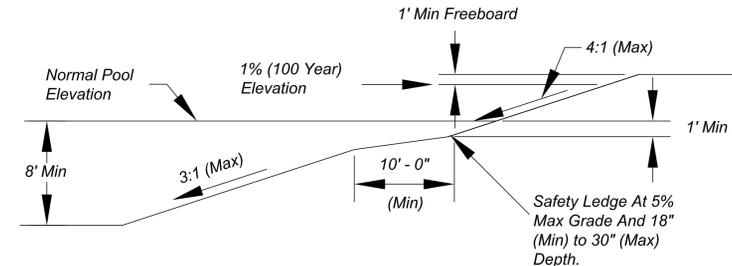


STORM SEWER DEFLECTION TESTING, TELEVISIONING AND AS-BUILT DRAWINGS:

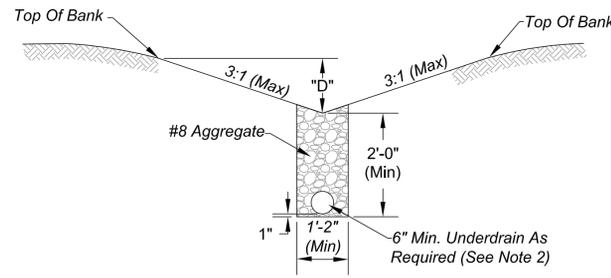
- Deflection Testing Is Required For All Mainline Flexible Storm Sewer Pipe Installed In The City Of Shelbyville. The City Engineer And MS4 Operator Shall Be Given A Minimum Of 24 Hour Written Notice Of Deflection Testing. A Nine-Point "Go-No-Go" Mandrel Shall Be Used For The Deflection Test. A Proving Ring Shall Be Provided For Each Mandrel. The "Go-No-Go" Mandrel Shall Be Manually Pulled Without The Use Of Any Mechanical Devices. An Allowable Deflection Of 5 Percent Of Inside Pipe Diameter Will Be Acceptable After All Backfilling Has Been In Place For 30 Days.
- Contractor Shall Bear All Testing Costs.
- All Pipe Exceeding The Allowable Deflection Shall Be Replaced Or Rerounded. The Replaced Or Rerounded Section Shall Be Retested 30 Days After Replacement Or Rerounding.
- Closed Circuit Television (CCTV) Inspection Shall Be Performed On All Pipes Installed Within The City Of Shelbyville For The Purposes Of Conveying Storm Water. Televisioning Shall Be Done After Deflection Testing.
- The Contractor Or Developer Responsible For Installing The Storm Sewer Pipe Shall Employ/Hire The Contractor Responsible For The Television Inspection Services. The Contractor Or Developer Shall Contact The City Engineer To Schedule The CCTV Inspection.
- All Pipe Segments Shall Be Thoroughly Cleaned Before The Start Of The CCTV Inspection.
- A Camera Equipped With Remote Control Devices To Adjust The Light Intensity And 1,000 Linear Feet Of Sewer Cable Shall Be Provided. The Camera Shall Transmit A Continuous Image To The Television Monitor As It Is Being Pulled Through The Pipe. The Image Shall Be Clear Enough To Enable The City Of Shelbyville Representative And Others Viewing The Monitor To Easily Evaluate The Interior Condition Of The Pipe. The Camera Shall Stamp The Video / DVD With Linear Footage And Project Number. An Audio Voice-Over Shall Be Made During The Inspection Identifying Any Problems.
- The Contractor Shall Bear All Costs Associated With Televisioning, Line Clearing, And Debris Removal & Disposal.
- If Any Pipe And/Or Joint Is Found To Be Faulty Or Leaking, The Contractor Shall Repair That Portion Of The Work To The Satisfaction And Approval Of The City Of Shelbyville.
- 2 Copies Of The CD-ROM, Or DVD Of The Entire Sewer Line, Reproduction Map Indicating The Numbers Of All Pipes That Have Been Televisioned, And As-Built Drawings Shall Be Submitted To The City Of Shelbyville MS4 Operator And City Engineer For Their Records.



TYPICAL DETENTION POND SECTION
Scale: None

NOTES:

- Public Safety Shall Be A Paramount Consideration In Storm Water Systems and Pond Design. Providing Safe Retention Is The Applicant's Responsibility.
- All Wet And Dry Detention Facilities Shall Be Posted With Warning Signage. All Wet And Dry Detention Facilities Shall Be Posted With Signs Warning Of Rapid Rise In The Water Levels And Strong Hydraulic Forces At Pipe Inlets And Outlets. All Wet Retention Facilities Shall Be Posted With Drowning Hazard Signs, No Swimming Or Wading Signs, And No Ice Skating Signs.
- All Wet And Dry Detention Facilities Shall Be Designed To Maximize The Distance Between Inflow And Outflow Pipes. Baffles May Be Required If Deemed Necessary By The City Engineer Or MS4 Operator.
- All Wet Retention Facilities Located Within 100 Feet Of A Roadway Or Parking Lot Shall Be Designed With Measures To Prevent Vehicular Entry Into The Water. These Measures Shall Include One Or More Of The Following:
 - High-Tension Cable Barrier In Accordance With INDOT Specifications
 - W-Beam Guardrail In Accordance With INDOT Specifications
 - Steel-Backed Timber Guardrail In Accordance With FHWA Standards, Sections 617 And 710.
 - Earth Mound At Least 8 Feet In Height With Maximum 4:1 Slopes
 - Wider Safety Ledge Or Shallow Wetlands Strip Adjacent To Roadway Side Of Pond
 - Thick Vegetative Buffers (i.e. Bushes, etc.) May Be Used As A Secondary Measure To Reduce Errant Vehicle Velocities And To Improve The Appearance Of The Site
 The City Engineer or MS4 Operator May Require Additional Measures Based On Site Conditions And Layout.
- Dam/Embankment Safety And Design Is The Applicant's Responsibility. Dams/Embankments Shall Be Designed To Prevent Failure Due To Erosion, Slope Instability, Overtopping, Heave, And Piping. The Following Elements Shall Be Incorporated In The Design Of All Dams And Embankments:
 - Appropriate Foundation Materials
 - Appropriate Core Fill Materials
 - Maximum 3:1 Side Slopes And Minimum 10 Feet Top Width
 - Emergency Spillway Designed In Accordance With The City Of Shelbyville Stormwater Design Manual And Adquately Protected Against Erosion And Scour
 - Anti-Seep Collar For All Outflow Pipes
- Dry Bottom Basins Shall Be Subject To The Maximum Of 3:1 Slope Above The Basin Floor. The Longitudinal Grade Shall Be Minimum 1% (0.5% With A Minimum 6 Inch Diameter Underdrain).
- City Engineer May Approve Alternate Detention Pond / Basin Sections.



SWALE UNDERDRAIN DETAIL
Scale: None

SWALE REGULATIONS ON DEVELOPED LOTS:

- Swales Shall Not Be Constructed In Front Yards. The Front Portion Of Lots Shall Be Graded Toward The Street And/Or Side Yard Lines.
- Swales Shall Be Constructed With A Minimum 0.5 Percent Profile Grade Provided That A 6-Inch Diameter Underdrain Is Provided For Swales With Less Than 1.0 Percent Profile Grade.
- Maximum Swale Depth "D" Shall Be In Accordance With The Following Table:

TABLE 13: SWALE DIMENSIONS AND SPECIFICATIONS

Lot Area (square feet)	Maximum Swale Depth "D" (inches)	Minimum Usable Rear Yard Depth (feet)
Performance Based Lots	D ≤ 24	10
	24 > D < 36	15
	D > 36	20
Greater Than 10,000	48	30

- Minimum Usable Rear Yard Depth Shall Lie Between The Furthest Rear Portion Of The Residence And The Top Of Bank Of The Near Swale Slope. The Maximum Slope In This Area Shall Be 5.0 Percent.
- Swales Shall Be Graded With Side Slopes No Steeper Than 3h:1v And Lay Totally Within The Drainage Easement Limits.

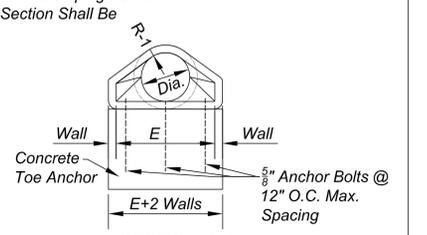
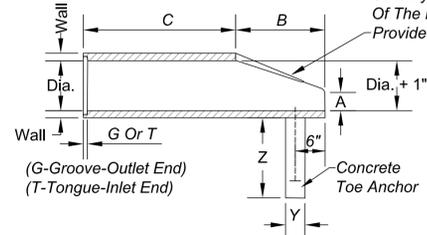
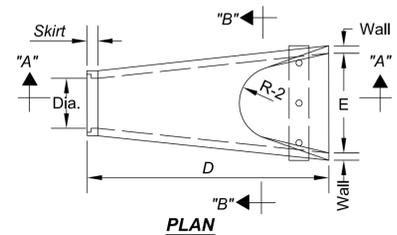


TABLE 12: PRECAST CONCRETE PIPE END SECTION SPECIFICATIONS

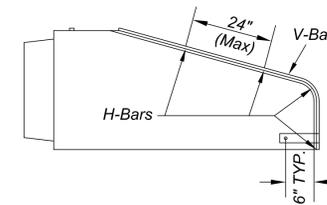
DIA.	WALL	G or T	WT SEC	A	B	C	D	E	DIA.+1"	R-1	R-2	SKIRT	Y	Z
12	2	1-1/2	530	4	24	48-7/8	72-7/8	24	13	10-1/16	9	3-1/2	12	24
15	2-1/4	2	740	6	27	46	73	30	16	12-1/2	11	3-1/2	12	24
18	2-1/2	2-1/2	990	9	27	46	73	36	19	15-1/2	12	4	12	24
21	2-3/4	2-1/2	1280	9	35	38	73	42	22	16-1/8	13	4	12	36
24	3	2-1/2	1520	9-1/2	43-1/2	30	73-1/2	48	25	16-11/16	14	4-1/2	18	36
27	3-1/4	2-1/2	1930	10-1/2	48	25-1/2	73-1/2	54	28	17-3/4	14-1/2	4-1/2	12	36
30	3-1/2	3	2190	12	54	19-3/4	73-3/4	60	31	18-5/16	15	5	12	36
33	3-3/4	3-3/8	3150	13-1/2	58-1/2	39-1/4	97-3/4	66	34	23-3/4	17-1/2	5-1/2	18	36
36	4	3-1/2	4100	15	63	34-3/4	97-3/4	72	37	24-1/16	20	5-1/2	18	36
42	4-1/2	3-3/4	5380	21	63	35	98	78	43	27-1/4	22	5-1/2	24	36
48	5	4-1/4	6550	24	72	26	98	84	49	28-1/8	22	5-3/4	24	36
54	5-1/2	4-3/4	8040	27	65	35	100	90	55	32-7/8	24	6-1/4	30	36
60	6	5	8750	30	60	39	99	96	61	36-3/4	24	6-3/4	30	36
66	6-1/2	5-1/2	10630	24	78	21	99	102	67	35-11/16	24	7-1/4	30	36
72	7	6	12520	34	78	21	99	108	73	38-5/8	24	7-3/4	36	36
78	7-1/2	6-1/2	14430	24	78	21	99	114	79	41-15/16	24	8-1/2	36	36
84	8	7	16350	24	78	21	99	120	85	44-13/16	24	9	39	36

NOTE: Debris Guard Shall Be Installed On All End Sections In Accordance With Debris Guard Detail Shown On This Sheet.

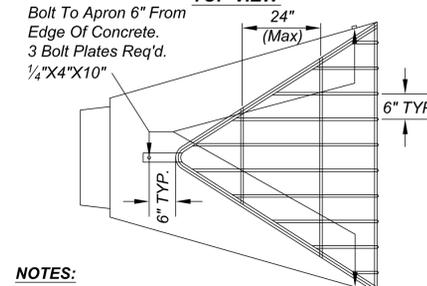
PRECAST CONCRETE PIPE END SECTION

Scale: None

SIDE PROFILE



TOP VIEW



NOTES:

- Bars And Plates Shall Be Hot-Rolled Steel.
- Bars, Plates, And Pipe Shall Be Finished With Two Coats Of Aluminum Paint
- Bolts Shall Be Galvanized.
- No Rebar Through Pipes Shall Be Allowed.
- Debris Guard Shall Be Removable.
- Debris Guard Shall Be Smooth On All Surfaces And Free From Jagged Edges, Sharp Edges, And Protruding Bars.

TABLE 12A: DEBRIS GUARD SPECIFICATIONS

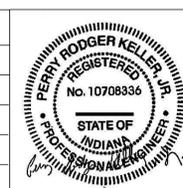
APRON SIZE (INCHES)	V-BAR SIZE (INCHES)	NO. OF H-BARS REQ'D	H-BAR SIZE (INCHES)	BOLT DIA. (INCHES)	"A" DIM. (INCHES)
18	1/2	3	5/8	1/2	5
24	5/8	4	3/4	1/2	7
30	5/8	4	3/4	1/2	7-1/2
36	3/4	4	1	1/2	10-1/2
42	3/4	4	1	3/4	11
48	3/4	4	1 1/2 Pipe	3/4	12
54	3/4	4	1 1/2 Pipe	3/4	12
60	3/4	5	1 1/2 Pipe	3/4	14
72	3/4	5	1 1/2 Pipe	3/4	14
84	3/4	6	1 1/2 Pipe	3/4	15

APRON SIZE (INCHES)	V-BAR SIZE (INCHES)	NO. OF H-BARS REQ'D	H-BAR SIZE (INCHES)	BOLT DIA. (INCHES)	"A" DIM. (INCHES)
12	1/2	3	5/8	1/2	4
15	1/2	3	5/8	1/2	4-1/2
18	1/2	4	5/8	1/2	4-1/2
21	1/2	4	5/8	1/2	5
24	5/8	4	3/4	1/2	5
27	5/8	4	3/4	1/2	5-1/2
30	5/8	4	3/4	1/2	5-1/2
36	3/4	4	1	3/4	8
42	3/4	4	1	3/4	8
48	3/4	5	1	3/4	8
54	3/4	5	1 1/2 Pipe	3/4	8
60	3/4	5	1 1/2 Pipe	3/4	8
66	3/4	6	1 1/2 Pipe	3/4	8
72	3/4	6	1 1/2 Pipe	3/4	9
84	3/4	7	1 1/2 Pipe	3/4	10
90	3/4	7	1 1/2 Pipe	3/4	14

DEBRIS GUARD FOR END SECTIONS

Scale: None

Rev. No.	Description	Date
1	Entire Set	07/26/2011



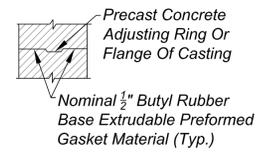
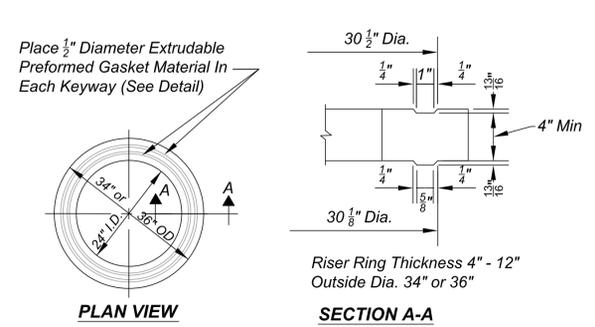
CITY OF SHELBYVILLE

STORM SEWER AND DRAINAGE DETAILS AND NOTES

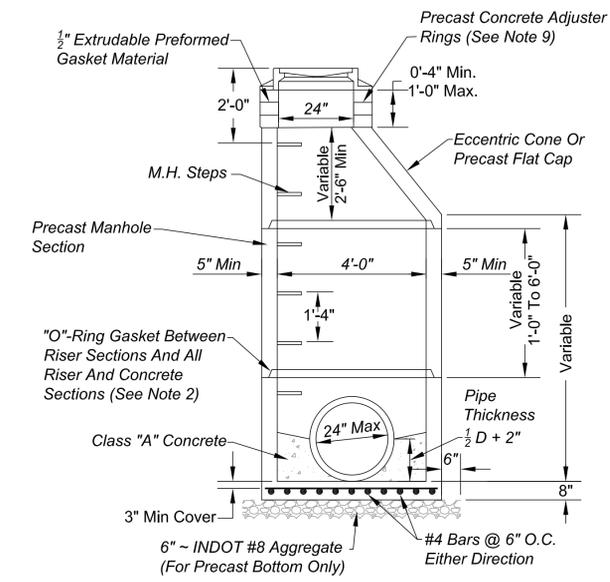
SHEET 9 OF 18

GENERAL NOTES

- 1.) Type J, K, L, M And N Manholes As Detailed Herein Require A Certain Minimum Depth. In Cases Where The Depth Of The Storm Sewer Is Not Sufficient To Meet The Minimum Depth As Required By The Detail, "F" Diameter Manhole Section May Be Used Throughout The Depth Of The Manhole.
- 2.) Manholes Shall Conform To ASTM C-478. Joints Shall Conform To ASTM C-443. The Use Of Cast-In-Place Concrete Structures Shall Require The Prior Written Approval Of The City Engineer. Regardless Of Type Of Casting Used, The Casting Shall Be Centered Over The Manhole Steps.
- 3.) Manhole Steps Shall Be Neenah R-1981-J, East Jordan No. 8512, M.A. Industries PS 1-PF, Or As Approved By The City Engineer.
- 4.) All Structures And Castings Shall Be Specified Based On Surface Conditions In Accordance With Table 14 On This Sheet.
- 5.) Castings For All Storm Structures Shall Be Stamped With Lettering As Shown In The Structure And Castings Specifications Detail On This Sheet.
- 6.) Castings Shall Not Be Buried And Shall Be Flush With The Adjacent Finished Grade. Castings Which Are Surrounded By Asphalt Or Concrete Shall Be Constructed Within A Tolerance Of $\pm 0.1'$ Of The Designed Elevation. All Other Castings Shall Be Constructed Within A Tolerance Of $\pm 0.2'$ Of The Designed Elevation.
- 7.) The Contractor Shall Remove Soils Under A Precast Bottom And Replace With 6 Inches Of Compacted INDOT #8 Stone.
- 8.) For Type C Manholes, The Base And First Riser Section Of The Precast Concrete Manhole Shall Be Integrally Cast As One Complete Unit.
- 9.) Final Adjustment In Elevation Of The Frame, Cover, Or Casting Shall Be Accomplished By The Use Of A 4 Inch Minimum Thickness Adjusting Ring Or Collar. Brick Or Block Shall Not Be Used In The Construction Of A Structure Or To Adjust The Elevation Of Frame Or Casting.
- 10.) All Structures Shall Have A Minimum Of 4" Allowed For Riser Rings Or Adjustment.
- 11.) The Minimum Pipe Diameter For Storm Sewer In Public Right-Of-Way Is 12".
- 12.) Manholes Shall Be Installed At Distances Not Greater Than 400 Feet. For Pipes 36 Inches Or Larger, Greater Distances Between Manholes May Be Used With Written Approval Of The City Engineer.
- 13.) All Structure Castings Shall Be Surrounded By A $\frac{1}{2}$ " Expansion Joint When Placed In Asphalt Or Concrete. When Placed In Asphalt, Joint Shall Be Sealed In Accordance With INDOT Standard Specifications, Section 408. When Placed In Concrete, Joint Shall Be Sealed In Accordance With INDOT Standard Specifications, Sections 503 and 906.



PRECAST ADJUSTING RING
Scale: None



MAXIMUM PIPE SIZE	
Pipe Entering / Pipe Exiting At 0° - 45° Bend	Pipe Entering / Pipe Exiting At 45° - 90° Bend
24"	21"

MANHOLE TYPE C
Scale: None

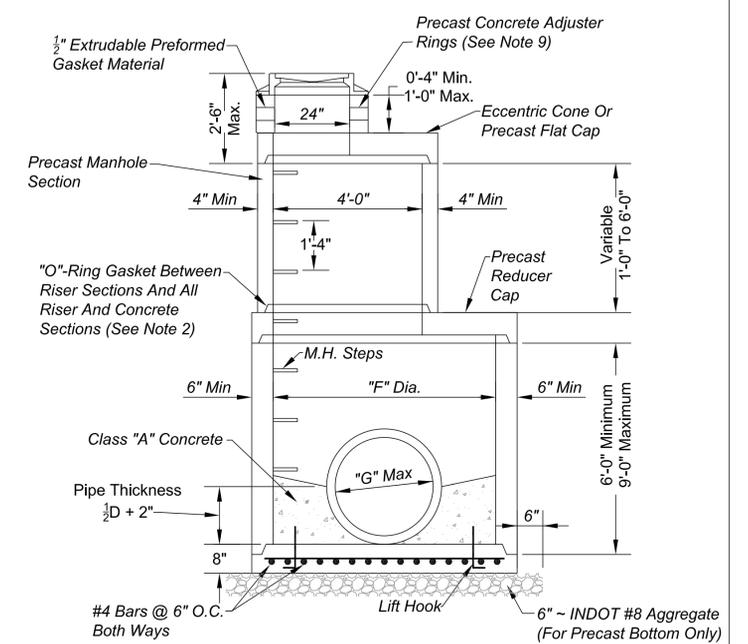


TABLE 15: DIMENSIONS FOR MANHOLE TYPES J, K, L, M & N

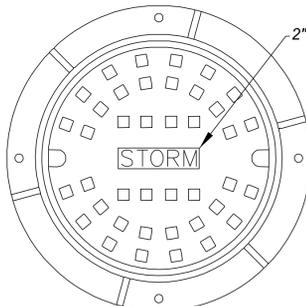
Manhole Type	Manhole Diameter "F"	MAXIMUM PIPE SIZE "G"	
		Pipe Entering / Pipe Exiting At 0° - 45° Bend	Pipe Entering / Pipe Exiting At 45° - 90° Bend
J	60"	36"	30"
K	72"	48"	36"
L	96"	54"	48"
M	102"	72"	66"
N	108"	84"	72"

MANHOLE TYPES J, K, L, M, & N
Scale: None

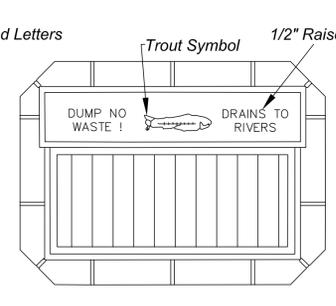
TABLE 14: STORM SEWER STRUCTURE & CASTING REQUIREMENTS

SURFACE DRAINAGE TYPE	COMPATIBLE STRUCTURE TYPES	*NEENAH CASTING #	*EJW CASTING #
Type I Roll Curb & Gutter	Inlet & Catch Basin Type A	R-3501-T (R or L)	7495 (M1 or M2)
	Inlet & Catch Basin Type B	R-3501-TB	
Type II Combined Curb & Gutter Type V Curb	Manhole Type C, H, J, K, L, M, N	R-3501-L2	7495
	Inlet & Catch Basin Type A	R-3286-8V	7520 T1
	Inlet & Catch Basin Type B	R-3287-10V	7505 (M1 or M2)
	Inlet & Catch Basin Type C	R-3287-15V	7565 T1
Type III Gutter Type IV Gutter	Manhole Type C, H, J, K, L, M, N	R-3286-8V	7520 T1
	Inlet & Catch Basin Type A	R-3210-L	5344
	Inlet & Catch Basin Type B	R-3067-L	7034
	Inlet & Catch Basin Type C	R-3396	
Open Pavement (No Curb)	Manhole Type C, H, J, K, L, M, N	R-3238	5100
	Inlet & Catch Basin Type A	R-3402-E	
Swales/Grass/Unpaved Areas	Manhole Type C, H, J, K, L, M, N	R-2502-D	1022 M1
No Surface Drainage	Manhole Type C, H, J, K, L, M, N	R-4342	6489
	Manhole Type C, H, J, K, L, M, N	R-1772	1022-2 TYPE A

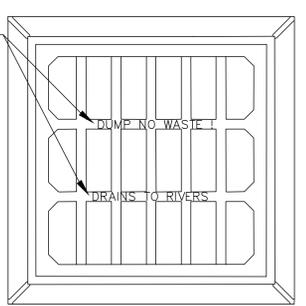
* Castings Other Than Neenah Or East Jordan Shall Be As Approved By The City Engineer.



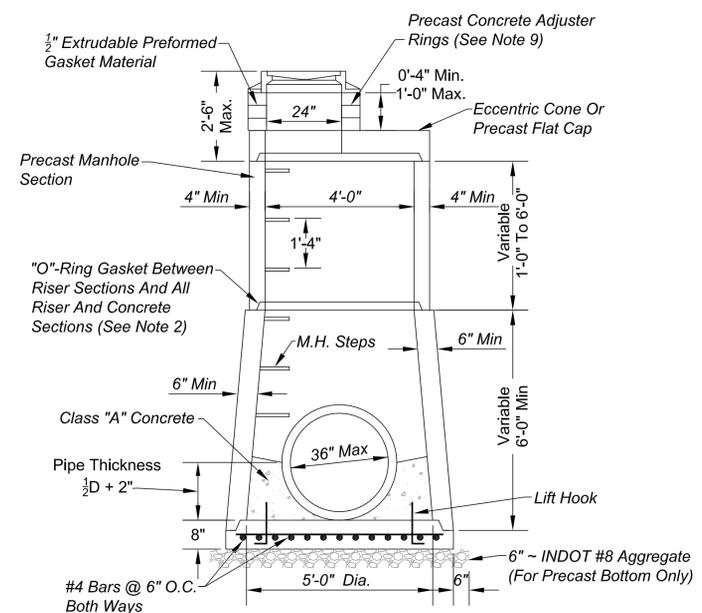
LETTERING FIGURE 1
Applies To Solid Manhole Castings



LETTERING FIGURE 2
Applies To Curb & Gutter Castings



LETTERING FIGURE 3
Applies To Open Pavement And Unpaved Open Areas Castings



MAXIMUM PIPE SIZE	
Pipe Entering / Pipe Exiting At 0° - 45° Bend	Pipe Entering / Pipe Exiting At 45° - 90° Bend
36"	30"

MANHOLE TYPE H
Scale: None

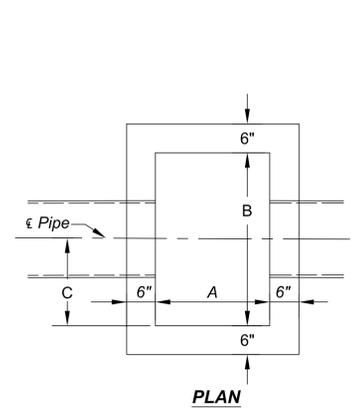
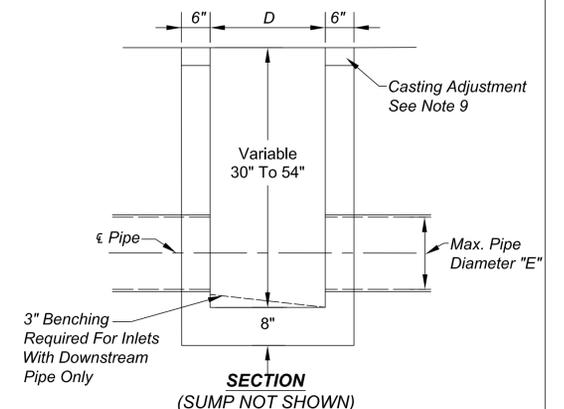


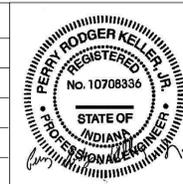
TABLE 16: INLET AND CATCH BASIN DIMENSIONS

STRUCTURE TYPE	A (in)	B (in)	C (in)	D (in)	E (in)	Sump (in)
Inlet Type A	24	24	12	24	18	None
Catch Basin Type A	24	24	12	24	18	24
Inlet Type B	24	36	18	24	24	None
Catch Basin Type B	24	36	18	24	24	24
Inlet Type C	30	46	23	30	30	None
Catch Basin Type C	30	46	23	30	30	24

INLETS AND CATCH BASINS - TYPES A, B, AND C
Scale: None



Rev. No.	Description	Date
1	Entire Set	07/26/2011



CITY OF SHELBYVILLE

STORM SEWER STRUCTURES DETAILS AND NOTES

SHEET
10
OF
18

SANITARY SEWER GENERAL NOTES:

- Sanitary Sewer Pipe Of Other Material Or Material Not Meeting These Specifications Shall Require The Prior Written Approval Of The City Engineer And Wastewater Superintendent.
- The Contractor Is Responsible For Locating All Sanitary Mains And Laterals Prior To Construction. Any Mains Or Laterals Damaged During Construction Shall Be Repaired By The Contractor At His/Her Expense.
- The Contractor Shall Submit Information To The City Engineer Showing Conformance With These Specifications Upon Request.
- As-Built Drawings Shall Be Submitted To The City Engineer And Wastewater Superintendent. See Note 11 On Sheet 1.
- During Construction Of New Sanitary Sewer Lines, The Contractor Shall Install A Watertight Plug In The End Of The Existing Sewer That Is Being Connected To. This Plug Shall Remain In Place And Be Checked For Water Tightness Daily Until The Entire Project Is Complete And Testing Has Been Performed. A Letter From The Wastewater Superintendent Must Be Written, Giving Permission To Remove The Plug Before The Plug Can Be Removed By The Contractor.

SANITARY SEWER POLYVINYL CHLORIDE (P.V.C.) PIPE:

- P.V.C. Pipe Diameters Of 6 Inches Through 15 Inches Shall Meet Or Exceed All The Requirements Of ASTM D-3034, And Shall Have A Minimum Cell Classification Of 12454. Reference Should Be Made To ASTM D-1784 For A Summarization Of Cell Class Properties. P.V.C. Pipe Diameters Greater Than 15 Inches Shall Meet Or Exceed All Requirements Of ASTM F-679, And Shall Have A Minimum Cell Classification Of 12454.

- P.V.C. Pipe Shall Conform To The Following Specifications Based On Pipe Diameter And Depth Of Cover:

PIPE DIAMETER	DEPTH OF FILL OVER PIPE	PIPE SPECS	ASTM STANDARD
6" - 15"	Less Than 15 Feet	SDR-35 Type PSM	D-3034
6" - 15"	15 Feet Or Greater	SDR-26 Type PSM	D-3034
18" or Greater	Less Than 15 Feet	PS 46	F-679
18" or Greater	15 Feet Or Greater	PS 115	F-679

P.V.C. SDR-35 And PS-46 Pipe Shall Have A Minimum Pipe Stiffness Of 46 Pounds Per Square Inch For Each Diameter When Measured At 5% Deflection And Tested In Accordance With ASTM D-2412. P.V.C. SDR-26 And PS-115 Pipe Shall Have A Minimum Pipe Stiffness Of 115 Pounds Per Square Inch For Each Diameter When Measured At 5% Deflection And Tested In Accordance With ASTM D-2412.

- Pipe Joints Shall Have A Bell Wall, Gasket Groove And Spigot Which Is Integral With The Pipe. The Assembly Of Joints Shall Be In Accordance With Pipe Manufacturers' Recommendations And ASTM D-3212. No Solvent Cement Joints Shall Be Allowed.
- Gasket Material Shall Meet Or Exceed All Requirements Of ASTM D3212-07, Standard Specification For Joints For Drain And Sewer Plastic Pipes Using Flexible Elastomeric Seals.
- Pipe Fittings Shall Be SDR-26 Manufactured Fittings Made Of P.V.C. Plastic Having A Cell Classification Of 12454 As Defined In ASTM D-1784. Saddle Connections Shall NOT Be Allowed For New Construction.
- Each Pipe Section Shall Be Marked With The Name Of Manufacturer, Trademark Or Tradename, Nominal Pipe Size, Production/Extrusion Code, Material And Cell Class Designation, And ASTM Number.
- Lateral Connections Shall Be Made With A SDR-26 Or PS 115 "Tee-Wye" Fitting Only.
- Sanitary Sewer Pipe Shall Have A Minimum Horizontal Separation Of 10 Feet From Storm Sewer Pipe Or Water Main Pipe. All Pipe Crossings Shall Have A Minimum Vertical Separation Of 1.5 Feet. Dimensions Are Measured From The Outside Of Pipe To Outside Of Pipe.
- Installation Shall Be In Accordance With ASTM Recommended Practice D-2321.

SANITARY SEWER REINFORCED CONCRETE PIPE:

- Reinforced Concrete Pipe For Use As Sanitary Sewers Shall Be Class III, IV, Or V As Specified In ASTM C-76. Lift Holes Shall Not Be Permitted.
- Each Section Of Reinforced Concrete Pipe Shall Be Vacuum Tested By The Manufacturer Prior To Delivery To The Job Site. Only Pipe Sections Passing This Test Shall Be Marked As "Vacuum Tested". Vacuum Test Requirements Are As Follows:
 - Each Section Of Pipe Shall Be Tested By Bringing The Internal Pressure Within The Pipe To 3.5 PSIG Below Atmospheric Pressure And The Pressure Must Not Drop To Less Than 2.5 PSIG Below Atmospheric Pressure Within The Time Limitation As Determined By The Following:

$$T = \frac{0.022(D^2)(L)}{2}$$

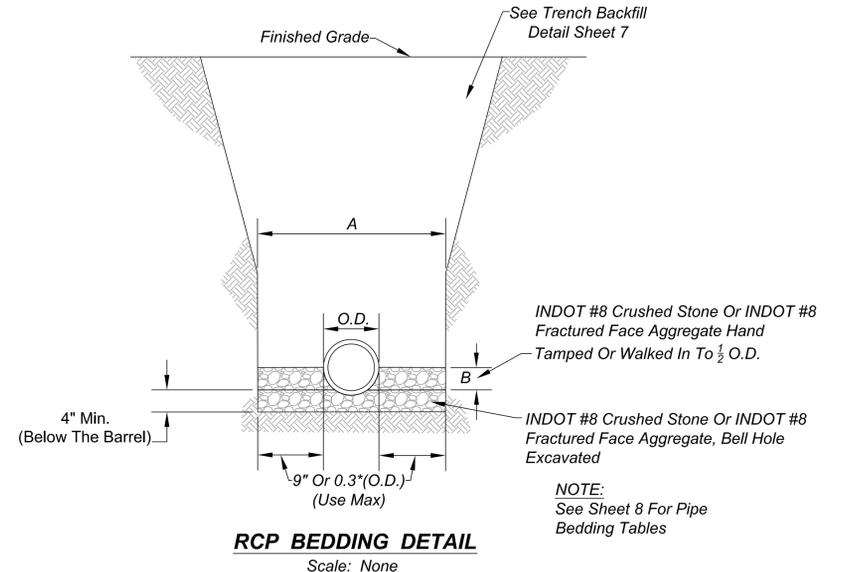
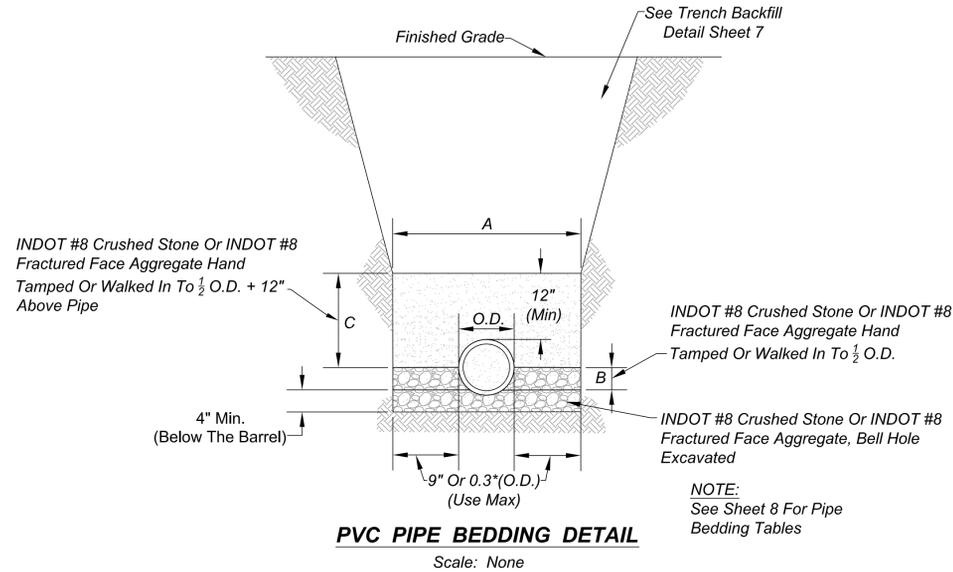
Where: T = Time In Seconds
D = Diameter Of Pipe In Inches
L = Length Of Pipe In Feet
 - Any Pipe Section Failing To Meet This Test Shall Not Be Permitted For Use As Sanitary Sewer In The City Of Shelbyville.
- Lateral Connections Shall Be Made With Insert-A-Tee Connector Or City Approved Equal.

- Each Pipe Section Shall Be Marked With The Date Of Manufacture, Size And Class Of Pipe, Specification Designation, Manufacturer And Plant Identification.

- Pipe Shall Be Furnished With A Bell Or Groove On One End Of A Unit Of Pipe And A Spigot Or Tongue On The Adjacent End Of The Adjoining Pipe. All Joints Shall Have A Groove On The Spigot For Placement Of A Rubber "O"-Ring Or Profile Gasket In Accordance With ASTM C-443. The Gasket Shall Be A Continuous Ring Which Fits Snugly Into The Annular Space Between The Overlapping Surfaces Of The Assembled Pipe Joint To Form A Flexible Watertight Joint Under All Conditions Of Service. Joint Shall Be Adequate For Hydrostatic Pressures Up To 13 Pounds Per Square Inch (30 Feet) Without Leakage.

SANITARY SEWER LEAKAGE TESTING:

- Leakage Testing Shall Be Performed For All Mainline Segments. Testing For Leakage Shall Commence After Backfill Has Been In Place For 30 Days. The City Engineer And Wastewater Superintendent Shall Be Given 24 Hour Written Notice Of The Required Leakage Testing Procedure To Be Performed By The Contractor. Low Pressure Air Shall Be Slowly Introduced Into The Sealed Line Until The Internal Air Pressure Reaches 5 PSIG Plus The Groundwater Head Divided By 2.31 (Maximum Test Pressure Is 9 PSIG).
- At A Stable Internal Air Pressure Within 0.5 PSIG Of The Initial Internal Air Pressure, Timing Shall Commence With A Stopwatch Or Similar Device Of 99.8 Percent Accuracy. Timing Shall End When The Internal Air Pressure Drops 1 PSIG Below The Stable Internal Air Pressure.
- The Line Shall Be Accepted If The Time Shown In Table 17 For The Designated Pipe Size And Length Elapses Before The Air Pressure Drops 1 PSIG Below The Stable Internal Air Pressure At Which Time The Test Can Be Discontinued For The Accepted Line.
- If A Leak Must Be Repaired, Then The Entire Mainline Segment Shall Be Retested For Leakage. If Contractor Excavates Pipe For The Purpose Of Repairing A Leak, Then The Entire Mainline Segment Shall Be Retested For Both Leakage And Deflection.
- The Design Engineer Or His/Her Representative Shall Attest That Each Mainline Segment Was Tested For Leakage, With Successful Results, In Compliance With Stated Leakage Testing Requirements.
- Contractor Shall Bear All Testing Costs.



SANITARY SEWER DEFLECTION TESTING:

- An In-Place Deflection Test Shall Be Performed On All Mainline Flexible Pipe To Be Used For The Purposes Of Conveying Sanitary Sewage. The City Engineer And Wastewater Superintendent Shall Be Given A Minimum 24 Hour Written Notice Of Deflection Testing Procedure To Be Performed By The Contractor. A Nine-Point "Go-No-Go" Mandrel Shall Be Used For The Deflection Test. A Proving Ring Shall Be Provided For Each Mandrel. The "Go-No-Go" Mandrel Shall Be Manually Pulled Without The Use Of Any Mechanical Devices. An Allowable Deflection Of 5% Of Inside Pipe Diameter Will Be Acceptable After All Backfilling Has Been In Place For 30 Days.
- All Pipe Exceeding The Allowable Deflection Shall Be Replaced Or Rerounded. The Replaced Or Rerounded Section Shall Be Retested For Leakage And Deflection 30 Days After Replacement Or Rerounding.
- The Design Engineer Or His/Her Representative Shall Attest That Each Mainline Segment Was Tested For Deflection, With Successful Results, In Compliance With Stated Deflection Testing Requirements.
- Contractor Shall Bear All Testing Costs.

SANITARY SEWER TELEVISION AND AS-BUILT DRAWINGS:

- Closed Circuit Television (CCTV) Inspection Shall Be Performed On All Pipe Installed Within The City Of Shelbyville For The Purposes Of Conveying Sanitary Sewage. Television Shall Be Performed After Deflection And Leakage Testing Are Completed.
- The Contractor Or Developer Responsible For Installing The Sanitary Sewer Pipe Shall Employ/Hire The Contractor Responsible For The Television Inspection Services. The Contractor Or Developer Shall Contact The City Engineer Or Wastewater Superintendent To Schedule The CCTV Inspection.
- All Pipe Segments Shall Be Thoroughly Cleaned Before The Start Of The CCTV Inspection.
- A Camera Equipped With Remote Control Devices To Adjust The Light Intensity And 1,000 Linear Feet Of Sewer Cable Shall Be Provided. The Camera Shall Transmit A Continuous Image To The Television Monitor As It Is Being Pulled Through The Pipe. The Image Shall Be Clear Enough To Enable The City Of Shelbyville Representative And Others Viewing The Monitor To Easily Evaluate The Interior Condition Of The Pipe. The Camera Shall Stamp The Video With Linear Footage And Project Number. An Audio Voice-Over Shall Be Made During The Inspection Identifying Any Problems.
- The Contractor Shall Bear All Costs Associated With Television, Line Cleaning And Debris Removal & Disposal.
- If Any Pipe And/Or Joint Is Found To Be Faulty Or Leaking, Regardless Of The Results Of Leakage And Deflection Testing, The Contractor Shall Repair That Portion Of The Work To The Satisfaction And Approval Of The City Of Shelbyville. All Repaired Or Replaced Pipe Sections Shall Be Retelvised And Retested.
- The CD-ROM, Or DVD Of The Entire Sewer Line, Reproduction Map Indicating The Numbers Of All Pipes That Have Been Televised, And As-Built Drawings Shall Be Submitted To The City Engineer And Wastewater Superintendent For Their Records.

MANHOLE TESTING REQUIREMENTS:

- After Manhole Assembly And Prior To Backfilling, A City Representative Will Visually Inspect Each Structure For Leakage Or Evidence Thereof. Contractor Shall Contact The City Engineer Or Wastewater Superintendent At Least 24 Hours Prior To Backfilling.
- All Sanitary Manholes Shall Be Vacuum Tested In Accordance With ASTM C-1244-93 (Latest Revision).
- Test Shall Commence By Drawing A Vacuum Of 5 Psig. Timing Shall Commence With A Stopwatch Or Similar Device Of 99.8% Accuracy Once The Vacuum Pressure Reaches 5 Psig. Timing Shall End When The Vacuum Pressure Drops To 4.5 Psig.
- If Any Manhole Shows Leakage Or Signs Thereof, The Manhole Shall Be Repaired To The Satisfaction Of The City Of Shelbyville And Retested.
- The Manhole Shall Be Accepted If The Time Shown In Table 18 For The Designated Manhole Size And Depth Elapses Before The Vacuum Pressure Drops Below 4.5 Psig, At Which Time The Test Can Be Discontinued For The Accepted Manhole.
- All Vacuum Testing And Equipment Shall Be Provided By The Contractor. Any Repairs Shall Be The Responsibility Of The Contractor.
- The Design Engineer Or His/Her Representative Shall Attest That All Manholes Were Vacuum Tested, With Successful Results, In Accordance With ASTM C-1244-93. A City Representative Shall Be Present Onsite During Each Vacuum Test.

TABLE 17: SPECIFICATION TIME REQUIRED FOR A 1.0 PSIG PRESSURE DROP FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q=0.0015

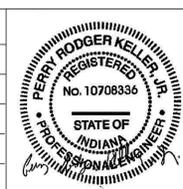
Pipe Diameter (In.)	Minimum Time (Min:Sec)	Length For Minimum Time (Ft)	Time For Longer Length (Sec.)	Specification Time For Length (L) Shown (Min:Sec)								
				100 Ft.	150 Ft.	200 Ft.	250 Ft.	300 Ft.	350 Ft.	400 Ft.	450 Ft.	
6	5:40	398	0.854L	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24	
8	7:34	298	1.520L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24	
10	9:26	239	2.374L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48	
12	11:20	199	3.418L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38	
15	14:10	159	5.342L	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04	
18	17:00	133	7.692L	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41	
21	19:50	114	10.470L	19:50	26:10	34:54	43:37	52:21	61:00	69:48	78:31	
24	22:40	99	13.674L	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:33	
27	25:30	88	17.306L	28:51	43:16	57:41	72:07	86:32	100:57	115:22	129:48	
30	28:20	80	21.366L	35:37	53:25	71:13	89:02	106:50	124:38	142:26	160:15	
33	31:10	72	25.852L	43:05	64:38	86:10	107:43	129:16	150:43	172:21	193:53	
36	34:00	66	30.768L	51:17	76:55	102:34	128:12	153:50	179:29	205:07	230:46	

NOTE:
For More Efficient Testing Of Long Test Sections And/Or Sections Of Larger Diameter Pipes, A Timed Pressure Drop Of 0.5 PSIG May Be Used In Lieu Of The 1.0 PSIG Timed Pressure Drop. If A 0.5 PSIG Pressure Drop Is Used, Required Test Time Shall Be Exactly Half As Long As Those Shown Above.

TABLE 18: SPECIFICATION TIME REQUIRED FOR A 0.5 PSIG PRESSURE DROP FROM 5PSIG TO 4.5PSIG FOR SIZE AND DEPTH OF MANHOLES INDICATED.

Depth Of Manhole (Feet)	MANHOLE VACUUM TEST TIMES TABLE						
	Diameter Of Manhole						
	48"	60"	72"	84"	96"	108"	120"
	Minimum Time (Seconds)						
8	20	26	33	39	45	51	57
10	25	33	41	48	56	64	72
12	30	39	49	58	67	77	86
14	35	46	57	68	79	89	100
16	40	52	67	77	90	102	114
18	45	59	73	87	101	115	129
20	50	65	81	96	112	127	143
22	55	72	89	106	123	140	157
24	59	78	97	116	134	153	171
26	64	85	105	125	145	166	186
28	69	91	113	135	157	178	200
30	74	98	121	144	168	191	214

Rev. No.	Description	Date
1	Entire Set	07/26/2011



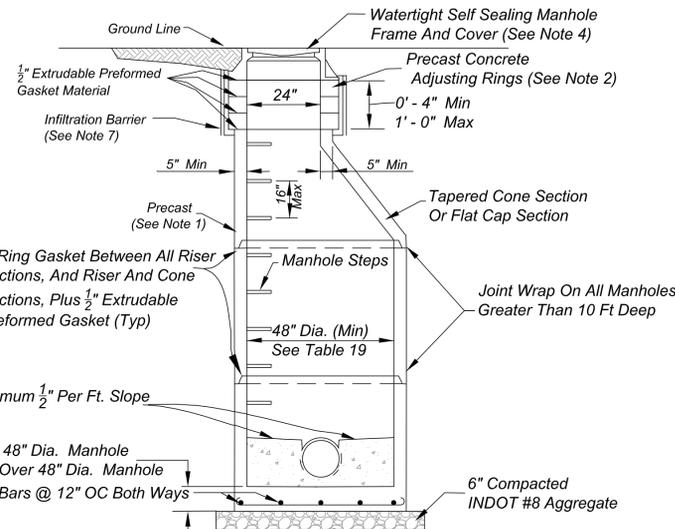
CITY OF SHELBYVILLE
SANITARY SEWER BEDDING AND PIPE DETAILS AND NOTES

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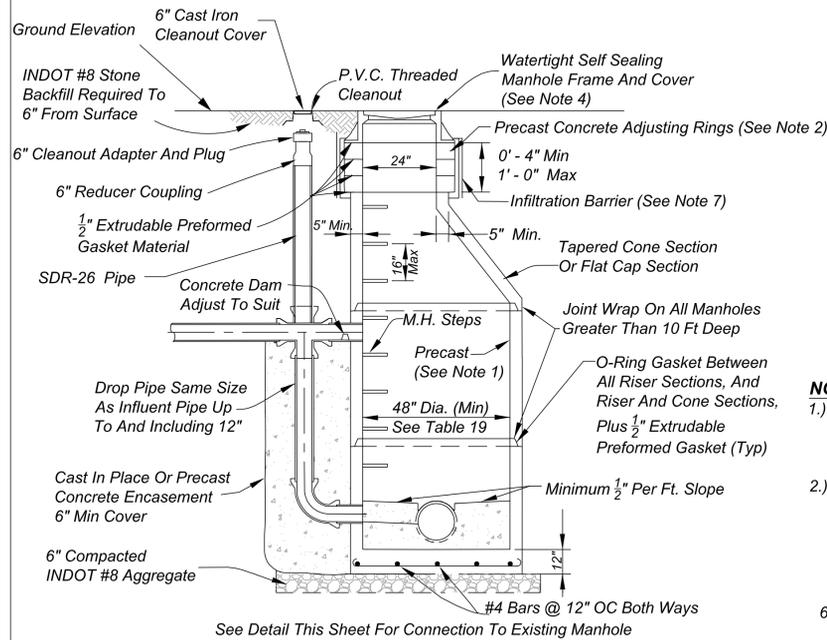
TABLE 19: SANITARY MANHOLE SIZES

Pipe Size	Minimum Manhole Diameter	
	Pipe Entering / Pipe Exiting At 0° - 45° Bend	Pipe Entering / Pipe Exiting At 45° - 90° Bend
8" - 21"	48"	48"
24"	48"	60"
27" - 30"	60"	60"
33" - 36"	60"*	72"

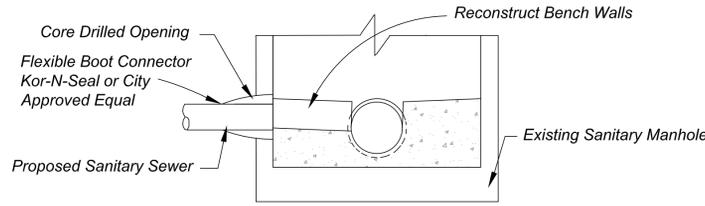
* 72" With A-Lock Connector



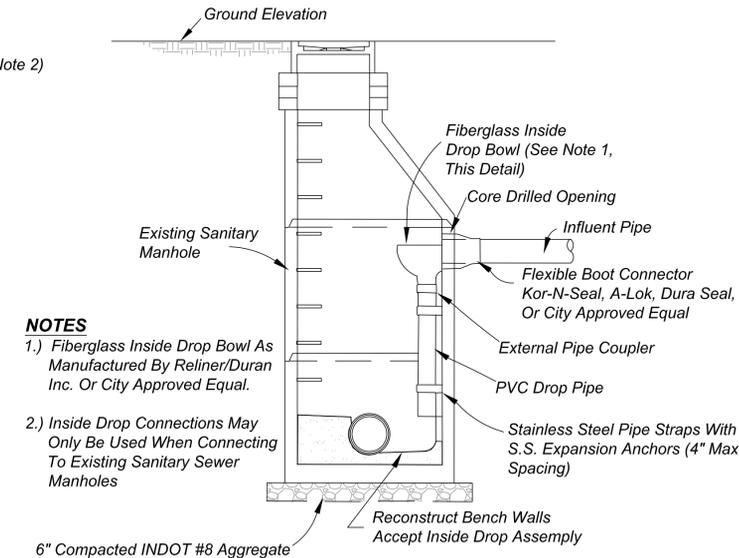
TYPICAL MANHOLE TYPE A
Scale: None



TYPICAL MANHOLE TYPE B (DROP MANHOLE)
Scale: None



EXISTING MANHOLE CONNECTION DETAIL
Scale: 1/2" = 1'-0"



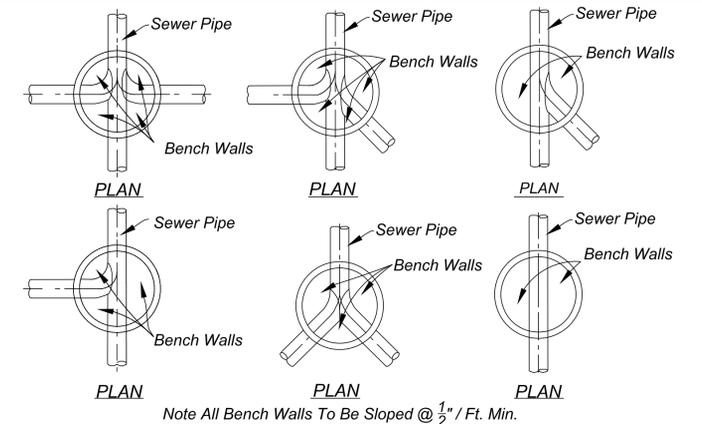
MODIFIED TYPE B INTERIOR DROP MANHOLE
Scale: None

NOTES

- 1.) Fiberglass Inside Drop Bowl As Manufactured By Reliner/Duran Inc. Or City Approved Equal.
- 2.) Inside Drop Connections May Only Be Used When Connecting To Existing Sanitary Sewer Manholes

MANHOLES:

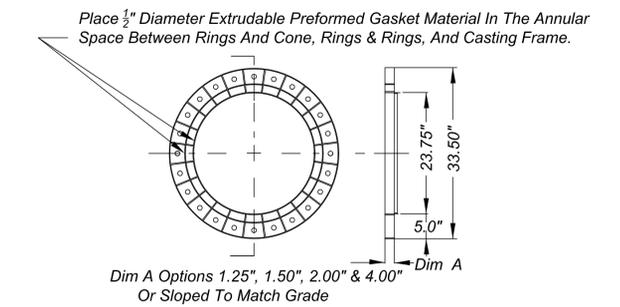
- 1.) Precast Concrete Manholes Shall Conform To ASTM C-478, With Rubber Type Gaskets Equal To ASTM C-443. Monolithic Cast-In-Place Manholes Shall Only Be Used With The Prior Written Approval Of The City. The Base And First Riser Section Of The Precast Concrete Manhole Shall Be Integrally Cast As One Complete Unit. Precast Concrete Cones Shall Be Of The Eccentric Cone Type. No "See Through" Lift Holes Shall Be Allowed On Precast Concrete Manholes 48 Inches In Diameter Or Less. In Addition To The Rubber Type Gaskets All Joints Shall Receive A 1/2 Inch Diameter Nonasphaltic Mastic (Kent-Seal Or City Approved Equal) Conforming To AASHTO M-198 And Federal Specifications SS-S-210A. Pipe Connection To Manhole Shall Be Watertight Flexible Connector (KOR-N-SEAL, A-LOK, Dura-Seal) Or City Approved Equal.
- 2.) Where One Solid Riser Or Barrel Section Cannot Be Used, Final Adjustment In Elevation Of The Frame And Cover Shall Be Accomplished By The Use Of A 4 Inch Minimum Thickness Adjusting Ring As Detailed Herein To A Maximum Combined Thickness Of 12 Inches. Brick Or Block Shall NOT Be Used In The Construction Of A Manhole Or To Adjust The Elevation Of The Frame And Cover.
- 3.) Manhole Steps Shall Be Neenah No. R-1981-J, East Jordan Iron Works No. 8512, M.A. Industries No. PS 1-PF Or City Approved Equal.
- 4.) Manhole Frame And Cover Shall Be Self-Sealing Neenah R-1772-B, East Jordan 1022-2-A Or City Approved Equal. When Watertight Frame And Cover Is Required By The City Or Developer, Neenah R-1916-C, East Jordan 1022-2-WT Or City Approved Equal Shall Be Provided. All Covers Shall Be Stamped "SANITARY SEWER" With 2" Raised Letters.
- 5.) The Lowest Elevation To Receive Gravity Sanitary Service Must Be One (1) Foot Above The Top Of Manhole Casting Elevation Of Either The First Upstream Or Downstream Manhole On The Public Sewer To Which Connection Is To Be Made. Those Portions Of The Building Not Meeting The Stated Gravity Sanitary Service Requirement Shall Be Provided And Maintained By The Property Owner With A Grinder Pump System Or City Approved Equal Discharging To The Gravity Building Connection Outside Of The Public Right-Of-Way.
- 6.) See Sheet 11 For Manhole Vacuum Testing Requirements.
- 7.) Contractor Shall Install An External Rubber Sleeve Sealing System Wrapped Over The Flange Of The Manhole Frame To 2 Inches Below The Bottom Of The Lowest Adjusting Ring. The External Rubber Sealing Sleeve Shall Have A Minimum Thickness Of 60 Mills And Meet The Requirements Of ASTM C-923, ASTM C-443 And ASTM F-477. The Rubber Sleeve Shall Be Infi-Shield External Manhole Seal, Or As Approved By The City Of Shelbyville.
- 8.) Apply Bituminous Coating, Hyrdacide 700 Mastic, On The External Face At All Manhole Section Joints. Hyrdacide Mastic Shall Be Applied To 6" Above And Below Each Joint. Apply Non-Shrink Mortar Or Epoxy Grout On The Internal Face At All Manhole Section Joints.
- 9.) Manholes Shall Be Installed At Distances Not Greater Than 400 Feet.
- 10.) Castings Shall Not Be Buried And Shall Be Flush With The Adjacent Finished Grade. Castings Which Are Surrounded By Asphalt Or Concrete Shall Be Constructed Within A Tolerance Of ± 0.1' Of The Designed Elevation. All Other Castings Shall Be Constructed Within A Tolerance Of ± 0.2' Of The Designed Elevation.
- 11.) There Shall Be A Minimum Of 0.1 Feet Of Fall Between The Upstream Invert(s) And The Downstream Invert In The Structure For Pipes Of The Same Diameter. For Pipes Of Differing Diameters, The Crown Of The Upstream Pipe Shall Match The Crown Of The Downstream Pipe. An Outside Drop Manhole Is Required For Upstream Inverts Which Are At Least Two Feet (2') Higher Than The Downstream Invert.
- 12.) All Manholes Receiving Discharge From A Forcemain Shall Be Coated With A City Approved Epoxy Or Polyurethane Coating Such As Culy Microsilica Cement Mortar And Epoxy Corrosion Barrier Or Approved Equal.



Note All Bench Walls To Be Sloped @ 1/2" / Ft. Min.

BENCH WALL DETAIL

Scale: None

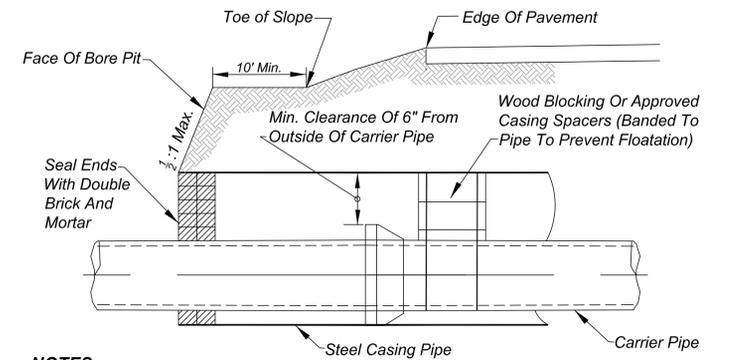


NOTES:

- 1.) HDPE Rings Shall Be Injection Molded - Recycled HDPE As Manufactured By LADTECH, Inc., Or Approved Equal, And Installed In Accordance With The Manufacturer's Recommendations.
- 2.) Wastewater Superintendent May Require Concrete Adjusting Rings For Manholes Subject To High Traffic Loading.
- 3.) Alternate Adjusting Rings May Be Submitted To The Shelbyville Wastewater Superintendent For Approval.

HDPE ADJUSTING RING

Scale: None

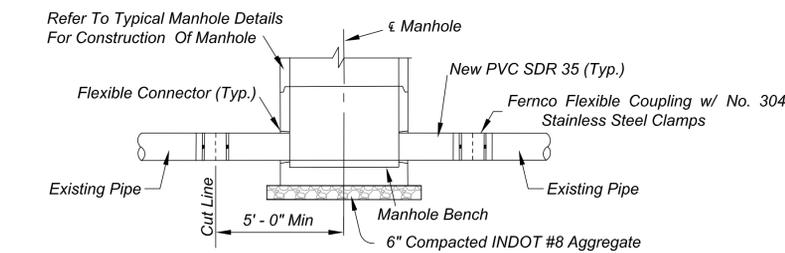


NOTES:

- 1.) Certification Is Limited To Those Standards And Guidelines Outlined In This Detail. Boring(s) Is Subject To Construction Drawings, Shop Drawings, And Design Engineer's Certification. Bored Or Jacked Crossings Require Intimate Knowledge Of Site Conditions. Therefore, Construction Is Subject To Certified Special Provisions Prepared By The Design Engineer.
- 2.) Design Engineer Is Responsible To Determine The Appropriate Size, Thickness, And Joint Strength For Steel Casing Pipes.
- 3.) Carrier Pipes Shall Be In Accordance With Shelbyville Standards.
- 4.) Bore Pits Shall Be Designed To Maximize Safety In Accordance With All Applicable State And Federal Regulations.

ROADWAY BORING DETAILS

Scale: None

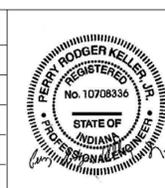


NOTE: Cut Existing Pipe(s) On The Side Of The Proposed Manholes. Remove Existing Pipe(s) Section And Install Manhole Base. Proceed With Typical Connections And Manhole Constructions.

SPECIAL MANHOLE CONNECTION DETAIL TO EXISTING PIPE

Scale: None

Rev. No.	Description	Date
1	Entire Set	07/26/2011
2	Added Joint Wrap Note For Manholes	01/10/2014



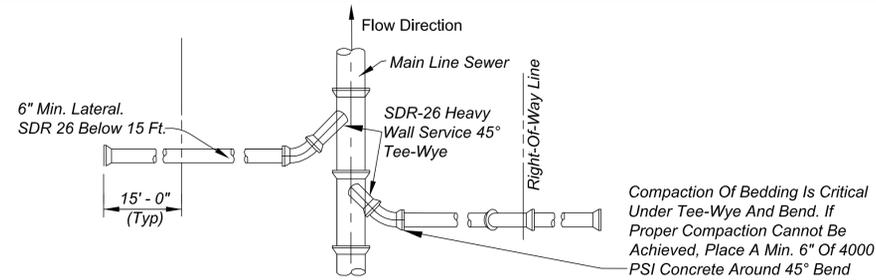
CITY OF SHELBYVILLE

SANITARY SEWER
DETAILS AND NOTES

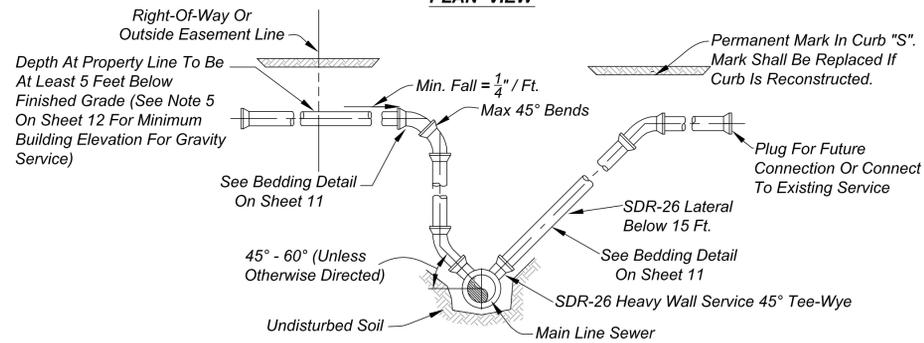
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SANITARY SEWER LATERAL PIPE AND FITTINGS

- 1.) Service Laterals Shall Be Gasketed PVC Pipe From The Sewer Main To The Building. Laterals Less Than 15 Feet Deep Shall Be SDR-35. Laterals Greater Than 15 Feet Deep Shall Be SDR-26. All Laterals Shall Be Inspected By The Shelbyville Wastewater Department Prior To Backfill.
- 2.) Joints Shall Be Flexible Gasket Push-On-Compression Type Conforming To ASTM D-3212 And ASTM F-477. No Solvent Cement Joints Shall Be Allowed.
- 3.) Lateral Size Shall Be A Minimum Of 6 Inches In Diameter Between Mainline Sewer And Clean-Out Closest To Building. Lateral Size Shall Be A Minimum Of 4 Inches In Diameter Between Building And First Downstream Clean-Out.
- 4.) A Minimum Of One Clean-Out Shall Be Installed For Each Lateral. Where The Length Of A Lateral Exceeds 100 Feet, Then One Clean-Out Shall Be Installed For Every 100 Feet Of Lateral Length. In Any Event, A Clean-Out Shall Be Located No Farther Than 5 Feet From The Building.
- 5.) In Accordance With City Ordinance §50.048, Approval Consideration Of A Lateral Connection Requires The Owner Of The Residence Or Business To Provide The Following Information On A Legible Diagram: Name Of Property Owner, Address, Telephone Numbers Of Both Property Owner And Contractor, Depth And Position Of Lateral Between Mainline Sewer And The Building, Location Of Connection Point Referenced To Any Permanent Object, Length And Size Of Pipe To Be Installed, Pipe Material, Slope Of Pipe, Bedding Type, Pipe Contractor, And Method Of Connection.
- 6.) Contractor Shall, When Curbs Are Available, Engrave A 3-Inch High By 1/8-Inch Deep "S" On The Curb Directly Above Each Service Lateral. Where Curbs Are Not Available, Contractor Shall Notch The Sidewalk Directly Above Each Service Lateral. If No Curb Or Sidewalk Is Present, A Concrete Monument Shall Mark The Lateral Location.
- 7.) A Backflow Prevention Valve May Be Installed By The Property Owner If Approved By The Wastewater Superintendent. Property Owner Shall Be Solely Responsible For Installation And Maintenance. The Backflow Prevention Valve Shall Be Installed On The Owner's Property Outside City Right-Of-Way. The Backflow Prevention Valve Shall Be Housed In A Minimum 18 Inch Diameter Meter Pit, Readily Accessible At All Times, And Located A Maximum 3 Feet Deep. The City May Require A Backflow Prevention Valve If The Finished Floor Elevation Of A Structure Is Below The Top Of Casting Elevations Of The Immediate Upstream Or Downstream Sanitary Manhole.
- 8.) The Approval Of A New Sanitary Sewer Service Lateral Or The Modification Of An Existing Service Lateral Requires The Procurement Of A Sewer Connection Permit From The Shelbyville Wastewater Department.
- 9.) Lateral Abandonment Requires Approval From The Shelbyville Wastewater Department. A Watertight Cap Or Seal With Fernco Type Fittings Shall Be Installed On The Abandoned Lateral In The Vicinity Of The Sidewalk Or Curb.
- 10.) In Accordance With ASTM D-3034, The Outside Of Each Pipe Section Shall Be Legibly Marked With The Date Of Manufacture, Class Of Pipe, Specification Designation, Name Or Trademark Of Manufacturer And Identification Of Plant/Location. Pipe Shall Be Rotated In Such A Manner That The Markings Are Easily Readable During Sanitary Lateral Inspection.



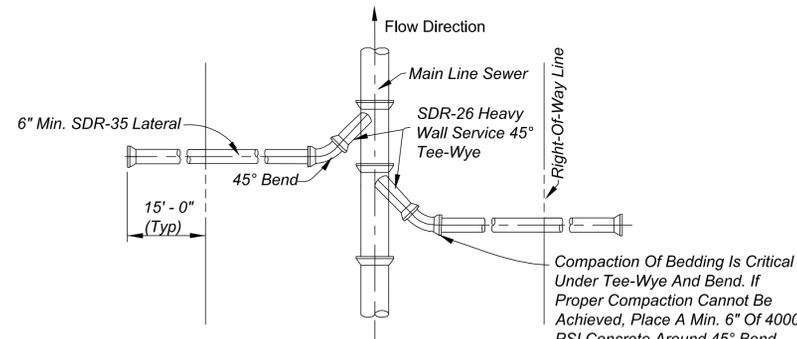
PLAN VIEW



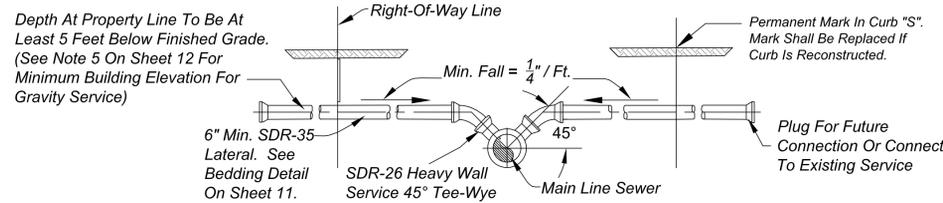
ELEVATION VIEW

SERVICE CONNECTION FOR DEEP SEWERS (15' DEEP AND OVER)

Scale: None



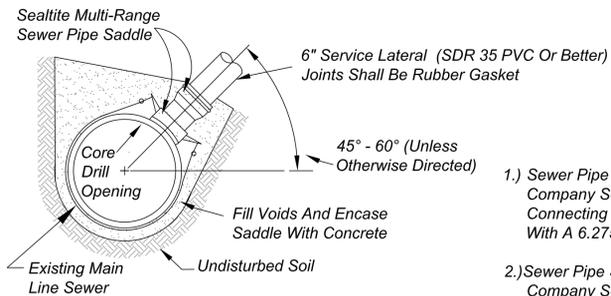
PLAN VIEW



ELEVATION VIEW

SERVICE CONNECTION FOR SHALLOW SEWERS (LESS THAN 15' DEPTH)

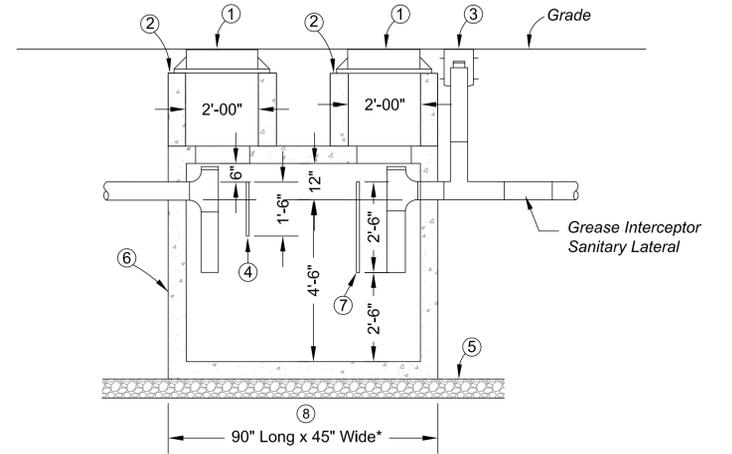
Scale: None



SANITARY LATERAL SADDLE TAP

Scale: None

- 1.) Sewer Pipe Saddle Shall Be General Engineering Company Seallite Type "U" For Laterals Connecting To Existing Mainline Sanitary Sewer With A 6.275" OD. TO 30.00" OD.
- 2.) Sewer Pipe Saddle Shall Be General Engineering Company Seallite Type "C" For Laterals Connecting To Existing Mainline Sanitary Sewer Over 30.00" OD.



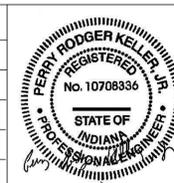
NOTES:

- 1) Cast Iron Manhole Frame And Cover Neenah R-6461-FH Or R-6462-FH Or Approved Equal
- 2) 24" Diameter Concrete Pipe Riser
- 3) Cast Iron Clean-Out And Cover
- 4) Precast Concrete Inlet Baffle
- 5) 6" Compacted INDOT #8 Aggregate
- 6) Precast Concrete Structure Designed For Vehicle Traffic. (Structure Shall Be Approved By The City And Shall Have 6" Minimum Wall Thickness)
- 7) Precast Concrete Outlet Baffle
- 8) Length And Width Dimensions Shown Correspond To A 1,000 Gallon Capacity Grease Trap. Larger Dimensions May Be Required. See Site Plan For Actual Size. Additional Vertical Depth May Also Be Required.
- 9) All New Commercial Or Industrial Entities, Which Either Generate And/Or Waste Oil, Grease Or Other Similar Substances Thereto, Shall Construct A 1,000-Gallon (Minimum) Grease Trap. The Design Engineer Shall Submit Detailed Calculations For Size Justification Of Said Trap. Calculations Shall Be Accompanied With References Specifically Denoting Origin Of Sizing/Calculation Method.
- 10) Toilets, Urinals, Sinks, And Other Non-Grease Laden Wastes Shall Not Waste Through The Grease Interceptor. All Other Waste Shall Enter Through The Grease Interceptor, Through The Inlet Pipe Only.
- 11) Grease Interceptor Shall Be Installed Downstream Of All Kitchen Drains Or Grease-Laden Equipment Drains, And In A Location Readily And Easily Accessible For Cleaning And Inspection Purposes, In Accordance With City Ordinances §50.048 (I) And §50.052 (D)(1).
- 12) The Oil/Grease Trap Shall Be Located Outside The Building And At A Distance Far Enough To Allow Soluble Grease/Oil To Become Insoluble. Water Temperatures Shall Be Less Than 120° F Prior To Entering The Grease Interceptor. Greater Distances May Be Required By The City.
- 13) Each Building Or Facility Shall Have A Separate Individual Grease Interceptor.
- 14) All Property Owners Or Utility Users With Grease Interceptors Shall Have Sole Responsibility For The Installation And Maintenance Of The Grease Interceptor. Owners Or Utility Users Shall Be Responsible For The Proper Removal And Disposal, By Appropriate And Lawful Means, Of The Captured Material In The Interceptors.
- 15) The City Of Shelbyville Reserves The Right To Inspect All Grease Interceptors That Are Located Upstream Of City Owned Sewers. Any Person, Business, Industry, Or Owner That Is Found To Be Responsible For Discharging Fats, Oils, Grease, Or Other Similar Substances Thereto Shall Be Responsible For The Cost Of Remediating Any And All Issues Created By Such Discharge.

GREASE INTERCEPTOR DETAIL

Scale: None

REVISIONS		
Rev. No.	Description	Date
1	Entire Set	07/26/2011



CITY OF SHELBYVILLE

**SANITARY SEWER
DETAILS AND NOTES**

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