SANITARY SEWER AND MANHOLES

1.00 GENERAL

1.01 DESCRIPTION

A. The CONTRACTOR shall furnish all labor, tools, equipment and materials to construct all sanitary sewers, manholes and necessary appurtenant work as herein specified. No sewers shall be accepted until the sewer system has passed the system acceptance tests.

1.02 TESTING

A. General

1. The CONTRACTOR shall furnish all equipment and personnel to conduct system acceptance tests as specified herein on all completed sewers. All tests shall be conducted under the supervision of the ENGINEER or Ann Arbor Township personnel. No acceptance tests shall be conducted until the entire sewer system is constructed and has been installed for not less than 30 days.

2. All sewer lines shall be televised while running enough water through the line to be visible at the next downstream manhole.

3. All sewer lines shall be checked for alignment.

4. All manholes shall be tested for leakage. All Polyvinyl Chlorine (PVC) pipes 8-inches or larger shall be tested for deflection.

5. Sewer pipe 18 inches and smaller shall be air tested. Sewer pipe larger than 18 inches shall be tested by either infiltration or exfiltration and shall be tested in lengths of 1600 feet or less.

6. Should the results of any test fail to meet the criteria established in this Specification, the CONTRACTOR shall, at his own expense, locate and repair rejected section and retest until it is within specified allowance.

B. Test for Leakage - Air Test

1. After a manhole-to-manhole section of line has been backfilled and cleaned, it shall be plugged at each manhole with pneumatic plugs inflated to 35 psig internal pressure. The design of the pneumatic plugs shall be such that they will hold against the line test pressure without requiring external blocking or bracing.

2. There shall be three (3) hose connections to the pneumatic plug. One hose shall be used only for inflation of the pneumatic plug. The second hose shall be used for continuously reading the air pressure rise in the sealed line. The third hose shall be used only for introducing low pressure air into the sealed line.

3. There shall be a 0-30 psig gauge for reading the internal pressure of the line being tested. Calibrations from the 1-10 psig range shall be in tenths of lbs (not ounces) and this 0-10 portion shall cover 90% of the complete dial range.

4. Low pressure air shall be introduced into the sealed line until the internal air pressure reaches 4.0 psig greater than the average back pressure of any ground water pressure that may be over the pipe. At least two (2) minutes shall be allowed for the air pressure to stabilize. After the stabilization period, the third hose shall be disconnected.

5. The portion of line being tested shall be accepted if the portion under test meets the following conditions.

a. Ductile Iron (DI)

(1) The time requirement for the pressure to decrease from 3.5 to 2.5 psig (greater than the average back pressure of any ground water that may be over the pipe) shall not be less than the time given in the following table:

Pipe Dia.	Min. Holding Time Seconds/100 ft. Pipe
4-inch	18
6-inch	42
8-inch	72
10-inch	90
12-inch	108
15-inch	126
18-inch	144

(2) In areas where ground water is known to exist, the CONTRACTOR shall install a 1/2-inch diameter capped pipe nipple, approximately 10 inches long, through the manhole wall on top of one of the sewer lines entering the manhole. This shall be done at the time the sewer line is installed. Immediately prior to the performance of the line acceptance test, the ground water level shall be determined by removing the pipe cap, blowing air through the pipe nipple into the ground so as to clear it, and then connecting a clear plastic tube to the pipe nipple. The hose shall be held vertically and a measurement of the height in feet of water shall be taken after the water stops rising in this plastic tube. The height in feet shall be divided by 2.3 to establish the lbs of pressure that will be added to all readings. For example, if the height of water is 11-1/2 ft, then the added pressure will be 5 psig. This makes the 3.5 psig to be 8.5 psig, and the 2.5 psig to be 7.5 psig. The 1 lb allowable drop and the timing remains the same.

b. Polyvinyl Cholride (PVC) Pipe

(1) The time requirement for the pressure to decrease from 3.5 to 3.0 psig (greater than the average back pressure of any ground water that may be over the pipe) shall not be less than that shown in the following table:

(inches) Pipe Size	(seconds) Holding Time	Minimum Holding Time (seconds)
4-inch	0.190xL	113
6-inch	0.427xL	170
8-inch	0.760xL	227
10-inch	1.187xL	283
12-inch	1.709xL	340
15-inch	2.671xL	425
18-inch	3.846xL	512

(2) If any section of the sewer fails to meet this requirement, the CONTRACTOR shall perform a television inspection of the faulty section and repair or replace at his own expense all defective materials and/or workmanship to the satisfaction of the ENGINEER. The test procedure shall be repeated until the results are acceptable.

C. Test for Infiltration

1. Sewer pipe over 18 inches shall be tested to measure the infiltration of ground water. If the measured leakage exceeds 100 gallons per inch diameter per mile of pipe per 24 hr period, the CONTRACTOR shall locate the points of excessive leakage and make the necessary repairs at his own expense.

2. In the event the line does not pass the infiltration test as stated above, the test shall be repeated after suitable repairs have been completed.

D. Test for Exfiltration

1. Where the ground water provides less than a 2 ft head on a sewer pipe over 18 inches, an exfiltration test shall be conducted by filling the sewer with water to a 4 ft head or 4 ft above the ground water level, whichever is greater. The allowable water loss shall be 100 gal/in./mi/day as calculated above for infiltration.

2. After the sewer has been filled with water, 4 hrs time shall be allowed for water absorption by the pipe before exfiltration tests are initiated.

3. For the purpose of establishing the 4 ft test head, the head shall be measured from the center of the sewer pipe at the midpoint of the test section length. This procedure shall be used for both infiltration and exfiltration tests.

A. Test for Manhole Leakage

1. All manholes shall be tested for leakage by using plugs on inleting-outleting sewers, and filling the manholes with water to the top of the manhole. Four hours shall be allowed for water absorption by the manhole before testing is initiated. Allowable exfiltration for 48-inch diameter manholes shall be 2 gallons per foot of depth per day.

F. Test for Alignment

1. All sewers shall be laid accurately to the line and grade designed by the ENGINEER. The sewers will be tested for alignment by shining a light through the pipe at a manhole and viewing the light from an adjacent manhole. Any section of sewer in which a light cannot be seen from one manhole to the next shall be corrected to the satisfaction of the ENGINEER to pass this test.

G. Test for Deflection of PVC Pipe

1. PVC pipe sewers shall be installed in such a manner that the initial deflection of the conduit shall conform to the latest revision of ASTM D3034.

2. Deflection of PVC pipe shall be tested by pulling a rigid mandrel or equivalent through the pipe. The pig shall be constructed in accordance with the following table of maximum outside diameters and shall be submitted to the ENGINEER for review before testing is initiated.

Pipe I.D.	Mandrel O.D.
6 inches	5.33 inches
8 inches	7.11 inches
10 inches	8.87 inches
12 inches	10.55 inches
15 inches	12.90 inches
18 inches	15.74 inches

3. The mandrel shall be drawn by hand through the pipe from manhole to manhole. Any portion of pipe through which the mandrel passes freely shall be deemed to have passed the deflection test. Sections of pipe through which the mandrel does not pass shall be located, uncovered and the pipe zone bedding improved and backfilled by the CONTRACTOR at his own expense. The pipe shall then be retested before acceptance is granted.

H. Material Tests

1. The CONTRACTOR shall have tests of pipe and strength made by an independent testing laboratory. Tests of up to 4 lengths of sewer pipe per hundred lengths may be required to show compliance with the Specifications. All pipe delivered to the job site shall be accompanied with a manufacturer's certificate of compliance to the Specifications.

1.03 SUBMITTALS

A. The CONTRACTOR shall submit shop drawings or data sheets for all pipe, manholes, manhole castings, pipe to manhole connections, and valves. The Contractor shall submit certification letter for all pipe proposed on the project. The letters shall contain the following: Contractor name, project name, township name, current date, certification of pipe provided and letterhead of the certifying company. All materials shall be approved by the ENGINEER before purchasing.

2.00 PRODUCTS

2.01 SEWER PIPE FOR OPEN CUT APPLICATIONS

A. Pipe for sanitary sewer shall be polyvinyl chloride (PVC). Ductile Iron pipe pipe shall be used as specified by the ENGINEER.

B. Pipe for service leads 4 though 8 inches in diameter shall be polyvinyl chloride (PVC).

C. PVC sewer pipe and fittings 4 inches through 15-inches in diameter shall meet or exceed all the requirements of ASTM D3034 SDR-26. PVC sewer pipe and fittings 18-inches or greater in diameter shall meet or exceed all the requirements of SDR 21. Samples of pipe and physical and chemical data sheets shall be submitted to the ENGINEER for review. Approval shall be obtained before pipe is purchased.

D. If the sewer pipe is greater than 15 feet deep, PVC pipe shall be SDR 21.

E. Ductile iron pipe shall meet or exceed all the requirements of Class 54 with a cement lining.

2.02 SEWER PIPE FOR DIRECTIONAL DRILL APPLICATIONS

A. Directional drill pipe for gravity sewer or force main shall be high density polyethylene pipe (HDPE). All gravity sewer shall be provided with IPS standard dimensions and all force main shall be provided with DIPS standard dimensions.

B. HDPE pipe and fittings shall be DR11, manufactured in conformance with ASTM F714, ASTM D3350 and PPI TR-4. HDPE pipe and fittings shall be manufactured of PE4710 polyethylene resin with a cell classification of 445574C/E.

C. HDPE fittings shall be butt heat fusion type manufactured in accordance with ASTM D3261.

D. HDPE pipe and fittings shall contain no recycled compound except that generated in the manufacturer's own plant. The physical appearance of the pipe having deformities such as concentrated ridges, discoloration, excessive rough spots, pitting, varying wall thickness, etc. shall constitute sufficient basis for rejection. The HDPE pipe and fittings shall be homogenous throughout, free from visible cracks, foreign inclusions and other defects that may affect the wall integrity.

2.03 SEWER PIPE FITTINGS

A. Fittings shall be of the same material as the pipe, and in no case shall the walls be thinner than that of the pipe furnished.

B. The dry fit of all fittings must be snug. If the fit is such that it is loose, the pipe or fitting will be rejected as faulty and of improper size.

2.04 SEWER PIPE JOINTS

A. PVC pipe shall be jointed with ring gusseted bell ends conforming to ASTM D3212. Jointing materials shall be applied to the bell end of the pipe at the point of manufacture in such a manner that a tight uniform joint will be achieved and such that when the joint is made up in the field, the joint material will not roll or tear from the pipe. A proper joint lubricant shall be furnished by the pipe manufacturer.

2.05 REINFORCED CONCRETE MANHOLES

A. Manholes shall conform to ASTM C478 for precast reinforced concrete manhole sections. Manhole section joints shall conform to ASTM C990. Cone sections shall be straight side type, with an offset step configuration.

B. All manhole component parts shall have the name of the manufacturer stenciled on the inside. The lettering or logo shall be a minimum of 4-inches high.

C. Manholes constructed over an existing sewer line shall have a doghouse mudded to an 8-inch thick cookie. The bottom of the existing pipe shall be the channel. All other manholes shall have precast integral base sections with pre-formed concrete channels.

D. All channels shall be constructed to the full flow depth of the pipe.

E. Manhole component part cut sheets shall be provided for all manholes.

2.06 MORTAR FOR MANHOLES

A. Mortar for plastering manholes shall be made of one part Portland cement and two parts fine aggregate.

2.07 MANHOLE FRAMES AND COVERS

A. Manhole frames and covers shall weigh not less than 350 lbs. Each frame and cover shall have machined bearing surfaces and shall be suitably notched for convenient removal of the cover. Each cover shall be marked with the letters, SANITARY SEWER integrally cast into the cover.

B. Covers shall be of the "self-sealing" design having a continuous gasket glued in a machined groove and a concealed pickhole. Frames and covers shall be East Jordan 1040 Z, with Type AGS cover. Covers located in a wetland area shall be EJIW 1040 APT lettered "SANITARY SEWER" and EJIW 1040 ZPT bolt down frame.

C. All manhole frames and covers shall be coated by the manufacturer with coal tar pitch varnish or other asphaltum coating reviewed by the ENGINEER. .

2.08 MANHOLE STEPS

A. Steps shall be plastic coated steel. They shall be M.A. Industries PS1-PF or PS1-B, or approved equal. The top step be no more than 18-inches from the top of the cover

2.09 MANHOLE CONNECTIONS

A. Sewer pipe (6-inch to 24-inch) to manhole connections shall be through a flexible pipe-to-manhole connector, which shall be securely clamped into a core-drilled port. Pipe ports shall be core-drilled at the point of manhole manufacturer and shall be accurately located within 1/2-inch of proposed sewer centerline. Flexible pipe-to-manhole connectors shall meet the requirements of ASTM C923 and shall be Kor-N-Seal, or approved equal. All rubber components shall be synthetic rubber only. All non-rubber components including wedges, bands and pipe clamps shall be stainless steel.

B. Sewer pipe over 24 inches to manhole connections shall be in accordance with details shown on the Plan.

2.10 SANITARY MANHOLE ADJUSTMENTS

A. All final grade adjustment of manhole covers and frame assemblies shall be completed utilizing injection molded High Density Polyethylene (HDPE) adjustment rings as manufactured by LADTECH, INC. or approved equal. The adjustment rings shall be manufactured from high density polyethylene as defined in ASTM 01248-84.

B. All adjustment for matching road grade shall be made utilizing a molded indexed slope ring.

C. Each adjustment ring shall be sealed with a 3/16 to 1/4 inch bead of approved butyl rubber sealant per the manufacturer's instructions.

D. All castings and adjustment rings shall be sealed to the structure with an external Infi-Shield Uni-Band seal manufactured by Sealing Systems, Inc., or approved equal. The seal shall be continuous bands, made of high quality Ethylene Propylene Diene Monomer (EPDM) rubber with a minimum thickness of 60 mils. Each unit shall have a 2-inch wide mastic strip on the top and bottom of the band. The mastic shall be non-hardening butyl rubber sealant, with a minimum thickness of 3/16-inch, and shall seal to the cone of the manhole and over the lip of the casting.

2.11 MANHOLE DROPS

A. Manhole drop connections shall be interior drops using the drop bowl as produced by Reliner-Duran Inc. or approved equal.

B. Drop bowl model A-4" shall be used for all lines up through full 6-inch inlets. Drop bowl model A-6" shall be used for all 8-inch inlets. Drop bowl model B-8" shall be used for all 10-inch inlets. Lines larger than 10 inches shall be as directed by the ENGINEER.

C. The force line hood shall be attached on models A-4" and A-6" when the incoming line is from a force main or the slope is 3 percent or greater.

D. The drop pipe shall be secured to the manhole wall with Reliner-Duran, Inc. stainless steel adjustable clamping brackets or approved equal.

E. The drop bowl and each clamping bracket shall be attached to the manhole wall with 3/8-inch x 3 3/4-inch bolts.

F. The incoming pipe shall be trimmed such that it protrudes 2 inches into the manhole .

G. A 1-inch V shaped notch shall be cut into the bottom edge of the incoming pipe.

3.00 EXECUTION

3.01 EXCAVATION AND BACKFILL

A. All excavation and backfill over 12 inches above the crown of the pipe shall conform to the Earthwork Specifications.

3.02 BEDDING

A. Ductile iron, and concrete pipes shall be laid on a compacted granular material placed on the bottom of the trench to a depth of not less than 3 inches for 24-inch and smaller pipe and not less than 4 inches for pipe larger than 24-inch conforming to Class B bedding as shown on the Plans. Where shown on the Plans or required by the ENGINEER, concrete encasement or concrete cradle shall be used.

B. PVC pipe shall be laid on a compacted granular material placed on the bottom of the trench to a depth of not less than 4 inches conforming to Class B bedding as shown on the Plans. Where shown on the Plans, or where the pipe passes under a road with less than 4 ft of cover, the pipes shall be encased.

C. For all pipes, compacted granular material shall be placed at the sides of the pipe and cover not less than 12 inches above the crown of the pipe.

D. "Granular Material" shall be class 2NS sand, pea gravel or crushed stone conforming to ASTM C33 Size No. 67 placed in not more than 6-inch layers and compacted to not less than 95% standard density for PVC and 90% standard density for reinforced concrete.

E. Pea gravel or crushed stone used for bedding shall be separated from the sand backfill with a non-woven geotextile fabric. The fabric shall be Amoco 4551, or approved equal.

3.03 OPEN CUT PIPE INSTALLATION

A. Installation of PVC pipe shall be in conformance with ASTM D2321. Installation of ductile iron pipe shall be in conformance with ANSI/AWWA C600.

B. All pipe shall be laid true to the required lines and grades. When pipe laying is in progress all trenches shall be kept dry; and all pipes and fittings shall be uniformly supported on a properly trimmed bedding with holes at each joint to receive bells. All pipe shall be laid with bells uphill.

C. All joints shall be made up in accordance with the manufacturer's instructions using materials and equipment especially prepared for the type of joint to be used.

D. The grade as shown on the profiles is that of the pipe invert and that to which the work must conform. The grade shall be kept by levels, laser or other tools which shall be furnished by the CONTRACTOR at his expense. Each pipe shall be laid accurately to the line and grade as shown on the Plans and in such manner as to form a close concentric joint with the adjoining pipe and prevent sudden offsets of the invert. The interior of sewers shall, as the work progresses, be cleaned of all dirt, cement, debris and other superfluous materials of every description. Bulkheads shall be used to keep foreign materials out of the open end of the sewer when work is not in progress.

E. The location of the piping as shown on the Plans has been determined to avoid, insofar as possible, interference with trees or structures or fixtures above ground and other underground mains, services, utilities, or structures. Any change in location or alignment of piping which may be found more feasible or practicable as the work progresses shall be made by the CONTRACTOR, as the ENGINEER may direct.

F. All pipe and fittings shall be carefully lowered and moved into position in trench or vault in a controlled manner such as will prevent damage to the pipe and any coatings or lining. An excessive amount of scratching on the surface of the PVC pipe will be considered cause for rejection.

G. The trench shall be backfilled closely behind the pipe laying. Unless otherwise directed or permitted by the ENGINEER, the backfilling shall follow and be completed to the top of the trench within two pipe lengths behind pipe laying.

H. All cutting of the pipe shall be done in a neat workmanlike manner with the least amount of waste and without damage to existing or new lines. A fine tooth saw, tubing cutter or similar tool may be used to cut PVC pipe. Cuts must be square. Ragged edges shall be removed with a cutting tool or file.

I. After cutting bell and spigot or socket pipe, a stop mark shall be made with a pencil or crayon using dimensions as shown by the manufacturer's instructions or by using another pipe in the field as a guide.

J. Breaks in pipe or joints shall be repaired to the satisfaction of the ENGINEER and at the expense of the CONTRACTOR.

3.04 DIRECTIONAL DRILL PIPE INSTALLATION

A. Sections of polyethylene pipe shall be assembled and joined by the butt fusion process into continuous lengths on the job site above the ground. The joining method shall be the heat fusion method and shall be performed in strict accordance with the pipe manufacturer's recommendations and ASTM F2620. The heat fusion equipment used in the joining procedures shall be capable of meeting all conditions recommended by the pipe manufacturer. Heat fusion joining of HDPE end sections and fittings may be performed in the excavations. Joint strength shall be equal to the pipe as demonstrated by testing requirements.

B. All joints shall be inspected by the ENGINEER before the pullback. The pipeline shall be joined on site in appropriate working lengths near the exit pit. In determining the maximum pulling length, the CONTRACTOR shall consider the physical condition at the job site and limitations of his equipment.

C. Fusible pipe will be fused by qualified fusion technicians, as documented by the pipe supplier. Training records for qualified fusion technicians shall be available to OWNER or ENGINEER upon request. Only appropriately sized, and outfitted fusion machines that have been approved by the pipe supplier shall be used for the fusion process

D. Each fusion joint shall be recorded and logged by an electronic monitoring device (data logger) connected to the fusion machine. The fusion data logging and joint report shall be generated by software developed specifically for the fusion of fusible PVC or HDPE pipe. The software shall include dimensional data and interfacial pressure relationships that are specific to either HDPE or PVC pipe depending on which material is utilized. Data not logged by the data logger shall be logged manually and be included in the fusion technician's joint report. Joint data shall be submitted as part of the As-Recorded information, in accordance with this specification.

E. The fusible pipe will be installed in a manner so as not to exceed the recommended bending radius. Where fusible pipe is installed by pulling in tension, the recommended Safe Pulling Force, according to the pipe supplier, will not be exceeded.

F. The drilling equipment shall be capable of placing the PVC or HDPE pipeline within the proposed line and grade without inverted slopes.

G. The guidance system shall have the capability of measuring inclination, roll and azimuth. The guidance system shall have an independent means to ensure the accuracy of the installation. The CONTRACTOR shall 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 CONTRACTOR shall also prepare to provide alternative methods such as gyroscoping, ground penetrating radar or "Intelligent" pigs to determine the as-built position.

H. The entry angle of the pilot hole and the boring process shall maintain a curvature that does not exceed the allowable bending radius of the PVC or HDPE pipe respectively.

I. The CONTRACTOR shall follow the pipeline alignment as proposed on the Drawings. If adjustments are required, the CONTRACTOR shall notify the ENGINEER for approval prior to making the adjustments.

J. In the event of difficulties at any time during boring operations requiring the complete withdrawal from the tunnel, the CONTRACTOR shall be allowed to withdraw, abandon the tunnel and begin a second attempt at a location approved by the ENGINEER, or at the option of the CONTRACTOR and with the approval of the ENGINEER, the CONTRACTOR may excavate at the point of the difficulty and install the ductile iron pipeline by open cut method.

K. The number of access pits shall be kept to a minimum and the equipment must be capable of boring the proposed length in a single bore.

L. After the pilot hole is completed, the CONTRACTOR shall 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.

M. Reaming diameter shall not exceed 1.4 times the diameter of the pipe being installed. When the reamer exceeds this maximum, a flowable fill or suitable grout shall be pumped into the void between the PVC or HDPE pipe and drill pilot hole displacing the drilling fluid. The flowable fill or suitable grout material and method of placement shall be approved by the ENGINEER prior to installation of pipeline.

N. Pulled HDPE pipes shall be allowed 24 hours of stabilization prior to making tie-ins to manholes. The length of extra HDPE pipe will be at CONTRACTOR's discretion.

3.05 CONNECTIONS TO EXISTING MANHOLES AND OTHER RIGID STRUCTURES

A. When a sewer is connected to an existing manhole, a hole adequate to receive the new pipe shall be cut into the manhole.

B. If the existing manhole is of brick construction, a single rowlock of brick shall be turned over the new pipe and the existing manhole brick work shall be cleaned, pointed and given a 1/2-inch mortar coat on the outside surface.

C. For connections to existing precast reinforced concrete manholes, a hole shall be cored into the concrete manhole wall to receive the pipe. A Kor-N-Seal boot or engineer approved equal shall be clamped into the cored hole and used to make the connection.

D. For connections to existing fiberglass manholes, a hole shall be cored into the manhole wall to receive the pipe. A Kor-N-Seal boot or engineer approved equal shall be installed using fiberglass reinforced pipe stubout for Kor-N-Seal boot sealing surface.

3.06 STREAM AND RIVER CROSSINGS

A. Whenever a pipe is required to cross a stream or river, all work shall be in accordance with the provisions of Act 346, the Inland Lakes and Streams Act of 1962, and the rules and regulations promulgated thereunder. Stream crossings and all restoration required shall be completed within five days of the construction.

B. The CONTRACTOR shall utilize such construction methods as are feasible and practical to divert or stop stream flow to lay the pipe in the dry. Pipe shall be ductile iron. After the sewer is properly laid, jointed and encased, the stream-channel shall be cleaned of dirt and debris resulting from the CONTRACTOR's operations.

C. After the crossing is made, heavy riprap and sodding shall be placed to protect the backs from corrosion as shown on the plans.

AAT February 2010

Stantec

Stantec Consulting Michigan Inc.
3754 Ranchero Drive
Ann Arbor MI U.S.A.
48108-2771
Tel. 734.761.1010
Fax. 734.761.1200
www.stantec.com

Copyright Reserved

The Contractor shall verify and be responsible for all dimensions. DO NOT scale the drawing - any errors or omissions shall be reported to Stantec without delay.
The Copyrights to all designs and drawings are the property of Stantec. Reproduction or use for any purpose other than that authorized by Stantec is forbidden.

Consultants

Legend

Notes

UPDATES	BWA	DRW	13.01.17
Revision	By	Appd.	YY.MM.DD
Issued	By	Appd.	YY.MM.DD
File Name: SS-02.DWG	CJE	GAT	CJE	11.02.07
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

Client/Project
ANN ARBOR TOWNSHIP

Standard Specifications and Details

Title
SANITARY SEWER SPECIFICATIONS

Project No.

Scale
NOT TO SCALE

Drawing No.
SS-02

Sheet
1 of 1

Revision
0