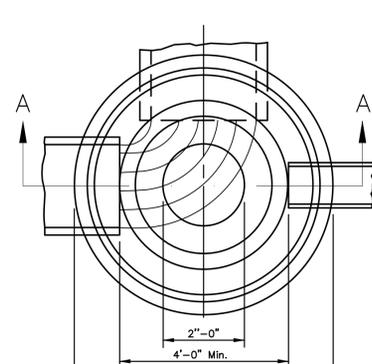
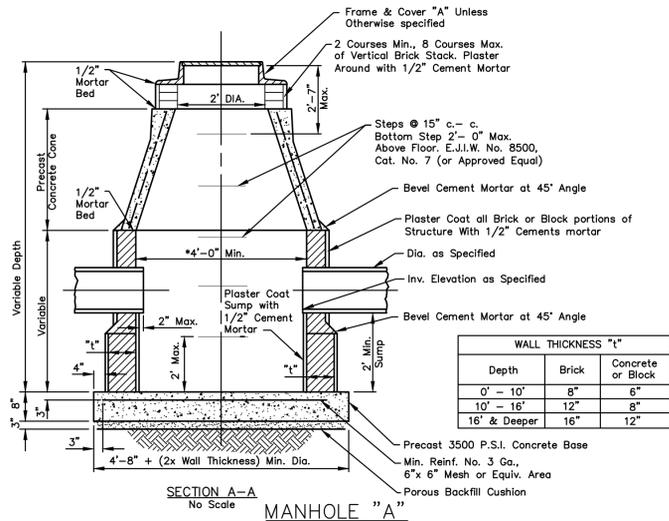


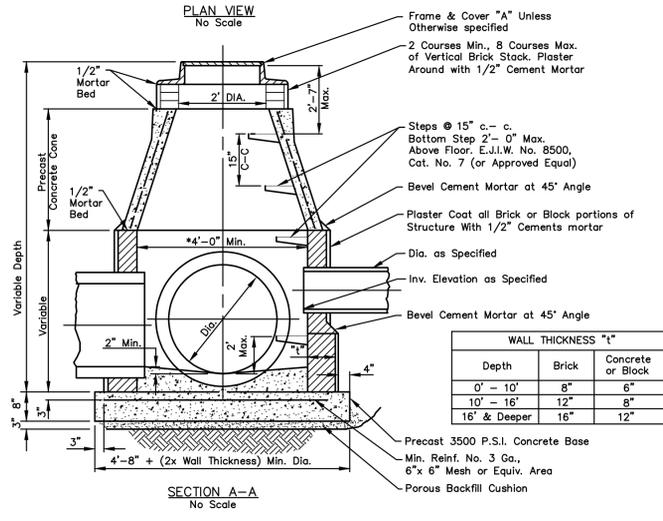
*Diameter of Manhole Shall be Increased as Shown on the Plans or in the Proposal Depending on the Diameters and Angles of Sewers.



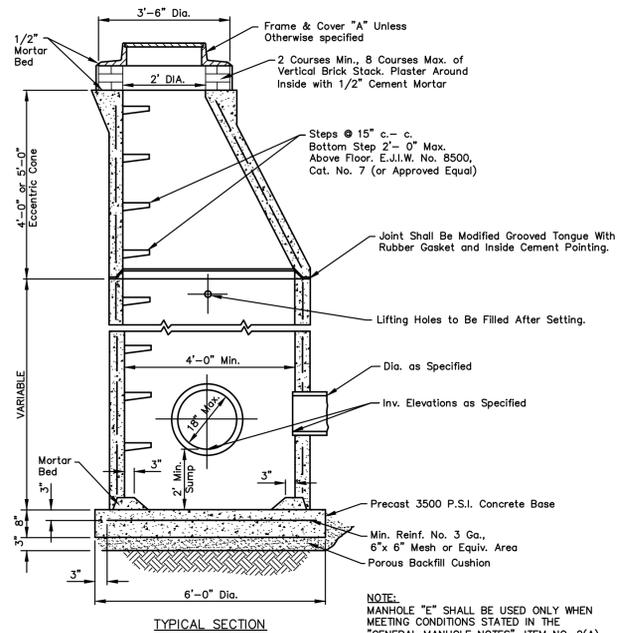
*Diameter of Manhole Shall be Increased as Shown on the Plans or in the Proposal Depending on the Diameters and Angles of Sewers.



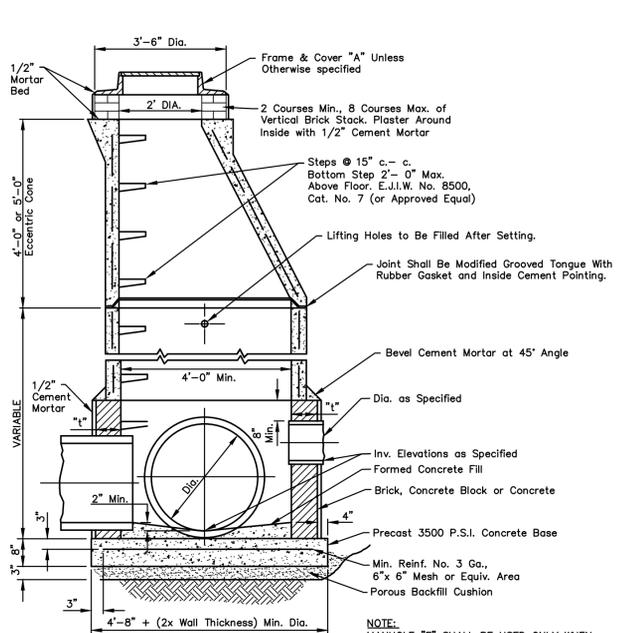
WALL THICKNESS "t"		
Depth	Brick	Concrete or Block
0' - 10'	8"	6"
10' - 16'	12"	8"
16' & Deeper	16"	12"



WALL THICKNESS "t"		
Depth	Brick	Concrete or Block
0' - 10'	8"	6"
10' - 16'	12"	8"
16' & Deeper	16"	12"



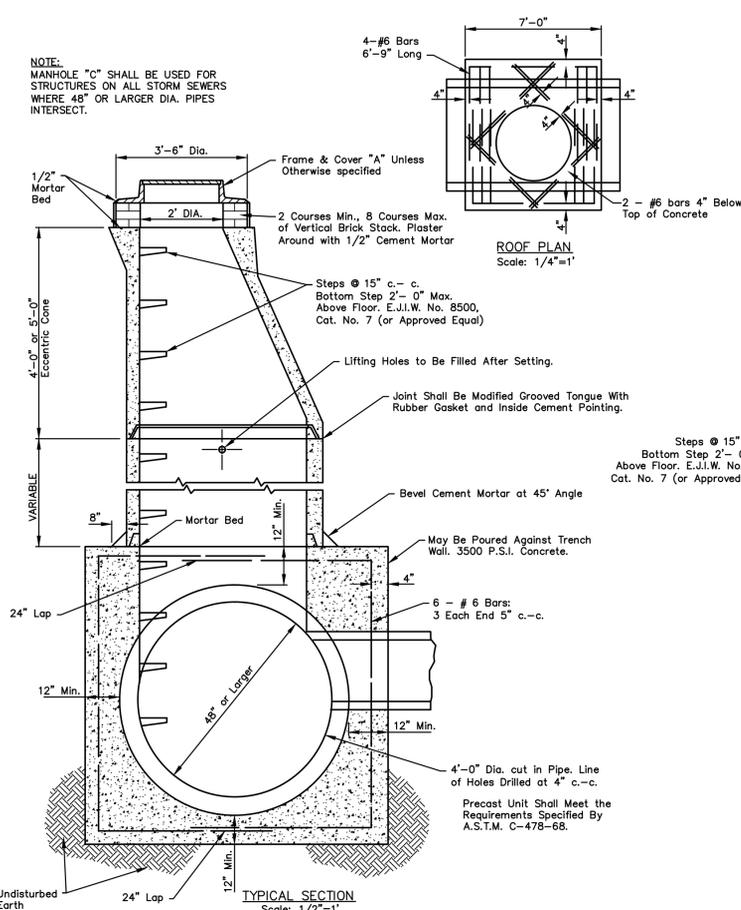
PRECAST MANHOLE "E"
Scale: 1/2"=1'



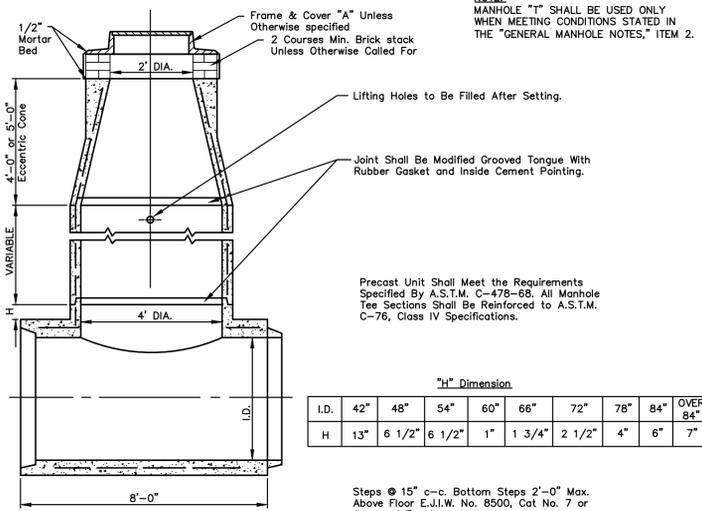
WALL THICKNESS "t"		
Depth	Brick	Concrete or Block
0' - 10'	8"	6"
10' - 16'	12"	8"
16' & Deeper	16"	12"

PRECAST UNITS SHALL MEET THE REQUIREMENTS SPECIFIED BY A.S.T.M. C-478-68

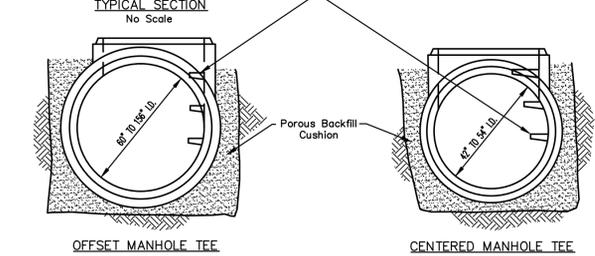
PRECAST MANHOLE "F"
Scale: 1/2"=1'



MANHOLE "C"
Scale: 1/2"=1'

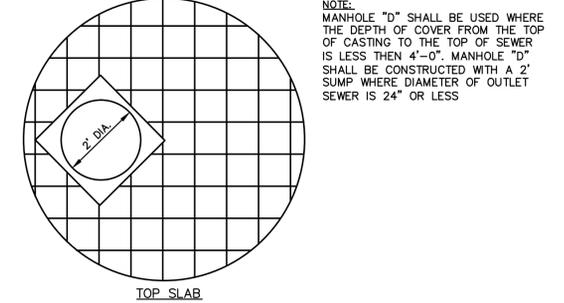


"H" Dimension	
I.D.	H
42"	13"
48"	6 1/2"
54"	6 1/2"
60"	1"
66"	1 3/4"
72"	2 1/2"
78"	4"
84"	6"
OVER 84"	7"

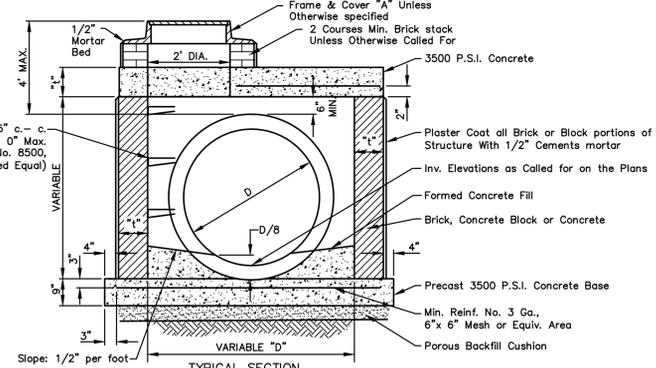


OFFSET MANHOLE TEE CENTERED MANHOLE TEE

MANHOLE "T"
Scale: 1/2"=1'



*Diameter of Manhole Shall be Increased as Shown on the Plans or in the Proposal Depending on the Diameters and Angles of Sewers.



MANHOLE "D"
Scale: 1/2"=1'

Outlet I.D.	M.H. D	Top Slab	Walls	Reinforcing Steel (Slab)	M.H. D	Top Slab	Walls	Reinforcing Steel (Slab)
24" OR LESS	4'-0"	9"	8"	3/4" @ 9" (each way)	7'-0"	12"	12"	7/8" @ 9" (each way)
30"	4'-0"	9"	8"	3/4" @ 9" (each way)	8'-0"	12"	12"	1" @ 9" (each way)
36"	4'-0"	9"	12"	3/4" @ 9" (each way)				
42"	5'-0"	10"	12"	3/4" @ 9" (each way)				
48"/54"	6'-0"	11"	12"	7/8" @ 9" (each way)				

GENERAL MANHOLE NOTES:

- ALL materials and workmanship shall be in accordance with the current standards and specifications set by the City of Livonia.
- The Contractor shall construct Manholes with Precast Reinforced Concrete units ("E", "F" and "T") in lieu of Concrete, Brick and Block Manholes ("A" and "B"), in accordance with the following conditions.
 - Maximum diameter of sewer outlet in any precast unit shall be 18" (Manhole "E" only).
 - No openings shall be made in precast unit which would leave less than 24" of undisturbed precast pipe or would remove more than 30% of the circumference along any horizontal plane.
 - Structures for sewers larger than 18" or those not meeting the opening requirements shall be built of brick or brick up to a minimum of 8" above the top of Sewer, with precast units being used above this point. Where the precast units rest on the block or brick, the groove in the precast unit will be filled with mortar.
 - Openings for the outlet sewer shall be precast with a diameter of 3 inches larger than the outside diameter of the outlet pipe. All other openings shall be made in the field after manhole has been constructed.
- All vertical opening in concrete block structures walls shall be completely filled with mortar. All vertical wall joints shall be cement point.
- A "Poured 3500 p.s.i. Concrete Base", without steel reinforcement, may be substituted for a precast base when approved by the City Engineer. A porous backfill cushion will not be required under the poured base, unless the Contractor has excavated below the required elevation at which time the Engineer will decide as to the merits of increasing the thickness of the concrete base or the use of a porous backfill cushion.
- Where unstable ground conditions are encountered, slag or stone bedding shall be used as directed by the City Engineer in order to provide a stable foundation for pipe and manholes, cost to be included in the unit price for pipe.
- All pipe entering or leaving a manhole shall be adequately supported by pouring 2500 p.s.i. concrete fill from undisturbed earth to spring line.
- Wherever existing manholes or sewer pipe are to be tapped, drill holes at 4" center to center around periphery or opening to create a plane of weakness, before breaking section out.

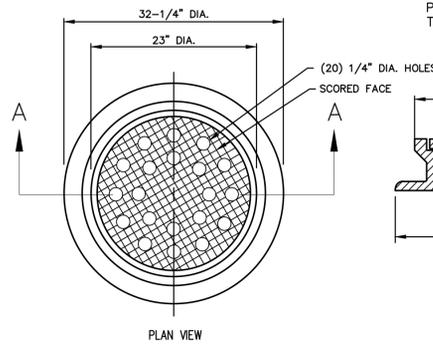
Storm Sewer Manhole Standard Details

JOB No.	DATE: 02/1992
REVISIONS:	SHEET 1 OF 2
Misc. Revisions	REV. DATE: 09/2007
	CADD: dwl
	ENG: dwl
	PM: tz
	TECH: Storm Manhole Details.dwg
	FBF:

CITY OF LIVONIA
 Department of Public Works - Engineering Division
 33000 Civic Center Drive
 Livonia, Michigan 48154
 (734) 466-2570 Office, (734) 466-2195 Fax

RELEASED FOR :	DATE

A SOLID COVER SHALL BE PROVIDED IN LIEU OF THE PERFORATED COVER SHOWN, WHEN THE COVER IS LOCATED WITHIN THE SIDE WALK AREA.

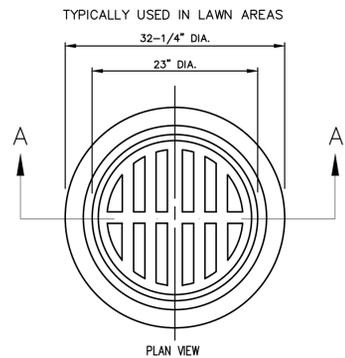


FRAME & COVER "A"
Scale: 1"=1'

MATERIAL:
GREY IRON, A.S.T.M. STD. SPEC. A48, CLASS 30.
BEARING SURFACES SHALL BE GROUND TO PREVENT ROCKING.
TOTAL WT. 410 LBS

E.J.I.W. NO. 1010 FRAME WITH TYPE "B" GRATE

A SOLID COVER SHALL BE PROVIDED IN LIEU OF THE TYPE "N" OVAL GRATE SHOWN, WHEN THE COVER IS LOCATED WITHIN A SIDEWALK AREA.

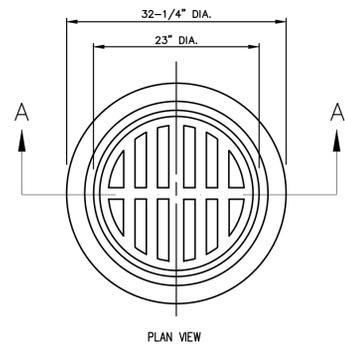


FRAME & COVER "B"
Scale: 1"=1'

MATERIAL:
GREY IRON, A.S.T.M. STD. SPEC. A48, CLASS 30.
BEARING SURFACES SHALL BE GROUND TO PREVENT ROCKING.
TOTAL WT. 315 LBS

E.J.I.W. NO. 1000 FRAME WITH TYPE "N" GRATE

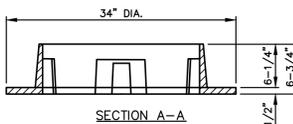
TYPICALLY USED IN DITCH AREAS.



FRAME & COVER "C"
Scale: 1"=1'

MATERIAL:
GREY IRON, A.S.T.M. STD. SPEC. A48, CLASS 30.
BEARING SURFACES SHALL BE GROUND TO PREVENT ROCKING.
TOTAL WT. 315 LBS

E.J.I.W. NO. 1010 FRAME WITH TYPE "O" GRATE



FRAME & GRATE "D"
Scale: 1"=1'

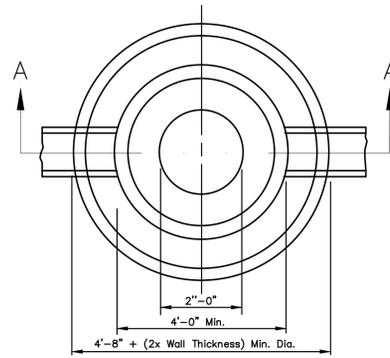
MATERIAL:
GREY IRON, A.S.T.M. STD. SPEC. A48, CLASS 30.
BEARING SURFACES SHALL BE GROUND TO PREVENT ROCKING.
TOTAL WT. 315 LBS

PLAN OF GRATE

SERIES 5000 M1 COVER TROUT LOGO GRATE

DUMP NO WASTE!

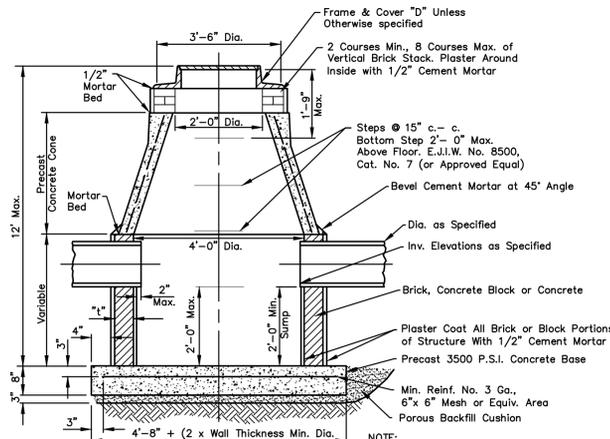
E.J.I.W. NO. 5080



PLAN VIEW
No Scale

Block Wall Construction will be Allowed Only When Authorized By The City Engineer.

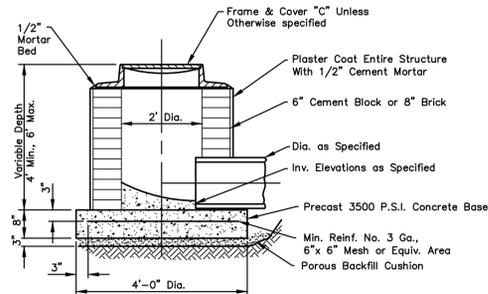
NOTE:
ALL VERTICAL HOLES IN CONCRETE BLOCK STRUCTURE WALLS SHALL BE COMPLETELY FILLED WITH MORTAR, ALL VERTICAL WALL JOINTS SHALL BE CEMENT POINTED.



SECTION A-A

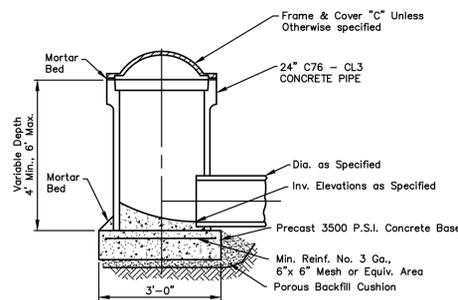
STANDARD CATCH BASIN "A"
Scale: 1/2"=1'

NOTE:
STANDARD INLETS "A" AND "B" SHALL BE USED ONLY WHEN OUTLETTING TO A STRUCTURE HAVING A SUMP OR WHEN OUTLETTING TO A DITCH



CROSS-SECTION

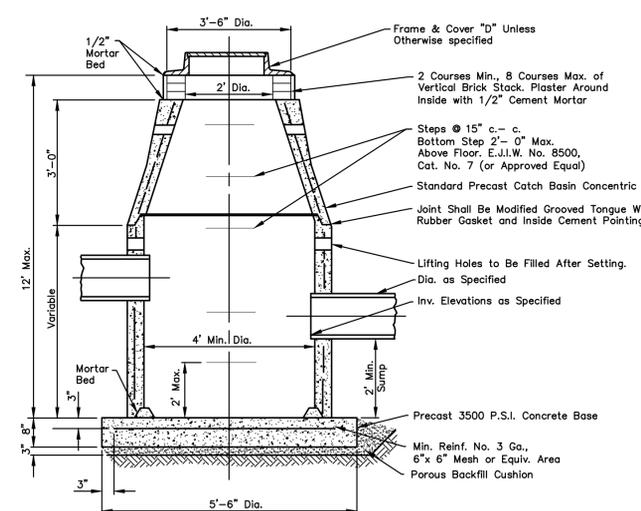
STANDARD INLET "A"
Scale: 1/2"=1'



CROSS-SECTION

STANDARD INLET "B"
Scale: 1/2"=1'

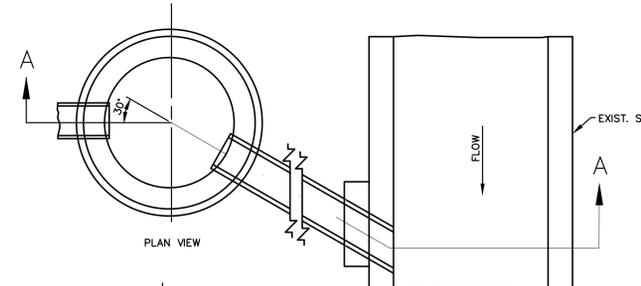
NOTE:
NO OPENING SHALL BE MADE IN PRECAST UNITS WHICH WOULD LEAVE LESS THAN 24" OF UNDISTURBED PRECAST PIPE OR WOULD REMOVE MORE THAN 30% OF THE CIRCUMFERENCE ALONG ANY HORIZONTAL PLANE. IF THOSE REQUIREMENT CANNOT BE FOLLOWED, THE CATCH BASIN SHALL BE BUILT OF BRICK OR BLOCK WHEN APPROVED, TO A MINIMUM OF 8" ABOVE SUCH OPENINGS.



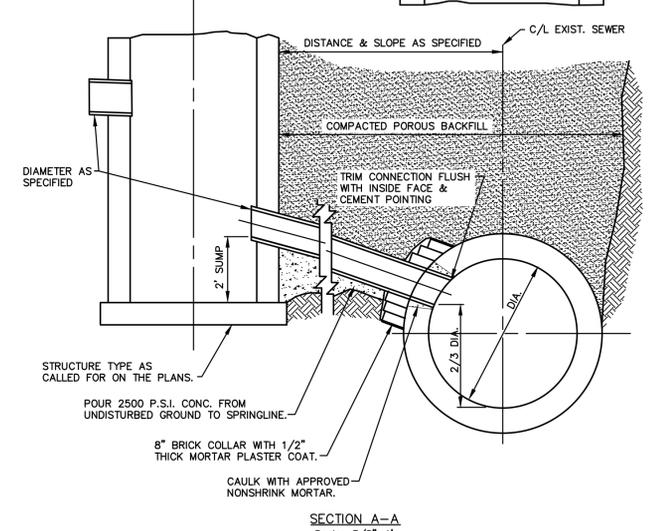
CROSS-SECTION

CATCH BASIN "B"
Scale: 1/2"=1'

NOTE:
STRAIGHT PORTION OF CATCH BASIN MAY BE BUILT OUT OF BLOCK.



PLAN VIEW

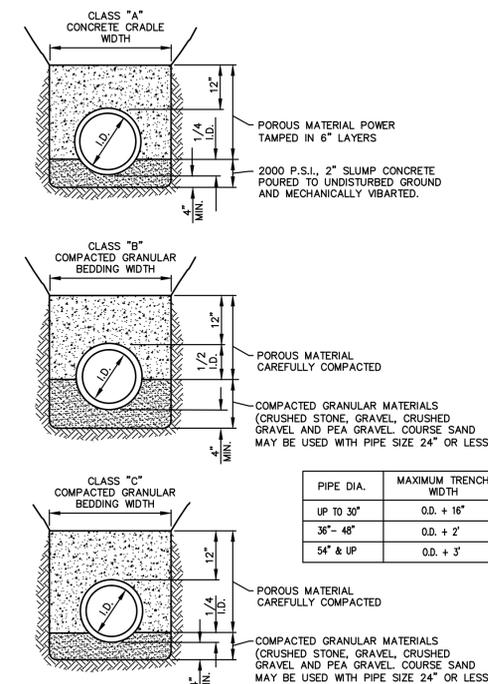


SECTION A-A
Scale: 3/8"=1'

SPECIAL CONNECTIONS TO EXISTING SEWERS

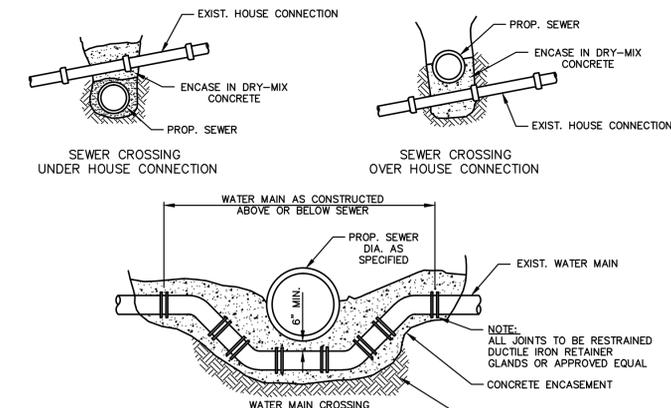
NOTE:
"BLIND TAP" STYLE OF PIPE CONNECTION ONLY TO BE USED WITH PERMISSION FROM THE CITY ENGINEER FOR MAINTENANCE PURPOSES. MANHOLES ARE TO BE USED IF POSSIBLE.

NOTE:
WHERE EXCAVATION OCCURS UNDER OR WITHIN 3' OF EXISTING OR PROPOSED ROAD PAVEMENT, CURBS, DRIVEWAY OR SIDEWALK, ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE SPECIFICATIONS OF THE CITY OF LIVONIA.



PIPE BEDDING METHOD

PIPE DIA.	MAXIMUM TRENCH WIDTH
UP TO 30"	O.D. + 16"
36" - 48"	O.D. + 2'
54" & UP	O.D. + 3'



UTILITY CROSSINGS

Storm Sewer Details and Appurtenances

JOB No.	DATE: 02/1992	SHEET 2 OF 2
REVISIONS:	REV. DATE	CADD: dwl
Pipe Bedding Revisions	7/10/80	ENG: dwl
Frame & Cover "C" Revised	1/11/90	PM: tz
Michigan Trout Logo	10/28/02	TECH:
Note Revisions	9/25/07	Storm Manhole Details.dwg
Blind Top Note Addition	7/11/12	FBF:

CITY OF LIVONIA
Department of Public Works - Engineering Division
33000 Civic Center Drive
Livonia, Michigan 48154
(734) 466-2570 Office, (734) 466-2195 Fax

RELEASED FOR :	DATE