 foot and 200 foot points thereafter to the next set-up point. Pipe invert elevation is to be measured prior to setting manhole cone for as-built drawings.
   4. Projector advancement: Reset at each manhole.

B. Bedding:
   1. Method: See Article 3.05 SCHEDULES.
   2. Provide bedding area backfill in accordance with MDOT Standard Plan No. R-83B.
   3. Provide continuous bearing by supporting entire length of pipe barrel evenly.

3.02 INSTALLATION:

A. Laying pipe:
   1. Direction shall be upstream with spigot or tongue end downstream and bell end upstream.
   2. Joints shall be smooth and clean.
   3. Place pipe length and bedding as a unit in a frost free, dry trench.
   4. Special supports and saddles: See Article 3.05 SCHEDULES.
   5. Sewer joints within 10-feet and above watermain offset, shall be encased in concrete (ref. 02220-201.A.3)
   6. Minimum grade for 8-inch pipe: 0.45%.

Pipe Size	Minimum Required Slope
8"	0.45%
10"	0.32%
12"	0.26%
15"	0.20%
18"	0.16%
21"	0.12%
24"	0.10%
27"	0.08%
30"	0.06%

B. Jointing:
   1. Provide solvents, adhesives and lubricants as furnished by Manufacturer.
   2. Gasket position: Confirm that the gasket is in place and that the joint is properly made.

C. Manholes:
   1. General: See Article 3.05 SCHEDULES:
   2. Base bedding: Provide 4-inch pea stone with full and even bearing in impervious soils or wet conditions. Otherwise provide on undisturbed, frost-free, dry subgrade.
   3. Fill joint space completely and trowel between sections of precast units.
   4. Provide casting grade setting as follows:
      a. Existing pavement: Finished grade.
      b. Gravel grade: 6 inches below in road R.O.W (only).
      c. Unpaved areas: Finished grade.
   5. Provide waterproofing on ASTM C478 units and cast-in-place manholes using one of the following methods:
      a. Bituminous: Apply 1 gallon per 100 sq.ft. to outside free of holidays and open pin holes
      b. Cement: Apply masonry filler to outside by brushing on two (2) coats, each minimum of 2 lbs. per sq. yd.
   6. Flow channels:
      a. Construct with concrete up to spring line of pipe unless otherwise directed by Township and slope towards center of manhole. Trowel smooth.
      b. Minimum elevation difference between pipe inverts: 0.1 feet.
   7. Casting adjustment: concrete ring between leveling and top course of bituminous.
   8. Drop connections, should be required for all installations without a flow channel, required for drop of 2 feet or more. The alternative drop connection should be used for drops greater than 0.1 feet and less than 2 feet: See ARTICLE 3.05 SCHEDULES.
   9. Place manhole at the end of an existing sewer stub if necessary to accommodate change in grade and / or alignment.
   10. Provide access to all manholes for sewer maintenance vehicles as directed by TOWNSHIP and TOWNSHIP ENGINEER.
   11. Manholes with precast flow channels will not be allowed unless the flow channels meet all requirements of these specifications.

D. Abandoning and filling existing sanitary sewer:
   1. Plug both ends of the sewer pipe to be abandoned and fill the existing pipe completely with flowable fill.

E. Connections:
   1. Expose existing sanitary sewer and structures to which the new work is to be connected to confirm condition, location and elevation.
   2. Connect to existing sanitary manhole by coring an opening adequate to insert pipe and flexible water tight rubber boot and secure circumference of pipe with non-shrink cement mortar.
      a. Relay and repoint loose blocks and bricks on existing block and brick structures. Re-channel flow lines and benches with concrete.
   3. Construct manhole over existing sanitary sewer by installing precast manhole doghouse over existing pipe onto precast concrete manhole base. Do not cut open the existing pipe until written approval has been obtained from the TOWNSHIP.
   4. Future Sanitary Sewer: Provide the following:
      b. Plug: Pipe 6-inch through 21-inch with standard disc.
      c. Bulkhead: Pipe 24-inch and larger with brick and mortar and ½-inch plaster coat outside.
         (1) 24 inch - 36 inch: 4-inch thick.
         (2) 42 inch - 60 inch: 8-inch thick.

5. No inside drop connections shall be permitted.

F. Service Lines:
   1. Sanitary sewer must be situated along lot's road frontage for service to be provided. All laterals must be located in 10' utility easement. Easements will not be allowed to obtain service to a residence.
   2. Align at right angles to street or easement line. Locate 15 feet from left property line (facing lot) unless otherwise directed by TOWNSHIP.
   3. Grade: Provide at uniform rate from connection or main riser to the property or easement line, minimum 1/4 inch per foot for residential, 1/8 inch per foot for commercial uses.
   4. Provide minimum depth at street right-of-way line, property line or easement line as follows:
      a. House with basement: 12 feet below first floor elevation or 3 feet below basement elevation, whichever is deeper.
      b. Commercial and industrial buildings, schools, churches: As determined by OWNER's ENGINEER.
      c. The above depths govern, except that the minimum depth at the right-of-way line or property line shall be 6 feet below street or easement centerline grade unless otherwise permitted.
      d. The above depths are based on homes located at minimum setback from street right-of-way line and with typical 8-foot high ceiling in basement. Depths required may increase based on setback and ceiling heights.
   5. Connection fitting:
      a. Locate as shown on Plans or as directed by OWNER's ENGINEER in field.
      b. 45° or 60° Wyes: Provide on all pipe except concrete pipe.
      c. Tees: Allowed only on reinforced concrete pipe.
      d. No laterals shall be connected to manholes.
   6. Main riser will be allowed where cover exceeds 13 feet at mainline.
   7. Plugging: Provide standard caps securely blocked.
   8. Markers: Place a wood marker (2" x 2" minimum) at end of lateral with sufficient length to extend from invert of lateral to ground surface. Install a steel re-rod 24-inches in length immediately next to the wood marker with the top of the re-rod 2" below grade. Cover 2' x 2' wood marker and steel rerod with 4' long 4-1/2" ID minimum pipe buried 1' foot.
   9. Witnesses: Report the following to the Owner's Engineer for preparation of record drawings:
      a. Wyes and Tee: Measurements to nearest downstream manhole.
      b. Markers: Two (2) measurements to permanent surface features.
      c. Laterals: Provide lengths and invert elevations.
   10. Property line Riser: Required on all laterals. See Article 3.05 SCHEDULES.

G. By-pass Pumping: Contractor to provide by-pass pumping of wastewater flow as required during construction or replacement of sanitary sewer.

H. Pipe insulation: Where noted on plans, place 2-inch thick Styrofoam insulation board 4 feet wide over pipe at top of bedding.

I. No excavation within 10-feet of sanitary sewer or other manner which could cause undermining of service after back fill which could impact its function as determined by Township DPW and /or Township Engineer.

3.03 TESTING AND INSPECTION:

A. General:
   1. Observation: By TOWNSHIP or TOWNSHIP's ENGINEER.
   2. Testing: Perform upon completion and before connecting to active system.
   3. Leakage tests: Provide promptly following installation of sewer pipe including services and keep within maximum 1200 feet behind pipe laying operation.
   4. Notification: Clean, pretest and arrange for final inspection and test.
   5. Provide necessary equipment, manpower and assistance.
   6. Video televising: Provide prior to paving.

B. Line and Grade: Allowable drift between structures from proposed alignment will be as follows:
   1. Line:
      a. Through 36-inch: 0.20 foot.
      b. Over 36-inch: 0.40 foot.
   2. Grade:
      a. Allowable sag between pipe joints: 5% of pipe diameter with maximum of 1-inch.
   3. Sags in excess of tolerance shall be repaired prior to acceptance by TOWNSHIP. Repaired sections shall be re-televised.

C. Plastic pipe deformation (required only if video televising indicates a problem):
   1. Pipe deflection will be limited to five percent (5%) of diameter.
   2. Correction: Repair defects and retest until acceptable.

D. Video Televising (see Section 02731 – Cleaning and Televising Sanitary Sewers):
   1. CONTRACTOR to complete video televising of completed sewers. The sewer main, laterals and manholes shall be cleaned and completely free of debris prior to televising. Flush sewer with flow of water from upstream end immediately prior to televising.
   2. Schedule: Televise after final backfill has been in place a minimum of thirty (30) days, and after shutdown of dewatering operation.
   3. CONTRACTOR to provide 1 original (CD/DVD format) of video of sewers to the Township.

E. Leakage Testing:

   1. CONTRACTOR to perform exfiltration (air) test.
   2. Exfiltration air test will have a holding time not less than that listed in table. Refer to Article 3.05 - Schedules
   3. Correction: Repair defects and repeat test until acceptable.
      a. Method of repairing defects shall be approved by TOWNSHIP or TOWNSHIP's ENGINEER.

F. Exfiltration (air): Perform in accordance with NCPI Publication, *"Low Pressure Air Test for Sanitary sewers"*, and in accordance with ASTM F 1417, *"Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air"*.
   1. Condition: Clean, dry pipe
   2. Procedure:
      a. All pressure readings are above the average groundwater head.

3.04 ADJUST AND CLEAN:

A. General: Keep pipe and structures clean as work progresses.

3.05 SCHEDULES:

A. Exfiltration Air Test Table.

B. Water / Sewer Leakage & Pressure Testing Report Form.

C. Specification FF-1 for Flowable Fill.

D. Standard Details:
   1. Special supports for underground utilities / pipe saddles.
   2. Methods of bedding pipe.
   3. Standard sanitary manhole.
   4. Watertight manhole cover.
   5. Plastic pipe manhole junction.
   6. Sanitary sewer cleanout.
   7. Standard riser details.

E. Manhole Final Inspection Punch List.

END OF SECTION

EXFILTRATION AIR TEST

TIME REQUIRED FOR LOSS OF PRESSURE FROM 3.5 PSIG TO 3.0 PSIG FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q = 0.0015 (CU. FT./MIN./SQ.FT. OF INTERNAL SURFACE AREA)

Pipe Diameter (in.)	Mini-mum time (min; sec.)	Length for Min. Time (ft.)	Time for Longer length (sec.)	Specification Time for Length (L) Shown (min:sec)										
				100ft	150ft	200ft	250ft	300ft	350ft	400ft	450ft	500ft	550ft	600ft
6	2:50	398	.427L	2:5050	2:50	2:50	2:50	2:50	2:50	2:51	3:12	3:34	3:55	4:16
8	3:47	298	.760	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42	6:20	6:58	7:36
10	4:43	239	1.187L	4:43	4:43	4:43	4:57	5:56	6:55	7:54	8:54	9:54	10:53	11:52
12	5:40	199	1.709L	5:40	5:40	5:42	7:08	8:33	9:48	11:24	12:50	14:15	15:40	17:06
15	7:05	159	2.671L	7:05	7:05	8:54	11:08	13:21	15:35	17:48	20:02	22:16	24:29	26:43
18	8:30	133	3.846L	8:30	9:37	12:49	16:01	19:14	22:26	25:38	28:51	32:03	35:16	38:28
21	9:55	114	5.235L	9:55	13:05	17:27	21:49	26:11	30:32	34:54	39:16	43:37	47:59	52:21
24	11:20	99	6.837L	11:24	17:57	22:48	28:30	34:11	39:53	45:35	51:17	56:59	62:41	68:23
27	12:45	88	8.653L	14:25	21:38	28:51	36:04	43:16	50:30	57:42	64:54	72:07	79:20	86:33
30	14:10	80	10.683L	17:48	26:43	35:37	44:31	53:25	62:19	71:13	80:07	89:02	97:56	106:51
33	15:35	72	12.926L	21:33	32:19	43:56	53:52	64:38	75:24	86:10	96:57	107:44	118:31	129:17
36	17:00	66	15.384L	25:39	38:28	51:17	64:06	76:55	89:44	102:34	115:23	128:13	141:02	153:51
39	18:25	61	18.054L	30:57	45:09	60:11	75:14	90:16	105:19	120:22	135:24	160:32	165:31	180:34
42	19:50	57	20.939L	34:54	52:21	69:48	87:15	104:42	122:09	139:36	157:03	174:31	191:58	209:25

Note: When 2 sizes of pipe are involved, the time shall be computed by the ratio of lengths involved.

Example: 400 feet of 10-inch pipe and 200 feet of 6-inch pipe

$$\text{Time} = \frac{\text{Length (1)} \times \text{Time (1)} + \text{Length (2)} \times \text{Time (2)}}{\text{Length (1)} + \text{Length (2)}} = \frac{400 \times 7{:}54 + 200 \times 2{:}50}{400 + 200}$$

$$= \frac{400 \times 474 + 200 \times 170}{400 + 200} = 373 \text{ seconds} = 6{:}13 \text{ (min:sec)}$$

SPECIFICATION FF-1
SPECIFICATION FOR FLOWABLE FILL

DESCRIPTION

Flowable Fill (FF) shall consist of a mixture of (a) Portland cement, fly ash, and water; (b) Portland cement, granular material, fly ash, and water; or (c) fly ash, granular material and water. All Materials will be as specified in the Standard Specifications or as stated. All flowable fill after setting is intended to be removable by conventional mechanical excavation methods.

MATERIALS

		Specific Gravities***
Portland Cement	MDOT Section 901	3.15
Fly ash	ASTM C 618(1)*	2.40
Granular material Class II **	MDOT Section 902	2.60
Water	MDOT Section 911	1.00

* Except there is no limit on the loss on ignition.
** Except that 100% shall pass 19mm sieve.
*** Specific gravity values used for mix proportions given. If material used differs from these values appropriate adjustments should be made.

OPTIONAL FLOWABLE FILL (FF) MIXTURES

FF Mix Number One*
Cement Stabilized Fly Ash Mixture (Class F Fly Ash)

Portland Cement		100 lb/ft3
Fly ash	(Class F)	2,000 lb/ft3
Water	Sufficient water to produce the desired flowability	(approx. 3 gal/ ft3)

FF Mix Number Two*
Controlled Density Fill Mixture (Class F Fly Ash)

Portland Cement		50 lb/ft3
Fly ash	(Class F)	500 lb/ft3
Granular material		2,850 lb/ft3
Water	Sufficient water to produce the desired flowability	(approx. 1 gal/ft3)

FF Mix Number Three*
Controlled Density Fill Mixture (Class C Fly Ash)

(due to the variability of type 'C' fly ash there is no suggested mix)

*NOTE: The ready-mixed concrete producer supplying the flowable fill shall have a 28-day test on the mix option to be used for the trench backfill showing that the compressive strength is less than 1034 kPa for the fly ash from the same source that will be used for the trench backfill.

TRANSPORTING AND CONSTRUCTION METHODS

The temperature of the flowable fill mix as manufactured and delivered shall be at least 50° F.

Mixtures shall be transported to the point of placement in a revolving drum mixer or agitator.

During placement operations around manholes and in utility trenches, care shall be used to avoid dislocating any pipes due to fluid pressure from the flowable fill by even placing of the material. Any pipes within the backfill area should be considered for securing to avoid buoyant effect of flowable fill.

When Flowable Fill (FF) is used in pavement cuts the fill shall be placed to the top of pavement. After setting, the flowable fill is to be removed to the bottom of a concrete pavement patch or to the top of bituminous base course.

WATER/SEWER LEAKAGE & PRESSURE TESTING REPORT

PROJECT:
PROJECT NO.:
LOCATION:

DATE:
INSPECTOR:
REPORT NO.:

LOCATION	TEST NO.	PIPE SIZE (IN.)	LENGTH OF PIPE (LFT.)	PRESSURE AT START OF TEST (PSI)	PRESSURE AT COMPLETION OF TEST	ALLOWABLE LOSS (GAL/HR)	ACTUAL LOSS (GAL/HR)	TIME REQUIRED FOR TEST	ACTUAL TIME OF TEST	APPROVED	REJECTED	REMARKS

WATERMAINS:

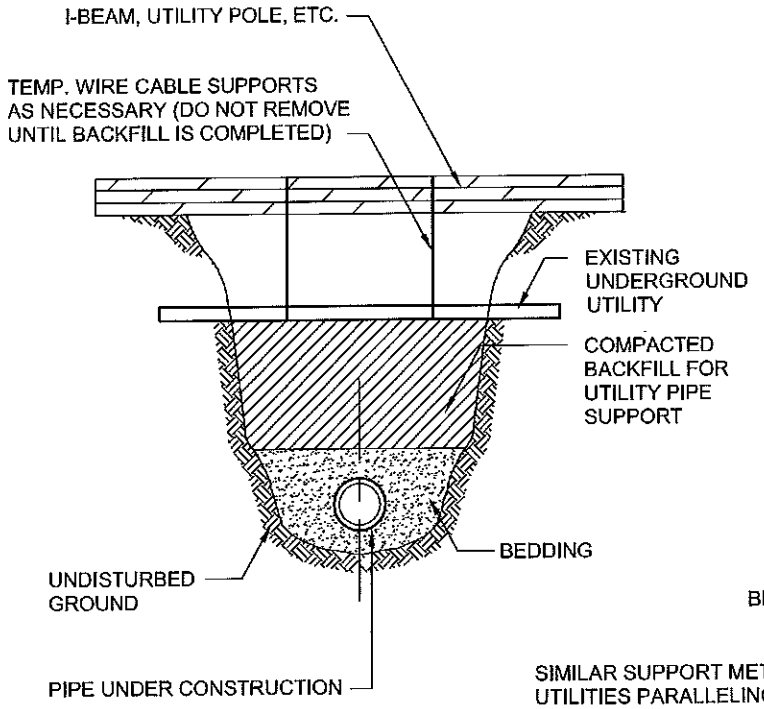
1. PRESSURE TEST: DURATION = 1 HR.
   140 TO 150 PSI @ LOWEST POINT
2. LEAKAGE TEST: DURATION OF TEST = 2 HRS.
   ALLOWABLE LOSS:

$$L = \frac{SD \times \sqrt{P}}{148{,}000}$$

   L = LEAKAGE (GALLONS PER HOUR)
   S = LENGTH OF PIPE (FEET)
   D = NORMAL PIPE DIAMETER (INCHES)
   P = AVERAGE TEST PRESSURE (PSI GAUGE)
3. VALVES: ALLOWABLE LEAKAGE = LESS THAN 10 PSI IN 5 MINUTES W/PUMP OFF

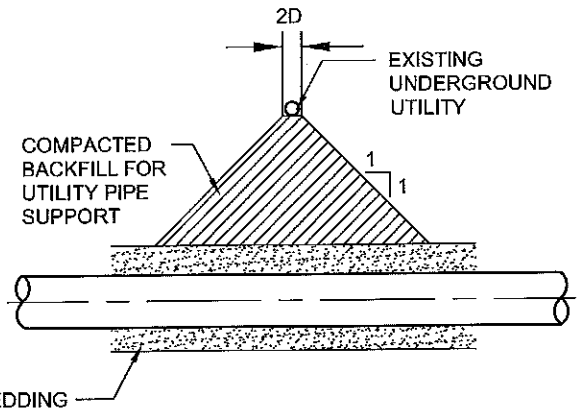
SEWERS:

1. EXFILTRATION AIR TEST: DURATION = (SEE CHART ON BACK)
   3.5 PSI AFTER STABILIZATION OF PRESSURE
   PRESSURE LOSS FROM 3.5 TP 2.5 PSI MUST NOT EXCEED TIME LIMITS
   TIME FOR 2 OR MORE SIZES IN SAME RUN SHALL BE COMPUTED AND ADDED TOGETHER



SECTION

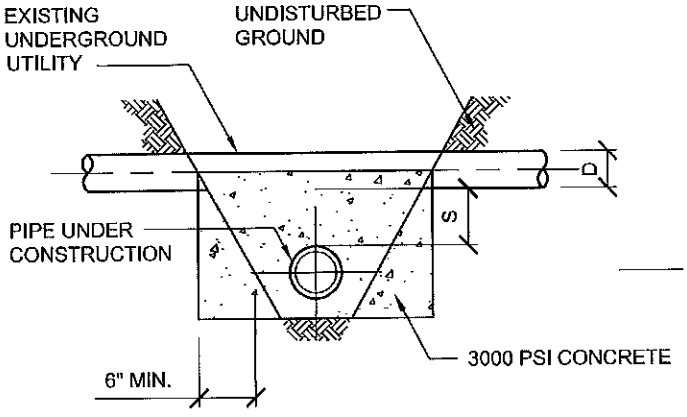
NOTE: MAINTAIN EXISTING COATING ON UTILITY

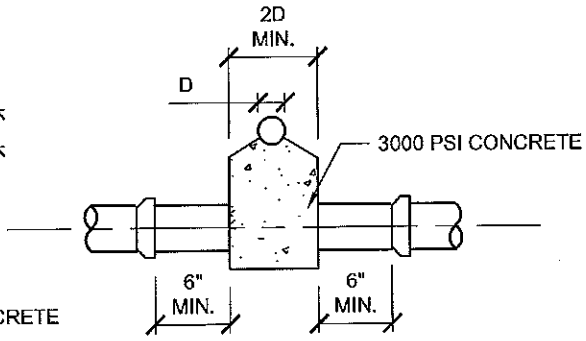


SIMILAR SUPPORT METHODS APPLY TO UTILITIES PARALLELING AND ABOVE THE PIPE UNDER CONSTRUCTION

ELEVATION

SPECIAL SUPPORTS FOR UNDERGROUND UTILITIES





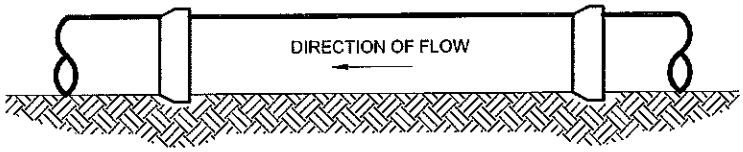
NOTES:

1. PIPE SADDLE REQUIRED WHEN SEPARATION (S) IS 12 INCHES OR LESS UNLESS OTHWERWISE DIRECTED OR SHOWN ON PLANS
2. PIPE SADDLE IS NOT REQUIRED FOR PLASTIC, STEEL, LEAD OR COPPER PIPE 2" OR SMALLER.

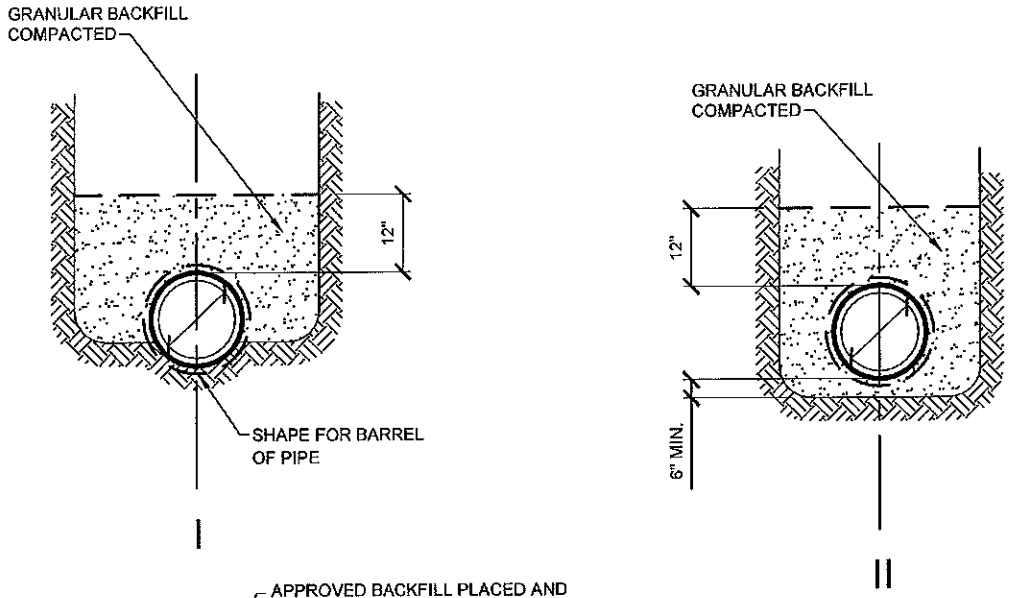
SECTION

ELEVATION

PIPE SADDLES



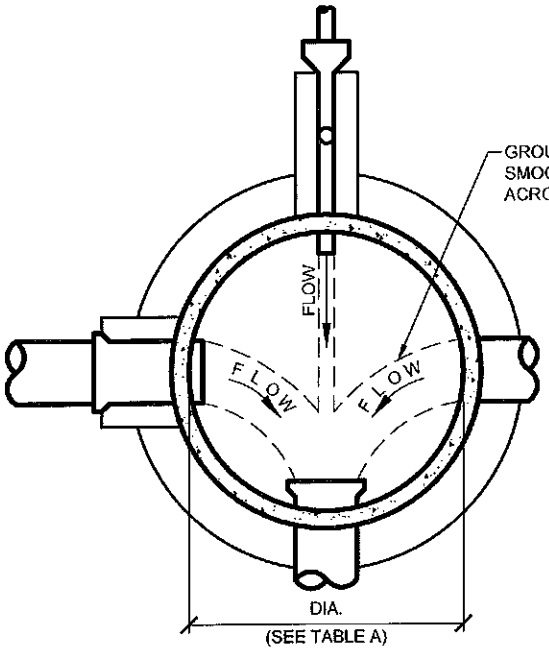
EXCAVATION FOR BELLS



NOTES:

1. METHOD I: IN AREAS OF UNCONSOLIDATED SOILS (SAND, GRAVEL, ETC.)
2. METHOD II: IN AREAS OF CONSOLIDATED SOILS (CLAY, HARDPAN, ROCK, ETC.)
3. METHOD III: IN AREAS INDICATED ON DRAWINGS

METHODS OF BEDDING PIPE



PLAN

6" MIN.
6" MIN.

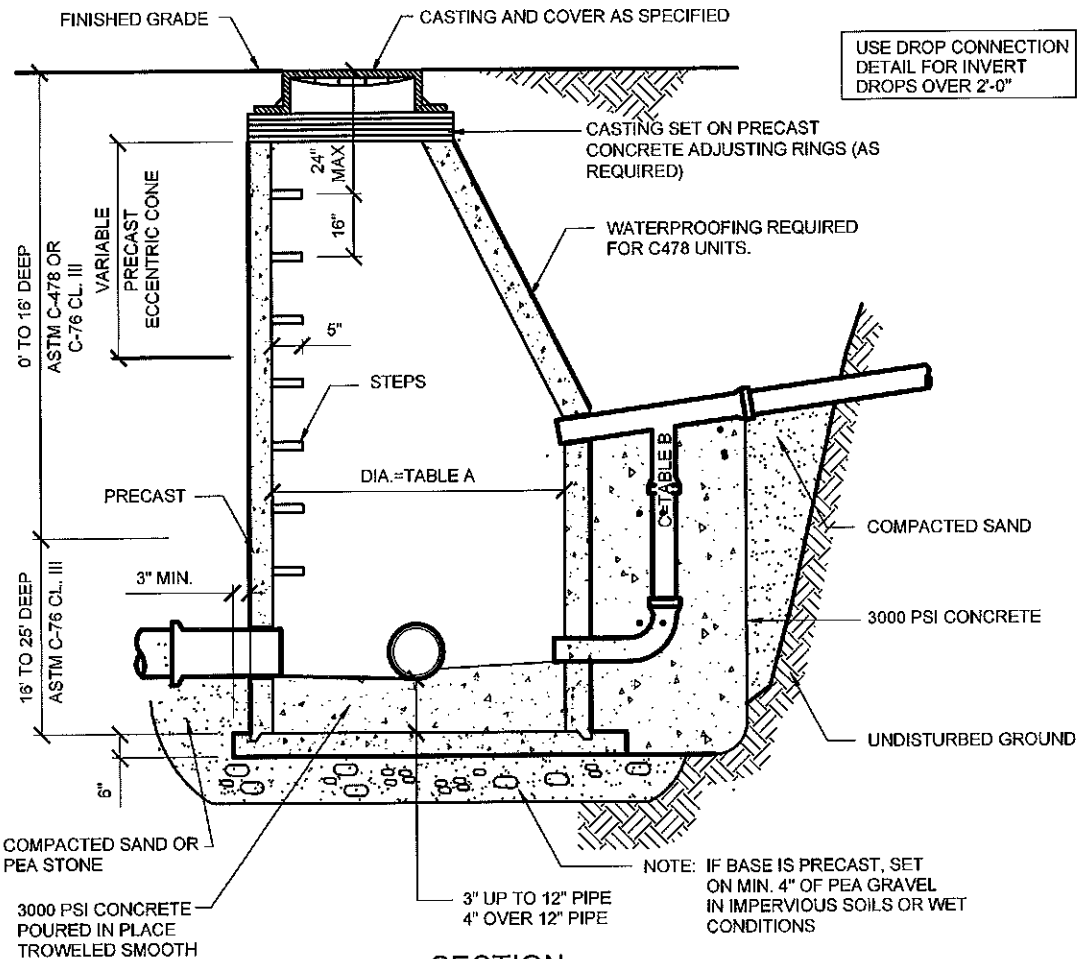
TABLE A

PIPE SIZE	DIA.
8" TO 24"	4'-0"
27" TO 33"	5'-0"
36" TO 42"	6'-0"

TABLE B

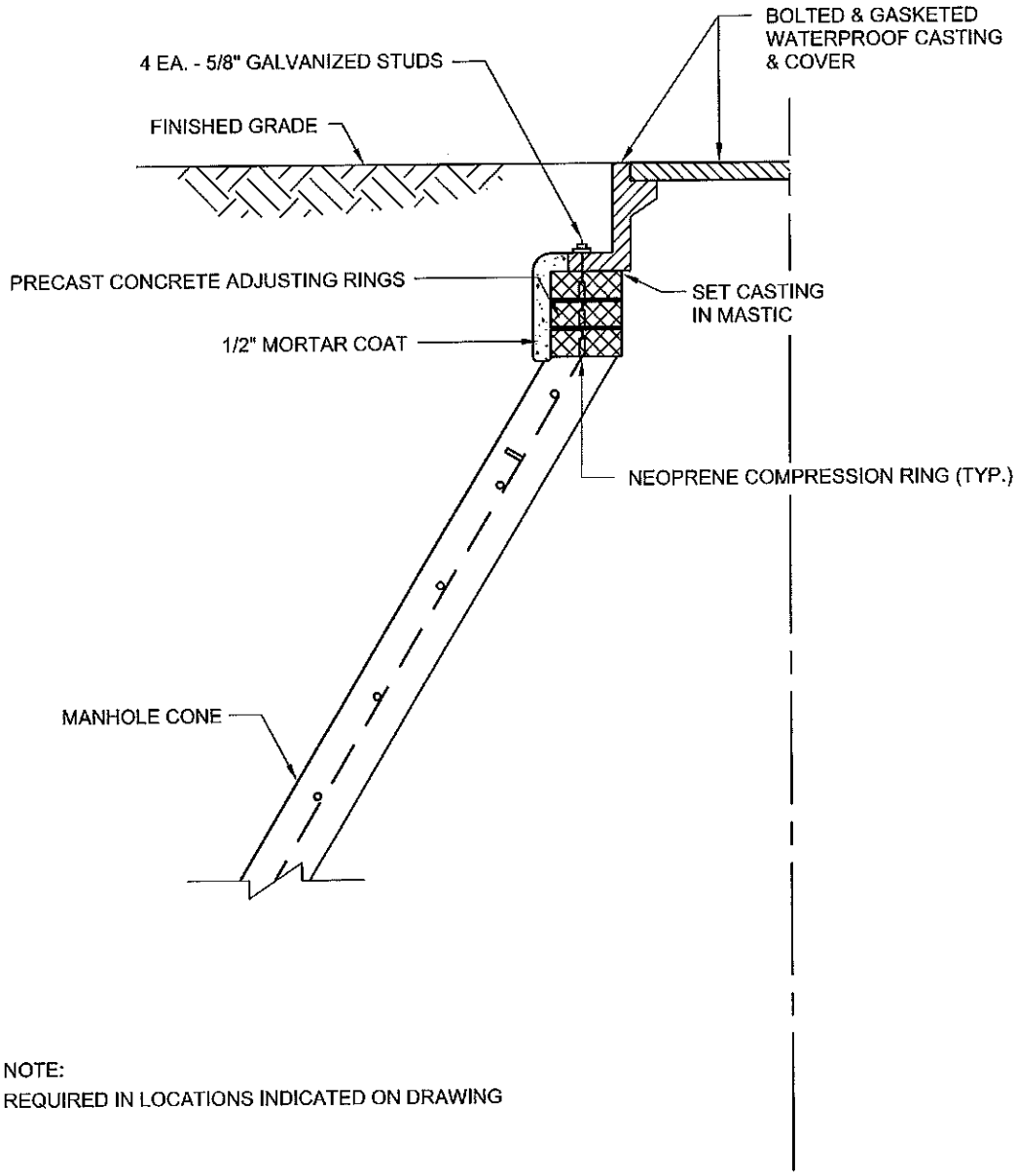
PIPE SIZE (INCOMING)	DROP SIZE C
8" THRU 12"	8"
15" THRU 18"	10"
21" THRU 27"	12"
30" THRU 36"	15"

USE DROP CONNECTION DETAIL FOR INVERT DROPS OVER 2'-0"



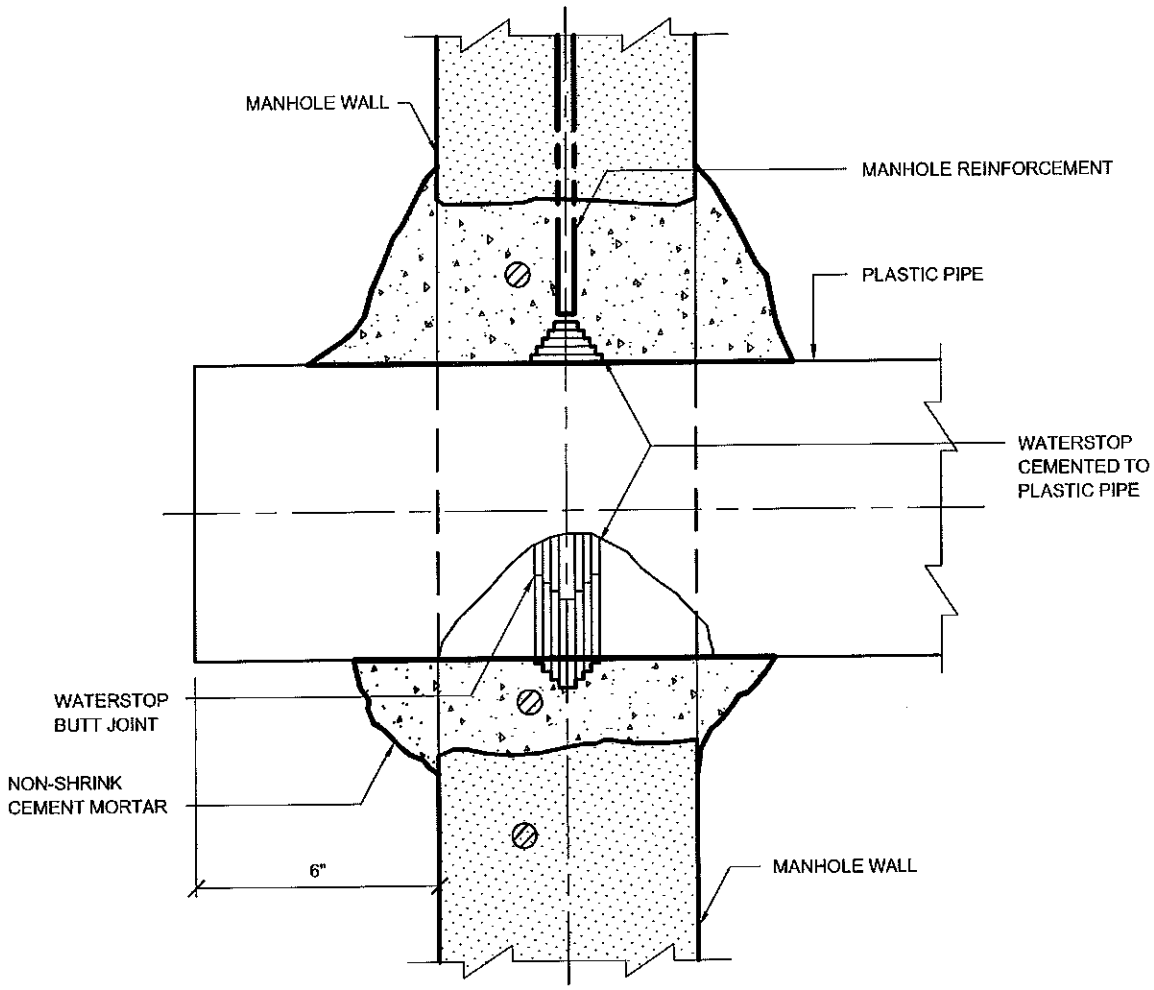
SECTION

STANDARD SANITARY MANHOLE



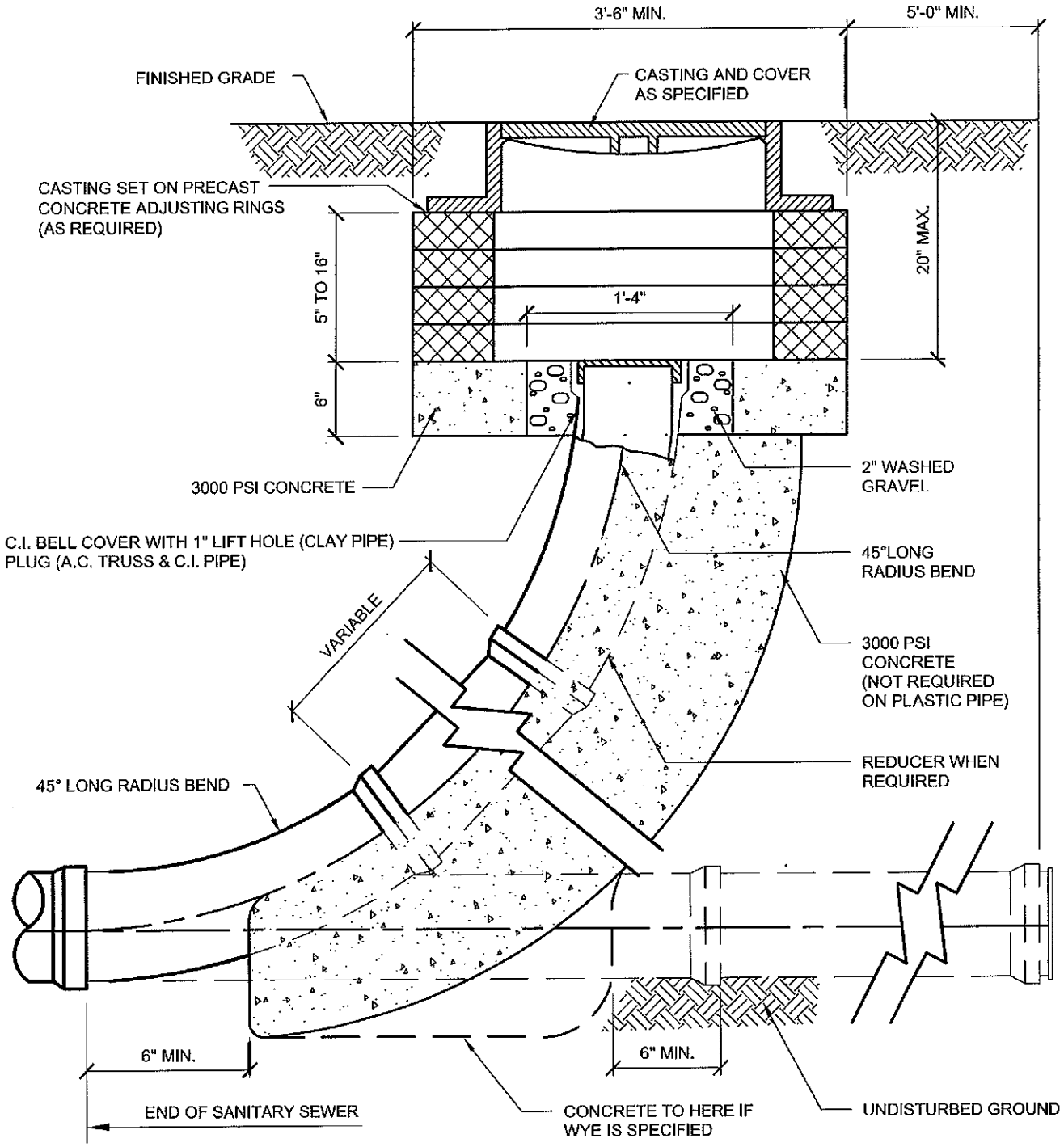
NOTE:
REQUIRED IN LOCATIONS INDICATED ON DRAWING

WATER TIGHT MANHOLE COVER



NOTE:
TO BE USED ONLY FOR CONNECTION TO EXISTING MANHOLE WHERE FLEXIBLE RUBBER BOOT CANNOT BE INSTALLED OR AS ALLOWED BY ENGINEER

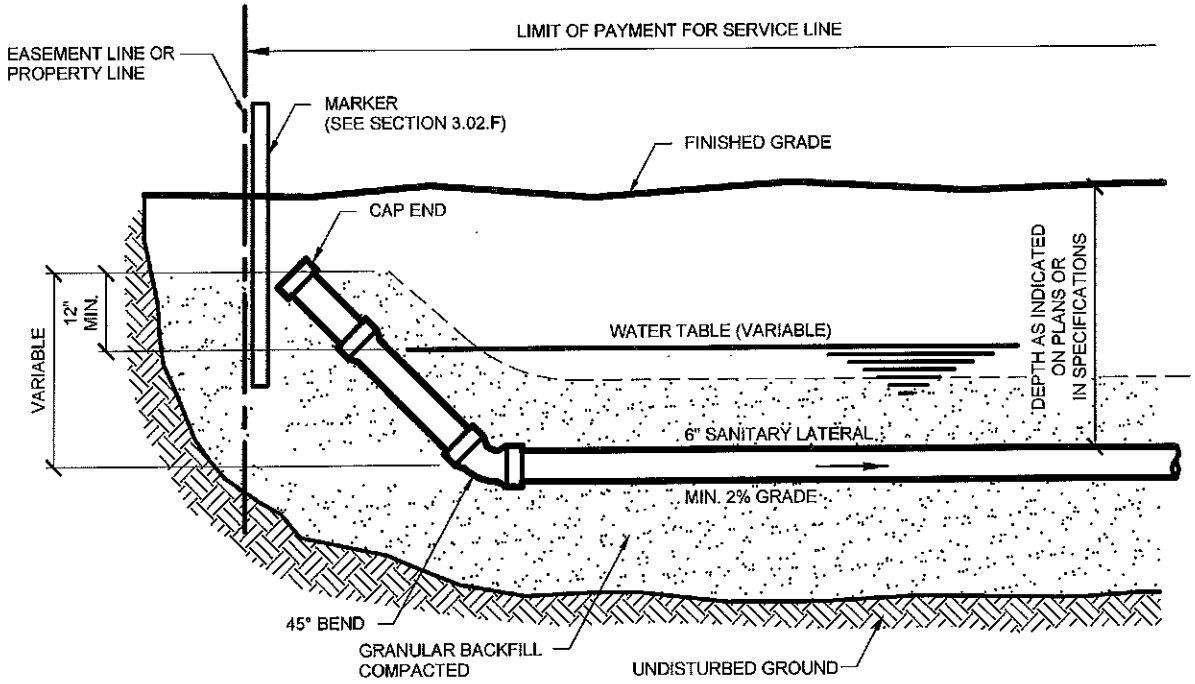
PLASTIC PIPE
MANHOLE JUNCTION



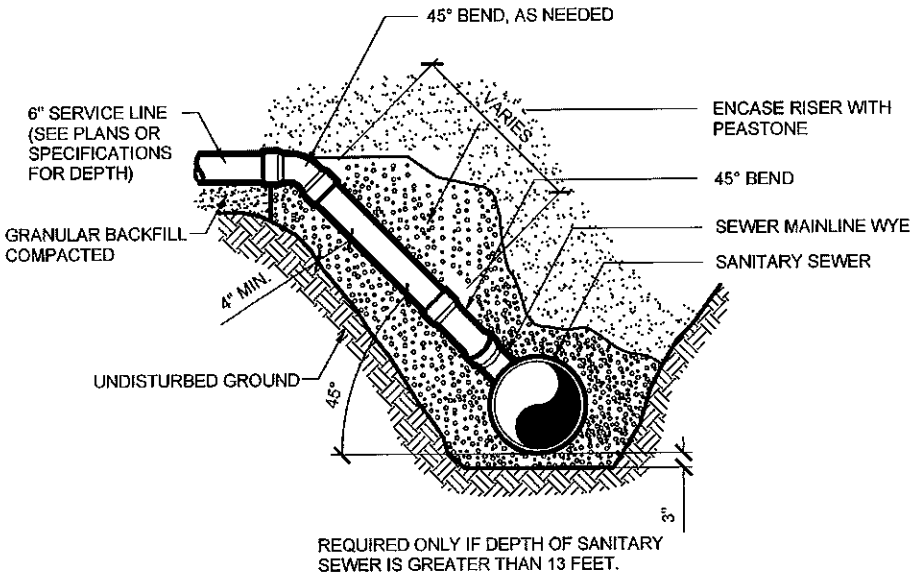
TABLE

MAINLINE	RISER
6"	6"
8"	8"
OVER 8"	8"

SANITARY SEWER CLEANOUT

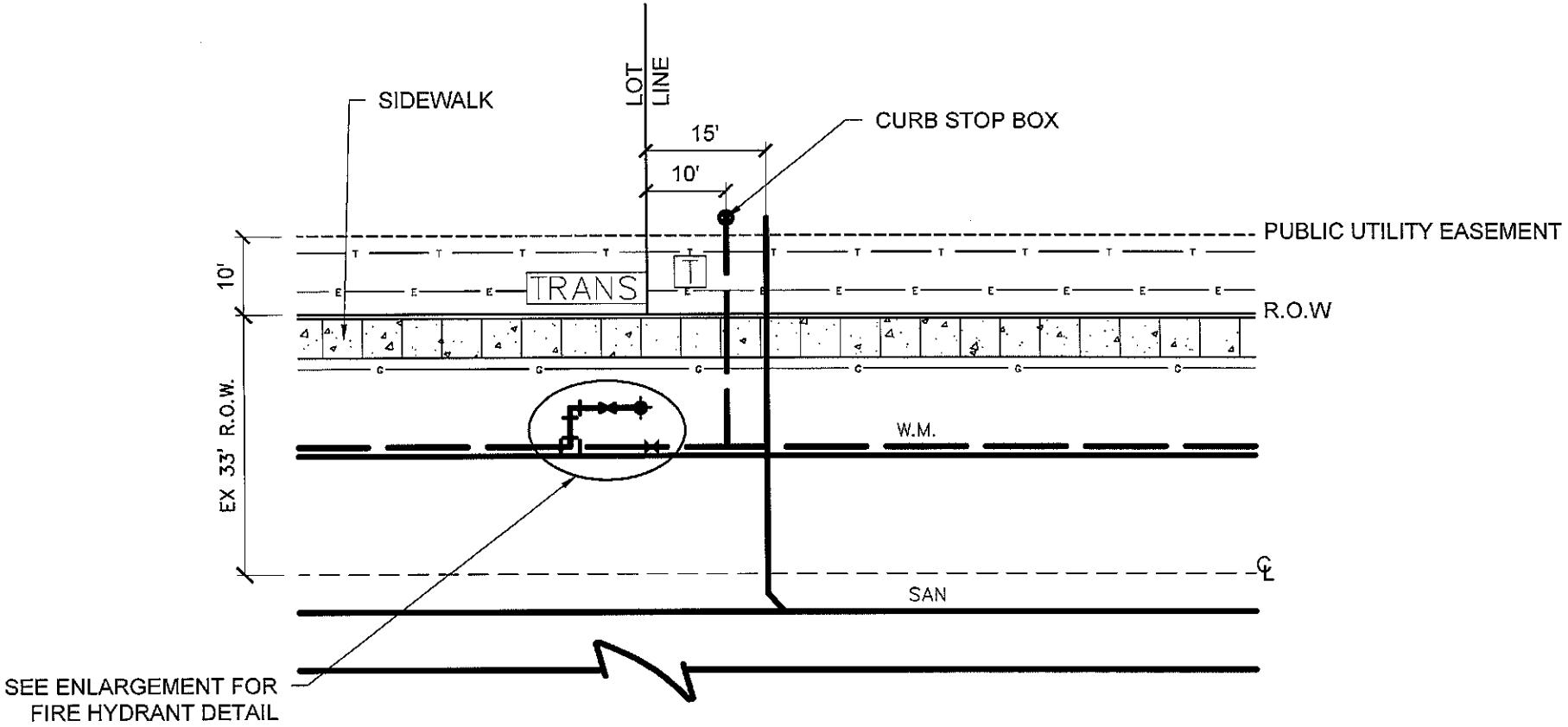


PROPERTY LINE RISER



MAINLINE RISER

STANDARD RISER DETAILS



UNDERGROUND UTILITIES

DRAWING TO SCALE

0 20 40

SCALE IN FEET

LEGEND

- Electrical
- Telephone
- Gas
- Telephone Pedestal
- TRANS Transformer

1071_Underground Utilities

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

MANHOLE FINAL INSPECTION PUNCH LIST

- ☐ Verify specification for correct casting.
- ☐ Record depth of all inverts to top of casting.
- ☐ Verify chimney adjustment rings are completely cemented in place and plaster coated.
- ☐ Verify casting is centered in the opening and completely cemented in place with no voids between casting and top of chimney (check maximum dimensions – see manhole detail).
- ☐ Cement lift holes and all penetrations.
- ☐ Verify pipe penetrations are properly sealed.
- ☐ Flow lines are completed and smooth with no high or low spots.
- ☐ Flow line is poured up to spring line or ½ the diameter of pipe.
- ☐ Benches sloped to flow line at 1" per foot minimum.
- ☐ All voids in walls and bottom are cemented.
- ☐ Manhole steps and bottom are clean of concrete, bituminous, dirt, debris, etc.
- ☐ Verify slope is correct from proposed upstream to down-stream inverts. Must have a minimum of 0.1 feet of elevation drop across inverts.
- ☐ Drainage structure constructed of blocks or bricks plaster coated inside of entire structure.
- ☐ Verify catch basin sumps are clean.
- ☐ Casting has been properly adjusted prior to final top course (check tilt to match pavement cross slope).
- ☐ Final inspection completed before final top course of asphalt is laid.

RECOMMENDED SAFETY CHECK LIST (may not be all-inclusive)

1. Use vehicle to protect yourself from traffic.
2. Use construction cones on street with traffic (4 minimum)
3. Always wear reflectorized safety vest.
4. Follow Confined Space Permitting & Entry Procedures if entering a manhole.

SECTION 02731

CLEANING AND TELEVISING SANITARY SEWERS

PART 1 – GENERAL

1.01 SUMMARY:

A. This Section includes work required for the cleaning and televising (video inspection) of sanitary sewers.
B. Castings must be set to the established gravel grade.

1.02 RELATED SECTIONS:

A. Section 02730 – Sanitary Sewers.

1.03 SUBMITTALS:

A. Submit the following to Allendale Charter Township Department of Public Works after completion of the sewer cleaning and televising:
   1. One copy of a bound written report of the video inspection including the following information:
      a. Specific details as to the internal condition of the sewer and manholes televised noting location and condition of any broken or crushed pipe, obstructions, defective joints, misalignment in line and grade, infiltration, service laterals, manhole flow channels, etc. per N.A.S.S.C.O. requirements for MACP/PACP grading.
      b. Length of sewer section, size, pipe material, manhole identification numbers and/or plan stationing, street name, etc.
   2. Original of the inspection video to Allendale DPW on a USB drive in protective case and labeled. A MDB file must be included.
   3. A read-only program shall be provided for Allendale DPW use.

1.04 JOB CONDITIONS:

A. Maintain existing sanitary sewer system operational, if applicable.

PART 2 – PRODUCTS

2.01 EQUIPMENT:

A. Sewer Cleaning Equipment:
   1. Shall be capable of removing all dirt, grease, rocks and other deleterious materials without causing damage to the sewer pipe
   2. Must be high velocity water-jetting, vacuum
   3. Necessary pulleys and supports shall be installed in manholes so as not to restrict the cleaning operation or damage existing manholes.
   4. Shall be capable of cleaning sewer lengths of up to 800 feet with vehicular access to one manhole only.

B. Video Camera:
   1. Camera operator to be PACP certified.
   2. Shall be specifically designed and constructed for the required video inspection and shall be capable of operating under 100% humidity conditions.

3. Shall have "pan / tilt and rotate" capabilities for viewing into lateral connections and manholes.
4. Shall be capable of producing quality color picture.
5. Shall record video continuously for each sewer section from manhole to manhole. The recording speed and electronics shall be equal to that which can be played back on standardized equipment in the electronics industry.

PART 3 – EXECUTION

3.01 PREPARATION:

A. Sewer and Manhole Cleaning:
1. Clean sewer mains, laterals and manholes until they are completely free of debris prior to televising (video inspection).
2. High velocity water-jetting of all debris to downstream manholes.
3. Remove all sludge, dirt, sand, rocks, grease and other solid or semisolid material resulting from the cleaning operation at downstream manholes. Passing material from manhole section to manhole section will not be permitted.
4. Properly dispose of removed material.
5. If sewer televising indicates that the sewers, laterals and manholes have not been **completely** cleaned free of debris, the sewers, laterals and manholes shall be re-cleaned and re-televised at no additional cost to the Township.

3.02 PERFORMANCE:

A. Televising (video inspection):
1. Flush sewer with flow of water from upstream end immediately prior to televising.
2. Move camera through sewer in either direction at a moderate and uniform rate (30 to 40 feet per minute) per N.A.S.S.C.O specifications for P.A.C.P inspection, stopping when necessary to allow examination and documentation of the sewer's condition and all points of infiltration, cracked or crushed pipe, defective joints, misalignment of line and grade, service laterals, and other points of interest noted during the inspection.
3. Use the "pan / tilt / rotate" features to inspect all service laterals, defective joints and manholes.
4. If the camera encounters a vertical dip in the sewer line, the amount of vertical dip shall be estimated in inches.
5. Note distances from a manhole to the various points of interest. The accuracy of the distance measurements shall be verified and certified to within 0.1 feet.

3.03 ACCEPTANCE:

A. Deliver completed product as outlined in paragraph 1.03 SUBMITTALS for review by the Township and Township Engineer.
B. If repairs are necessary to repair deficiencies found during the video inspection, the section repaired shall be re-televised for acceptance.
C. Should excavation be required to repair sewer, another 30-day waiting period will be mandatory.

END OF SECTION

SECTION 02732

SANITARY FORCE MAINS

PART 1 - GENERAL

1.01 SUMMARY:

A. This Section includes work required for sanitary force mains, structures and appurtenant work.

1.02 REFERENCES:

A. ASTM - American Society Testing Materials, latest edition.

B. ANSI - American National Standards Institute, latest edition.

1.03 SUBMITTALS:

A. Submit the following for review by TOWNSHIP or TOWNSHIP's ENGINEER:
   1. Product data on Isolation Valves and Air Release Valves.
   2. Proposed equipment and method for Pressure and Leakage testing
   3. Details for connection to sanitary sewer system.
   4. Submittals must be approved by ACT DPW prior to construction.

B. Report witness measurements on fittings.
   1. Provide measurements from two permanent fixtures such as building corners, power poles and trees 8-inch diameter and larger.

C. Provide certification on pipe and fittings indicating conformance to specifications prior to installation.

D. Submittal of as-built plans to the Township upon completion of project. 2 printed sets to the Township and 1 electronic file in PDF format to the Township Engineer will be required.

1.04 JOB CONDITIONS:

A. Clean up promptly following pipe installation and within maximum of 600 feet behind pipe laying operation. Cleanup includes backfill and rough grading.
B. Installation not allowed when air temperature is 25 degrees or colder (F), or when determined too cold by Township field inspector.

PART 2 - PRODUCTS

2.01 GENERAL:

A. Cement Lining: ANSI A21.4 Standard thickness for ductile iron pipe and fittings.

2.02 PIPE:

A. Ductile Iron: ANSI A21.50 and ANSI A21.51; Class 52.

2.03 JOINTS:

A. Ductile Iron Pipe and Fittings:
   1. Mechanical: ANSI A21.11.
   2. Push-on: ANSI A21.11.
   3. Electrical Continuity: Provide bronze wedges (3 per joint), or thermite welded sockets and cables.

2.04 FITTINGS:

A. Ductile Iron: ANSI A21.10, ANSI 21.53, Class 54, 250 psi working pressure through 12-inch and 150 psi greater than 12-inch.

2.05 VALVES (Open Right):

A. Gate: AWWA C515, double disc, non-rising stem, fully bronze mounted and roller and gear operator over 16 inches.

B. Plug: ANSI B16.1, Clow Corporation F-5410, or equal.

C. Air release: APCO 400 or Val-Matic 48 BWA.

D. Boxes: Three (3) section cast iron with lid marked SEWER.
   1. Upper section: Screw on adjoining center section and full diameter throughout. Place geotextile fabric around threaded joint of risers, if used.
   2. Center section: Minimum 5-inch inside diameter.
   3. Base section: Fit over valve bonnet and shaped round for valves through 10-inch and oval for 12-inch and over. Place geotextile fabric around valve bonnet.

2.06 AIR RELEASE VALVE AND CLEANOUT CHAMBERS:

A. Chambers shall be precast or cast-in-place concrete.

B. Precast Units: ASTM C478 and ASTM C76, Class III.
   1. Joints: Cement mortar, preformed bituminous rope or "O"-ring gaskets.
   2. Pipe Opening: Pipe diameter plus 6-inch, maximum.

C. Concrete: 4000 psi 28 day, 4-inch maximum slump.

D. Concrete Brick: ASTM C55, Grade N-1 (For repair of existing brick structures only).

E. Grade Rings: ASTM C478.

F. Mortar: ASTM C270, 1 part Portland cement, 1 part lime and 3 parts sand by volume.

G. Chamber Steps:
   1. Plastic with $^{3}/_{8}$-inch steel reinforcement.
   2. Dimensions: 10-inch deep by 10-inch wide, 5-inch tread depth.

H. Chamber Casting: East Jordan 1040 A cover – two (2) hole cover with the words OTTAWA COUNTY SEWER and East Jordan 1045 Z1 frame.

I. Piping: Coal tar epoxy coating required.

2.07 MISCELLANEOUS:

A. Tie Rods and Clamps: Clow Corporation or Traverse City Iron Works.

B. Polyethylene Encasement:
   1. Material: ASTM D1248 Polyethylene, Type I, Class C, 8 mils thick.
   2. Closing tape: 2-inch wide Poly Ken #900 or Scotchwrap #50.

C. Mechanical Joint Restraint: Megalug by EBBA Iron Sales, Inc.

PART 3 - EXECUTION

3.01 PREPARATION:

A. Alignment and Grade:
   1. Deviations: Notify OWNER's ENGINEER and obtain instructions to proceed where there is a grade discrepancy or an obstruction not shown on the plans.
      a. Verify location and depth of existing utilities in advance of construction and provide adjustments in alignment and grade of force main.
      b. Depth of pipe: Minimum cover over pipe below finished grade shall be 5 feet.
   2. High points in pipe line: Locate at air release valves.
   3. Install pipe to elevations and grades when indicated on drawings.
   4. Measure pipe inverts prior to setting cones, for as-built drawings.

B. Bedding:
   1. Method: See Article 3.04 SCHEDULES.
   2. Provide bedding area backfill in accordance with MDOT Standard Plan No. R-83B.
   3. Provide continuous bearing by supporting entire length of pipe barrel evenly.

C. Cleaning Pipe and Fittings:
   1. General: Provide interior free of foreign material and joint surfaces free of lumps and blisters.

D. Termination:
   1. Forcemains shall terminate at the bottom of a manhole 0.1 foot above outlet invert.
   2. The alignment of forcemain discharge must be within 30 degrees of straight through (i.e. 12 o'clock to 6 o'clock position).
   3. Manhole flow channels shall be constructed to crown of downstream outlet.

3.02 INSTALLATION:

A. Laying pipe:
   1. Place pipe length and bedding as a unit in a frost free, dry trench.
   2. Special supports and saddles: See Article 3.04 SCHEDULES.
   3. Joint deflection shall be as recommended by pipe manufacturer.

B. Cutting Pipe:
   1. Ductile iron: Power saw.

C. Jointing:
   1. Mechanical:
      a. Lubricate with manufacturer specified material.
      b. Tighten bolts evenly to manufacturer specifications.
   2. Push-on:
      a. Lubricate as recommended by manufacturer.

b. Shape beveling as recommended by manufacturer.

D. Setting Valves and Fittings:
   1. General: See Article 3.04 SCHEDULES.
   2. Valves: Plumb.
   3. Valve boxes:
      a. Base section: Center and plumb over operating nut and 2 inches above bonnet joint.
      b. Upper section: Set cover flush with finished grade.
      c. Witnesses: Provide two (2) measurements to permanent surface features.

E. Cleanout and Air Release Valve Chambers:
   1. General: See Article 3.04 SCHEDULES:
   2. Base Bedding: Provide 4-inch pea stone with full and even bearing in impervious soils or wet conditions. Otherwise provide on undisturbed, frost-free, dry subgrade.
   3. Precast: Fill joint space completely and trowel.
   4. Provide casting setting as follows:
      a. Existing pavement: Finished grade.
      b. Gravel road: 6 inches below.
      c. Unpaved areas: Finished grade.

F. Pipe Joint Restraint:
   1. Provide mechanical joint restraint for the minimum lengths shown in joint restraint detail (i.e. Schedule 3.06.A.4)

      * The length of restrained pipe required shown in the joint restraint detail is based on trench backfill being compacted to 95% of the maximum density according to the Modified Proctor Method. The joint restraint detail does not consider polyethylene wrapped pipe. If the pipe is wrapped with polyethylene, a greater length of restrained pipe will be required. Unless otherwise specified, a multiplier of 1.5 shall be used to determine the required length when the pipe is wrapped with polyethylene.

      ** If straight run of pipe on small side of reducer exceeds this value, then no restrained joints are necessary.

         a. Tees: Pipe restraint length shown in the joint restraint detail shall be provided in the branch direction. Also, the minimum length of pipe restraint in the straight through (run) direction shall be 10 feet on both sides of the tee.
         b. Bends: Pipe restraint length shown in the joint restraint detail shall be provided on both sides of the bend.
         c. Dead End: Pipe restraint length shown in the joint restraint detail shall be provided back from the dead-end plug.
         d. See 3.06 SCHEDULES for a detail illustrating the joint restraint requirements.
         e. All joints shall be restrained for pipe within casings.
         f. All joints between bends on water main offsets shall be restrained.

G. Reaction Backing (allowed only where restrained joints cannot be used and when approved by ENGINEER):
   1. Placement:
      a. Place concrete manhole block next to pipe and concrete reaction backing behind. Megalugs and fitting bolts shall not be covered with concrete.

2. Bearing area: Provide the following square feet of concrete against trench wall in sand:

Pipe Size	Tees Plugs	Hydrants 90° Els	Wyes 45° Els	22½° Els	11¼° Els
4"	2	1	1	1	1
6"	3	3	2	1	1
8"	4	6	3	2	1
12"	9	11	6	3	2
16"	13	20	10	6	3

3. Other Soil Conditions:
   (a) Cement sand or hardpan - Multiply above by 0.5
   (b) Gravel - Multiply above by 0.7
   (c) Hard dry clay - Multiply above by 0.7
   (d) Soft clay - Multiply above by 2.0
   (e) Muck - secure all fittings with Megalug retainer glands or tie rod clamps and concrete reaction backing the same as listed for sand conditions. Install as required by SECTION 02220 – EXCAVATING, BACKFILLING AND COMPACTING.

H. Polyethylene Encasement:
1. In corrosive soils: Install over ductile iron pipe and tape seams in accordance with AWWA C-105.

3.03 TESTING AND INSPECTION:

A. General:
1. Observation: By TOWNSHIP or TOWNSHIP's ENGINEER.
2. Completion: Before connection to lift station.
3. Notification: Pretest and arrange for inspection and test.
4. Equipment and assistance: Provide.
5. Required water: By TOWNSHIP where available from municipal system.

B. Electrical Continuity: Test ductile iron pipe for continuity and repair breaks.

C. Pressure:
1. Conditions: Air or air-water methods of applying pressure prohibited.
2. Range: 100 to 110 psi at lowest elevation.
3. Duration: 1 hour and until completion of inspection.
4. Procedure: Fill system slowly, expel air through air release valve connection at high points and apply pressure. Install air release valve after test.
5. Inspection: Examine line and appurtenances for leaks and movement.
6. Corrections: Repair defects, visible leaks and repeat test until acceptable.

D. Leakage:
1. Condition: Following pressure test.

2. Average pressure: Within pressure test range.
3. Duration: two (2) hours.
4. Filling: As in pressure test.
5. Supplying make-up water: Measurable source.

6. Leakage: Quantity of water supplied to maintain test pressure.
7. Allowable: Less than:

$$L = \frac{ND \times \text{Square root of } P}{3700}$$, where

L = leakage (gallons per hour)
N = number of joints
D = nominal pipe diameter (inches)
P = average test pressure (pounds per square inch gauge)

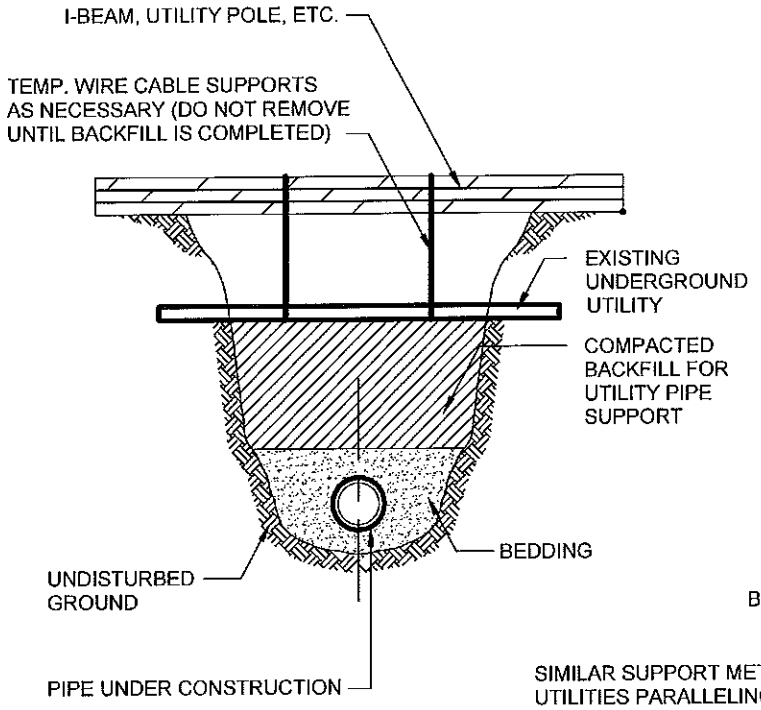
Note: Formula equals 0.8 gallon per hour per mile per inch diameter at 100 psi for 18 foot lengths.

8. Correction: Repair defects and repeat test until acceptable.

3.04 SCHEDULES:

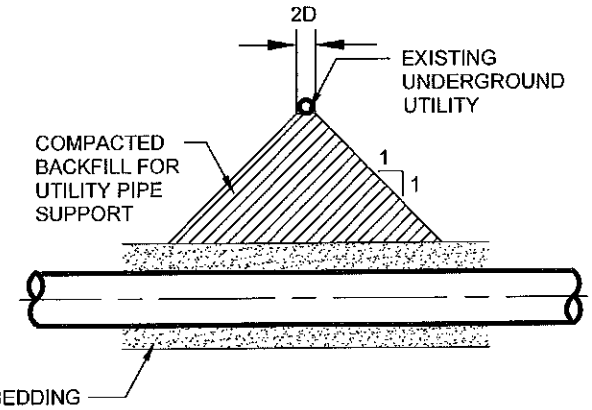
A. Standard Details:
1. Special supports for underground utilities / pipe saddles
2. Methods of bedding pipe
3. Standard air release valve chamber
4. Drop connection detail
5. Force main discharge detail

END OF SECTION



SECTION

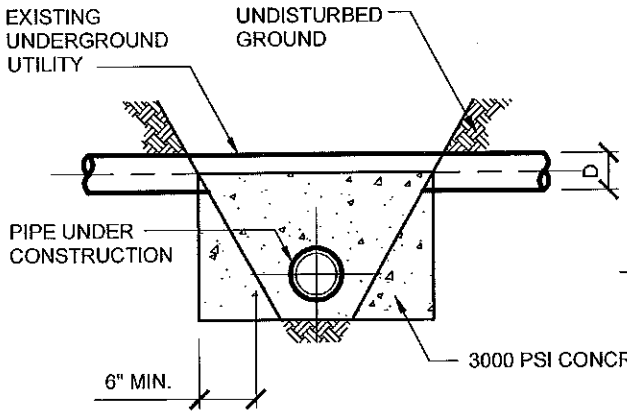
NOTE: MAINTAIN EXISTING COATING ON UTILITY

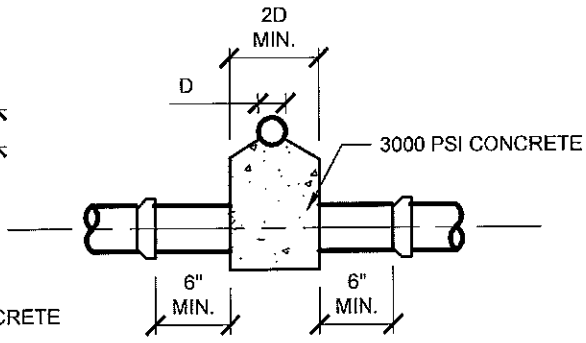


SIMILAR SUPPORT METHODS APPLY TO UTILITIES PARALLELING AND ABOVE THE PIPE UNDER CONSTRUCTION

ELEVATION

SPECIAL SUPPORTS FOR UNDERGROUND UTILITIES





NOTE:

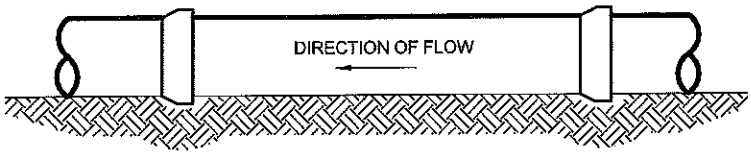
1. PIPE SADDLE IS NOT REQUIRED FOR PLASTIC, STEEL, LEAD OR COPPER PIPE 2" OR SMALLER.

SECTION

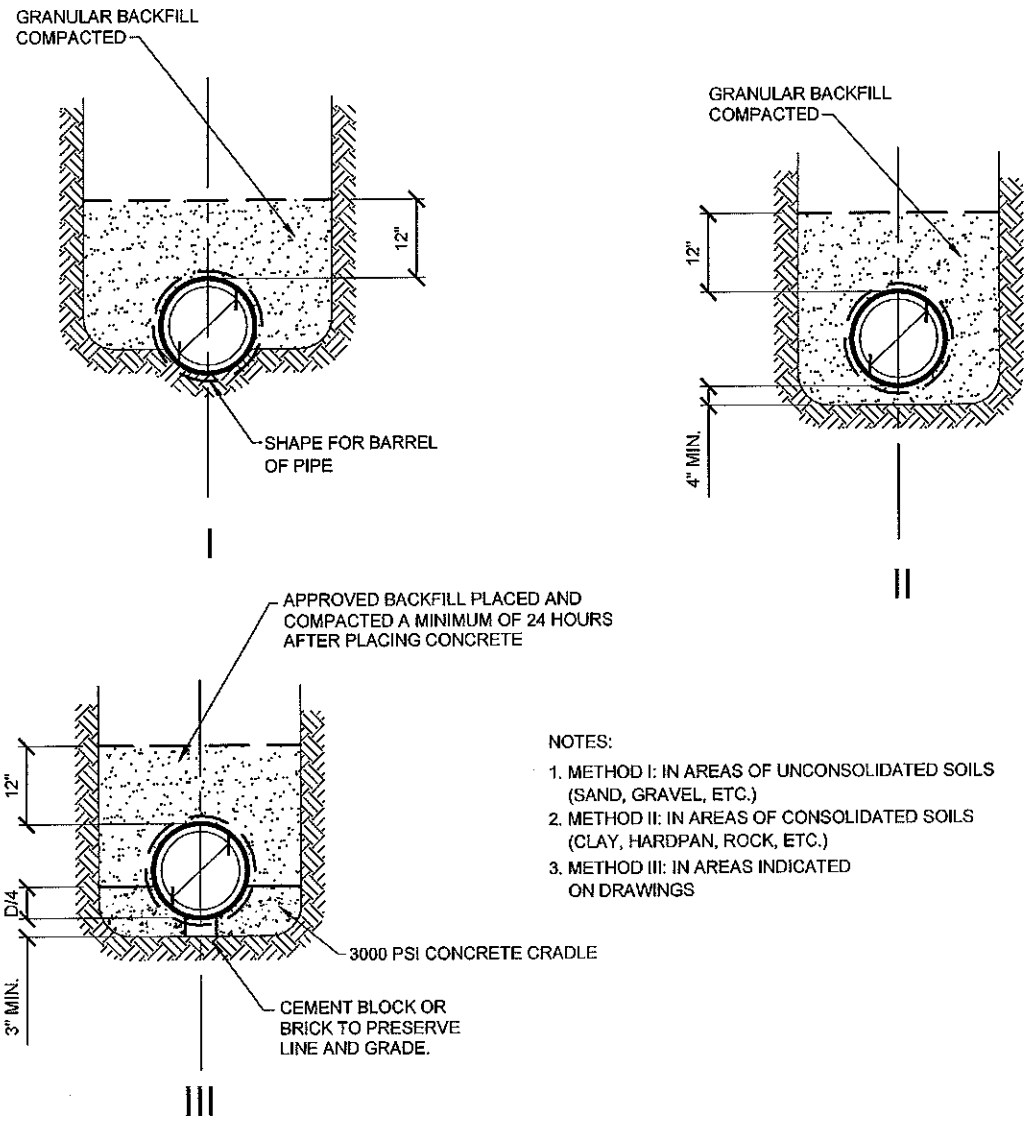
ELEVATION

PIPE SADDLES

02660_SADDLE
8/02



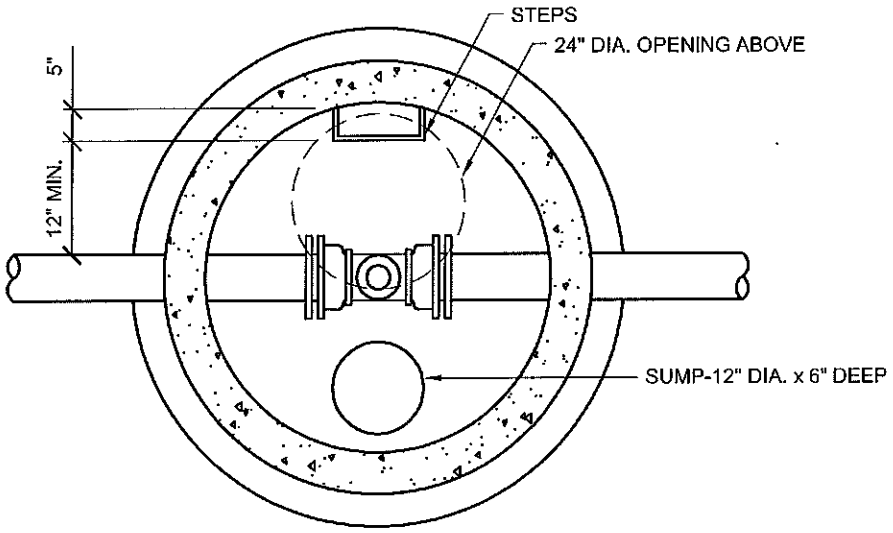
EXCAVATION FOR BELLS



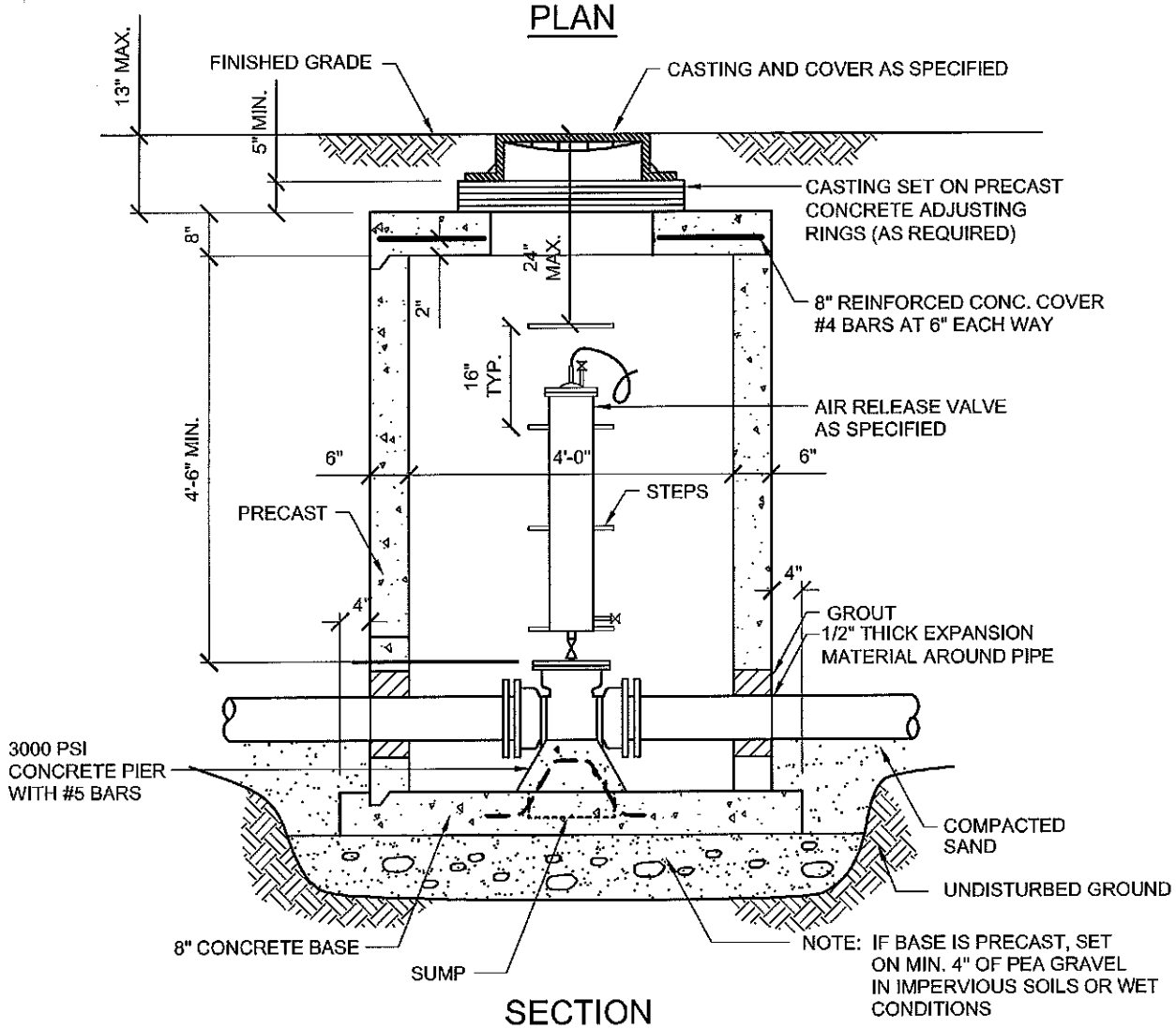
NOTES:

1. METHOD I: IN AREAS OF UNCONSOLIDATED SOILS (SAND, GRAVEL, ETC.)
2. METHOD II: IN AREAS OF CONSOLIDATED SOILS (CLAY, HARDPAN, ROCK, ETC.)
3. METHOD III: IN AREAS INDICATED ON DRAWINGS

METHODS OF BEDDING PIPE

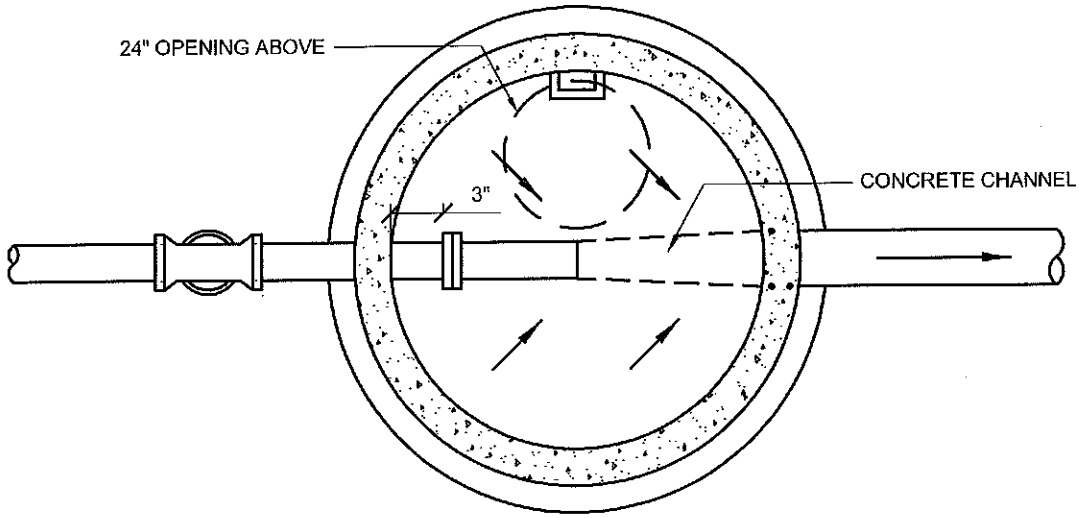


PLAN



SECTION

STANDARD AIR RELEASE VALVE CHAMBER



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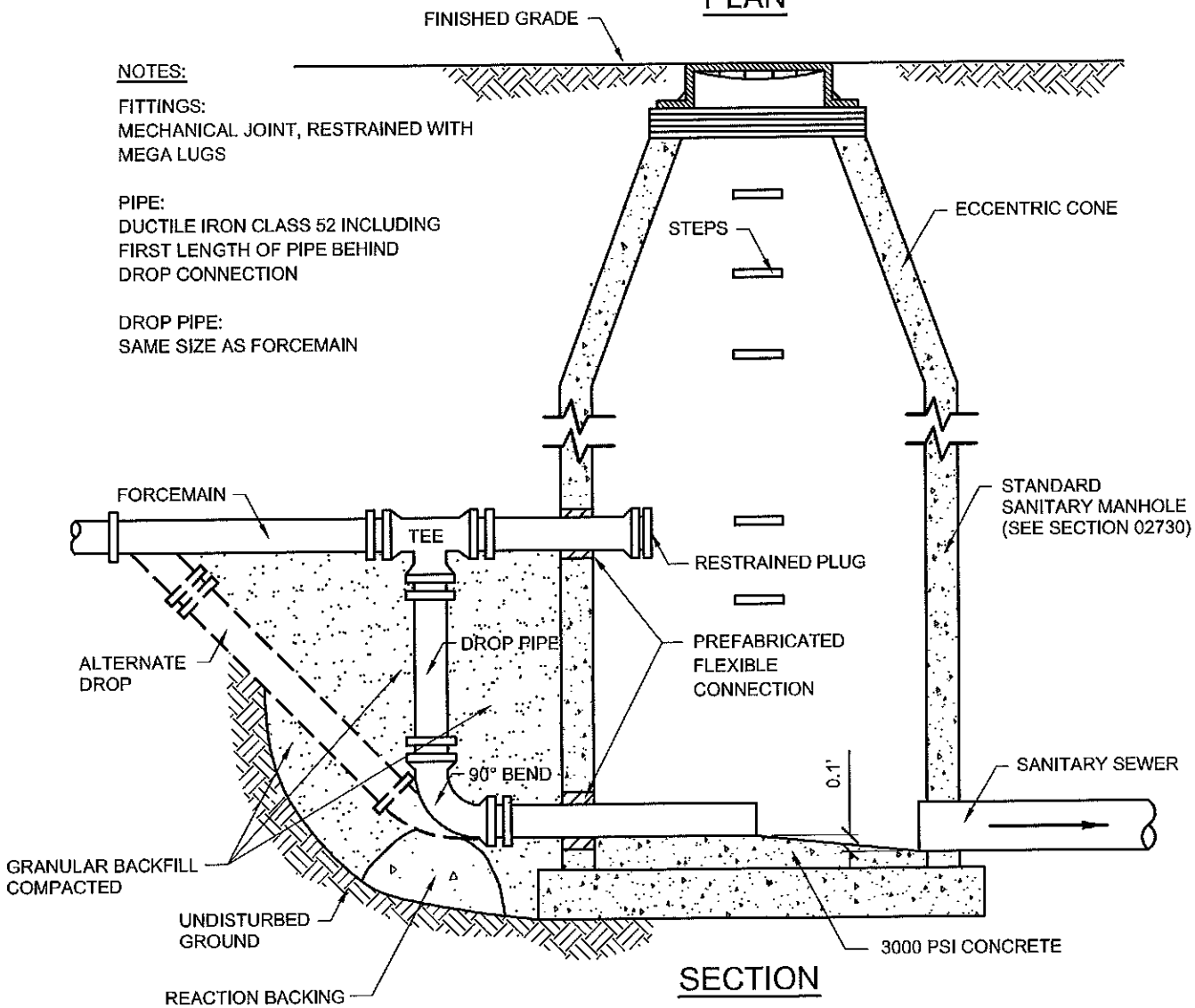


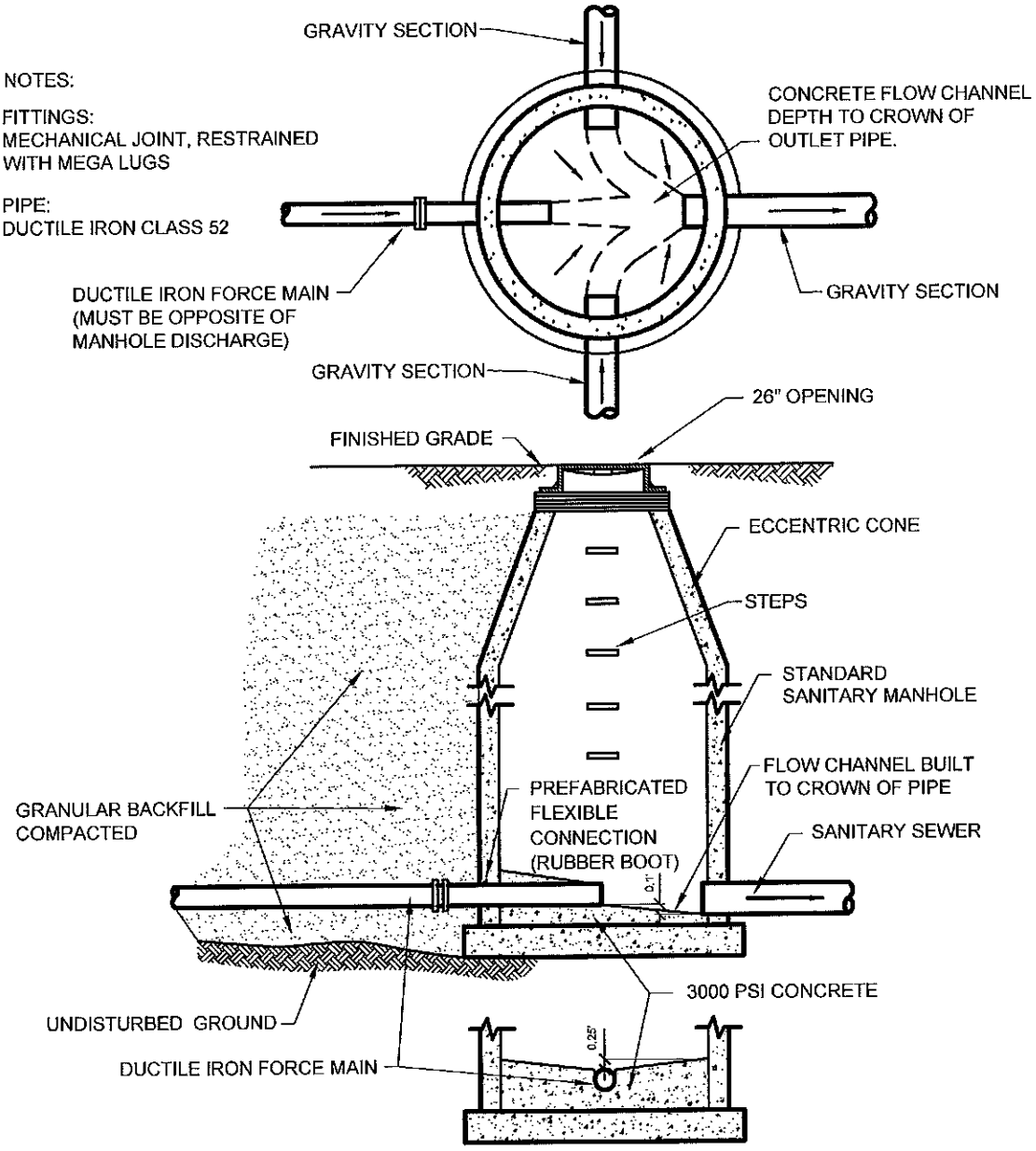
SECTION

DROP CONNECTION DETAIL

NOTES:

FITTINGS:
MECHANICAL JOINT, RESTRAINED
WITH MEGA LUGS

PIPE:
DUCTILE IRON CLASS 52



FORCE MAIN DISCHARGE DETAIL

SECTION 02740

HORIZONTAL DIRECTIONAL DRILLING

PART 1 - GENERAL

1.01 SUMMARY:

A. This Section includes the work required to install a carrier or casing pipe under an obstacle using the method commonly known as directional drilling to the grades and alignments shown on the Drawings, where approved by the TOWNSHIP and TOWNSHIP ENGINEER.

1.02 REFERENCES:

A. ASTM - American Society of Testing Materials, *Latest Edition.*

B. PPI - Plastics Pipe Institute

C. AWWA - American Water Works Association

D. ANSI - American National Standards Institute

1.03 JOB CONDITIONS:

A. A. MDOT Right-of-Way: Comply with MDOT "Provisions for Jack Construction (1998)" for permitting, installing and inspecting jacked-in-place and directional-drilled pipe within MDOT right-of-way.

B. Other Jurisdictions: Comply with all permit requirements.

C. Critical Crossings: Critical crossings, such as surface water crossings, require valve chambers on each side of the crossing so that the section of piping may be isolated. The valve chambers shall include corporation stops on each side of the valve for purposes of future chlorination, sampling, and leak testing.

1.04 GENERAL REQUIREMENTS:

A. The CONTRACTOR shall be responsible for the method of construction, the stability and accuracy of the drilled and reamed hole and pits constructed, and all costs for damages resulting from any failure thereof. The CONTRACTOR shall be solely responsible for the safety of the pits and related structures and personnel engaged in underground construction throughout the duration of the work.

B. The CONTRACTOR's methods and schedule shall consider the overall project requirements and anticipated subsurface soils and groundwater conditions. The CONTRACTOR's selection of inadequate, inappropriate or inefficient equipment and methods will not be cause for adjustments to the contract price or contract time.

C. The general dimensions, arrangement and details for the drilled hole and pits to be constructed shall be as needed to complete the required work.

D. Methods of excavation, equipment and procedures for the directional drilling operation and pits shall be selected by the CONTRACTOR to provide adequate working space and clearances for the work to be performed.

E. Pit excavation methods, groundwater control and pit support techniques shall be selected by the CONTRACTOR.

1.05 CONTRACTOR QUALIFICATIONS:

A. The CONTRACTOR who will complete the work contained in this Section must be experienced in the type of work specified in this Section and must have successfully completed similar projects within the last three years.

B. Personnel that will perform the work must be trained and experienced in the fabrication and installation of the materials and equipment, as well as being knowledgeable of the design and the reviewed shop drawings.

C. At the ENGINEER's request, the CONTRACTOR responsible for the completion of the work contained in this Section shall submit a list of jobs successfully completed within the last three years. Information on each job must include the following:
   1. Date of Project
   2. Location
   3. Length of Directional Drill
   4. Size and Material of Pipe
   5. General CONTRACTOR's name, contact and phone number.
   6. OWNER's name, contact and phone number.
   7. Other information relevant to the successful completion of the project.

1.06 SAFETY:

A. The CONTRACTOR shall become familiar with, and shall at all times conform to, all applicable codes, ordinances and laws in relation to the work required.

B. Directional drilling equipment machine safety requirements shall include a common grounding system to prevent electrical shock in the event of a high voltage underground cable strike. The grounding system shall connect all pieces of interconnecting machinery; the drill, mud mixing system, drill power unit, drill rod trailer, operator's booth, worker grounding mats and any other interconnected equipment to a common ground. The drill shall be equipped with an "electrical strike" audible and visual warning system that shall notify the system operators of an electrical strike.

C. Operators of the drill shall wear electrical shock protection equipment and operate from common grounding mats as required.

1.07 SUBMITTALS:

A. Proposed drill profile data including the minimum information listed below:
   1. Entrance angle
   2. Exit angle
   3. Minimum radius of curvature
   4. Depth of pipe every 50 feet
   5. Pilot hole diameter
   6. Back ream hole diameter
   7. Wet or dry pullback

8. Estimated maximum pullback force

B. Polyethylene pipe data including, but not limited to, the following:
   1. Manufacturer's brochures and catalog sheets
   2. Dimensions
      a. Inside diameter
      b. Outside diameter
      c. Standard dimension ratio
      d. Yield stress

C. HDPE to DI connection:
   1. Manufacturer
   2. Product data sheet
   3. Dimension drawing
   4. Installation instructions

D. Drilling Fluid:
   1. Bentonite (or alternate):
      a. Product manufacturer
      b. Product data sheet
      c. Mixing instructions
   2. Polymer:
      a. Product manufacturer
      b. Product data sheet
      c. Mixing instructions
      d. Material safety data sheet (MSDS)

E. Drill Path Documentation upon completion: See Article 3.07.

F. Contractor corrective action plan as noted in Section 02740.1, Paragraph 5.

1.08 DELIVERY, STORAGE AND HANDLING:

A. Handle and store materials in a manner that will prevent:
   1. Deterioration or damage
   2. Contamination with foreign matter
   3. Damage by weather or elements

B. After the pipe is fused together and before it is pulled through the drilled hole, the CONTRACTOR shall be responsible to provide vehicular and emergency access to all properties affected by the fused pipeline. The CONTRACTOR shall be responsible to repair all damage to existing surface and site improvements damaged by the fused pipeline.

1.09 UTILITY PROTECTION:

A. All underground utilities shown on the drawings are shown according to the best available information. It is the CONTRACTOR's responsibility to verify the location of all existing utilities prior to working in the area.

B. All utilities are to remain in service and shall be protected by the CONTRACTOR from any damage as a result of his operations.

C. Where utilities are encountered and not shown on the drawings, the CONTRACTOR shall report them to the OWNER before proceeding with the work.

D. All utilities damaged by the CONTRACTOR's activities shall be repaired or replaced by the CONTRACTOR without preventable delay. All costs to repair the utility including, but not limited to, materials, labor, inspection, testing and temporary service shall be borne by the CONTRACTOR with no cost to the OWNER.

E. All utilities in close proximity to the drill pilot bore, back ream or product pipe installation must be exposed in accordance with all codes, ordinances and regulations to ensure, by visual inspection, that the CONTRACTOR's work has not caused any damage to the utility or to the CONTRACTOR's work and adequate clearance between the utility and the CONTRACTOR's work is maintained.

1.10 APPLICABLE REGULATIONS:

A. All work covered by this Section shall be performed in accordance with all applicable federal, state and local laws, regulations, codes and ordinances which pertain to such work, as well as the supplemental regulations contained in these specifications. If a conflict exists between any laws, regulations, codes or ordinances, the most stringent shall govern.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. PIPE:

1. Water main pipe material shall be high density polyethylene (HDPE) constructed of PE 3408 resin with an SDR of 11 or less and conform to AWWA Standard C-906. In addition, all materials must be listed and approved for use with potable water under ANSI/NSF Standards 14 and 61 (Standard 14 meets the requirements of Standard 61). The Exterior wall of all HDPE pipe proposed for potable use must also bear NSF and AWWA C-906 identification. The pipe shall conform to DIPS (Ductile Iron Pipe Size) size and be appropriately striped as water main (blue).

2. Sanitary force main pipe material shall be high density polyethylene (HDPE) made from a high density, high molecular weight resin classified as a Type III, Grade P34, Class C, Category 5 by ASTM D1248. Cell Classification by ASTM D3350 shall be 345434C, and rated 3408 by the Plastics Pipe Institute, a Division of the Society of the Plastics Industry, Inc.

3. The pipe shall have the minimum or maximum inside diameter (ID) and standard dimension ratio (SDR) as indicated on the plans. The rated working pressure (psi) shall be as indicated on the plans.

4. The CONTRACTOR is responsible for calculating loads placed on the pipe during its installation based on the CONTRACTOR's chosen means and methods of construction. It is the CONTRACTOR's responsibility to ensure the pipe will withstand all loadings placed on it during installation. If the pipe with dimensions given above will not withstand the installation loads, it is the CONTRACTOR's responsibility to size the pipe to withstand the installation loads.

5. Manufacturers:

a. Phillips Driscopipe, Inc.
b. Chevron Chemical Company (Plexco)
c. or Engineer approved equal

B. DRILLING FLUIDS:
1. The CONTRACTOR must use a high-quality Bentonite drilling fluid or equivalent to ensure hole stabilization, cuttings transport, bit and electronics cooling, and hole lubrication to reduce drag on the drill pipe and the product pipe. Oil-based drilling fluids or fluids containing additives that can contaminate the soil or ground water will not be considered acceptable substitutes. Composition of the drilling fluid must comply with all federal, state and local environmental regulations.
2. Polymer used as lubrication in the drilling fluid is acceptable, if desired.
3. Drilling fluids must be mixed with water that is free from significant solids and contamination. Potable water is acceptable. River water is acceptable provided no organic matter or soil particulates are mixed into the drilling fluid. It is the CONTRACTOR's responsibility to apply for and obtain any necessary permits for the procurement of drilling fluid water. It is also the CONTRACTOR's responsibility to pay permit application fees, metering charges or any other costs associated with drilling fluid mixing water.

C. HDPE TO DUCTILE IRON CONNECTION:
1. The connection from the HDPE pipe to DI shall be manufactured by the pipe manufacturer. It shall be made of HDPE and connect to the DI pipe with a standard rubber gasket and a mechanical joint gland.
2. Additional restraint shall be provided on each side of the connection point in the form of an HDPE anchor ring encased in concrete or other methods as approved by TOWNSHIP ENGINEER. All proposed connection and restraint details shall be included on the plans.
3. Connections shall not be made for a period of 24 hours after the pipe has been installed to allow the pipe to approach an equilibrium temperature with it's surrounding environment.
4. The HDPE pipe shall be properly aligned at all connections.

D. TRACER WIRE:
1. Provide minimum copper 6 gauge.

PART 3 - EXECUTION

3.01 ALIGNMENT AND PROFILE OPTIONS:

A. Alignment and profile shown on the drawings.

B. An alternate alignment and profile developed by the CONTRACTOR with the following requirements:
1. Alignment must be within easement(s) and right-of-way.
2. Clearance between utilities is maintained.
3. 15-foot minimum vertical distance between the drill path and the bottom of a river to prevent drilling fluid breakout.
4. Changes from the approved plans shall be applied by the Township DPW or Township Engineer.

3.02 PIPE FUSION:

A. All pipe shall be joined with the "butt fusion" method in accordance with the pipe manufacturers recommendations. Socket fusion, extrusion welding, hot gas welding and mechanical connections are not acceptable.

B. Butt fusion joining shall produce a joint of equal or greater tensile strength than the strength of the pipe.

3.03 DRILL ENTRANCE AND EXIT PITS:

A. The CONTRACTOR is responsible for the design and construction of the drill entrance and exit pits. Supports may be required to maintain safe working conditions. Ensure stability of the pit, minimize loosening, and minimize soil deterioration and disturbance of the surrounding ground.

B. Entrance and exit pits must be contained in the easement(s) and right-of way.

C. Drill entrance and exit pits must be maintained at minimum size to allow only the minimum amount of drilling fluid storage prior to transfer to mud recycling or processing system or for removal from the site.

D. Drilling fluid will not be allowed to freely flow on the site or around the entrance or exit pits. Fluid spilled must be removed as soon as possible and the ground restored to original condition.

E. Pits must be shored to OSHA standard if workers are required to enter the pits for any reason.

3.04 DRILL ENTRANCE AND EXIT ANGLES:

A. Entrance and exit angles of the drill can be whatever the CONTRACTOR desires such that the elevation profile maintains adequate ground cover to ensure no drilling fluid breakout occurs and that ground exit occurs within the designated easement(s) or right-of-way. The CONTRACTOR is responsible for ensuring that entrance and exit angles ensure pullback forces do not exceed 5% strain on the polyethylene pipe.

3.05 GUIDANCE SYSTEM:

A. The guidance system must have the capability of measuring inclination, roll and azimuth. The guidance system must have an independent means to ensure the accuracy of the installation. The CONTRACTOR will demonstrate a viable method to eliminate accumulated error due to the inclinometer (pitch or accelerometer). The guidance system will be capable of generating a plot of the borehole survey for the purpose of an as-built drawing.

The guidance system must meet the following specifications:

Inclination:	Range	-90° to +90°
	Accuracy	0.2°
Azimuth:	Range	0° to 360°
	Accuracy	0.5°
Roll:	Range	0° to 360°
	Accuracy	0.2°

3.06 PILOT HOLE TOLERANCES:

A. The pilot hole shall be drilled along the agreed-to alignment and profile with the following tolerances:
   1. Vertical
      a. Plus 4 feet (deeper or additional ground cover).
      b. Minus 1 foot (shallower or reduced ground cover).
   2. Horizontal:
      a. Plus or minus 2.5 feet
   3. Curve radius:
      a. Curve radius shall not exceed the pipe manufacturer's recommendations.

3.07 DRILL PATH DOCUMENTATION:

A. The CONTRACTOR is responsible for maintaining drilling logs that provide drill path data every 25 feet along the drill path. Information logged every 25 feet will, at a minimum, include the following:
   1. Pilot hole:
      a. Distance out or station
      b. Depth below a known ground surface elevation
      c. Plus or minus (left or right) of alignment
      d. Torque
      e. Drill fluid flow rate
      f. Time
   2. Back ream:
      a. Distance out or station
      b. Pull back force
      c. Torque
      d. Drill fluid flow rate
      e. Time

3.08 PIPE GOUGING:

A. The CONTRACTOR shall take every precaution to prevent gouging of the pipe prior to and during pipeline installation.

B. It is expected some pipe gouging will occur during pullback. However, the constructed pipeline shall not have any gouges that are deeper than 10% of the pipe wall thickness. Pipe that has gouges greater than 10% of the pipe wall thickness will not be accepted.

3.09 INSTALLING PRODUCT PIPE:

B. After the pilot hole is completed, install a swivel to the reamer and commence pullback operations. Pre-reaming of the tunnel may be necessary and is at the option of the CONTRACTOR.

C. Reaming diameter will not exceed 1.4 times the diameter of the product pipe being installed.

D. Allow sufficient length of product pipe to extend past the termination point to allow connections to adjacent pipe sections or gate valves. Pulled pipes will be allowed 24 hours of stabilization prior to making tie-ins. The length of extra product pipe will be at the CONTRACTOR'S discretion.

E. Install an AWWA C153-11 Mechanical Joint Adaptor, per the manufacturer's requirements, when connecting the pipe to a valve or hydrant.

3.10 YIELD STRESS:

A. The yield stress shall be calculated from the HDPE material submitted and the cross-sectional area of the pipe. The result will be the force at which the HDPE pipe will yield.

B. The pullback force will be monitored throughout the pullback. At no time shall the equipment be operated to produce a pullback force that exceeds 75% of the yield force.

3.11 CLEANUP:

A. All excavated soil, soil cuttings and drilling fluid shall be the property of the CONTRACTOR. All material shall be disposed of in accordance with all laws, regulations, codes, ordinance and these specifications.

B. Immediately upon completion of the work in this section, all rubbish and debris shall be removed from the job site. All construction equipment and implements of service shall be removed and the entire area involved shall be left in a neat, clean and acceptable condition.

C. If a drilling fluid breakout should occur, the area shall be cleaned immediately and the surface washed and returned to original condition by Contractor.

D. Every precaution shall be implemented to prevent a drilling fluid breakout in the river. It is the CONTRACTOR's responsibility to conduct construction activities to prevent this occurrence. However, if a drilling fluid breakout occurs in the river, it is the CONTRACTOR's responsibility to clean up any resultant contamination. The CONTRACTOR is also responsible for any damage to property or the environment due to such a breakout.

3.12 HYDROSTATIC TESTING:

A. The pipe shall be hydrostatically tested before being connected to other piping systems. The pipe shall be tested independently of other hydrostatic tests.

B. Hydrostatic testing will consist of filling the constructed pipeline with water taking care to bleed off trapped air. The CONTRACTOR shall pressurize the pipe to 150 psi for a minimum of 4 hours to give the pipe time to expand. During this initial 4 hours, make-up water shall be added as-needed to maintain the pressure within 5 psi of the specified pressure. At the end of the first 4 hours, the pipe shall be pressurized to the specified pressure and the test commences. The pipeline shall be maintained under the test pressure for a continuous period of between 1 and 3 hours, as determined by the TOWNSHIP ENGINEER, by pumping water into the line at frequent intervals. The volume of water so added to maintain pressure within 5 psi of the specified pressure shall be measured and considered to represent the "leakage" from the line during the interval.

The allowable "leakage" for the pipeline shall not exceed the allowances given in the following table.

Nominal Pipe	Allowable "Leakage" (Gal/100' of Pipe)		
Size (In)	*1-Hour Test*	*2-Hour Test*	*3-Hour Test*
3	0.10	0.15	0.25
4	0.13	0.25	0.40
6	0.30	0.60	0.90
8	0.50	1.0	1.5
10	0.75	1.3	2.1
11	1.0	2.0	3.0
12	1.1	2.3	3.4
14	1.4	2.8	4.2
16	1.7	3.3	5.0
18	2.2	4.3	6.5
20	2.8	5.5	8.0
22	3.5	7.0	10.5
24	4.5	8.9	13.3
28	5.5	11.1	16.8
32	7.0	14.3	21.5
36	9.0	18.0	27.0
40	11.0	22.0	33.0
48	15.0	27.0	43.0

It is understood that the pipe will continue to expand after the initial 4 hours under pressure and throughout the 1 to 3-hour test period. The allowable "leakage" presented in the table above accounts for this expansion and no additional allowable "leakage" will be considered.

C. Under no circumstances shall the total time under the specified test pressure exceed 8 hours. If the test is not completed due to leakage, equipment failure, etc., the test shall be terminated and the pipeline shall be de-pressurized and permitted to "relax" for a minimum of 8 hours prior to the next testing sequences.

D. If there are no visual leaks or significant pressure drops during the final test period, and the measured "leakage" is less than allowable, the pipeline passes the hydrostatic test.

E. In the event that the "leakage", as determined by the ENGINEER, exceeds the specified allowable, the CONTRACTOR shall be responsible to repair or replace the pipeline until the pipeline passes the hydrostatic test, as determined by the ENGINEER.

3.13 TRACER WIRE:

A. Tracer wire shall be installed with the directionally drilled pipe.

3.14 SCHEDULES:

A. Horizontal Directional Drilling Plan for Preventing and Controlling the Loss of Drilling Mud (5 sheets).
B. HDPE / DI Connection and Restraint Detail (1 sheet).
C. Valve Chamber with Corporation Stops Detail (1 sheet).

END OF SECTION

SECTION 02740.1

HORIZONTAL DIRECTIONAL DRILL PLAN FOR PREVENTING LOSS OF DRILLING MUD

1.0 INTRODUCTION

A. This directional drill contingency plan provides specific procedures and steps to prevent and/or to contain inadvertent releases of drilling mud (also referred to as frac-outs) for waterbodies that are crossed using horizontal directional drilling (HDD) techniques.

2.0 HORIZONTAL DIRECTIONAL DRILLING PROCESS

A. Installation of a pipeline by HDD is generally accomplished in three stages. The first stage consists of directionally drilling a small-diameter pilot hole along a pre-determined path. The second stage enlarges this pilot hole to a diameter that will accommodate the pipeline. Numerous "reaming" passes will be necessary with each pass enlarging the diameter of the pilot hole incrementally. The third stage involves pulling the pipeline through the enlarged hole.

During the drilling of the pilot hole, directional control is achieved by using a non-rotating drill string with an asymmetrical leading edge. The asymmetry of the leading edge creates a steering bias, which allows the operator to control the direction of the drill bit. The actual path of the pilot hole is monitored during drilling by taking periodic readings of the inclination and azimuth. These readings are used to calculate the horizontal and vertical coordinates along the pilot holes relative to the initial entry point on the surface.

Once the pilot hole is complete, it is enlarged using reaming tools that are often custom-made for a particular diameter of pipe or type of soil. The reamers are typically attached to the drill string at the exit point and are rotated and drawn to the drilling rig, thus enlarging the pilot hole with each pass. Pipe installation is accomplished by attaching a prefabricated pull section behind a reaming assembly at the exit point and pulling the entire assembly back to the drilling rig.

B. Ideally, horizontal directional drilling involves no disturbance to the bed or banks of a stream or wetland. However, it is possible that geologic irregularities could be encountered during drilling, and drilling could fail. This plan describes the potential for failure of horizontal directional drilling, the contingency methods that would be implemented in the event of inadvertent release of drilling fluids to water or land, and drill hole abandonment procedures.

The feasibility of the horizontal directional drill method primarily depends on the local geologic setting, as well as site topography and other surface features. For example, horizontal directional drilling may not be feasible in areas of glacial till or outwash interspersed with boulders and cobbles, highly fractured bedrock, or non-cohesive coarse sands and gravels. These formations increase the likelihood that drilling could fail due to refusal of the drill bit, continuous loss of drilling fluid through fractures or weak areas in the ground, or collapse of the bore hole in non-cohesive, unstable substrate.

Fortunately, surface characteristics at the proposed Project drill sites are generally favorable for HDD.

Also, subsurface geotechnical investigations indicate that conditions are favorable for horizontal directional drilling.

3.0 MONITORING PROCEDURES

A. The Project Engineer and construction personnel will continuously monitor operations during drilling activities.
   1. Visual inspection along the drill path, including monitoring the water body for evidence of a release.
   2. Continuous examination of drilling fluid pressures and returns flows.

4.0 NOTIFICATION PROCEDURES

A. If in the course of an inspection an inadvertent release is discovered, steps will be taken by construction personnel to contain the release as described in Section 5.0, Corrective Action and Cleanup.

B. If monitoring indicates an in-stream release, the Project Engineer will immediately notify the appropriate Federal and State agencies as soon as possible by telephone and/or facsimile of an in-stream release event, detailing the nature of the release and corrective actions being taken. The notified agencies will determine whether additional measures need to be implemented.

C. If a release occurs that may migrate downstream and affect water quality, downstream water users will be contacted.

5.0 CORRECTIVE ACTION AND CLEANUP

A. By monitoring drilling operations continuously, it is intended to correct problems before they occur. In addition, containment equipment including earth-moving equipment, portable pumps, hand tools, sand, hay bales, silt fence, lumber, and a suction dredge will be readily available at the drill site. If a release does occur, the following measures will be implemented to stop or minimize the release and to clean it up.
   1. The drilling contractor will decide what modifications to make to the drilling technique or composition of drilling fluid (*e.g.*, thickening of fluid by increasing bentonite content) to reduce or stop minor losses of drilling fluid.
   2. If a minor bore path void is encountered during drilling, making a slight change in the direction of the bore path may avoid loss of circulation.
   3. If the bore head becomes lodged resulting in loss of drilling pressure, the borehole may be sized by moving the bore head back and forth to dislodge the stuck materials.
   4. If necessary, drilling operations will be reduced to assess the extent of the release and to implement other possible corrective actions.
   5. If public health and safety are threatened, drilling fluid circulation pumps will be turned off. This measure will be taken as a last resort because it increases the potential for drill hole collapse resulting from loss of down-hole pressure.
   6. If a land release is detected, the drilling crew will take immediate corrective action to contain the release and to prevent migration off site.
   7. The contractor will construct pits and berms around the borehole entry point to contain inadvertent releases onto the ground.
   8. Any drilling mud released into the pits will be pumped by contractor personnel into a mud-processing unit for recycling of drilling fluid and separation of cuttings.
   9. Additional berms will be constructed around the bore pit as directed by the Project Engineer to prevent release materials from flowing into the water body.

10. If the amount of an on-land release does not allow practical collection, the affected area will be diluted with fresh water and allowed to dry. Steps will be taken (such as berm, silt fence, and/or hay bale installation) to prevent silt-laden water from flowing into the water body.
11. If hand tools cannot contain a small on-land release, small collection sumps (less than 5 cubic yards) may be constructed to pump the released material into the mud processing system.
12. Contractor HDD crews will immediately implement non-mechanized measures to contain the spread of drilling fluids, including the installation of hay bales or silt fence.
13. Sump pumps or vacuum trucks will be used to remove and dispose of any drilling fluids.

6.0 ABANDONMENT

A. If corrective actions do not prevent or control releases from occurring into the water body, the HDD Contractor may opt to re-drill the hole along a different alignment or suspend the Project altogether. In either case, the following procedures will be implemented to abandon the drill hole.
   1. The method for sealing the abandoned drill hole is to pump thickened drilling fluid into the hole as the drill assembly is extracted, and using cement grout to make a cap.
   2. Closer to the surface of the hole(s) (within approximately 10 feet of the surface), a soil cap will be installed by filling with soil extracted during construction of the pit and berms.
   3. The bore hole entry location will be graded by the contractor to its original grade and condition after the drill hole has been abandoned.

SECTION 02800

SURFACE PROTECTION AND RESTORATION

PART 1 - GENERAL

1.01 SUMMARY:

A. This Section includes the work required for protection and restoration of surface features such as site improvements and all trees, shrubs, lawns and other landscape features.

B. Definition of Site Improvements: Fences, retaining walls, parking appurtenances, playing fields and equipment, sheds, mail boxes, lawn sprinkling systems, landscaping, yard lights and yard accessories.

1.02 REFERENCES:

A. MDOT - Michigan Department of Transportation, *"Standard Specifications for Construction", Current Edition.*

1.03 JOB REQUIREMENTS:

A. Lawn Areas Disturbed by Construction Operation shall be as follows:
   1. Restoration: Fine grade to 4 inches below finish elevations. Remove all stones and debris greater than 1 inch diameter. Place 4 inches of new topsoil, and heavy duty hydroseed and mulch.
   2. Install mulch blanket as directed.

B. Scheduling:
   1. Restoration of lawns and other surface features: Promptly following curb and gutter, site improvements and paving.
   2. Restoration of site improvements: Promptly following utility installation.
   3. Clean up: Promptly following restoration.

C. Seasonal Limitations: MDOT 816.03.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Trees, shrubs and Plants: MDOT 917.

B. Topsoil: MDOT 917.

C. Chemical Fertilizer: MDOT 917. Phosphorus not allowed.

D. Grass Seed: MDOT 917.12.
   1. Lawns: Mixture THM.
   2. Other areas: Mixture THV.

E. Sod: MDOT 917.13.

F. Mulch Blanket: Excelsior or straw mulch blanket, MDOT 917.15, anchored in place only with wood stakes.

G. Site Improvements: Provide materials equal to or better than those that existed prior to start of construction whether shown or not shown on the drawings.

PART 3 - EXECUTION

3.01 PREPARATION:

A. Inspection: Approval required.

3.02 TREES AND SHRUBS:

A. Protection: All items not indicated for removal.

B. Damaged branches: Trim and seal within fifteen (15) days.

C. Replacement: MDOT 815. Place mulching around tree with diameter one foot greater than ball diameter.

D. Maintain a clear space of ten feet (10') around all existing and proposed fire hydrants.

3.03 TOPSOIL:

A. Place new topsoil in preparation of seeding or sodding. Remove all stones and debris larger than 1-inch diameter.

B. Construction methods: MDOT 816.03.

3.04 SEEDING:

A. Construction methods: MDOT 816.03 except with the following rates:

1. Topsoil: 4 inches of new topsoil.
2. Heavy duty hydroseed.
3. Heavy duty hydromulch.

3.05 SODDING:

A. Construction Methods: MDOT 816.03 with 4-inch topsoil.

3.06 SITE IMPROVEMENTS:

A. Protection: All items not indicated for removal.

B. Restoration: Approval required.

3.07 SURFACE RESTORATION:

A. Seed: Backfill with site soil, place new topsoil, fine grade, remove stones larger than 1 inch, clay lumps, wood, debris and other extraneous materials, provide hydraulic seeding.

B. Sod: Grade backfill to smooth subgrade, place and fine grade new topsoil, place Class A sod, fertilizer, water and roll into new topsoil.

SECTION 13425

PEDESTRIAN BRIDGE

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Work Included:
   1. This Section includes the design, furnishing, erection, testing and placing in service of a pedestrian bridge intended to carry pedestrian and bicycle traffic.

1.02 REFERENCES:

A. General:
   1. Bridge shall be designed, fabricated and constructed in accordance with the AASHTO Guide Specifications for Pedestrian Bridges and the AASHTO Guide Specifications for Highway Bridges where applicable.

B. The work of this Section shall comply with the following references:
   1. AASHTO HB-17– Standard Specification for Highway Bridges, Latest Edition
   2. AASHTO GSDPB – LRFD Guide Specifications for Design of Pedestrian Bridges, Latest Edition
   3. AASHTO GSDFPB – Guide Specifications for Design of FRP Pedestrian Bridges, Latest Edition
   4. Michigan Building Code, Latest Edition
   5. AWS D1.1 – Structural Welding Code, Latest Edition
   6. AWS D1.5 – Bridge Welding Code, Latest Edition
   7. ACI 318 – Building Code and Commentary, Latest Edition
   8. AISC – Manual of Steel Construction, Latest Edition
   9. AITC TCM–Timber Construction Manual, Latest Edition
   10. NDS – National Design Standard for Wood Construction, Latest Edition
   11. ASCE 7 – Minimum Design Loads for Buildings and other Structures, Latest Edition
   12. PCI - Pre-stressed Concrete Institute:
       a) MNL-116 - Manual for Quality Control for Plants and Production of Precast Pre-stressed Concrete Products.
       b) MNL-127 - Recommended Practice for Erection of Precast Concrete.
   13. ASTM Standard Specifications:
       a) A 185 - Steel Welded Wire Fabric. Plain, for Concrete Reinforcement.
       b) A 615 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
       c) C 33 - Concrete Aggregates.
       d) C 150 - Portland Cement.
       e) A123 - Standard Specifications for Zinc (hot dip galvanizing) coatings on iron and steel products.

1.03 SUBMITTALS:

A. Signed and sealed design calculations, specifications, plans and detail drawings.
   1. Prepared by a Professional Engineer registered in Michigan.
   2. Submit for:
      a. Foundation
      b. Bridge Structure
      c. Bridge Railings

3. Obtain ENGINEER's review prior to proceeding with fabrication and construction.

B. Welder's qualifications and certification.

C. Structural steel certified steel mill test reports and certification.

D. Concrete reinforcing steel certified mill steel test report.

E. Concrete mix design.

F. Concrete reinforcing steel schedule and layout drawing.

G. Precast Concrete test reports

H. Prestressing strand certifications.

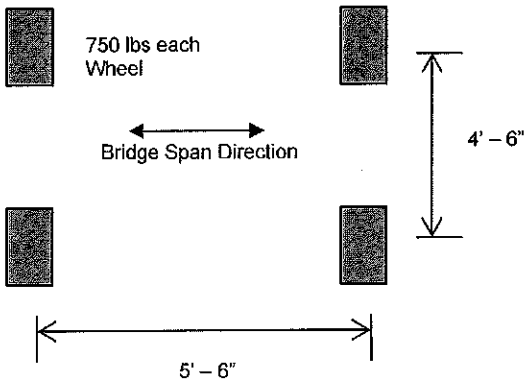
I. Soils report for foundation design.

1.04 GUARANTEE:

A. Bridge Contractor shall guarantee the structure against any defects in materials or workmanship for a period of one year from the date of completion. If any defect is discovered and reported to the Contractor during the guarantee period, the Contractor shall make the necessary repairs without charge to the owner.

1.06 DESIGN REQUIREMENTS:

A. Design Loads:
   1. Dead load: Structure load including decking
   2. Live load: 85 pounds per square foot uniformly distributed. Reductions in live load will be allowed for contributory area exceeding 400 square feet in accordance with the AASHTO Specification. In no case shall the live load be less than 65 pounds per square foot.
   3. Snow load: Calculated per ASCE 7 acting in combination with the live load
   4. Wind load: Calculated per AASHTO Specification
   5. Concentrated load: The bridge structure shall be designed for each of the following point load conditions:
   6. A concentrated load of 1000 pounds placed on any area 2 feet x 2 feet square.
   7. A 3000 pound 4-wheel vehicle as shown in the following diagram placed on the structure to provide the most critical loading.



8. Construction loads: All other associated loads experienced during construction such as equipment, workers, steel rigging and erecting methods.

B. Hydraulic Capacity:

1. For bridges over water the clear opening of the structure shall be designed to pass the 100 yr storm with a minimum of one foot of freeboard to the low beam elevation.
2. The span of the structure shall be set to clear the channel and to minimize scour of the abutments and footings. Where scour counter measures are required, such as sheet piling or rip rap shall be utilized.

C. Abutments:

1. The bridge abutments shall be constructed using cast in place steel reinforced concrete.

D. Foundation:

1. Design the foundation based on the results of a soil investigation report and foundation recommendations provided by geotechnical engineer registered in the State of Michigan.

E. Railings:

1. Railings shall be designed to resist a 50 lb/ft linear load applied to any member in from any direction and a nonconcurrent 200 lb point load applied in any direction to the top of the rail.
2. Railing posts shall be spaced at a maximum of 5'-0" on center.

F. Structure Dimensions:

1. The Minimum clear width for the structure as measured from face of curb to face of curb shall be 8 feet.
2. The bridge shall be cambered for dead load of the bridge and 1% of the span length. The camber shall not exceed the maximum grades specified for ADA compliance.

G. Deflection:

1. The vertical deflection of the main span due to the pedestrian load shall not exceed 1/500 of the span length.
2. The horizontal deflection of the main span shall not exceed 1/500 of the span under an 85-mph wind load.

1.07 PERMITS:

A. The CONTRACTOR shall obtain all permits required for the structure including but not limited to the MDEQ Inland Lakes and Streams Army Corps of Engineers Joint Permit, SESC permit and applicable County Road Commission and Drain Commission permits.

PART 2 - PRODUCTS

2.01 BRIDGE:

A. Foundation:

1. Foundation shall consist of reinforced concrete spread footings or piles as recommended in the soils investigation report.
2. Foundation concrete shall have a minimum 3500 psi compressive strength.

B. Abutments:

1. Abutments shall be constructed of reinforced cast in place concrete with minimum 3500 psi compressive strength.

C. Bearings:

1. The proposed bridge shall include bearing devices designed for the rotational movements of the bridge due to dead and live loads as well as the anticipated thermal expansion and contraction movements of the structure.
2. Anchor rods shall be provided at the bearing points of the bridge to resist the design reactions at the bearing points.

2.02 ATTACHMENTS:

A. Safety Railings:

1. Vertical safety rails or pickets shall be placed on the structure to a minimum height above the deck surface of 54 inches. The pickets shall be placed as to prevent a 4-inch diameter sphere from passing through the railing.

2. Railings shall extend off of the structure where required for approach slopes in excess of 1 on 3 or where required for fall protection from vertical drops.

B. Handrail:

1. The bridge shall have a handrail on each side of the structure meeting ADA requirements.

C. Rubrail:

1. The bridge design shall include a 6 inch high rubrail located along each side of the structure at deck level. The rubrail shall be designed and located to protect the structure and handrails during snowplowing operations.
2. The design of the rubrail and placement shall not impede stormwater runoff from the structure.

D. Paint:

1. Steel structures shall be constructed with unpainted weathering steel with a minimum corrosion index of 6.0, determined in accordance with ASTM G101.

PART 3 - EXECUTION

3.01 GENERAL:

A. Coordinate Site access and staging area with ENGINEER prior to mobilization.

3.02 ERECTION:

A. Erect in accordance with bridge manufacturer's Shop Drawings and these Specifications.
B. Remove all lifting lugs and other devices used for the purpose of bridge erection.

END OF SECTION

Sewer/Water Utility - Trace Wire Specification

Materials

General

All trace wire and trace wire products shall be domestically manufactured in the U.S.A.

All trace wire shall have HDPE insulation intended for direct bury, color coated per APWA standard for the specific utility being marked.

Trace wire

- **Open Trench** - Trace wire shall be #12 AWG Copper Clad Steel, High Strength with minimum 450 lb. break load, with minimum 30 mil HDPE insulation thickness.
- **Directional Drilling/Boring** - Trace wire shall be #12 AWG Copper Clad Steel, Extra High Strength with minimum 1,150 lb. break load, with minimum 30 mil HDPE insulation thickness.
- **Trace wire – Pipe Bursting/Slip Lining** - Trace wire shall be 7 x 7 Stranded Copper Clad Steel, Extreme Strength with 4,700 lb. break load, with minimum 50 ml HDPE insulation thickness.

Connectors

- All mainline trace wires must be interconnected in intersections, at mainline tees and mainline crosses. At tees, the three wires shall be joined using a single 3-way lockable connector. At Crosses, the four wires shall be joined using a 4-way connector. Use of two 3-way connectors with a short jumper wire between them is an acceptable alternative.
- **Direct bury wire connectors** – shall include 3-way lockable connectors and mainline to lateral lug connectors specifically manufactured for use in underground trace wire installation. Connectors shall be dielectric silicon filled to seal out moisture and corrosion, and shall be installed in a manner so as to prevent any uninsulated wire exposure.
- Non locking friction fit, twist on or taped connectors are prohibited.

Termination/Access

- All trace wire termination points must utilize an approved trace wire access box (above ground access box or grade level/in-ground access box as applicable), specifically manufactured for this purpose.
- All grade level/in-ground access boxes shall be appropriately identified with "sewer" or "water" cast into the cap and be color coded.
- A minimum of 2 ft. of excess/slack wire is required in all trace wire access boxes after meeting final elevation.
- All trace wire access boxes must include a manually interruptible conductive/connective link between the terminal(s) for the trace wire connection and the terminal for the grounding anode wire connection.
- Grounding anode wire shall be connected to the identified (or bottom) terminal on all access boxes.

This Standard specification was prepared by Joe Rubbelke (joe.rubbelke@gmail.com), Jeff Dale (jeff.dale@mrwa.com) and Frank Stuemke (frank.stuemke@mrwa.com), and is a work-in-progress, intended for redistribution, modification and immediate use by any municipality (March 2014). The end user must accept all liabilities and hold harmless the contributors of this information.

Sewer/Water Utility - Trace Wire Specification

- **Service Laterals on public property** - Trace wire must terminate at an approved grade level/in-ground trace wire access box, located at the edge of the road right-of-way, and out of the roadway.
- **Service Laterals on private property** - Trace wire must terminate at an approved above-ground trace wire access box, affixed to the building exterior directly above where the utility enters the building, at an elevation not greater than 5 vertical feet above finished grade, or terminate at an approved grade level/in-ground trace wire access box, located within 2 linear feet of the building being served by the utility.
- **Hydrants** – Trace wire must terminate at an approved above-ground trace wire access box, properly affixed to the hydrant grade flange. (affixing with tape or plastic ties shall not be acceptable)
- **Long-runs, in excess of 500 linear feet without service laterals or hydrants** - Trace wire access must be provided utilizing an approved grade level/in-ground trace wire access box, located at the edge of the road right-of-way, and out of the roadway. The grade level/in-ground trace wire access box shall be delineated using a minimum 48" polyethylene marker post, color coded per APWA standard for the specific utility being marked.

Grounding

- Trace wire must be properly grounded at all dead ends/stubs
- Grounding of trace wire shall be achieved by use of a drive-in magnesium grounding anode rod with a minimum of 20ft of #14 red HDPE insulated copper clad steel wire connected to anode (minimum 0.5 lb.) specifically manufactured for this purpose, and buried at the same elevation as the utility.
- When grounding the trace wire at dead ends/stubs, the grounding anode shall be installed in a direction 180 degrees opposite of the trace wire, at the maximum possible distance.
- When grounding the trace wire in areas where the trace wire is continuous and neither the mainline trace wire or the grounding anode wire will be terminated at/above grade, install grounding anode directly beneath and in-line with the trace wire. Do not coil excess wire from grounding anode. In this installation method, the grounding anode wire shall be trimmed to an appropriate length before connecting to trace wire with a mainline to lateral lug connector.
- Where the anode wire will be connected to a trace wire access box, a minimum of 2 ft. of excess/slack wire is required after meeting final elevation.

Installation

General

- Trace wire installation shall be performed in such a manner that allows proper access for connection of line tracing equipment, proper locating of wire without loss or deterioration of low frequency (512Hz) signal for distances in excess of 1,000 linear feet, and without distortion of signal caused by multiple wires being installed in close proximity to one another.
- Trace wire systems must be installed as a single continuous wire, except where using approved connectors. No looping or coiling of wire is allowed.

This Standard specification was prepared by Joe Rubbelke (joe.rubbelke@gmail.com), Jeff Dale (jeff.dale@mrwa.com) and Frank Stuemke (frank.stuemke@mrwa.com), and is a work-in-progress, intended for redistribution, modification and immediate use by any municipality (March 2014). The end user must accept all liabilities and hold harmless the contributors of this information.

Sewer/Water Utility - Trace Wire Specification

- Any damage occurring during installation of the trace wire must be immediately repaired by removing the damaged wire, and installing a new section of wire with approved connectors. Taping and/or spray coating shall not be allowed.
- Trace wire shall be installed at the bottom half of the pipe and secured (taped/tied) at 5' intervals.
- Trace wire must be properly grounded as specified.
- Trace wire on all service laterals/stubs must terminate at an approved trace wire access box located directly above the utility, at the edge of the road right-of-way, but out of the roadway. (See Trace wire Termination/Access)
- At all mainline dead-ends, trace wire shall go to ground using an approved connection to a drive-in magnesium grounding anode rod, buried at the same depth as the trace wire. (See Grounding)
- Mainline trace wire shall not be connected to existing conductive pipes. Treat as a mainline dead-end, ground using an approved waterproof connection to a grounding anode buried at the same depth as the trace wire.
- All service lateral trace wires shall be a single wire, connected to the mainline trace wire using a mainline to lateral lug connector, installed without cutting/splicing the mainline trace wire.
- In occurrences where an existing trace wire is encountered on an existing utility that is being extended or tied into, the new trace wire and existing trace wire shall be connected using approved splice connectors, and shall be properly grounded at the splice location as specified.

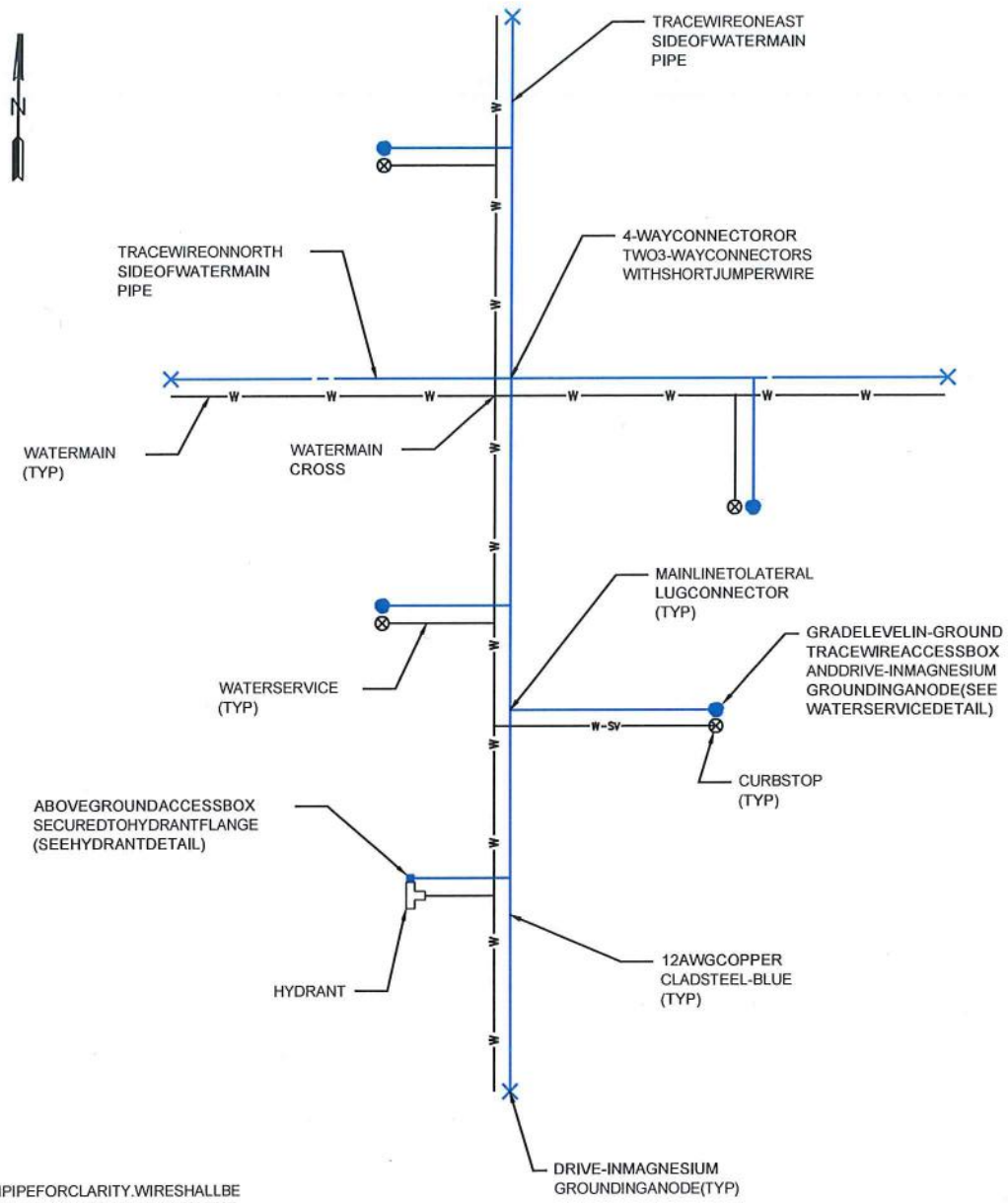
Sanitary Sewer System

- A mainline trace wire must be installed, with all service lateral trace wires properly connected to the mainline trace wire, to ensure full tracing/locating capabilities from a single connection point.
- Lay mainline trace wire continuously, by-passing around the outside of manholes/structures on the North or East side.
- Trace wire on all sanitary service laterals must terminate at an approved trace wire access box color coded green and located directly above the service lateral at the edge of road right of way.

Water System

- A mainline trace wire must be installed, with all service lateral trace wires properly connected to the mainline trace wire, to ensure full tracing/locating capabilities from a single connection point.
- Lay mainline trace wire continuously, by-passing around the outside of valves and fittings on the North or East side.
- Trace wire on all water service laterals must terminate at an approved trace wire access box color coded blue and located directly above the service lateral at the edge of road right of way.
- Above-ground tracer wire access boxes will be installed on all fire hydrants.
- All conductive and non-conductive service lines shall include tracer wire.

This Standard specification was prepared by Joe Rubbelke (joe.rubbelke@gmail.com), Jeff Dale (jeff.dale@mrwa.com) and Frank Stuemke (frank.stuemke@mrwa.com), and is a work-in-progress, intended for redistribution, modification and immediate use by any municipality (March 2014). The end user must accept all liabilities and hold harmless the contributors of this information.



NOTES:
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TRACEWIREPLAN(WATER)
NOSCALE

MICHIGAN RURALWATERASSOCIATION
STANDARDDETAIL

TRACEWIRE
SAMPLEWATERPLAN

May28,2014

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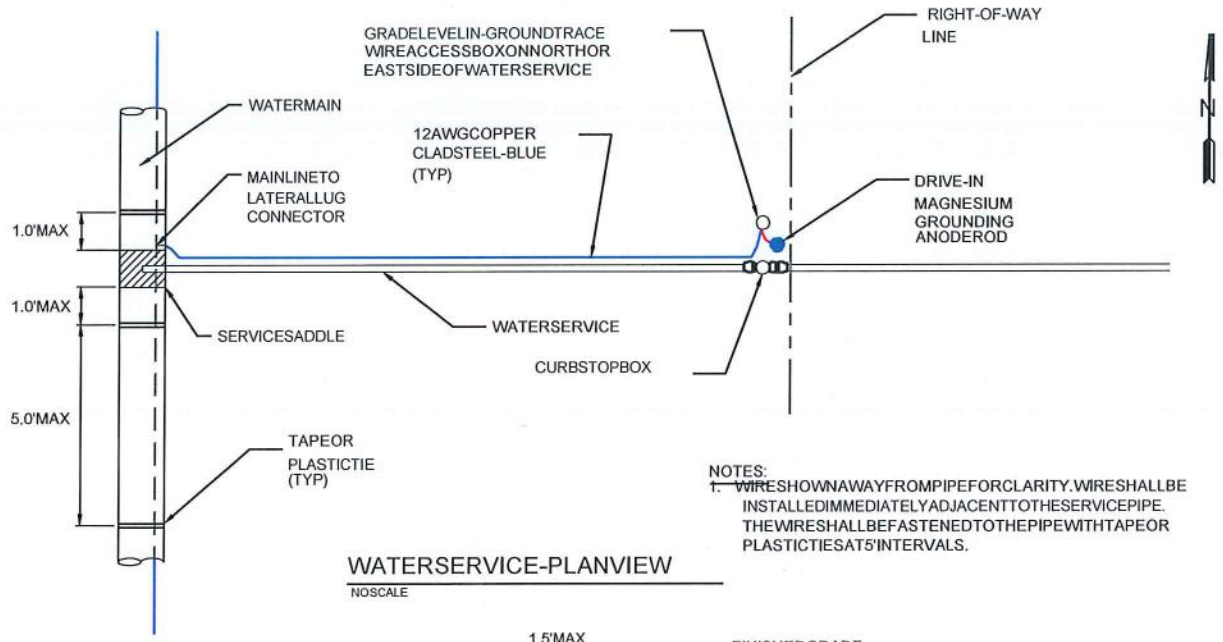

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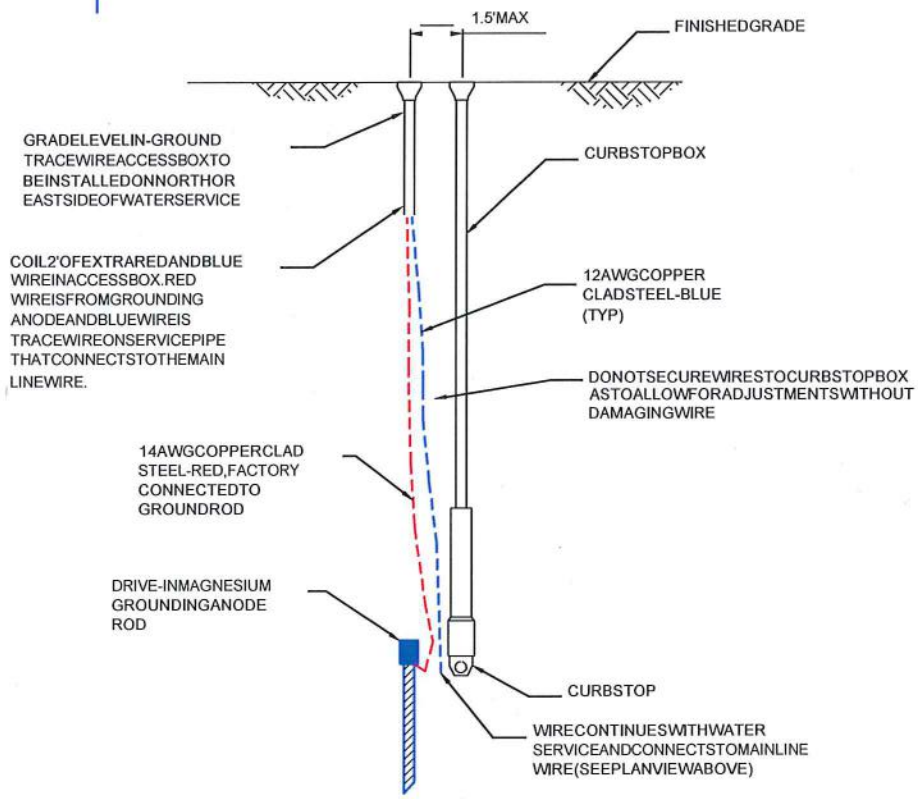
WATERSERVICE-PLANVIEW

NOSCALE



WATERSERVICE-SECTIONVIEW

NOSCALE

MRWA Quality On Tap!

MICHIGAN RURALWATERASSOCIATION STANDARDDETAIL

TRACEWIRE
WATERSERVICEDETAIL

May28,2014

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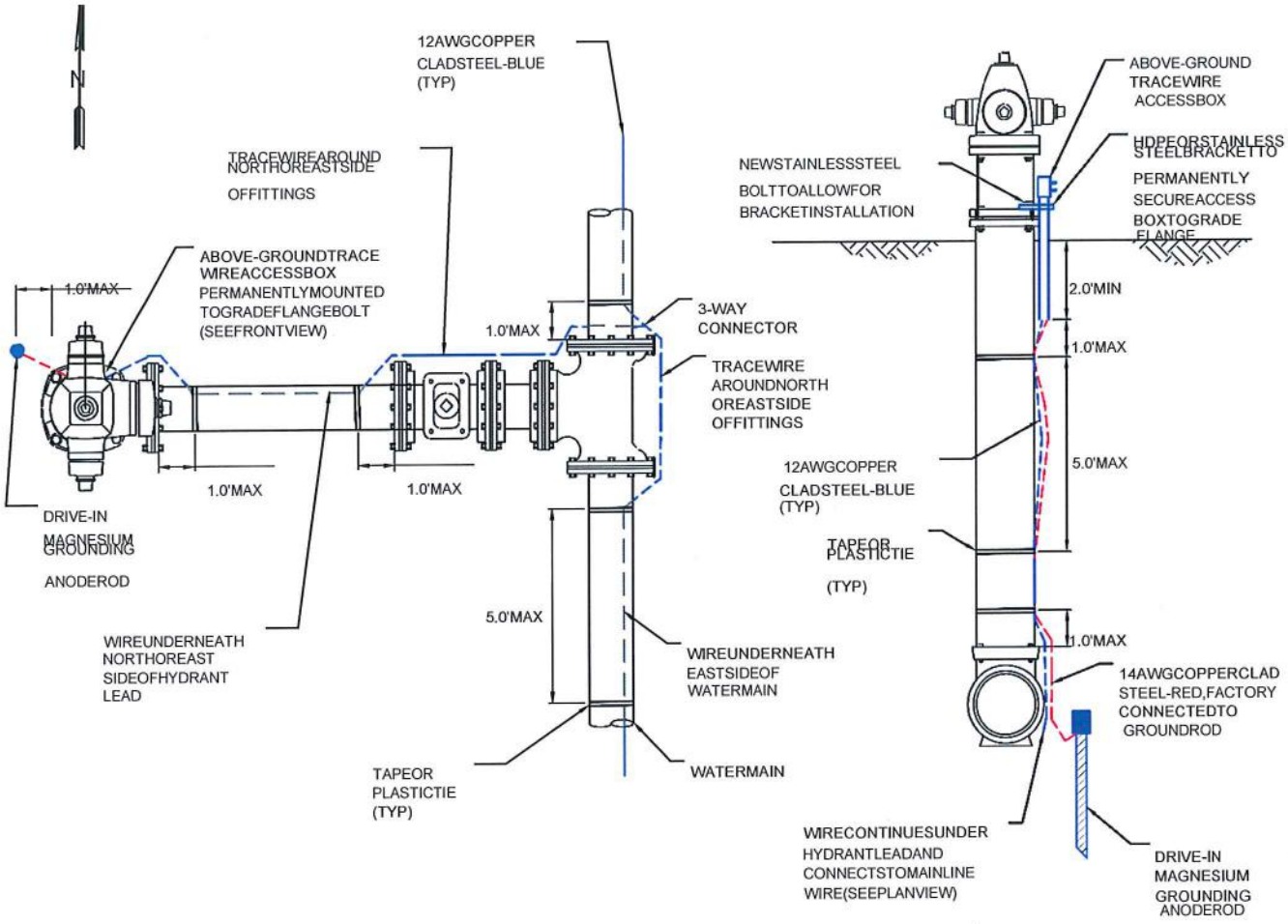

HYDRANT-PLANVIEW

NOSCALE

HYDRANT-SECTIONVIEW

NOSCALE

MRWA Quality On Tap!

MICHIGAN RURALWATERASSOCIATION STANDARDDETAIL

TRACEWIRE HYDRANTDETAIL

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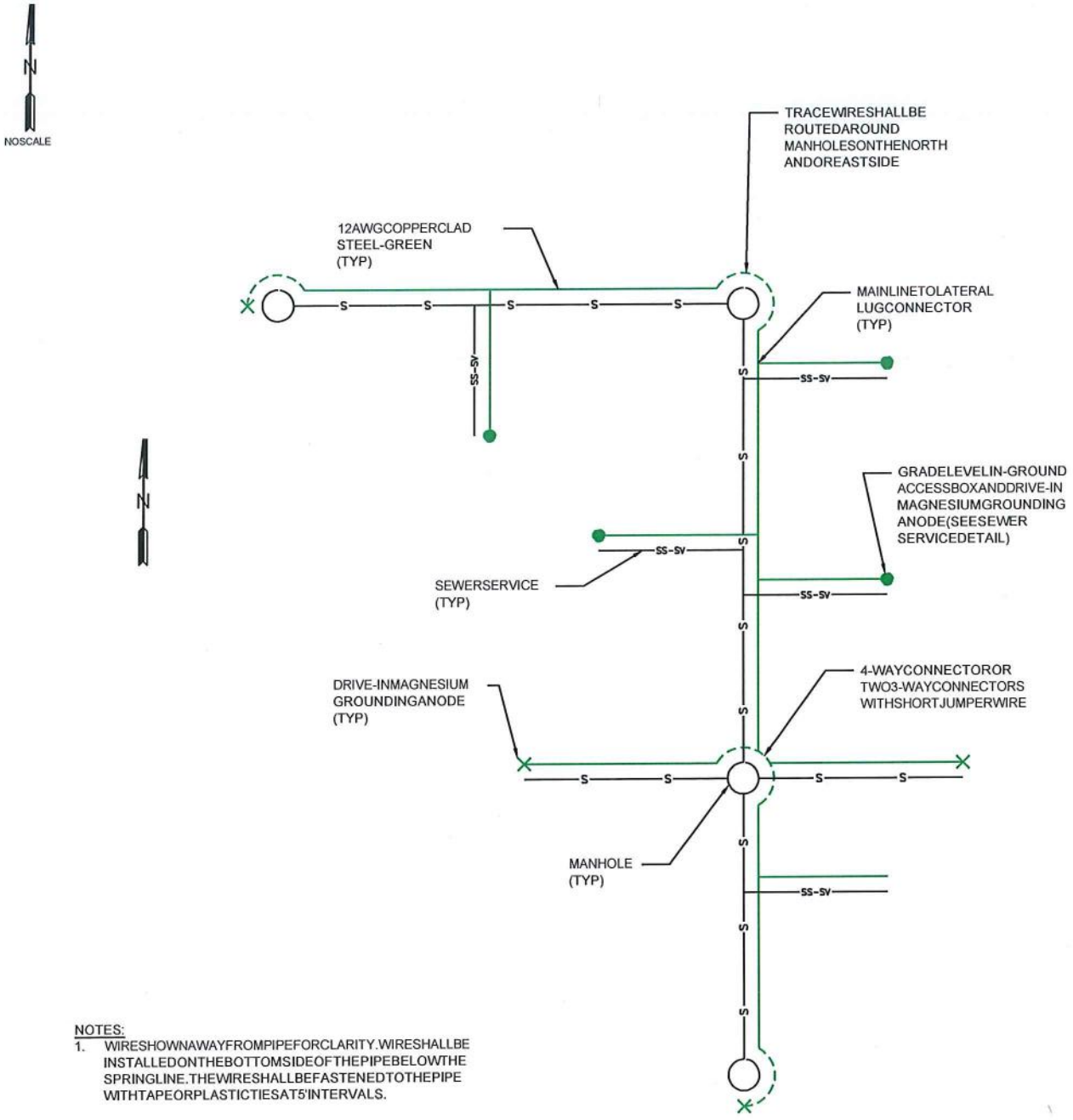

NOTES:

1. WIRESHOWNAWAYFROMPIPEFORCLARITY.WIRESHALLBE INSTALLEDONTHEBOTTOMSIDEOFTHEPIPEBELOWTHE SPRINGLINE.THEWIRESHALLBEFASTENEDTOTHEPIPE WITHTAPEORPLASTICTIESAT5'INTERVALS.

TRACEWIREPLAN(SEWER)

NOSCALE

MICHIGANRURALWATER ASSOCIATION STANDARDDETAIL

TRACEWIRE SAMPLESEWERPLAN

May28,2014

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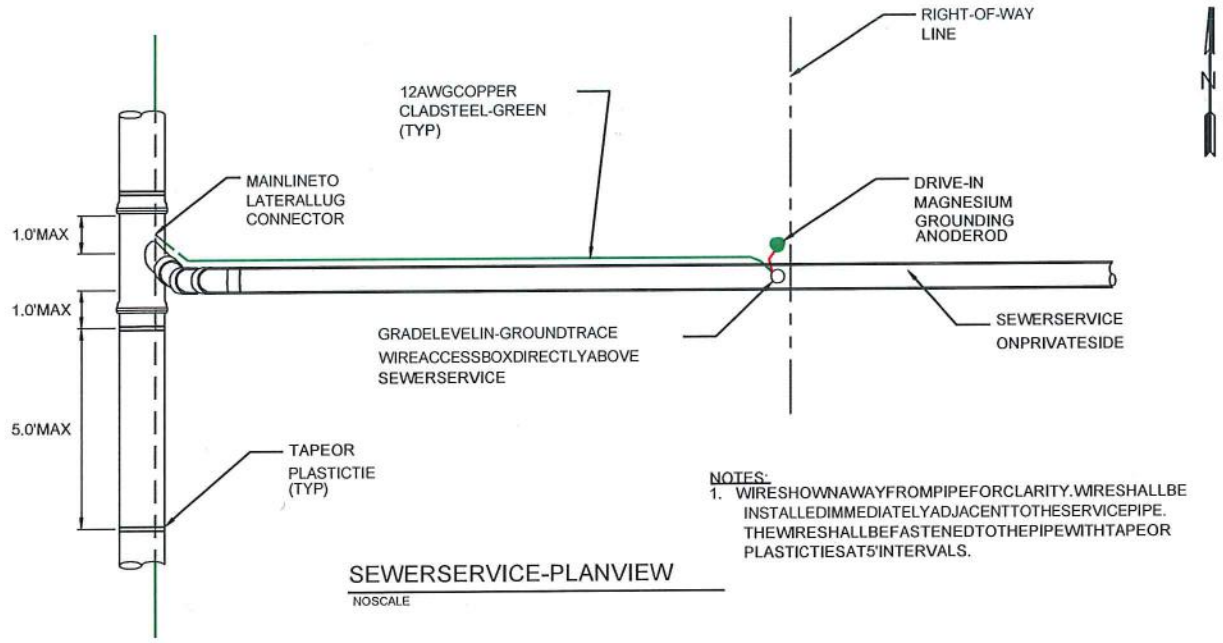
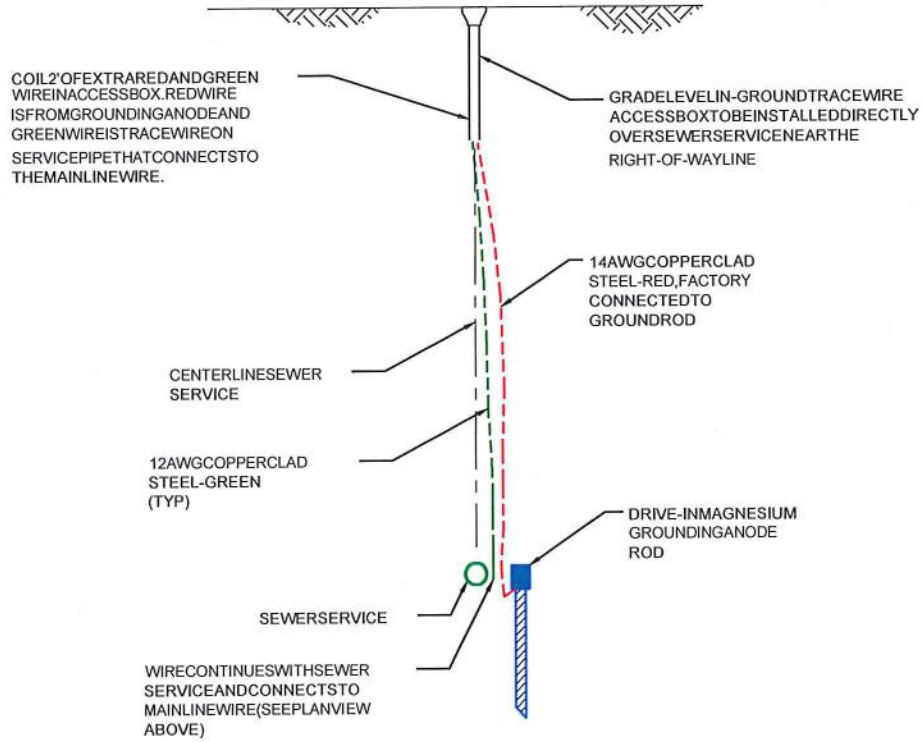


NOTES:
1. WIRESHOWNAWAYFROMPIPEFORCLARITY.WIRESHALLBE INSTALLEDIMMEDIATELYADJACENTTOTHESERVICEPIPE. THEWIRESHALLBEFASTENEDTOTHEPIPEWITHTAPEOR PLASTICTIESAT5'INTERVALS.

SEWERSERVICE-PLANVIEW

NOSCALE



SEWERSERVICE-SECTIONVIEW

NOSCALE

MICHIGAN RURAL WATER ASSOCIATION
STANDARD DETAIL

TRACEWIRE
SEWERSERVICEDETAIL

May28,2014

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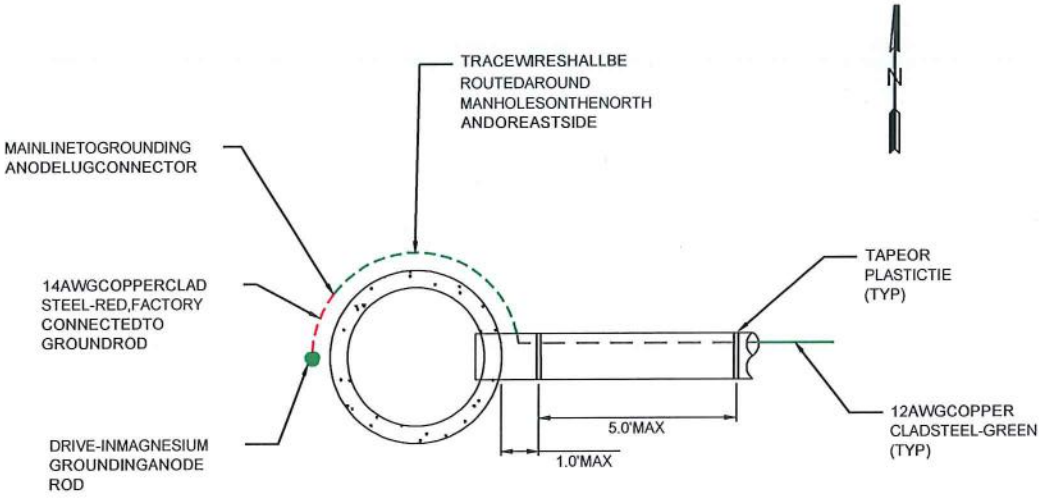
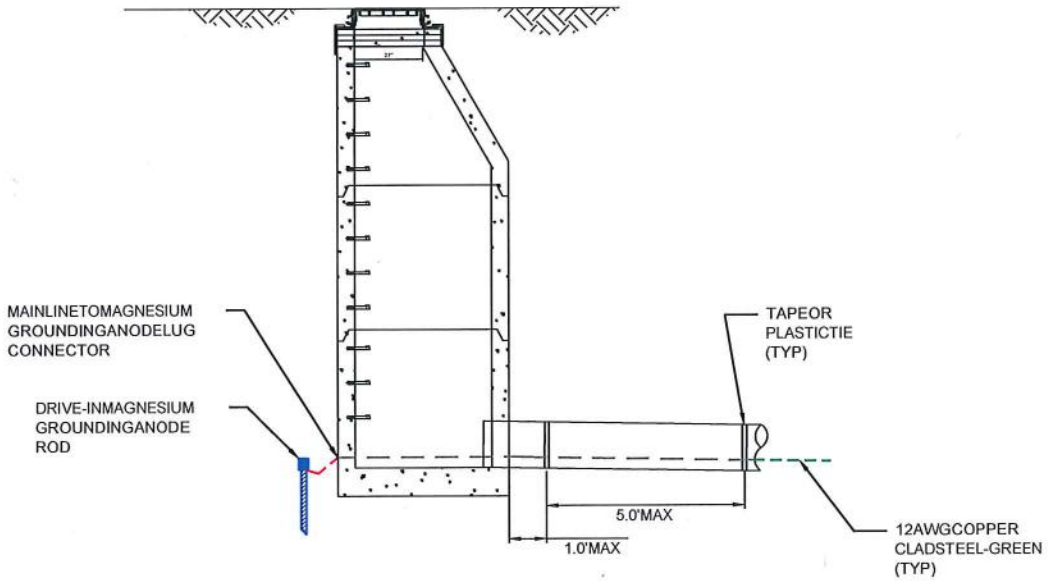


SEWERMANHOLE-PLANVIEW

NOSCALE



SEWERMANHOLE-SECTIONVIEW

NOSCALE

MICHIGAN RURAL WATER ASSOCIATION
STANDARDDETAIL

TRACEWIRE
SEWERMANHOLEDETAIL

May28,2014

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APPENDIX A

APPENDIX "A"

WATER MAIN AND SANITARY SEWER PLANS AND SPECIFICATIONS OVERVIEW

1. The Plans and Specifications shall be submitted with a cover letter which shall contain a brief description of the proposed extension or connection, including the name, location and the lengths and sizes of the water mains and sewer lines per street to be constructed. The plans must indicate the project name, location of the project and location sketch. Refer to Section 01000, Paragraph 1.03 for complete description of the plan review process.

2. The plans must be sealed by a State of Michigan licensed professional engineer.

3. The proposed Plans must be reviewed and approved by the Township and Township Engineer.

4. Easements for water and/or sewer lines must be detailed on the Plans. Platted easements must be so noted and one (1) executed easement document must be submitted for each easement.

5. A general note must be included on the Plans stating the construction shall be done in accordance with the "Allendale Charter Township Standard Construction Requirements".

6. The Plans must define all areas of construction adjacent to lakes, streams, water courses, or other erosion sensitive locations and reference acceptable control techniques, which must be used to control soil erosion and sedimentation.

7. If the project is within 500 feet of a lake or stream, or if the construction activity is within a 100 year floodplain and /or wetlands (Wetlands as defined by 30301(d) of Part 303 of Act 451 of Michigan, PA 1994) copies of all necessary permits or evidence of submittal, or a request for determination from the Michigan Department of Environmental Quality – Land and Water Management Division regarding those activities must be submitted.

8. For water mains constructed within public easement, the curb stop or shut-off valve must be located on the easement line or right-of-way.

9. For water main and sanitary sewer projects, the permit applications for water systems as required by Act 399 and wastewater systems as required by Authority of Part 41, Act 451 of Michigan, PA 1994 as amended shall be completed and submitted.

APPENDIX B

APPENDIX "B"

DEVELOPMENT FEE

This fee is intended to cover the cost of plan review, construction observation/inspection and administration by the Township and Township Engineer on development projects in the Township.

The fee amount will be considered an estimated amount and is estimated for each development project by application of the following rates:

Item	Rate
Water main	$5.00 per lineal foot
Sanitary Sewer	$7.00 per lineal foot
Force main	$4.50 per lineal foot
Storm Sewer / Storm Water Management	$900 lump sum
Sidewalk, Shared Use Path, Pedestrian Bridge	$4.00 per square foot
Pump Station(s)	$22,000 lump sum per station

The entire estimated Development Fee shall be paid by the Developer to the Township prior to submittal of plans to MDEQ for permits.

The above noted fees are intended to cover all Township expenses related to site plan reviews, construction plan reviews, meeting, construction observation/inspection, and Township administration. Any plans submitted multiple times for review will have an additional charge for each plan review after the second review. Beginning with the third submittal, a review fee of $400.00 will be added on to the development fee.

The Development Fee amount paid by the Developer to the Township will be placed into an Escrow Account. Draws from the Escrow Account will be made by the Township for the actual costs incurred in plan review, design engineering, construction observation/inspection and administration by the Township and Township Engineer.

Should expected costs exceed fees placed in the escrow account, the Township may request additional funds be deposited into the account in an amount necessary to cover current and/or projected future costs.

Monies remaining in the Escrow Account upon completion of the project and acceptance by the Township will be returned to the Developer within 30 days after final acceptance of the project by the Township.

APPENDIX C

APPENDIX "C"

UTILITY LINE EASEMENT

Contract No. _____
Plan Sheet _____
Tax Description No. _____
Tax Map _____

THIS INDENTURE, made and entered into this _____ day of _____, 20__, by and between _____, whose address is _____, hereinafter referred to as "Grantor," and **ALLENDALE CHARTER TOWNSHIP, a body corporate, as authorized by the Constitution of the State of Michigan, acting by and through its TOWNSHIP BOARD**, whose address is 6676 Lake Michigan Dr., P.O. Box 539 Allendale, Michigan 49401, hereinafter referred to as "Township";

WITNESSETH:

For and in consideration of the sum of _____ _____ ($_____) Dollar(s), paid to Grantor, the receipt of which is hereby acknowledged, Grantor does hereby grant unto Township, its successors and assigns, a non-exclusive perpetual and permanent easement and right of way, under, through and across a certain piece or parcel of land situated in the _____ **OF** _____, **in the COUNTY OF OTTAWA and STATE OF MICHIGAN**, the piece or parcel of land being owned by Grantor in fee simple and described as follows:

FEE DESCRIPTION:

EASEMENT DESCRIPTION:

This Easement is exempt from ad valorem transfer tax by reason of MCL 207.526, Section 6(a) and MCL 207.505, Section 5(a).

The easement and right of way granted herein shall be for the purpose of the construction and installation of utility lines, including sewer line or lines, water line or lines, storm sewer lines, drains and drain tiles, and their appurtenant valves, hydrants and accessories, under, through and across the above-described Easement Description for the purpose of constructing, operation, maintaining, repairing, replacing, reinstalling, inspecting and keeping in working order the utility lines, sewer lines, water lines and storm sewer lines, and their appurtenant valves, hydrants and accessories, which are running under, through and across the above-described Easement Description, all hereinafter collectively referred to as "Utility Lines."

The easement and right of way granted herein shall include the right to enter upon sufficient land of Grantor adjacent to the Easement Description ("Adjacent Land") as is required for the construction, installation, maintenance, repair, replacement, reinstallation, operation and inspection of said Utility Lines, together with the right to install intersecting Utility Lines therein. In exercising its rights to enter Adjacent Land, Township shall conduct its activities in a manner that will minimize its presence on land outside of the easement and right of way. Each time it enters the Adjacent Land, Township shall, at its sole expense, restore it to the condition it was in immediately prior to entry.

TERM: Said easement and right of way under, through and across the above-described Easement Description, for the use and benefit of Township, its successors and assigns, shall be perpetual.

AUTHORITY: Grantor warrants that they have the right and authority to grant this easement as above-described and own the lands covered by the Easement Description.

RESTORATION: The easement and right of way shall include, but not be limited to, Township's right to enter upon the Easement Description at such times as may be reasonably necessary to construct, maintain, repair, replace, reinstall and inspect its Utility Lines across, through and under the above-described Easement Description, together with the right to excavate a trench or ditch for the location of said Utility Lines. Township shall have the further right to remove trees, brush, undergrowth and other obstructions situated upon the above-described Easement Description interfering with the location, construction, maintenance or repair of said Utility Lines. As a consideration for the Township to have the right to construct and install said Utility Lines, Township shall be obligated, at its sole expense (i) to fill and grade to ground level the trench or ditch occupied by said Utility Lines and (ii) to restore the drives, parking areas, shrubs or grass to their former condition, insofar as is reasonably possible. Township does further covenant and agree that in the event it shall become necessary, at any time, to enter upon the above-described Easement Description for the purpose of maintenance, repair, replacement, construction or reinstallation of said Utility Lines, Township shall, at its sole expense, return said piece or parcel of land to a similar condition as before such maintenance or repair upon the completion of the same, insofar as is reasonably possible.

The removal or demolition of any existing buildings, structures or fences which shall be required for the reasonable exercise of the foregoing powers, shall be removed or demolished at the expense of the Township.

INDEMNIFICATION: Township agrees to fully defend, indemnify, save and keep harmless the Grantor from any and all claims for damage to real and personal property and injuries and death suffered by persons in any manner caused by or growing out of or in any way connected with the construction, installation, repair, maintenance or presence of said Utility Lines, under and across the piece or parcel of land of Grantor or the presence of Township or its employees, guests, invitees, contractors and agents upon the Easement Description or Adjacent Land. Grantor agrees that they will not construct a building, structure or other permanent improvement on said Easement Description without first obtaining the written consent of the Township, which consent will not be unreasonably withheld, delayed or conditioned; and this conveyance includes a release of any and all claims to damage arising from or incidental to the exercise of any of the foregoing powers, except as above provided.

The pronouns and relative words herein are written in the masculine and singular only. If more than one joins in, or be either of the feminine sex or a business entity, such words shall be read as if written in plural, feminine or neuter, respectively.

The Grantor has caused these presents to be signed the day and year first above written.

Sign here: _____
Type here: _____

Sign here: _____
Type here: _____

Address: _____
_____

STATE OF MICHIGAN)
ss.
COUNTY OF OTTAWA)

On this _____ day of _____, 20__, before me, a Notary Public, in and for said County, personally appeared _____, to me known to be the same persons described in and who executed the within instrument, who each acknowledged the same to be their own free act and deed.

Prepared by:

_____
_____
_____
_____
_____
_____

Sign here: _____
Type here: _____

Notary Public
_____ County, Michigan

My Commission Expires:_____

CONSENT AND ACKNOWLEDGMENT OF EASEMENT

Parcel _____ (_____)

KNOW ALL MEN BY THESE PRESENTS, that _____ _____, of _____, as the Mortgagee under a certain Mortgage dated _____, 20__, and recorded on _____, 20__, in Liber _____ of Ottawa County records on Page _____, hereby consents to the grant of easement made by _____, Mortgagor in the Mortgage herein described, to _____, dated _____, 20__, and recorded on _____, 20__, in Liber _____ of Ottawa County records on Page _____, and acknowledges that such Mortgage will be subject to this Easement.

Dated this _____ day of _____, 20__.

Signed in the Presence of:

_____

Sign here: _____
Type here: _____

By:
Sign here: _____
Type here: _____
Its: _____

Sign here: _____
Type here: _____

By:
Sign here: _____
Type here: _____
Its: _____

STATE OF _____)
ss.
COUNTY OF _____)

On this _____ day of _____, 20__, before me, a Notary Public, in and for said County, appeared _____ and _____, to me personally known, who, being by me duly sworn, did say that they are respectively the _____ _____ and the _____ of _____, the banking corporation named in and which executed the within instrument, and that instrument was signed on behalf of said banking corporation by authority of its Board of Directors, and said _____ and _____ acknowledged said instrument to be the free act and deed of said banking corporation.

Prepared by:

_____
_____
_____
_____
_____
_____
_____

Sign here: _____
Type here: _____

Notary Public
_____ County, _____

My Commission Expires:_____

STATEMENT OF JUST COMPENSATION

TO: _____
_____
_____
_____

THIS STATEMENT OF JUST COMPENSATION is based on the fair market value of the interest in real property, hereinafter described, obtained by the _____ _____, **for the** _____ _____ **Project**. This Statement is not less than the appraised value of the interest in said property acquired, and this Statement disregards any decrease or increase of the fair market value of the property caused by the Project. It has been determined that there is no damage to any remaining real property. There are no buildings, structures or other improvements, including fixtures, removable building equipment and trade fixtures which are considered to be part of the real property interest for which the offer of just compensation is made, as follows:

REAL PROPERTY:

INTEREST OBTAINED:

DESCRIPTION OF PROPERTY:

INTERESTED PERSONS:

APPORTIONMENT OF JUST COMPENSATION:

APPRAISED FAIR MARKET VALUE:

_____

By: _____

Its: _____

THE UNDERSIGNED acknowledges receipt of the foregoing Statement of Just Compensation and understands their rights and hereby waives their rights under Public Law 91-646, and agrees to grant the interest requested on the terms proposed, even if a donation of such interest.

This waiver includes a waiver of any appraisal of our property, including accompanying an appraiser inspecting our property. This waiver and the execution of the Easement and/or instruments of conveyance of our interest in such property is made without undue influence or coercive action of any nature by anyone involved in this Project. We understand that we could request an appraisal of our property and have the right to receive Just Compensation for the conveyance of the interest being requested by the party receiving the Easement or conveyance.

Dated this ____ day of _____, 200_.

_____

_____

BICYCLE PATH AND WALKWAY EASEMENT

Parcel No. _____
_____ Project

THIS INDENTURE made and entered into this _____ day of _____, 200_, by and between _____, of _____, hereinafter "Grantor," and the _____, of _____ _____, hereinafter "Township;"

WITNESSETH:

For the sum of One and no/100 ($1.00) Dollar and other valuable consideration paid to the Grantor by the Township, the receipt of which is hereby acknowledged by Grantor, the Grantor does hereby grant, bargain, convey and assign unto the Township, its successors and assigns, a non-exclusive, perpetual and permanent easement and right-of-way over and across that certain piece or parcel of land situated in the _____ **OF** _____, **COUNTY OF** _____ **and STATE OF MICHIGAN**, the piece or parcel of land being owned by the Grantor in fee simple and described as follows:

FEE DESCRIPTION:

IN A PUBLIC BICYCLE PATH AND WALKWAY EASEMENT SPECIFICALLY DESCRIBED AS FOLLOWS:

EASEMENT DESCRIPTION:

This Easement is exempt from transfer tax by reason of MCL 207.526, Section 6(a); and MCL 207.505, Section 5(a).

The easement granted herein shall be for the purpose of installing, constructing, operating, maintaining, repairing, replacing, reinstalling, inspecting and keeping in working order the Bicycle Path and Walkway (including sidewalks at the election of the Township) which may run over and across the above-described easement and right-of-way, all hereinafter collectively referred to as the "Bicycle Path and Walkway Easement."

The easement granted herein shall include the right to enter upon sufficient land owned by the Grantor which is adjacent to the Bicycle Path and Walkway as is required for the construction, installation, maintenance, repair, replacement, reinstallation, operation and

inspection of said Bicycle Path and Walkway, together with the right to install signs on the adjacent land as to the use by the public.

TO HAVE AND TO HOLD said Bicycle Path and Walkway Easement and right-of-way over and across the above-described piece or parcel of land unto the Township, its successors and assigns, for the use and benefit of the Township, its successors and assigns, **FOREVER.**

The Grantor warrants that they have the right and authority to grant this easement as above-described and own the lands covered by the easement and right- of-way.

The easement and right-of-way shall include, but not be limited to, the right to enter upon the easement at any reasonable time for the purpose of such construction, maintenance, repair, replacement, reinstallation and inspection of its Bicycle Path and Walkway, together with the right to excavate a foundation for the location of such Bicycle Path and Walkway. The easement and right-of-way shall further include right to remove trees, brush, undergrowth and other obstructions situated upon the above-described piece or parcel of land which may interfere with the location, construction, maintenance or repair of such Bicycle Path or Walkway. The Township, as a consideration for our granting the right to construct and install such Bicycle Path and Walkway, shall be obligated to fill and grade to ground level the areas adjoining the Bicycle Path and Walkway and shall also be obligated to restore to their former condition, insofar as is reasonably possible, the drives, parking areas, shrubs and/or grass along side such Bicycle Path and Walkway. The Township further covenants and agrees that it will restore such piece or parcel of land to a similar condition, insofar as is reasonably possible, in the event it shall at any time become necessary to enter upon the easement for the purpose of maintenance, repair, replacement, construction or reinstallation of such Bicycle Path and Walkway.

The removal or demolition of any existing buildings, structures or fences required for the reasonable exercise of the foregoing powers shall be removed or demolished at the Township's expense.

The Township agrees to fully indemnify, save and keep harmless the Grantor from any and all claims for damage to real and personal property and injuries or death suffered by persons in any manner caused by or growing out of the construction, installation, repair, maintenance or presence of said Bicycle Path and Walkway over and across the piece or parcel of land of Grantor, except for the negligence of the Grantor, their heirs, representatives, successors or assigns. The Grantor further agrees that they will not construct a building, structure or improvement on such easement and right-of-way without first obtaining the written consent of the Township, and this conveyance includes a release of any and all claims to damage arising from or incidental to the exercise of any of the foregoing powers, except as above provided.

The pronouns and relative words herein are written in the masculine and singular only. If more than one joins in, or be of the feminine sex or a business entity, such words shall be read as if written in plural, feminine or neuter, respectively.

IN WITNESS WHEREOF, the Grantor has caused these presents to be signed the day and year first above written. This instrument shall be binding upon and inure to the benefit of the parties hereto, their respective heirs, representatives, successors and assigns.

Signed in the Presence of:

Sign here: _____ Sign here: _____
Type here: _____ Type here: _____

Sign here: _____ Sign here: _____
Type here: _____ Type here: _____

Address: _____
_____

STATE OF MICHIGAN)
ss.
COUNTY OF _____)

On this ____ day of _____, 200_, before me, a Notary Public, in and for said County, personally appeared _____, to me known to be the same persons described in and who executed the within instrument, who each acknowledged the same to be their own free act and deed.

Prepared by:

_____
_____
_____
_____
_____
_____

Sign here: _____
Type here: _____

Notary Public
Ottawa County, Michigan

My Commission Expires:_____

APPENDIX D

APPENDIX "D"

DEVELOPMENT AGREEMENT

CONTRACT FACE PAGES

I. **PARTIES**

A. **DEVELOPER** (the "**Developer**"):

_____
Name

_____
Address

_____
Type of legal entity, i.e. Corporation, Partnership, Limited Liability Company, Individual, etc.

B. **ALLENDALE CHARTER TOWNSHIP** (the "**Township**")
6676 Lake Michigan Drive, PO Box 539, Allendale, MI 49401

II. **DESCRIPTION OF THE PUBLIC IMPROVEMENTS** (the "**Project**").

_____

_____

_____

_____

III. **PROJECT COMPLETION DATE** (the "**Completion Date**"):

_____

IV. ***IRREVOCABLE LETTER OF CREDIT***

A. Required prior to scheduling the pre-construction meeting.

B. Amount of Letter of Credit: $_____

The amount of the Letter of Credit shall be based on an estimate of the construction cost prepared by the Owner's Engineer and approved by the Township Engineer.

V. **AGREEMENT OF THE PARTIES:**

In consideration of the mutual covenants and agreements contained in the attached Terms and Conditions, the parties mutually agree that the Developer will acquire and construct the Project at Developer's sole expense, that after completion and acceptance of the Project by the Township, ownership shall be transferred by the Developer to the Township for $1.00, and that all aspects of the acquisition, construction, completion, and transfer of the Project to the Township shall be governed by the Terms and Conditions, attached hereto.

IN WITNESS WHEREOF, the parties have executed this Agreement.

Witnesses:

(1) _____

(2) _____

DEVELOPER:

By: _____

Its: _____

By: _____

Its: _____

Dated: _____, 20___

TOWNSHIP:

(1) _____

(2) _____

By: _____

Its: Supervisor

Dated: _____, 20___

DEVELOPMENT AGREEMENT

TERMS AND CONDITIONS

Section 1. **PRECONSTRUCTION MATTERS**. Before commencing construction of the Project, Developer shall accomplish all of the following:

(a) Obtain all necessary permits for the installation and construction of the Project from all agencies having jurisdiction;

(b) Submit to the Township for approval detailed plans and specifications for the Project prepared by a professional engineer licensed in Michigan. Construction of the Project shall not commence unless and until the Township approves these plans and specifications in writing. ***Developer shall pay in cash to the Township the Township Development Fee then in effect.***

The Development Fee amount paid by the Developer to the Township will be placed into an Escrow Account. Draws from the Escrow Account will be made by the Township for the actual costs incurred in plan review, design engineering, construction observation / inspection and administration by the Township and Township Engineer.

Monies remaining in the Escrow Account upon completion of the project and acceptance by the Township will be returned to the Developer within 30 calendar days after final acceptance of the project by the Township.

If the Township requests changes in the plans and specifications for the Project, Developer agrees to make such changes as shall be requested by the Township provided, however, the Township shall not withhold its approval of the plans and specifications unreasonably and, further, that if Township requirements with respect to the plans and specifications are in conflict with those of any agency having jurisdiction, the requirements of the agency shall control. The fact the Township may require higher quality materials or better construction practices than an agency shall not be deemed a conflict and the Township requirements shall control. The plans and specifications shall provide for complete restoration to original or better condition of all paved street surfaces and bicycle paths as well as replacement of all driveways and landscaping disturbed or damaged in the course of the construction of the Project;

(c) ***Submit to the Township the names of the proposed general contractor and all subcontractors who will be constructing and completing the Project on behalf of Developer. Construction of the Project shall not commence unless and until the Township has approved in writing Developer's general contractor and all subcontractors, such approval not to be withheld unreasonably. On request, Developer shall submit to the Township such information concerning Developer's proposed contractors as the Township shall reasonably request;***

(d) Transfer to the Township all easements required to construct the Project. All easements shall be in such form and substance as shall be required by the Township. All easements shall be perpetual and shall be at least as wide as required by the Township but no less then twenty (20) feet in width in any event. Developer shall provide to the Township such proof of title and other title documentation as the Township shall reasonably require in order to verify that the Township is receiving good title to all easements being transferred to the Township by the Developer.

(e) Schedule and convene a preconstruction meeting per the terms described in Section 01000, General Requirements Part 1.06.

Section 2. **PROJECT CONSTRUCTION**. Developer shall cause the Project to be constructed in accordance with the approved plans and specifications in a good and workmanlike manner and so as to meet all quality standards and tests which would apply and be conducted if the Township itself constructed and acquired the Project. During construction of the Project, the Township shall be free itself or with third party contractors or consultants to undertake such inspection of the Project as the Township shall deem appropriate. No change order shall be issued with respect to the approved plans and specifications without prior written approval of the Township, such approval not to be withheld unreasonably.

Section 3. **DEWATERING**. If the Project requires dewatering, Developer agrees that Developer alone, at Developer's sole cost and expense, is responsible for any negative impact including, but without limitation, quantity, quality and taste, caused to the well water supply of any lands affected by Project dewatering. No Project shall be transferred to the Township, and the Township will not approve any Project or accept ownership thereof, unless and until the Township is satisfied that all negative impact to well water supplies caused by the Project have been fully and satisfactorily corrected. The Township may require written documentation from the owner of lands whose well water supply has been affected by Project dewatering that such land owner is satisfied with his/her/their well water supply if the lands have not been connected to the public water system. In the event of a disagreement between the Township and the Developer as to whether a particular well has been adversely affected by the Project, the Township Engineer shall make a written determination and this determination shall be final and binding on the Township and the Developer.

Section 4. **COMPLETION OF THE PROJECT**. The Project shall be completed and made available to the Township for final inspection and approval no later than the completion date. Upon completion of the Project and after final inspection and written approval by the Township, such approval not to be withheld unreasonable, the Project shall be transferred by the Developer to the Township pursuant to the Township's standard form Warranty Bill of Sale.

The Township shall not be obligated to approve the Project or accept ownership thereof unless and until it is satisfied the Project has been constructed in accordance with approved plans and specifications and in a good workmanlike manner and, further, that the Project meets all quality standards and tests which would apply and be conducted if the Township itself acquired and constructed the Project. In addition, the Township shall not be obligated to approve the Project and accept ownership thereof unless and until all of the restoration has been fully completed.

Prior to the Township's approval of the Project and an acceptance of ownership thereof, the Township shall receive from the Developer such waivers of lien, affidavits and other documentation as the Township shall reasonably deem necessary to be assured that all contractor(s) and all pipe and other equipment suppliers in connection with the project have been paid in full and that there are no liens or other unpaid obligations outstanding with respect to the Project.

The Township also reserves the right to require, prior to approval of the Township and acceptance of ownership thereof, a written opinion from Developer's consulting engineer that the Project has been constructed and completed in accordance with the approved plans and specifications.

If the Contract face pages require that the Developer provide an irrevocable letter of credit prior to commencement of construction in order to guarantee completion of the Project by the Completion Date, this irrevocable letter of credit shall be issued by a bank in favor of the Township in the amount shown on the Contract face pages. The letter of credit to be provided shall be in such form and with such provisions as the Township shall reasonably require. A standard format for the Letter of Credit is included in Appendix D of the Standard Construction Requirements. In lieu of a Letter of Credit, the Developer may deposit a check with the Township for the full amount of the completion guarantee.

Said check will be deposited and held by the Township in an escrow account. The escrow account shall be used for the same purpose as a Letter of Credit with draws being made in a similar manner.

The Project shall not be connected to the Township sewer and/or water systems unless and until the Township has completed its final inspection and approved the Project in writing. ***If the Developer desires to connect the Project to the water and/or sewer systems after substantial completion but in advance of this final inspection and written approval, Developer shall provide to the Township an irrevocable letter of credit issued by a bank in favor of the Township in such amount and duration as the Township shall reasonably determine is necessary to pay all costs and expenses related to completing the Project. The letter of credit to be provided shall be in such form and with such provisions as the Township shall reasonably require.***

The amount on the Letter of Credit will not be reduced during the general course of construction on the Project, but may only be reduced as agreed upon by the Township at the time of substantial completion of the Work, provided that the amount of the Letter of Credit after the proposed reduction is still deemed by the Township to be sufficient to complete the project as determined by the Township or their authorized representatives.

If the Project is not completed by the Completion Date, the Township shall have the right to complete the Project at Developer's expense and to pay the full cost of such completion by making a draw or draws against Developer's letter of credit. Developer shall reimburse the Township for all costs incurred in completing the Project including, but without limitation, engineering, third party contractors and the charges of the Township personnel necessary to supervise the completion of the Project. To the extent the Township costs to complete the Project are not fully paid by a draw or draws on a letter of credit, Developer shall pay such amounts to the Township on demand. Amounts not paid on demand shall bear interest at a rate of 1% per month or fraction of a month that the amount remains unpaid.

Section 5. **GUARANTEE.** The Developer shall guarantee the completed Work for one year after final completion and shall promptly repair, replace, restore, or rebuild, as the Township may determine, any finished Work in which defects of materials or workmanship may appear or to which damage may occur (or has occurred) because of such defects during the one-year period, except where other periods or maintenance and guarantee are provided. The one-year period shall begin on a date agreed upon in writing by the Developer and the Township (see Guarantee Period Agreement form at the end of Section 01000 – General Requirements). The one-year guarantee period shall be extended for an additional year from the time that any of the finished Work is repaired, replaced, restored or rebuilt pursuant to the guarantee agreement as determined by the Township. (See Guarantee Period Agreement Form at the end of Section 0100 – General Requirements.)

Section 6. **INSURANCE**. Beginning as and when construction of the Project is commenced, and continuing at all times while the Project or any part thereof is under construction, Developer and/or its contractor(s) shall continuously carry and maintain the same insurance coverage which is routinely required by the Township with respect to the construction of its own water and sewer projects. The Township and its Township Board members, officers, agents and employees, the Township Engineer and its directors, officers, agents and employees, and the Ottawa County Road Commission and its board members, officers, agents and employees, shall all be named as additional insureds under such insurance, and such insurance shall also provide that it is the primary source of coverage for all such parties named as additional insureds with respect to the Project and the acts of omission of Developer and its contractor(s) related thereto.

Certificates evidencing the acquisition of all insurance required by this section and that such insurance is in full force and effect shall be deposited with the Township before construction of the Projects is commenced. Developer shall furnish, or cause to be furnished, upon request of the Township, certified copies of all policies required pursuant to this section as well as all amendments and

renewals. All insurance policies required pursuant to this section shall contain a provision that they are non-cancelable and not subject to material modification by the insurer except upon 30 days' prior written notice to the Township. At least 30 days prior to the expiration or cancellation of any such insurance policy, there shall be furnished to the Township evidence satisfactory to it that the policy has been renewed or replaced by another policy. Construction of the Project shall not commence unless and until the Township has approved the insurance required to be provided by Developer and its contractor(s) pursuant to this section in writing, such approval not be withheld unreasonably.

With respect to the Project, Developer agrees to indemnify the Township and its Township Board members, officers, agents and employees, as well as all of the other additional insureds named in the first paragraph of this section, from and against any and all claims, costs, actions, causes of action, loses, or expenses (including reasonable attorney's fees and other expense of defense) resulting from or caused by the acts or omissions of Developer or its contractor(s) in acquiring, constructing and completing the Project.

Section 7. ***CONNECTION CHARGES/RATES.*** ***Developer shall pay all connection and other charges imposed by the Township pursuant to the applicable rate ordinance or rate resolution with respect to the Project on such terms and provision as are provided in that rate ordinance or rate resolution. The Township shall be entitled to establish such water rates and/or sewer usage rates as the Township deems appropriate. The fact the Developer has installed the Project at its expense shall not excuse Developer or any party owning or utilizing lands and premises within the development served by the Project or any part thereof from being obligated to pay water rates and sewer rates or any other charges levied by the Township generally against water and/or sanitary sewer customers.***

Section 8. **TOWNSHIP UTILIZATION OF THE PROJECT**. As and when the Project has been transferred to the Township pursuant to the Bill of Sale referred to above, the Project shall become part of the Township water and/or sewer system, as the case may be, and may be utilized by the Township in such manner as the Township utilized other portions of its water and sewer systems. Without limiting the generality of the preceding sentence, the Township may connect other water and/or sewer customers to he Project itself and may also connect water and/or sewer extensions to the Project and connect additional customers to those extensions, all without any obligation to make any payment or reimbursement to the Developer on account of the Developer having constructed the Project at Developer's expense, unless there is a written agreement to the contrary.

Section 9. **ENFORCEMENT**. In the event the Township has to take legal action to enforce the terms of this Agreement, the Developer agrees and shall be responsible to pay all of the Township's expenses, including reasonable attorney fees and engineering fees, associated with the legal action.

Section 10. **MISCELLANEOUS**. Neither this Contract nor any rights under it may be assigned nor may any duty be delegated without prior written consent of the non-assigning nor non-delegating party. Any attempt to assign or delegate rights or duties without prior written consent shall be void. This Contract shall inure to the benefit of and be binding upon the parties hereto and their respective successors and permitted assigns.

All notices and other documents to be served and transmitted hereunder shall be in writing and addressed to the respective parties hereto at the addresses stated on the Contract face pages or such other address or addresses as shall be specified by the parties hereto from time to time and may be served or transmitted in person or by ordinary or certified mail properly addressed with sufficient postage. This is an integrated contract. It contains the full understanding of the parties and supersedes all other understandings, agreements or conditions, written or oral, regarding the subject matter of this Contract. This Contract has been executed in the State of Michigan and shall be governed by Michigan

law, except as to matters pertaining to choice of law. The waiver by any party hereto of a breach or violation of any provision of the Contract shall not be a waiver of any subsequent breach of the same or any other provision of this Contract. If any section or provision of this Contract is unenforceable for any reason, the unenforceability thereof shall not impair the remainder of this Contract, which shall remain in full force and effect. It is contemplated that this Contract will be executed in multiple counterparts, all of which together shall be deemed to be one contract. The captions in this Contract are for convenience only and shall not be considered as part of this Contract or in any way to amplify or modify the terms and provisions hereof. This Contract shall be enforceable only by the parties hereto and their successors in interest by virtue of any assignment which is not prohibited under the terms of this Contract and no other person shall have the right to enforce any of the provisions contained herein. No amendment, modification or waiver shall be effective unless in writing and signed by both parties. All rights and remedies set forth in this Contract are cumulative and are in addition to any other legal or equitable rights and remedies.

[END OF CONTRACT TERMS]

LETTER OF CREDIT FORM

Bank:

[Name and address]

Irrevocable Standby Letter of Credit
Bank Reference No. _____
Issued: _____

Beneficiary:

Allendale Charter Township
6676 Lake Michigan Drive
PO Box 539
Allendale, MI 49401-0539

Applicant:

[Developer Name and address]

Project:

[Description of Public Improvements]

Date: _____
Expiration Date: _____ [3 months after **Project** completion date]
Amount: USD _____
Bank Reference No.: _____

Gentlemen:

We hereby establish our Irrevocable Standby Letter of Credit No. _____ in your favor for the account of **Applicant** up to an aggregate amount of USD _____ available by your draft(s) at sight drawn on **Bank**.

Drafts to be accompanied by the following document(s):

1. Beneficiary's statement signed by the Supervisor of Allendale Charter Township, stating: "**Applicant** has failed to satisfactorily install the **Project**."
2. Copy of Letter of Credit and any amendments.

Partial drawings are permitted.

Draft(s) must be marked "Drawn under **Bank** Irrevocable Standby Letter of Credit No. _____ dated _____."

We hereby agree with you that drafts drawn under and in strict compliance with the terms of this credit will be duly honored by us upon presentation at this office on or before our close of business on **Expiration Date**.

Except as otherwise expressly stated herein, this Letter of Credit is issued subject to the International Standby Practices of the International Chamber of Commerce ("ISP98"). This Letter of Credit shall be

deemed to be a contract made under the laws of the State of Michigan and shall, as to matters not governed by ISP98, be governed by and construed in accordance with the laws of the State of Michigan, other than its conflict of laws rules, which would result in the application of the law of any jurisdiction other than the laws of the State of Michigan.

Sincerely,

Bank

_____
Authorized Signature

_____
Printed Name and title

APPENDIX E

APPENDIX "E"

PAYBACK AGREEMENT

The Developer may enter into a Payback Agreement with the Township where the Developer is required to extend sanitary sewer and/or water main to the Development and across the frontage of the Development where future connections could be made on the opposite side of the street. The Payback Agreement requires the Township to reimburse to the Developer any future "front footage" charges and "Lateral Fees" (less an administrative fee of 10%) collected on future connections to the utilities for a 10-year period. This reimbursement is intended to defray the Developers upfront investment in extending the utilities to the Development and across the frontage of the Development.

Extension of sanitary sewer, water main, sidewalk, and other related improvements to the Development, across the Project frontage and within the Development shall be the Developer's responsibility. "Front footage" charges and "Lateral Fees" are not assessed to the Developer when the utility improvements are made by the Developer.

Included at the end of this Appendix "E" are sketches of various Development examples illustrating the Developer's responsibilities for the extension of sanitary sewer and/or water main.

The following "Payback Agreement" form will be used where appropriate.

PAY BACK AGREEMENT

THIS AGREEMENT entered into this _____ day of _____, 20___, by and between _____

_____

hereinafter referred to as the "Developer", and ALLENDALE CHARTER TOWNSHIP, a Michigan Charter Township, whose address is 6676 Lake Michigan Drive, P.O. Box 539, Allendale, MI 49401, hereinafter referred to as the "Township":

WHEREAS, the Developer is the owner of the following described property:

and,

WHEREAS, the Developer desires having _____

_____

provided by the Township to the Property and,

WHEREAS, other property owners within the area do not desire _____

_____

at this time; and

WHEREAS, the Developer is willing to pay the entire cost of the construction of _____

_____

to this property and which is to be constructed under plans entitled: _____

_____

_____

_____

_____

NOW, THEREFORE, IT IS AGREED by and between the parties hereto as follows:

1. The Township shall have the right to allow other properties abutting said _____

_____

to connect thereto upon payment by the property owner applying for said services of Frontage Charges and Lateral Fees regularly due. The Township shall pay such Frontage Charges and Lateral Fees received by it (less an administrative charge of 10%) to the Developer. The Township does not guarantee that any property owner shall connect to said _____.

2. The limits of the _____ for which charges will be collected by the Township and paid back to the Developer shall be as follows: _____

_____

_____

_____

_____

3. The Developer hereby waives any and all claims for damage against the Township arising out of any temporary discontinuance of services, no matter what the cause, no matter by whom the same is caused. Should damages be awarded, it is stipulated and agreed that one dollar ($1.00) shall be in full settlement thereof.

4. The Developer after a period of ten (10) years, hereby waives any right to collect fees thereafter, and it is mutually agreed that any fees collected thereafter shall be the sole and exclusive monies of the Township.

5. Upon construction of the _____, all such construction, as may be in the right-of-way and/or public easement, shall become the sole and exclusive property of the Township and shall be under its sole and exclusive control.

6. All notices and other documents to be served and transmitted under this agreement shall be in writing and addressed to the respective parties at the addresses stated on the Contract face pages or such other address or addresses as shall be specified by the parties from time to time and may be served or transmitted in person or by ordinary or certified mail properly addressed with sufficient postage. This is an integrated contract. It contains the full understanding of the parties and supersedes all other understandings, agreements or conditions, written or oral, regarding the subject matter of this Contract. This Contract has been executed in the State of Michigan and shall be governed by Michigan law, except as to matters pertaining to choice of law. The waiver by any party of a breach or violation of any provision of this Contract shall not be a waiver of any subsequent breach of the same or any other provision of this Contract. If any section or provision of this Contract is unenforceable for any reason, the unenforceability thereof shall not impair the remainder of this Contract, which shall remain in full force and effect. It is contemplated that this Contract will be executed in multiple counterparts, all of which together shall be deemed to be one contract. No amendment, modification or waiver shall be effective unless it is made in writing and signed by both parties. All rights and remedies set forth in this Contract are cumulative and are in addition to any other legal or equitable rights and remedies.

6. This Agreement shall be binding on the heirs, successors and assigns of the parties of the first part.

IN WITNESS THEREOF, the parties have set their hands and seals on the day and year first above written.

WITNESSES:

_____

_____

DEVELOPER:

_____
BY:

Its _____

_____
BY:

Its _____

WITNESSES:

_____

_____

ALLENDALE CHARTER TOWNSHIP

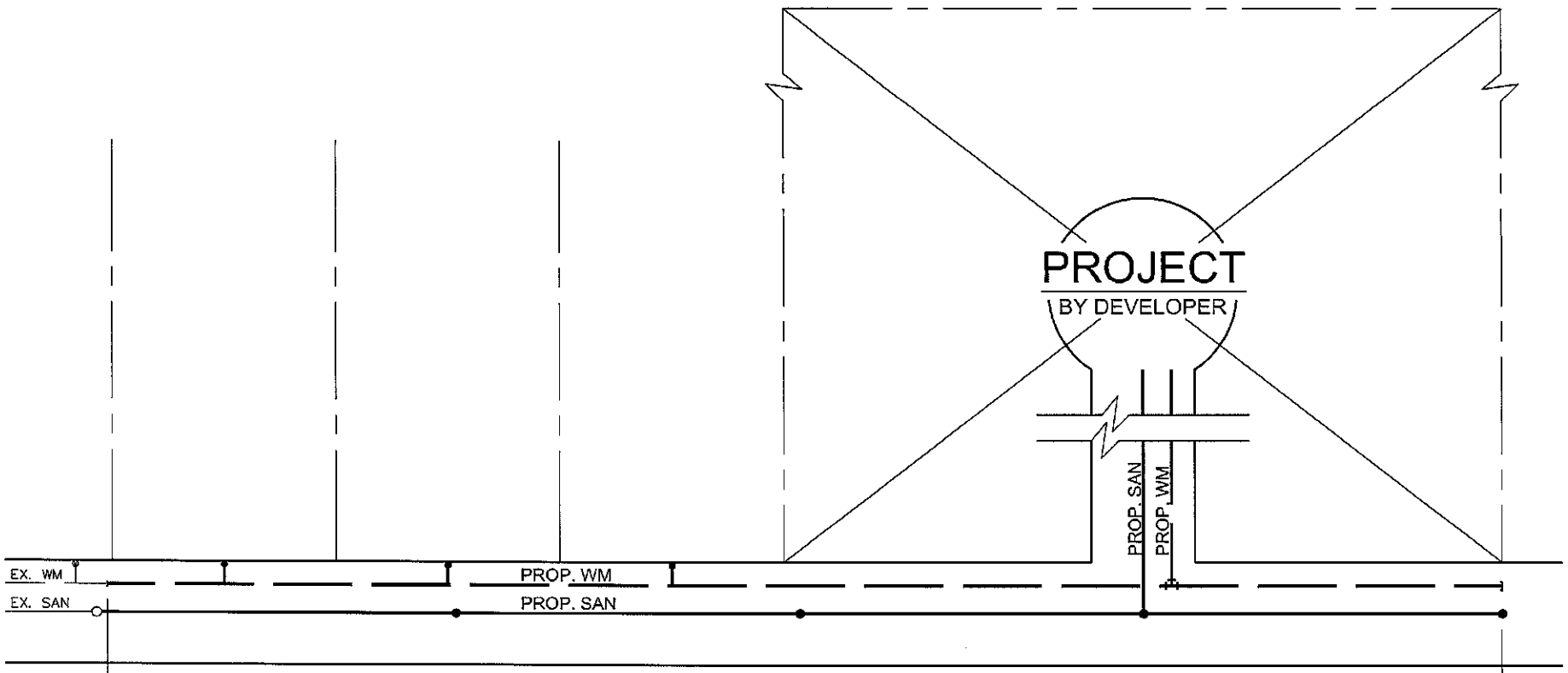
_____
BY:

Its Supervisor

_____
BY:

Its Clerk

1071FIG1/ SAD112807/ 1:1



PAYBACK AGREEMENT

FUTURE "FRONT FOOTAGE" CHARGES &
LATERAL FEES (LESS ADMIN. FEE)*
TO BE REIMBURSED TO DEVELOPER

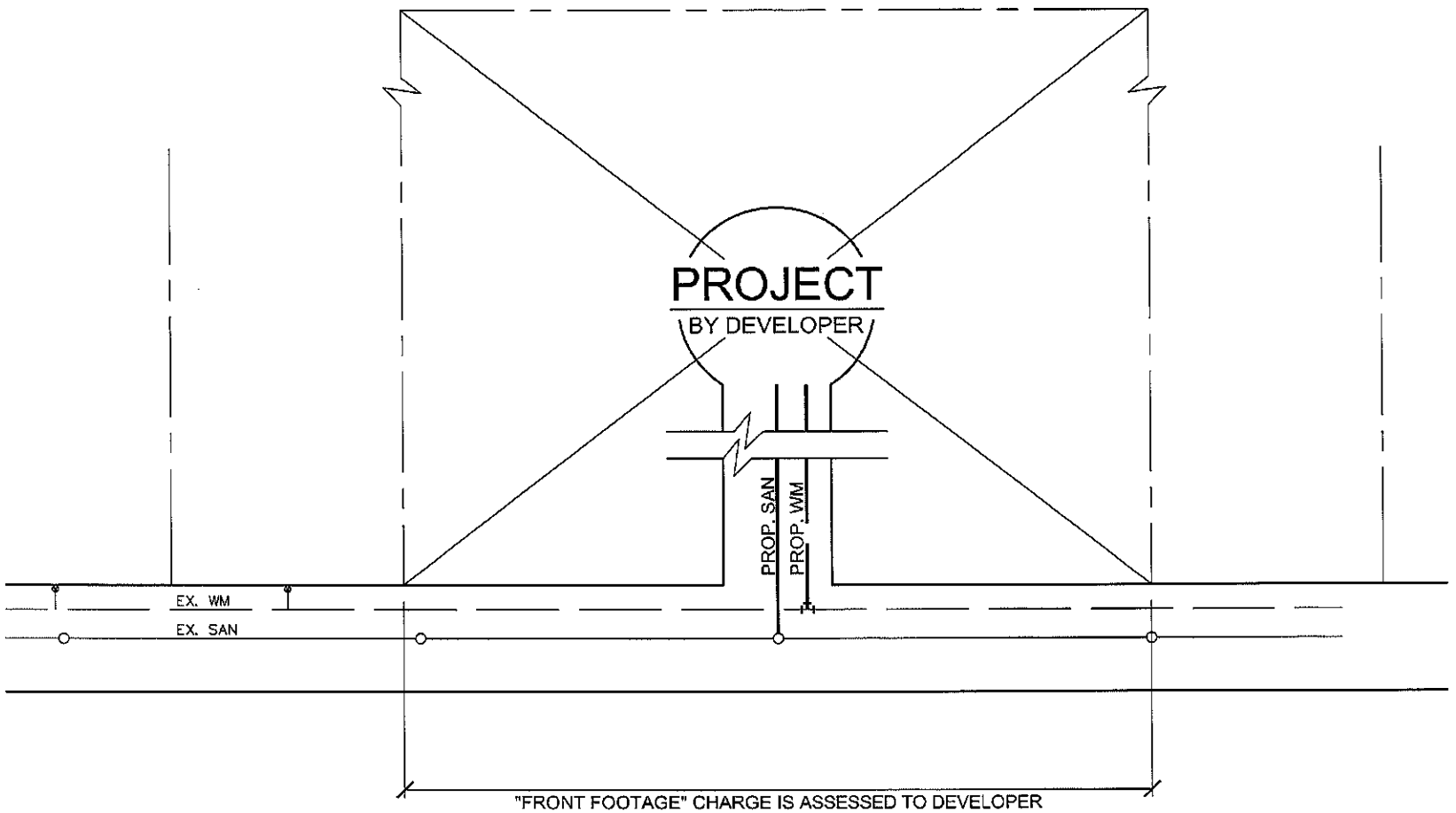
BY DEVELOPER

EXTENSION TO PROJECT SITE & ACROSS PROJECT FRONTAGE
"FRONT FOOTAGE" CHARGE (AND LATERAL FEE) IS NOT ASSESSED TO
DEVELOPER WHEN DEVELOPER INSTALLS THE MAIN (AND LATERALS)

* ADMIN. FEE = 10%

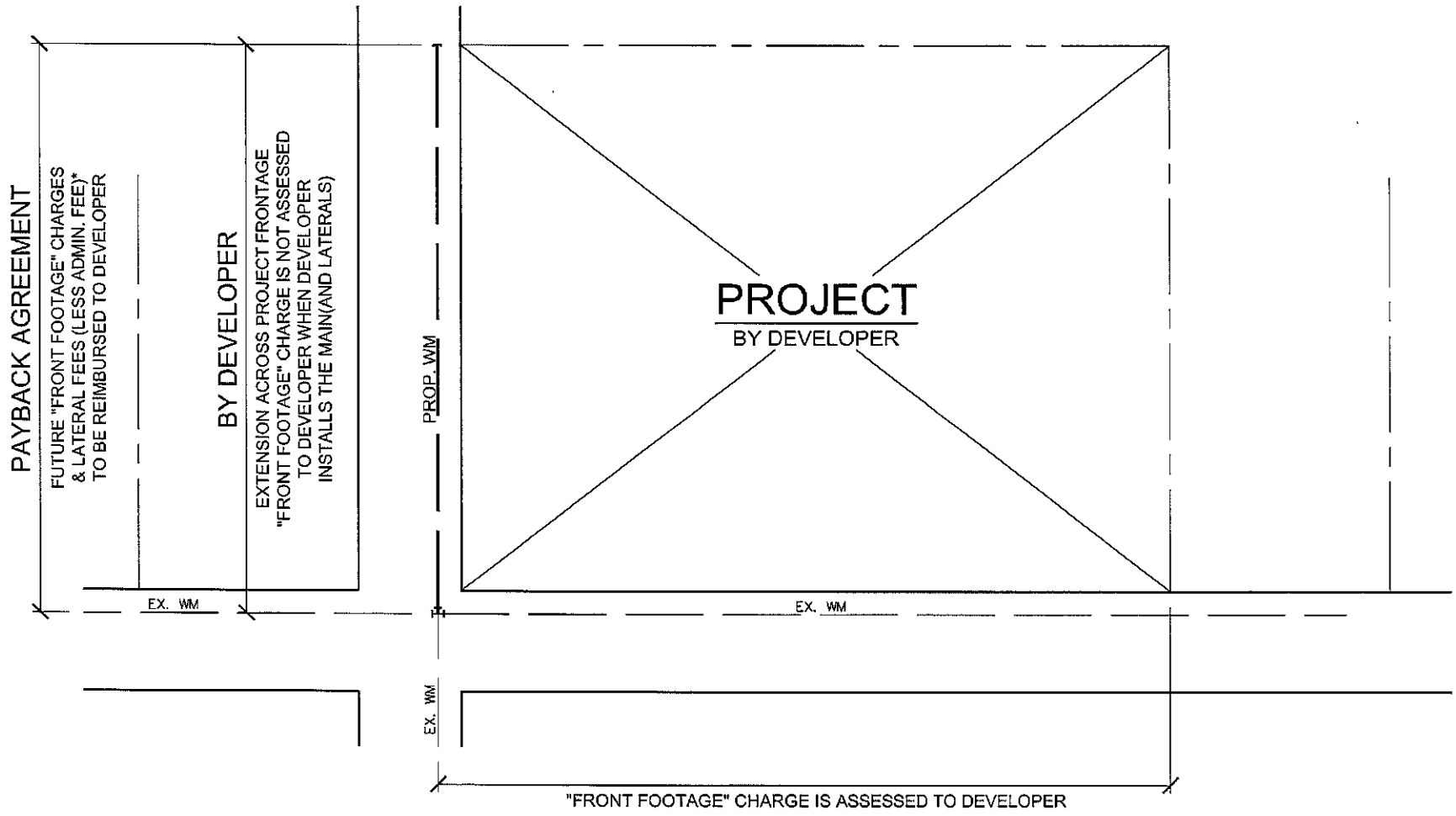
NO SCALE

1071FIG2/ SAD112807/ 1:1



NO SCALE

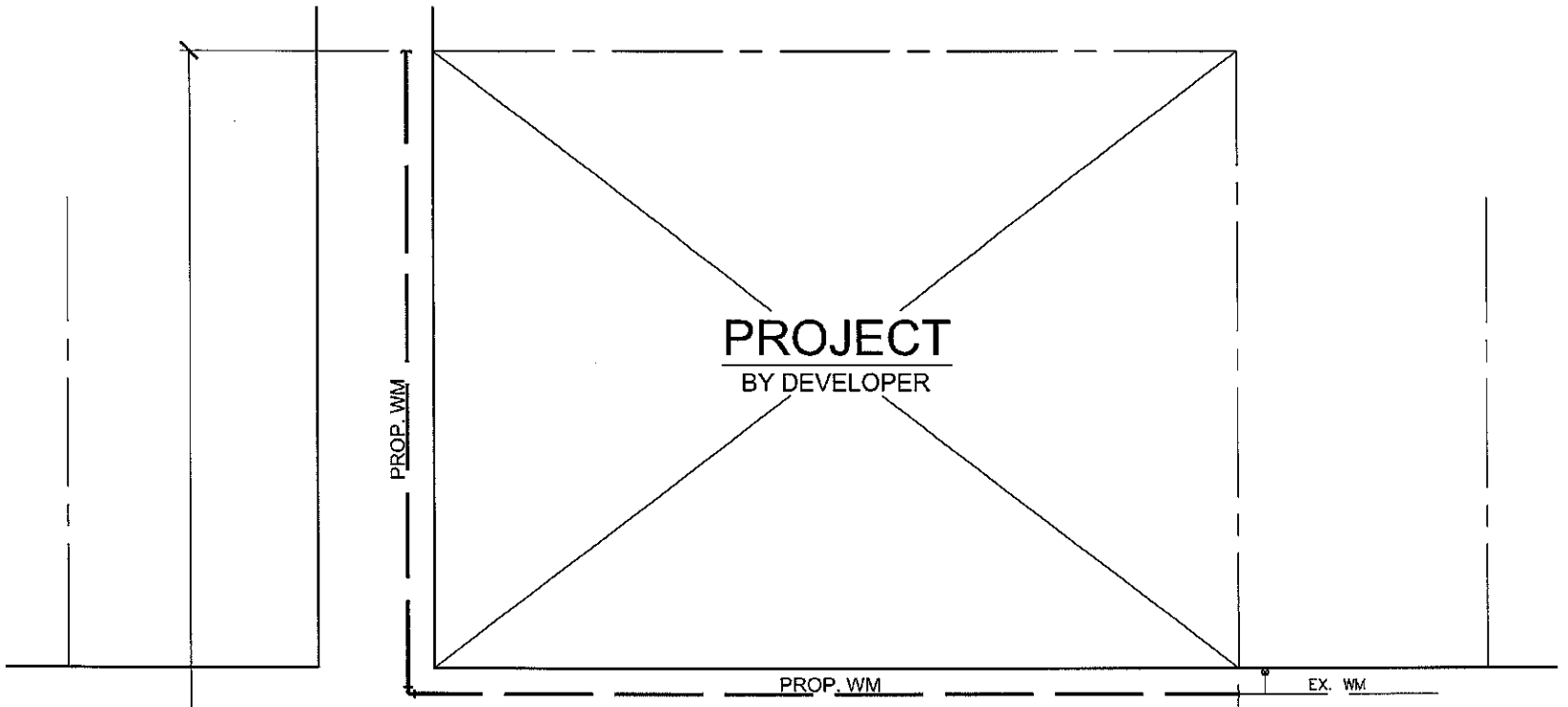
1071FIG3/ SAD112807/ 1:1



* ADMIN. FEE = 10%

NO SCALE

1071FIG4/ SAD112807/ 1:1



BY DEVELOPER

EXTENSION ACROSS PROJECT FRONTAGE
"FRONT FOOTAGE" CHARGE IS NOT ASSESSED TO DEVELOPER
WHEN DEVELOPER INSTALLS THE MAIN(AND LATERALS)

PAYBACK AGREEMENT

FUTURE "FRONT FOOTAGE" CHARGES
& LATERAL FEES (LESS ADMIN. FEE)*
TO BE REIMBURSED TO DEVELOPER

* ADMIN. FEE = 10%

NO SCALE

APPENDIX F

APPENDIX "F"

TOWNSHIP POLICY ON PARTICIPATION TOWARDS OVERSIZING

WATER MAIN

- Developer required to meet Water System Master Plan.
- If Master Plan is not clear, the following minimum pipe sizes will be required:

Residential Area	-	8"
Commercial/Industrial Area	-	12"
Section Line Roads	-	12"

- Looping of water main may be required.
- Township to participate in oversizing where deemed appropriate (construction cost only).
- Participation for oversizing shall be based on actual bid prices not-to-exceed $2.00 per inch diameter of oversizing per linear foot of water main.

SANITARY SEWER AND FORCE MAIN

- Developer required to meet Sanitary Sewer System Master Plan.
- Township to participate in oversizing where deemed appropriate (construction cost only).
- Participation for oversizing shall be based on actual bid prices not-to-exceed $2.00 per inch diameter of oversizing per linear foot of sanitary sewer and/or force main.
- No participation for extra depth.

PUMP STATION

- Township to participate in construction cost of pump station if the ultimate service area (as defined in the master sewer map/plan; i.e. sub-district area) is at least 50% greater than the Development area.
- Participation shall be based on actual bid prices not-to-exceed $30,000.
- Upgrade of existing pump stations may be required.

WATER MAIN AND SEWER OVERSIZING AGREEMENT FORMS
See Attached

WATERMAIN OVERSIZING AGREEMENT

THIS AGREEMENT, entered into this _____ day of _____, 20___, between ALLENDALE CHARTER TOWNSHIP, 6676 Lake Michigan Drive, P.O. Box 539, Allendale, MI 49401, hereinafter referred to as the "Township" and _____

_____

_____

hereinafter referred to as the "Developer".

WITNESSETH:

WHEREAS, the Developer, at his own expense, is installing _____ lineal feet of _____ inch diameter water main as a part of a project known as: _____

_____

_____

_____

And,

WHEREAS, said water main has, at the request of the Township, been oversized from a normal _____ inch diameter water main to a _____ inch diameter water main for purposes of providing transmission capability,

NOW, THEREFORE, it is agreed as follows:

1. The Developer will construct said water main in accordance with the Township's Standard Construction Requirements.

2. The Township will, within thirty days of acceptance of said water main by the Township, pay to the Developer the sum of _____ which sum represents the difference in material cost of normal _____ inch diameter water main and said _____ inch diameter oversized water main.

3. All rights, title and interest in the aforesaid oversized water main shall remain in the Township. Should it be determined in any court of law that the Developer owns in whole or in part any legal or equitable interest in said oversized water main it is agreed between the Township and Developer that such interest may be purchased by the Township for the sum of One Dollar ($1.00).

4. All notices and other documents to be served and transmitted under this agreement shall be in writing and addressed to the respective parties at the addresses stated on the Contract face pages or such other address or addresses as shall be specified by the parties from time to time and may be served or transmitted in person or by ordinary or certified mail properly addressed with sufficient postage. This is an integrated contract. It contains the full understanding of the parties and supersedes all other understandings, agreements or conditions, written or oral, regarding the subject matter of this Contract. This Contract has been executed in the State of Michigan and shall be governed by Michigan law, except as to matters pertaining to choice of law. The waiver by any party of a breach or violation of any provision of this Contract shall not be a waiver of any subsequent breach of the same or any other provision of this Contract. If any section or provision of this Contract is unenforceable for any reason, the unenforceability thereof shall not impair the remainder of this Contract, which shall remain in full force and effect. It is contemplated that this Contract will be executed in multiple counterparts, all of which together shall be deemed to be one contract. No amendment, modification or waiver shall be effective unless it is made in writing and signed by both parties. All rights and remedies set forth in this Contract are cumulative and are in addition to any other legal or equitable rights and remedies.

5. This Agreement shall be binding on the parties hereto, their successors and assigns.

IN WITNESS THEREOF, the parties have set their hands and seals on the day and year first above written.

Witnesses:

ALLENDALE CHARTER TOWNSHIP

_____

_____

By

Its Supervisor

_____

_____

Attest

Its Clerk

Witnesses:

DEVELOPER

_____

_____

By

Its _____

_____

_____

Attest

Its _____

SEWER OVERSIZING AGREEMENT

THIS AGREEMENT, entered into this _____, day of _____, 20 _____, between ALLENDALE CHARTER TOWNSHIP, 6676 Lake Michigan Drive, P.O. Box 539, Allendale, MI 49401, hereinafter referred to as the "Township" and _____

_____

_____

_____

_____ hereinafter referred to as the "Developer".

WITNESSETH:

WHEREAS, the Developer, at his own expense, is installing _____ lineal feet of _____ inch diameter sewer and _____ lineal feet of _____ inch diameter sewer as a part of a project known as: _____

_____

_____

_____

and,

WHEREAS, said sewer has, at the request of the Township, been oversized from a normal _____ inch diameter sewer to a _____ inch diameter and ___ inch diameter sewer for purposes of providing transmission capability,

NOW, THEREFORE, it is agreed as follows:

1. The Developer will construct said sewer in accordance with the Township's Standard Construction Requirements.

2. The Township will, within thirty days of acceptance of said sewer by the Township, pay to the Developer the sum of _____ which sum represents the difference in material cost of a normal _____ inch diameter sewer and said _____ inch diameter and ___ inch diameter oversized sewer.

3. All rights, title and interest in the aforesaid oversized sewer shall remain in the Township. Should it be determined in any court of law that the Developer owns in whole or in part any legal or equitable interest in said oversized sewer it is agreed between the Township and the Developer that such an interest may be purchased by the Township for the sum of One Dollar ($1.00).

4. All notices and other documents to be served and transmitted under this agreement shall be in writing and addressed to the respective parties at the addresses stated on the Contract face pages or such other address or addresses as shall be specified by the parties from time to time and may be served or transmitted in person or by ordinary or certified mail properly addressed with sufficient postage. This is an integrated contract. It contains the full understanding of the parties and supersedes all other understandings, agreements or conditions, written or oral, regarding the subject matter of this Contract. This Contract has been executed in the State of Michigan and shall be governed by Michigan law, except as to matters pertaining to choice of law. The waiver by any party of a breach or violation of any provision of this Contract shall not be a waiver of any subsequent breach of the same or any other provision of this Contract. If any section or provision of this Contract is unenforceable for any reason, the unenforceability thereof shall not impair the remainder of this Contract, which shall remain in full force and effect. It is contemplated that this Contract will be executed in multiple counterparts, all of which together shall be deemed to be one contract. No amendment, modification or waiver shall be effective unless it is made in writing and signed by both parties. All rights and remedies set forth in this Contract are cumulative and are in addition to any other legal or equitable rights and remedies.

5. This Agreement shall be binding on the parties hereto, their successors and assigns.

IN WITNESS THEREOF, the parties have set their hands and seals on the day and year first above written.

Witnesses:

ALLENDALE CHARTER TOWNSHIP

_____

_____

By

Its Supervisor

_____

_____

Attest

Its Clerk

Witnesses:

DEVELOPER

_____

_____

By

Its _____

_____

Attest

Its _____

APPENDIX G

APPENDIX "G"

STORM WATER OPERATION AND MAINTENANCE AGREEMENT

This Storm Water Operation and Maintenance Agreement (the "Agreement") is executed this ___ day of _____, 20__, between Allendale Charter Township, a Michigan charter township, whose address is 6676 Lake Michigan Drive, PO Box 539, Allendale, Michigan 49401-0539 (the "Township") and _____, a Michigan_____, whose address is _____ (the "Developer").

RECITALS

A. The Developer is the owner of real property located in the Township at _____, and is legally described on attached Exhibit A incorporated by reference herein (the "Property") (PP No. 70-09-_____). The Property comprises approximately _____ acres of land.

B. The Property is zoned _____. The Developer has sought approval from the Township to improve the property by constructing_____ _____ (the "Project").

C. The Township has reviewed the proposed improvement plan, and, during the Township's consideration of the Project, areas of concern were identified including the potential for soil erosion, storm water drainage and storm water retention or detention.

D. Article 24 of the Township's Zoning Ordinance requires that before a site plan can be approved to permit certain development, the Township must find that it complies with certain identified criteria, including proper surface water drainage (Section 24.07 D).

E. Section 2.01 of the Township's Storm Water Ordinance prohibits a developer from installing or constructing any impervious surfaces that require approval of a site plan, plat, site condominium, special land use, planned unit development, rezoning, land division, or private road or other approvals without first obtaining a storm water permit from the Township. Section 2.02 of the Township's Storm Water Ordinance requires that a developer seeking Township storm water permit approval must provide the Township with an operation and maintenance agreement ensuring the reasonable routine, emergency and long-term maintenance of all storm water management facilities constructed in accordance with a development project, unless dedicated as part of a Drainage District under the jurisdiction of the Ottawa County Drain Commissioner.

F. The Township's Engineer and the Ottawa County Drain Commissioner have indicated that the storm water drainage facilities and systems, as detailed in the plans prepared by _____ and dated _____, 20__, are adequate, provided that the Developer executes an agreement for the ongoing maintenance of the referenced storm water drainage facilities as described and detailed in the plans prepared by _____ and dated _____, 20__, which plans are hereby incorporated by reference.

AGREEMENT

For good and valuable consideration including, but not limited to, the covenants and pledges contained herein and the Township's willingness to forego the posting of performance guarantees to ensure construction and maintenance of the drainage improvements described, the sufficiency of which is acknowledged, the parties agree as follows:

Section 1. Compliance with Laws, Ordinances, Permits. Developer agrees to construct, install, and operate the Project in accordance with approvals received from the Township and other governmental entities with applicable jurisdiction. In constructing the Project, Developer agrees to comply with all state and local laws, ordinances, and regulations as well as the terms of this Agreement.

Section 2. Alterations or changes. No alterations or changes to the storm water systems, as defined in this Agreement, shall be permitted unless they are approved, in writing, by the Township, and any such approved changes will be deemed to comply with this Maintenance Agreement.

Section 3. Easements to be secured and recorded. The Developer, at its expense, shall secure from any affected owners of land all easements and releases of rights-of-way necessary for utilization of the storm water systems, as defined in this Agreement, and shall record them with the Ottawa County Register of Deeds. Copies of easements shall be provided to the Township. These easements and releases of rights-of-way will not be altered, amended, vacated, released or abandoned without prior written approval of the Township. Shrubs, trees or permanent structures shall not be located within the easements utilized by the Developer without the prior written approval of the Township.

Section 4. Operation and Maintenance of Storm Water System. As used in this Section, "storm water system" shall mean all storm water systems, catch basins, storage structures, drains, leaching basins, ponds, pipes, porous pavement and appurtenances located on the Property including, but not limited to, all pollution-control devices utilized as part of the storm water system, as detailed in the plans prepared by _____, dated _____, 20__. As used herein, "maintain" or "maintenance" shall mean inspecting, cleaning out, mowing, repairing, and removing accumulated sediment, leaves, weeds, debris, and obstructions from all ponds, leach basins, pollution-control devices, or similar appurtenances of the storm water system such that failure to maintain is likely to result in impeding the functioning of the storm water system.

A. Operation of Storm Water System. The Developer shall at all times or until such time that another governing body such as but not limited to a Home Owner's Association or Ottawa County Water Resources Commission assumes responsibility, operate the storm water system in a manner consistent with generally accepted storm water management practices. Not less than annually, the Developer shall maintain the storm water system located on the Property. The Developer shall submit certified reports of the maintenance performed to the Township.

B. Maintenance of Storm Water Detention / Retention System. At a minimum, the following maintenance procedures shall be performed by the Developer:

(1) Inspect the facilities regularly for clogging and clean / repair as necessary several times during the first few months after construction and then quarterly or after a large rain event thereafter.
(2) Check banks and bottom surface of basin for erosion and repair as necessary.
(3) Trim or harvest any aquatic vegetation as appropriate, and frequently mow grassy areas.
(4) Remove sediment when accumulation reaches 6 inches, or if re-suspension is observed or is probable.
(5) The Developer shall submit certified reports of the maintenance performed to the Township.

C. Maintenance of Storm Water System with porous pavement. At a minimum, the following maintenance procedures shall be performed by the Developer:

(1) Inspect the system several times during the first few months after construction.
(2) Inspect the system 2 times per year and after heavy storms. Check for standing water on the surface and within the stone bed under the porous pavement.
(3) Clean the surface of the porous pavement at least 2 times per year by vacuum sweeping followed by high pressure jet hosing.
(4) The Developer shall limit the use of deicing chemicals and shall not use sand on porous pavement surfaces. Repairs of porous pavement by sealing or repaving with non-porous materials shall be avoided and limited to 10 percent of the total surface area.
(5) The Developer shall submit certified reports of the maintenance performed to the Township.

In the event that storm water facilities maintenance is not conducted, an authorized representative of the Township shall notify the Developer, specifying the necessary maintenance. Within thirty (30) days of the notice, the Developer shall perform the specified maintenance at his expense. Within thirty-six (36) hours of notice, the Developer shall perform any specified emergency maintenance as may be required in the Township's notice.

C. Failure to Maintain. In the event the Developer does not operate and maintain the storm water system as required under the terms of this Agreement, the Township shall be entitled, and is hereby expressly authorized by the Developer, to take one or more of the following actions (or any combination of the same):

(1) The Township or its agent may go onto the Property and maintain the storm water system. Not less than ten (10) days before taking such action, the Township shall provide to the Developer and any other owners (as shown on the latest Township tax assessment roll), by first-class mail, notice of its intention. The Developer hereby grants to the Township and its agents a non-revocable license to go onto the Property to carry out the provisions of this subsection. The Township will invoice the cost of the specified maintenance, and the Developer shall pay the amount of the invoice within thirty (30) days of the Township's mailing the invoice by first class mail. If the Developer shall fail to pay the amount of the invoice, all costs, fees, or expenses incurred by the Township in maintaining the storm water system pursuant to this subsection may be, without further notice, assessed as a lien on the Property, to be collected in the same manner as ad valorem property taxes.

(2) If requested, the Developer shall provide a letter of credit in an amount sufficient to ensure maintenance of the storm water system, in a form satisfactory to the Township. The Developer shall provide the requested letter of credit within fifteen (15) business days of receiving such a request from the Township. The letter of credit shall provide that the payment to the Township shall be assured upon submission by the Township of notice that the Developer has not maintained the storm water system as required by this Agreement.

Section 5. Violation of Agreement. The parties acknowledge that monetary damages for a breach of this Agreement would be inadequate to compensate the parties for the benefit of their bargain. Accordingly, the parties expressly agree that in the event of a violation of this Agreement, the non-breaching party shall be entitled to receive specific performance. Nothing herein shall be deemed a waiver of the Township's rights to seek enforcement of this Agreement or zoning approvals previously granted, to the extent otherwise authorized by law. A violation of the terms and conditions of this Agreement by the Developer or its successors subsequent to the completion of the Project shall entitle the Township, in the event of litigation to enforce this Agreement, to receive its reasonable attorney and consulting fees incurred.

Section 6. Recording. The obligations under this Agreement are covenants that run with the land, and bind successors in title of the Developer. It is the parties' intent that this Agreement shall be recorded with the Ottawa County Register of Deeds.

Section 7. Miscellaneous.

A. Severability. The invalidity or unenforceability of any provision of this Agreement shall not affect the enforceability or validity of the remaining provisions and this Agreement shall be construed in all respects as if any invalid or unenforceable provision were omitted.

B. Notices. All notices permitted or required to be given shall be in writing and sent either by mail or by personal delivery to the address first above given.

C. Waiver. No failure or delay on the part of any party in exercising any right, power, or privilege under this Agreement shall operate as a waiver thereof, nor shall any single or partial exercise of any right, power, or privilege under this Agreement preclude further exercise thereof or the exercise of any other right, power, or privilege. The rights and remedies provided in this Agreement are cumulative and not exclusive of any rights and remedies provided by law.

D. Governing Law. This Agreement is being executed and delivered and is intended to be performed in the State of Michigan and shall be construed and enforced in accordance with, and the rights of the parties shall be governed by, the laws thereof.

E. Amendment. This Agreement may only be amended in writing, signed by all parties.

The parties have executed this Agreement on the day and year first above written.

WITNESSES:

_____(LS)

*_____

_____(LS)

*_____

* Printed Name

ALLENDALE CHARTER TOWNSHIP

_____(LS)

By: *_____

Its: _____

STATE OF MICHIGAN)
) ss.
COUNTY OF OTTAWA)

On this _____ day of _____, 20__, before me a Notary Public, personally appeared _____, the _____ of Allendale Charter Township, a Michigan charter township, who, being first duly sworn, did say they signed this document on behalf of the Township.

_____

Notary Public, _____County, Michigan
My Commission Expires: _____

WITNESSES:

_____(LS)

*_____

_____(LS)

*_____

(DEVELOPER)

_____(LS)

By: *_____

Its: _____

* Printed Name

STATE OF MICHIGAN)
) ss.
COUNTY OF)

On this _____ day of _____, 20__, before me a Notary Public, personally appeared _____, the _____ of _____, who, being first duly sworn, did say he signed this document on behalf of said _____.

_____

Notary Public, _____ County, Michigan
By Commission Expires: _____

PREPARED BY:
Fleis & VandenBrink Engineering, Inc.
2960 Lucerne Drive SE
Grand Rapids, MI 49546
(616) 977-1000

EXHIBIT A

LEGAL DESCRIPTION

(Insert legal description of parcel indicated in RECITALS, (A), page 1)

APPENDIX H

APPENDIX H

PRE-CONSTRUCTION MEETING
AGENDA / MINUTES

Meeting Date: _____ Time: _____

Project Title / Public Improvements: _____

PARTIES

Owner (Developer): As Noted in Definitions	_____	Phone Number:	_____
Owner's Engineer: As Noted in Definitions	_____ _____	Phone Number: Phone Number:	_____ _____
Contractor: Section 0100, Part 1.12 As Noted in Definitions	_____		
Manager:	_____	Phone Number:	_____
Site Superintendent: Sect.1.12.05	_____	Phone Number:	_____
Safety Representative: Sect. 1.12.03	_____	Phone Number:	_____
Township:	_____		
Supervisor:	Adam Elenbaas	Phone Number:	616.895.6295 x12
DPW Superintendent:	Chad Doornboss	Phone Number:	616.895.6295 x13
DPW Inspector:	Jon Currier	Phone Number:	616.895.5142
Fire Department:	Dave Pelton	Phone Number:	616.895.6295 x30
Maintenance Dept.: Sidewalks	Larry Haveman	Phone Number:	616.895.6295 x8
Township Engineer:	Fleis & VandenBrink	Phone Number:	616.977.1000
Engineer:	Bruce Pindzia	Phone Number:	616.260.4306
Inspector:	Dudley Pierce	Phone Number:	616.291.9088

PERMITS

Agencies / Permits:
Section 1.04

Ottawa County Road Commission (work within ROW)
Ottawa County Water Resources Commissioner (SESC, County Drain / Storm Water Management)
MDOT (work within ROW)
MDEQ (Wetland, Inland Lakes and Streams, Notice of Coverage, Water Main, Sanitary Sewer)
Other:_____

FROM PROJECT CHECKLIST

Confirm receipt of the following:

- ☐ Letter of Credit
- ☐ Certificate of Insurance
- ☐ Copy of DEQ Permits
- ☐ Copies of Permits from OCRC, OCWRC & MDOT

☐ Executed Easements
☐ Executed Storm Water O&M Agreement

SCHEDULE

Anticipated Start Date: _____

Detailed Schedule: _____

Completion Date(s): _____

UTILITIES Identify potential conflicts / scheduling concerns

Electric: Consumers Energy

Great Lakes Energy

Gas: DTE Energy / Michcon

SEMCO

Telephone: AcenTek

AT&T, SBC / Ameritech

Cable Vision: Charter Communications

AcenTek

Water Transmission: City of Grand Rapids (M-45 & Fillmore)

City of Coopersville (60th Avenue north of M-45)

MISCELLANEOUS

Subcontractors / Material Suppliers: _____

_____

_____

_____

_____

Shop Drawings / Submittals (to Township & Township Engineer): Prior to Construction

Certifications on pipe
Product data – pipe fittings, valves, hydrants, etc.
Concrete mix design - sidewalk

Staking: Sect. 1.18

By (firm name): _____
Notice: 2 working days
Contact Person: _____
Phone Number: _____

Materials Testing: Sect. 1.18 & 1.36

By (firm name): _____

Notice: _____
Contact Person: _____
Phone Number: _____

Compaction: _____

_____

_____

Bituminous: _____

_____

_____

Concrete: _____

_____

_____

Other: _____

_____

Public Safety / Convenience:

Dust Control, Tracking and Access
Barricades & Signing
Protection of Work Areas

_____

_____

_____

_____

Anticipated Road Closures / Detours: _____

_____

_____

Notice to Police, Fire Department, Schools:

Notify Township and Township will Notify

SPECIAL REQUIREMENTS

OCRC	IDR's	_____
	Inspection / Testing	_____
	Detours	_____
		_____
		_____
OCWRC	SESC	_____
		_____
		_____
		_____
MDOT	Notification	_____
	Inspection	_____

ALLENDALE TOWNSHIP

Date of Approved Plans: _____

Record Drawings: Sketches, Dimensions, Witnesses:
Sect. 1.12.07

By Contractor (with assistance of Township Inspector)

Preparation of Record Drawings:
By Owner's Engineer

24 Hour notice needed for Visual Inspections
48 Hour notice needed for Pressure Testing / Televising Inspections

All deviations and revisions from approved plans must be reviewed and approved by Township and Township Engineer

Connection Fees: Obtain current fact Sheet for water and/or sewer from Township

Allendale Fire Department: Sections 1410 – Access for Fire Fighting and Section 1412 – Water Supply for Fire protection of the most recent edition International Fire Code will be enforced (see Section 1.49 of the general Requirements of the Township Standard Construction Requirements)

Stationary rods for curb stops shall be obtained from East Jordan.

Sanitary Sewer:

Testing:	Exfiltration Air Test
	Video Televising (30 days after last backfill)

Water Main:

Testing:	Pressure / Leakage Test
	Flushing
	Chlorination: Samples / testing of bacteriological requirements by Township

Sidewalk / Shared Use Path: Inspection / approval of forms required prior to pouring concrete

Construction Progress Checklist

Job Name:				
Contractor & Supervisor:				
Name:				
Address:				
Email:				
Phone:		Office		Cell
Owner:				
Name:				
Address:				
Email:				
Phone:		Office		Cell
Construction Manager:				
Name:				
Address:				
Email:				
Phone		Office		Cell
Engineer:				
Name:				
Address:				
Email:				
Phone		Office		Cell

Sanitary	
Install Completed	
Pressure Test After Backfill	
Televising (30 Days after pressure test)	
Manhole Inspection	
(after casting set to grade – can vary with each project	
All Laterals Marked Properly	
Final After Top Coat of BIT and/or Green Area Grading	
Water Main:	
Install Complete	
Pressure Test	
Chlorinate	
Bac T Test	
Services Complete	
F.D. H&V Inspection	
Hydrant & Valve Inspection	
Services Marked Properly	
Final After Top Coat of BIT and/or Green Area Grading	
Substantial Completion (water & sewer)	
Punch List:	
Final Punch List to Contractor	
Final Punch List Completed	
Asbuilt Filed	
(Send to Steve and Bruce for final billing and paperwork.)	

NOTE: Water and Sewer hook ups only allowed after Substantial Completion.

PAPER WORK CHECK LIST

Copy of recorded easements –

Complaints resolved –

Guarantee period agreement in writing –

Storm water operation and maintenance agreement recorded –

Engineer's certificate signed –

Warranty bill of sale signed –

Allendale Charter Township

Allendale Water & Sewer

Site Inspector: _____

Date: _____

PRE-CONSTRUCTION MEETING CHECKLIST

Name of Development_____

Contractor(s) for Underground Utilities

Water_____

Sewer_____

Most recent plans available to Township_____

Township Standard Construction Requirements with 2017 updates_____

Water and sewer fact sheet containing required connection fees_____

Approximate Start Date_____

DOUBLE CHECK ELEVATIONS (existing hydrants may have been raised)

24 hour notice needed for visual inspections

48 hour notice needed for pressure testing and televising inspections

All deviations and revisions from approved plans must be reviewed and approved by the TOWNSHIP and the TOWNSHIP ENGINEER. TOWNSHIP site inspector is not authorized to approve revisions.

Curb Stop Box Rods only spec from EJ

30 days after backfill completion to televise sewer – see spec book for instructions

"As-Built" measurements are the contractor's responsibility (not TOWNSHIP site inspector)