STORM SEWER SPECIFICATIONS

A. MATERIALS

PIPE

Storm sewer pipe shall be reinforced concrete or ductile iron.

1. Reinforced concrete pipe and manhole tees shall conform to the latest revision of ASTM C76, with the class designation as follows:

Cover Over Pipe	Class of Concrete Pipe
Less than 18'	IV
18' and deeper	V

2. Pipe located in any pavement areas shall be not less than Class IV.

Ductile Iron (Pipe) shall meet current requirements of ANSI A21.50.

SEWER JOINTS

Sewer joints for reinforced concrete pipe shall be tongue and groove joints secured with rubber gaskets, mastic, or concrete mortar.

1. All storm sewer under paved areas shall have synthetic rubber gasket joints from structure to structure conforming to ASTM C 361. Natural rubber gaskets are not allowed.
2. Joints for storm sewer with diameters 30-inches or greater shall have concrete mortar applied on the inside.
3. Mastic material for joints shall be of DeWitts No. 10 or approved equal.

STRUCTURES

Storm structures shall be constructed of precast concrete pipe, brick or block.

1. Precast Concrete

   Reinforced concrete structures and grade rings shall conform to the current ASTM Specifications for Precast Reinforced Concrete Manhole Sections, Serial Designation C478. Manhole section joints shall be made with mortar. Dome sections shall be straight side type.

2. Brick and Block

   a. Brick for brick and mortar structures shall conform to the current ASTM Specification C32. Block for block and mortar structures shall conform to the current ASTM Specification C135. Mortar for plastering drainage structures shall be made of one part Portland cement and two parts of fine aggregate.

   b. The concrete block masonry used to construct manhole and catch basin walls shall be solid curved blocks with the inside and outside surfaces curved to the required radii. The blocks shall have tongue and groove or other approved type of joint at the ends so that the units interlock to form a strong, rigid structure. Curved blocks shall have the inside and outside surfaces parallel.

   c. The block shall not exceed 18 inches in length or 8 inches in depth (height). No block shall be less than 6 inches in width (thickness). All blocks in one structure shall be of the same height dimension. The blocks shall be designed for length so that only full-length or half-length blocks are required to lay the circular wall of any one course.

   d. Blocks intended for use in the cones or tops of manholes and catch basins shall have such shape as may be required to form the structure as shown on the plans with inside and outside joint not to exceed 1/4-inch in thickness.

CASTINGS

Castings shall conform to the latest revision of the ASTM Specification A48, Gray Iron Castings, and be coated by the manufacturer with coal tar pitch, varnish, or other asphaltum coating reviewed by the Township Engineer.

Frames and covers shall be as follows:

For use on drainage structures in paved areas: East Jordan Frame 5105 with type M1 grate, or equal.

For use in curb and gutter line: East Jordan Frame 7045 with type M1 grate, or equal.

For use on drainage structures in grassed areas: East Jordan Frame 1040 with type 02 Beehive Grate, or equal.

For use on drainage structure manholes in paved areas: East Jordan Frame 1040 with type B perforated cover, or equal.

For use on sump drain cleanouts: East Jordan Frame 1040 with type B perforated cover or equal.

HEADWALLS

Headwalls shall be constructed of concrete in accordance with the latest revision of MDOT Specifications.

MANHOLE STEPS

1. In precast manhole.

   Manhole steps shall be reinforced polypropylene plastic coated steel. They shall be M.A. Industries, Inc. PS-1-PF.

2. In brick or block construction

   Manhole steps shall be MA Industries, Inc. PS-1B.

B. CONSTRUCTION

EXCAVATION

The CONTRACTOR shall do all the excavation required for the construction of the sewer, including clearing of the site for the work and the removal and disposal of all materials necessary for construction.

Excavated materials may be temporarily stored along the trench, unless otherwise noted, in a manner that will not cause damage to trees, shrubs, fences, or other property, nor that will endanger the bank stability of the trench by imposing too great a load thereon.

Excavations shall be adequately braced and/or sheeted to prevent caving or squeezing of the soil, or disturbing existing utilities or pavement, and shall be completely de-watered prior to construction of the sewer.

The subgrade shall be accurately prepared to line and grade so that the pipe, when laid, shall have uniform bearing upon the approved backfill, throughout its length.

The trench shall be backfilled closely behind the pipe laying. Unless otherwise directed or permitted by the Township Engineer, the backfilling shall follow at least two lengths behind pipe laying and shall be completed to the top of the trench not more that ten lengths behind pipe laying.

Pavement cutting, maintenance and reinstatement shall be done in a manner satis-factory to the Wayne County Department of Public Services and the Township Engineer.

PIPE INSTALLATION

All pipe shall be laid true to the required lines and grades. All trenches when pipe laying is in progress 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.

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.

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. Each pipe shall be laid accurately to the line and grade as shown on the Plans and in such a 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.

All pipe and fittings shall be carefully lowered and moved into position in the trench or vault in a controlled manner such as will prevent damage to the pipe and any coatings or lining.

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.

BEDDING

Concrete pipe shall be laid on a compacted granular cushion 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 Trench A bedding as shown on this sheet. Where shown on the Plans or required by the Township Engineer, concrete encasement or concrete cradle shall be used.

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.

Granular material shall conform to Class II material as defined in MDOT 902.08 and shall be placed in not more than 6-inch layers and compacted to not less than 95% standard density.

BACKFILL

Backfill is defined as that material placed into the trench from the top of the standard pipe bedding to the ground surface.

Trench Backfill Options are as Follows:

Trench	Location	Backfill Requirements
A.	Open areas and all areas not in compliance with the trench locacations identified for trench B.	Selected excavated or other approved backfill material shall be placed, after standard bedding as shown on this sheet has been completed. Compaction of backfill shall be such as to obtain not less than 90% of its maximum unit weight.
B.	Under existing or proposed pavement, sidewalk, curb and gutter, and where pipe bottom is within 1 on 1 influence of pavement.	Backfill shall be full depth mechanically compacted Class II granular material constructed in 6" layers, loose measure, with each layer compacted to not less than 95% of its maximum unit weight at optimum moisture content per A.A.S.H.T.O.-180 or by M.D.O.T. Cone Density Method.

Trech B backfilled areas shall be tested for compaction by an independent testing laboratory. Intervals of testing shall be one test per layer per 75 feet of trench or as determined necessary by Township Engineer. The cost of the testing services shall be paid for by the Contractor.

For areas not requiring Trench B backfill, backfill shall be of the excavated material, with the exception that materials such as soft clay, topsoil, muck, cinders, vegetable matter, refuse, stones larger than 3" in any dimension and other objectionable and non-packing earth shall be excluded from the backfill and removed from the site by the Contractor.

Backfill shall not be placed against any portion of a structure until the structure has passed inspection and has been approved by the Township Engineer for backfilling. All trenches should be backfilled as soon as inspection is completed in order to avoid unnecessary risk or damage to the structure and also to reduce the risk of accidents involving the public.

Prior to backfilling, all underground utilities encountered, shall be adequately protected by the use of supporting concrete or timber bents (to be left in place) of such a size and construction as to effectively prevent failure of the utility in settlement.

If a bulldozer or other machine is used to place the backfill material; no material shall be pushed or dropped into the trench, but shall be placed on the sloping ends of the completed backfill, and allowed to roll in place to the bottom of the trench.

PIPE CONNECTIONS

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

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 and inside surface.

For connections to existing precast reinforced concrete manholes, a hole shall be cut into the concrete manhole wall to receive the pipe. Reinforcing steel shall not be cut but shall be bent and replaced in the area that is to be patched. A form shall be constructed over the area of pipe penetration. The formed area shall then be filled with concrete.

DRAINAGE STRUCTURES

Manhole and catch basin bottoms shall be concrete with the top of slab having a troweled finish.

The manhole and catch basin walls may be constructed of concrete block masonry or concrete manhole pipe conforming to the requirements of the Specifications previously listed. Construction shall be in accordance with the details as shown on the Plans.

Pipe shall not extend into a manhole beyond the inside face of the manhole wall.

A plaster coat of mortar 1/2-inch in thickness shall be applied to the outer surface of all manholes and catch basins constructed with concrete block masonry.

Final adjustment of the top of manholes and catch basins, so that the manhole or catch basin cover is at finished elevation as shown on the Plans or meets the finished surface, may be accomplished with sewer brick conforming to the previously listed Specifications. The total height of brick for this purpose shall not exceed 12 inches. The inside and outside surfaces of all manholes and catch basins constructed with sewer brick shall receive a plaster coat of mortar 1/2-inch in thickness. The inside coat of mortar shall be applied in a smooth, neat workmanlike manner.

If precast manhole pipe is used for manholes and catch basins, the bottom barrel section shall be placed in a full bed of mortar. The pipe shall be set in a true verticle position. A maximum of three courses of brick shall be placed on top of the precast section for grade adjustment.

TESTING

All tests shall be conducted under the supervision of the Township Engineer.

COMPACTION TEST

Where storm sewer is constructed in pavement areas or where the sewer is within a one on one influence of pavement, compaction testing shall be performed by an independent testing laboratory.

Testing shall be performed at intervals of one test per layer per 75 feet of trench or as determined necessary by the Township Engineer.

TEST FOR ALIGNMENT

All sewers shall be laid accurately to the line and grade established 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 Township Engineer to pass this test.

C. FOOTING DRAIN SEWERS

FOOTING DRAIN COLLECTOR SEWER

1. Minimum pipe diameter shall be 8" with a clean-out provided at the upstream end with a manhole or catch basin at all changes in size and/or any changes in horizontal or vertical alignment.
2. The following pipes are allowed:
   (1) Non-reinforced concrete pipe ASTM C14XM.
   (2) Polyvinyl chloride (PVC) ASTM D-3034, SDR 26
   (3) Polyvinyl chloride (PVC) ASTM F-949, A-2026
3. Surface water drainage will not be permitted to enter into the footing drain collector pipe.
4. The Minimum slope shall be 0.50%

HOUSE LEAD

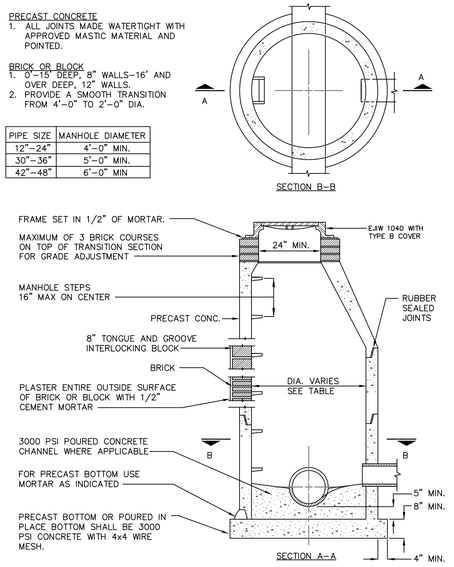
1. Minimum size shall be 3" diameter laid at a minimum 1.00% slope.
2. House lead shall be schedule 40 PVC.

CLEAN OUT STRUCTURES

1. Clean out structures shall be installed at the end of all footing drain collector sewers.
2. Clean outs shall be 2' diameter concrete block or precast concrete structures.
3. Casting shall be East Jordan Iron Works 1045 with Type "B" covers.

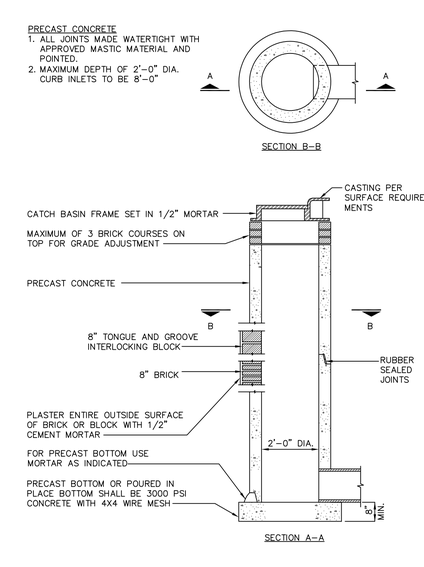
STORM SEWER CONSTRUCTION NOTES

1. ALL WORKMANSHIP, MATERIALS, AND TESTING SHALL BE IN ACCORDANCE WITH THE CURENT STANDARDS AND SPECIFICATIONS OF THE CHARTER TOWNSHIP OF NORTHVILLE.
2. A PRE-CONSTRUCTION MEETING SHALL BE SCHEDULED TWO WEEKS PRIOR TO THE EXPECTED START OF CONSTRUCTION WITH THE TOWNSHIP DEPARTMENT OF PUBLIC SERVICES AND THE TOWNSHIP ENGINEER. THE CONTRACTOR SHALL CONTACT THE TOWNSHIP DEPARTMENT OF PUBLIC SERVICES TO ARRANGE THE MEETING.
3. CONTRACTOR SHALL SUBMIT FIVE (5) COPIES OF SHOP DRAWINGS TO THE TOWNSHIP ENGINEER FOR REVIEW OF COMPLIANCE WITH THE TOWNSHIP STANDARDS FOR ALL MATERIALS PROPOSED FOR CONSTRUCTION.
4. CONTRACTOR SHALL NOTIFY THE TOWNSHIP WATER AND SEWER DEPARTMENT AT (248) 348-5820 AND THE TOWNSHIP ENGINEER 48 HOURS PRIOR TO THE START OF CONSTRUCTION.
5. CONTRACTOR SHALL CALL MISS DIG AT (800) 482-7171 PRIOR TO START OF CONSTRUCTION. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE DONE TO ANY EXISTING UTILITY DURING CONSTRUCTION.
6. IF WORK IS PROPOSED WITHIN THE PUBLIC RIGHT-OF-WAY THE CONTRACTOR SHALL NOTIFY THE WAYNE COUNTY DEPARTMENT OF PUBLIC SERVICE (313-595-6515) 48 HOURS PRIOR TO THE START AND END OF CONSTRUCTION.
7. CONTRACTOR SHALL SCHEDULE A FINAL INSPECTION OF THE COMPLETE STORM SYSTEM WITH THE TOWNSHIP ENGINEER. A PUNCH LIST WILL BE SUBMITTED TO THE CONTRACTOR IN LETTER FORM.
8. CONTRACTOR SHALL SUBMIT AS-BUILT DRAWINGS OF THE COMPLETED STORM SEWER SYSTEM PRIOR TO RECEIVING FINAL ACCEPTANCE OF THE SEWER.



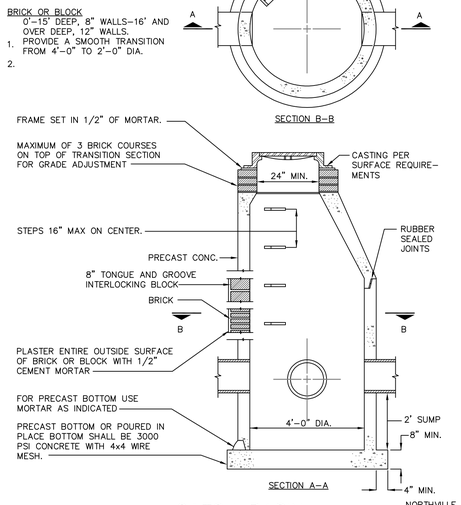
STORM SEWER MANHOLE

NORTHVILLE ST-2 REV. 5/96



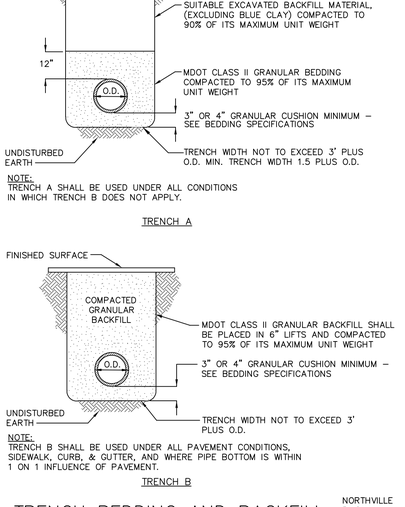
2' DIAMETER CURB INLET

NORTHVILLE ST-5 REV. 5/96



CATCH BASIN

NORTHVILLE ST-1 REV. 5/96



TRENCH BEDDING AND BACKFILL

NORTHVILLE B-2 REV. 10/96

STANTEC
3959 RESEARCH PARK DRIVE
ANN ARBOR, MICHIGAN 48108
(734) 761-1010

NORTHVILLE TOWNSHIP HALL
41600 SIX MILE ROAD WEST
NORTHVILLE, MICHIGAN 48167
(248) 348-5800

NORTHVILLE TOWNSHIP DEPARTMENT OF PUBLIC SERVICES
16225 BECK ROAD
NORTHVILLE, MICHIGAN 48167
(248) 348-5820

REV.			
REV.			
REV.			
REV.	3	01/10	REVISED PIPE CLASS REQUIREMENTS FOR COVER
REV.	2	04/01	ADD FOOTING DRAIN REQUIREMENTS
REV.	1	11/96	ADOPTED WCDPS TRENCH REQUIREMENTS
		6/96	ORIGINAL ISSUE:

DRAWN BY: B.W.A. CHECKED BY: G.A.T., C.J.E.

CHARTER TOWNSHIP OF NORTHVILLE

STORM SEWER SPECIFICATIONS & DETAILS

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SCALE: NONE FILE: ST-1.DWG

ST-1

REVISION 3