

**DECATUR COUNTY
CONSTRUCTION & DEVELOPMENT
STANDARDS MANUAL**

**SECTION 02720
STORMWATER SPECIFICATIONS**

Table of Contents

Section	Subject	Page
1.0	GENERAL	2
1.01	Permitting	2
1.02	References	2
2.0	MATERIAL SPECIFICATIONS	2
2.01	Sewer Pipe	2
2.02	Pipe Materials	2
2.03	Manholes, Catch Basins and Inlets (Structures)	2
2.04	Joints, Fittings and Appurtenances	4
3.0	CONSTRUCTION REQUIREMENTS	4
3.01	Surface Conditions	4
3.02	Field Measurements, Surveys Lines, Reference Points and Grades	5
3.03	Installation of Pipe	5
3.04	General Trenching	9
3.05	Removal of Material	10
3.06	Stabilization	10
3.07	Backfilling	10
3.09	Installation Structures	12
3.10	Grade Adjustment of Existing Structures	14
3.11	Record Drawings	14

LIST OF DRAWINGS

<u>Title</u>	<u>Drawing No.</u>
Storm Sewer Manhole	STS-1
Storm Sewer Manhole Type 1	STS-2
Straight Curb Inlet Type 1	STS-3
Straight Curb Inlet Type 2	STS-4
Rolled Curb Inlet	STS-5
Beehive Inlet	STS-6
Flat Inlet	STS-7
Inlet Structure	STS-8

1.00 General

1.01 Description

- A. Included in this Section work for the construction of storm sewer piping systems and related items, including catch basins and inlet drains, junction chambers, diversion chambers, manholes, outfall structures and miscellaneous structures.
- B. This section is for all sewers that do not require watertight joints or require hydrostatic or air testing.

2.00 Materials

2.01 Sewer Pipe

- A. All pipe shall conform to the applicable specifications and requirement set forth herein.
- B. Pipe used in storm sewer construction shall be of reinforced concrete, corrugated smooth walled interior high density polyethylene pipe (HDPE), or polyvinyl chloride pipe (PVC); unless approved by County, whereby this will be the only acceptable type of pipe installed.
- C. All flexible storm sewer pipe must meet a deflection of 7.5%

2.02 Pipe Material

- A. Concrete Pipe, Plain and Reinforced
 - 1. Shall conform in all respects with, ASTM C76, AASHTO M170 or ASTM C361 for Reinforced Low Head Concrete Pipe.
- B. Corrugated Smooth Walled Interior High Density Polyethylene Pipe (HDPE)
 - 1. Corrugated HDPE pipe shall conform to AASHTO M294 Type S for sized 12" and larger Joints shall be bell and spigot and shall be watertight. Rubber gasket for joints shall conform to ASTM F477.
- C. Polyvinyl Chloride (PVC) Pipe
 - Shall have an SDR (Standard Dimensions Ratio) of not greater than 35.
 - 1. For depths of bury through 15 feet a minimum wall thickness of SDR 35 as defined in Section 7.4.1 of ASTM D3034 is required. For depths of bury greater than 15 feet, a minimum wall thickness of SDR 35 as defined in Section 7.4.1 of ASTM D3034 is required. For depths of bury greater than 15 feet, a minimum wall thickness of SDR 26 is required.

2.03 Manholes, Catch Basins and Inlets (Structures)

- A. Reinforced Concrete

1. These structures shall be erected of precast, or cast in place, reinforced concrete sections to the shape of the manhole. Steps shall be cast in place in accordance with the standards as shown on the construction standards. All concrete, reinforcing and wall thickness shall be in accordance with ASTM C478, latest edition. All structure joints shall be watertight and constructed in accordance with ASTM C443, latest edition. The bottom of the structures shall be of either precast, poured in place, or monolithic bottom stack, with 3,000 psi concrete to conform to the plans and shall be at least eight (8) inches thick and shall be reinforced as shown on the construction standards.

B. Precast Manhole Components

1. Shall conform with ASTM C478, latest edition, and with design dimensions. Cones and sections shall be substantially free from fractures, large or deep cracks and surface roughness. Slabs shall be sound and free from gravel pockets. All precast manhole components shall be manufactured by an experienced and reputable manufacturer whose precast manhole components have been used commercially for at least three (3) years.

C. Monolithic Concrete Manholes

1. Shall conform to the contract drawings and/or the construction standards. Walls and base dimensions shall be of approved thickness and the maximum step spacing shall be sixteen (16) inches.

D. Manhole Joints

1. Storm sewer manholes shall be either flexible rubber gasket.

E. Cast Iron Frames & Covers

1. Shall conform to the requirements of ASTM A48 for Gray Cast Iron, latest edition. The dimensions, weight and finish preparation shall conform to the appropriate construction standards.

F. Ductile Cast Iron Frames, Covers and Grates

1. Shall conform to the requirements of ASTM A536 for Ductile Cast Iron, latest edition. The dimensions, weights and finish preparation shall conform to the appropriate construction standards.

2. Manhole covers shall have the word "Storm" cast into the lid.

G. Steps

1. Manhole steps shall meet the requirements of ASTM C478, latest revision. Step spacing shall be a minimum of 12" (equal spacing).

H. Adjustment Risers and Shims

1. Rubber adjustment risers and shims shall be Infra-Riser as manufactured by GNR Technologies, or approved equal. HDPE and concrete riser rings will also be acceptable.

2.04 Joints, Fittings and Appurtenances

A. Joints for Storm Sewers

1. Elastomeric seals for gasketed joints for corrugated PVC shall meet ASTM F477.
2. Flexible rubber gasket joints for concrete sewer pipe shall conform to the requirements of ASTM C443, joints for circular concrete sewer and culvert pipe, using flexible watertight, rubber gaskets. Storm sewer pipe larger than 24-inch diameter may be tongue and groove plain joint unless the sewer is under a pavement of specifically called for otherwise on the plans. If plain joint is used, an approved bituminous material shall be applied to each joint.
3. Coupling bands for use with corrugated metal pipe shall be "hugger" type with "O" rings.
4. The PVC joint shall conform to ASTM D3212 "push on" type with a confined rubber gasket conforming to ASTM F477.

B. Fittings

1. PVC sewer fittings shall conform to the requirements of ASTM D3034 specifications. Four-, six-, and eight-inch fittings shall be molded in one piece, with elastomeric joints and minimum socket depths as specified in Section 6.2 and 7.3.2 of the D-3034 specification. Fittings 10 inches and larger shall be molded or fabricated from pipe meeting ASTM D3034 with manufacturer's standard pipe bells and gaskets.
2. The PVC fittings for corrugated pipe shall conform to ASTM F794, latest edition.

C. Plug for Fittings

1. All fittings shall be capped with a plug of the same material as the pipe, and gasketed with the same gasket material as the pipe joint, or be of material approved by the County. The plug shall be able to withstand all test pressures involved without leakage.

3.00 Execution

3.01 Surface Conditions

- A. Examine the areas and conditions under which work of this section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 Field Measurements

A. Make necessary measurements in the field to assure precise fit of items in accordance with the approved design.

3.03 Installation Pipe

A. Trenching

1. All poles, fences, sewer, gas, water or other pipes, wires, conduits, manholes, buildings, structures and property in the proximity of any excavation shall be supported and protected from damage by the Contractor during construction.

2. Wherever sewer, gas, water or other pipes or conduits cross the excavation, the Contractor shall support said pipes and conduits without damage to them and without interrupting their use during the progress of the Work. The manner of supporting such pipes, etc., shall be subject to review by County.

3. All property shall be thoroughly cleaned of all surplus materials, earth and rubbish placed thereon by the Contractor.

4. The Contractor shall notify County and the appropriate utility companies at least seventy-two (72) hours prior to the start of construction.

a. The Contractor shall coordinate all utility companies location of any existing underground utilities and structures within the site limits.

b. The Contractor, prior to the start of construction, shall verify the location of any existing underground utilities and structures within the site limits. It is the Contractor's responsibility to make any and all exploratory investigation, which may be necessary to verify or locate the utility pipe, wires, structures and appurtenances of others.

5. The Contractor shall locate the storm sewer piping per approved Plan.

a. Where concrete encasement is used, provide not less than 4-inch thickness including that on pipe joints.

B. Laying Pipe

1. All pipes shall be re-inspected for soundness and damage due to handling immediately before being lowered into the trench. Any pipe found to be unsound or damaged will be rejected and shall be removed immediately from the site of the work.

2. All pipes shall be laid accurately to the required line and grade in such manner as to form a close, concentric joint with the adjoining pipe and to bring the invert of each section to the required grade. Bell holes shall be dug in advance of the pipe being laid as required. The supporting of the pipe on blocks will not be permitted.

3. Pipe laying shall precede upgrade, beginning at the lower end of the sewer, unless otherwise approved by the County.
4. All open ends of pipes and branches shall be sealed with plugs or bulkheads firmly held in place in a manner acceptable to the County.
5. At the end of each day's work, the open ends of all pipes shall be satisfactorily protected against the entrance of animals, earth or other materials.
6. Each length of section shall be properly pulled or shoved "home" with a winch or come-a-long against the section previously laid to make a proper joint. The pipe shall then be securely held in position during the backfill operations. Joints shall not be pulled or cramped more than the design of the joint will permit and so as not to injure the conduit.

C. Dewatering

1. Dewatering sufficient to maintain the water level below the surface of the trench bottom shall be accomplished prior to pipe laying and jointing, if not done prior to excavation and placement of the bedding as called for. The dewatering operation, however accomplished, shall be carried out so that it does not destroy or weaken the strength of the soil under or along the side of the trench. When the dewatering operation is ended, the trench shall be replaced in such a manner so as not to disturb the pipe and its foundation.

D. Abandoning Pipe or Structures

1. Where called for on the plans to be abandoned, said sewer or structures shall be permanently plugged or bulkheaded. Where standard "plugs" are available, they shall be employed. For other pipes or structures, the use of brick and mortar or concrete may be used in a manner suitable to the County.

E. Bedding, Rigid Pipe

1. Each pipe shall be laid in Class "B" bedding unless specifically approved otherwise.

a. Definition of Terms for Bedding Explanation

Bc = Outside diameter of pipe, in inches

D = Inside diameter of pipe, in inches

d = Depth of bedding material below the pipe bell, in inches

- b. The values of "d", depth of bedding material below the bell of the pipe shall be as follows:

"D" (inside dia. Of pipe, in.) "d" (depth of bedding material)

<u>Minimum Requirements</u>	
27" and smaller	3"
30" to 60"	4"

66" and larger

6"

2. Class "A" Bedding (Concrete Cradle)

- a. Class "A" bedding is that method of bedding in which the conduit is set on "d" inches of concrete in an earth foundation and encased in concrete up to $\frac{1}{4}$ " of "Bc" to fit the lower part of the conduit's exterior breadth. The remainder of the conduit is to be surrounded to a height of at least twelve (12) inches above its top by densely compacted granular backfill material carefully placed by hand to completely fill all spaces under and adjacent to the conduit. The fill to be tamped thoroughly on each side of the conduit, as far as practicable, shall be in layers not to exceed six (6) inches in thickness.
- b. The concrete used for Class "A" bedding shall be plain concrete with a 28-day compressive strength of 3,000 psi, unless otherwise specified. Refer to "Bedding & Backfill Details" of the Construction Standards for further details on Class "A" bedding.

3. Class "B" Bedding-

- a. Class "B" bedding is that method of bedding in which the conduit is set on "d" inches of a fine granular material (sand cushion) in an earth foundation, carefully shaped to fit the lower part of the conduit exterior for a width of at least 60% of the conduit's breadth. The remainder of the conduit is to be surrounded to a height of at least twelve (12) inches above its top by densely compacted granular backfill material carefully placed by hand to completely fill all spaces under and adjacent to the conduit. The fill is to be tamped thoroughly on each side and under the conduit, as far as practicable, in layers not to exceed six (6) inches in thickness. Bell excavation is to be provided. Refer to "Bedding & Backfill Details" of the Construction Standards for further details on Class "B" Bedding.
- b. Class "B" bedding material shall be as follows:
 - (1) B Borrow per Section 211 of the current INDOT Specifications, except that no more than 12% of less than 5% shall pass the No. 200 sieve (silt or clay).
 - (2) No. 8 stone per Section 904 of the current INDOT Specifications.

4. Class "C" Bedding

- a. Class "C" bedding is that method of bedding in which the conduit is set on an earth foundation, carefully shaped to fit

the lower part of the conduit exterior for a width of at least 50% of the conduit's breadth. The remainder of the conduit is to be surrounded to a height of at least twelve (12) inches above its top by lightly compacted granular backfill material carefully around the exterior of the conduit. Bell excavation is to be provided. Refer to "Bedding & Backfill Details" of the Construction Standards for further details on Class "C" Bedding.

F. Bedding, Flexible Pipe

1. Each pipe shall be laid in a Class I or II bedding, as shown on the construction details. Pipe bedding material and installation shall conform to ASTM D2321.

G. Existing Sewer Removal and Replacement

1. Where called for on the plans, existing sewer lines shall be completely removed and replaced with new. The Contractor is required to maintain service during said removal and replacement, which may entail bypass pumping. The Contractor shall inform the County of the method proposed for maintaining service. All such costs including additional bedding shall be included in the cost of the new replacement sewer.

H. Sheet Piling

1. Sheet piling (permanent or temporary) shall be provided as required, for construction in areas where wise excavations cannot be permitted, or for an excavation that is open for an extended period, or where soil conditions dictate to protect adjacent structures, roadway and utilities.

2. The section modulus of piling sections shall be as required to function properly as intended.

3. Piling sections shall be marked for length and sorted and stacked at the job site to prevent distortion and to facilitate proper sequence of setting and driving.

4. Interlocks shall be protected from becoming obstructed by sand, gravel, mud or other materials.

5. Pile tips are approved for use at the Contractor's option.

I. Backfill Materials

1. Granular Backfill shall be "B" Borrow or No. 8 Stone or No. 12 Stone per current INDOT Standard Specifications.

2. Earth backfill material shall contain no more than 5% organic material, no particles larger than four inches and shall be free of trash, rubble and debris. The Plastic Index of the fraction passing the No. 40 sieve shall not be more than 25.

3. Course aggregate material shall be No. 53 or 73 complying with INDOT Standard Specifications, current edition.
4. Flowable fill shall be in accordance with INDOT Standard Specifications, current edition.
5. Geotextile for use with No. 8 or No. 12 Stone shall be per the current INDOT Specifications.

3.04 General Trenching

- A. Unless otherwise directed or permitted, not more than one hundred feet (100') of any trench shall be open at any time.
- B. Surface encumbrances, located so as to create a hazard to employees involved in excavation work or in the vicinity thereof at any time during operations, shall be removed or made safe before excavating is begun.
- C. During excavation, material satisfactory for backfilling shall be stockpiled in an orderly manner at a distance from the banks of the trench sufficient to avoid overloading and to prevent slides and cave-ins. Adequate drainage shall be provided for the stockpiles and surrounding areas by means of ditches, dikes, or other approved methods. The stockpiles shall also be protected from contamination with unsatisfactory excavated material or other material that may destroy the quality and fitness of the suitable stockpiled material. If the Contractor fails to protect the stockpiles and any material becomes unsatisfactory as a result, such material, if directed by the County, shall be removed and replaced with satisfactory on-site or imported material from approved sources.
- D. Grading shall be done as may be necessary to prevent surface water from flowing into the excavation, and any water accumulating therein shall be removed so that the stability of the bottom and sides of the excavation is maintained. In wet trenches dewatering equipment shall be operated ahead of pipe laying and the water level kept below the pipe invert.
- E. The trench shall be excavated as shown in these Standards or as recommended by the manufacturer of the pipe to be installed, whichever is more stringent. Trench walls below and above the top of the pipe shall be sloped, or made vertical, as recommended in the manufacturer's installation manual. The trench width below an elevation one foot above the top of pipe shall not exceed that recommended in the installation manual. Where no manufacturer's installation manual is available, trench wall below an elevation one foot above the top of pipe shall be vertical and trench walls one foot or more above the top of pipe shall be adequately sloped as required to prevent slides and cave-ins unless proper precautions, as stipulated by OSHA, are taken. If adequate trench slopes cannot be provided in the available workspace and right-of-way limits, then use of sheeting and shoring and/or a trench box is mandatory.

F. Excavation of manholes or similar structures shall be sufficient to leave at least 12 inches clear between the outer structure surfaces and the face of the excavation or support members and be of sufficient size to permit the placement and removal of forms for the full length and width of structure footings and foundations. When concrete is to be placed in an excavated area, special care shall be taken not to disturb the bottom of the excavation. Excavation to the final grade level shall not be made until just before the concrete is to be placed.

G. Dust conditions shall be kept to a minimum by the use of water. The use of salt, or calcium chloride will not be permitted.

H. The Contractor shall saw cut hard surfaces along straight lines when trenching occurs in pavement, sidewalks, or driveways. Upon completion of backfilling and compaction testing, the contractor shall replace in kind all pavements and surfaces encountered and match original elevations, lines, and grades.

3.05 Removal Of Material

A. As trenches are backfilled, the Contractor shall remove all surplus material, regrade and leave clear, free, and in good order all roadways and sidewalks affected by the construction of the work. During the progress of and until the expiration of the guarantee period, he shall maintain in good and safe conditions the surface or any street over the trenches and promptly fill all depressions over and adjacent to trenches caused by settlement of backfilling.

B. Surplus or unsatisfactory excavated material shall be properly disposed of at a location off the property limits.

3.06 Stabilization

A. If portions of the bottom of trenches or excavations consist of material unstable to such a degree that, in the opinion of the County inspector, it cannot adequately support the pipe or structure, the bottom shall be over excavated and stabilized with granular material in compliance with the INDOT Standard Specifications, current edition. Depth of stabilization shall be as directed by the inspector.

3.07 Backfilling

A. Pipe bedding and initial backfill shall be clean granular material to a depth as approved. Initial backfill shall be placed in lifts of a maximum of 6 inches loose thickness. The method for placing and compacting the backfill shall comply with the INDOT Standard Specifications as applicable. At a minimum, the Contractor shall use a vibrating plate compactor with adequate passes to achieve compaction. The backfill shall be brought up evenly on both sides of pipe for the full length of pipe. Care shall be taken to ensure thorough compaction of the fill under pipe haunches.

B. Final backfill for the remainder of the trenches shall be as follows:

1. Backfill for trenches under sidewalks, under turfed or seeded areas, and in miscellaneous areas shall be of approved earth material and contain no stones over four inches (4) in their largest dimensions. Stones which are used in backfilling shall be distributed among the earth backfill so that all interspaces are filled with fine material. All such backfilling shall be deposited in lifts of a maximum 12 inches loose thickness and compacted with a vibrating plate compactor or approved mechanical tamping devices. Excess earth to the amount required to replace settlement shall be neatly rounded over the trench and the remainder hauled off the work site. Trenches shall be maintained by the Contractor until settlement has ceased and trenches remain level with the adjacent ground.

2. Backfill of all trenches under proposed roadways and structural footings or slabs shall be approved granular material. IN addition, the top seven inches below the base of the pavement shall be backfilled with No. 53/73 crushed stone. The backfill shall be placed in 6" maximum lifts and the method of placing and compacting the backfill shall comply with the INDOT Standard Specifications, as applicable. At a minimum, the Contractor shall use a vibrating plate compactor with adequate passes to achieve compaction.

3. If No. 8 stone or No. 12 stone is used as a trench backfill material, then the compaction requirement for this material shall be waived. If no. 8 Stone or No. 12 stone used under proposed pavement, then a layer of geotextile fabric shall be placed on top of the No. 8 stone and before the No. 53 or 73 crushed stone is placed.

4. Backfill for trenches under or within five (5) feet of existing County streets shall be flowable fill.

C. Pipe bedding and each backfill lift shall be compacted to a dry density not less than the following percentage of maximum dry density as determined by the Modified Proctor Test (ASTM D-1557):

<u>Usage</u>	<u>Compaction %</u>
Beneath piping	95
Upper 2 feet of backfill under roadways	95
Under roadways (except upper 2 feet of backfill)	92
Under haunches and up to spring line of pipe	95
From spring line to 12 inches above top of pipe	90
Adjacent to (or behind) vertical walls	90
Under turfed or seeded areas below topsoil, and miscellaneous area (from 12" above pipe to surface)	85

D. No fill shall be placed against any manhole or other structure until placed concrete has been allowed to cure for at least 3 days. Backfill shall be placed in such a manner that the structure will not be damaged by shock from falling earth. The backfill

material shall be deposited and compacted as specified for final backfill, and shall be placed in such a manner as to prevent eccentric loading and excessive stress on the structure. Heavy equipment for spreading and compacting shall not operate closer to foundation walls than set forth as follows:

3.08 Installation of Structures

A. Bedding for Structures

1. Precast base sections shall be placed on a well-graded granular bedding course conforming to the requirements for sewer bedding, but not less than four (4) inches in thickness and extending to the limits of the excavation. The bedding course shall be firmly tamped and made smooth and level to assure uniform contact and support of the precast element.

B. Cast-in-Place Bases

1. Unless otherwise specified, cast-in-place bases shall be at least eight (8) inches in thickness and shall extend at least six (6) inches radially outside of the outside dimensions of the manhole section. The cast-in-place base shall be made of 4,000 psi concrete, 28-day compression test, and shall be reinforced as shown on the construction standards.

C. Lift Holes

1. All lift holes in precast elements shall be thoroughly wetted and then be completely filled with non-shrinking concrete grout, smoothed and painted both inside and out, to ensure water tightness.

F. Placing Precast Sections

1. Precast sections shall be placed and aligned to provide vertical sides and vertical alignment of the ladder rungs. The completed manhole shall be rigid, true to dimensions and be watertight.

G. Placing of Castings

1. Castings placed on concrete surface shall be set in full grout beds. The grout shall be mixed in proportion of one (1) part Portland Cement to three (3) parts sand, by volume, based on dry materials. Casting shall be set accurately to the finished elevation so that no subsequent adjustment will be necessary, or unless otherwise specified by the County.

2. After grout has cured, use an approved bituminous mastic material around the outside of casting to ensure water tightness.

3. Where work is in paved street or areas which have been brought to grade, not more than fifteen (15) inches shall be provided between the top of the cone or slab and the underside of the manhole casting for adjustment of the casting to street grade.

4. Where work is in the unimproved street or alley, not less than twelve (12) inches of adjusting rings shall be provided between the top of the cone or slab and the underside of the manhole casting for adjustment of the casting to finished grade. The top of the manhole casting shall be flush with the finished grade, unless otherwise shown.

5. Where work is in cultivated areas, the top of the manhole casting shall be buried three (3) feet, and in non-cultivated areas, the casting shall be flush with the finished grade, unless otherwise directed by the County.

6. Where the last manhole section is a reducing cone and is set to final grade as required by the County; then if as part of the continuous work, it becomes necessary to lower this casting and it entails going below the cone, compensation to the Contractor will be allowed for said adjustment and changing of the manhole stacks.

7. When concrete adjusting rings are used to set the castings to grade, they shall be pointed up and grout bed placed between each ring and casting; and made watertight with a heavy coating of an approved bituminous mastic material on the outside of structure. The casting is flush with surrounding pavement.

8. When rubber adjustment rings are used to set casting to grade, they shall be positioned so that the casting is flush with surrounding pavement.

H. Channels and Inverts

1. Channels and inverts shall be made to conform accurately to the sewer characteristics and grades, and shall be brought together smoothly with well-rounded junctions, satisfactory to the County and in conformance with the construction standards, unless otherwise directed.

I. Pipe Connections

1. Special care shall be taken to see that the openings through which pipes enter the structure have all pipe ends sawed and smoothed completely. Pipes are to be firmly full of jointing material at entrance to manhole to ensure water tightness. The pipes shall not protrude farther than three (3) inches into the inside face of the manhole, measured along the horizontal center of the pipe.

2. In case of smooth sidewall pie, rubber water stops, "O"-Ring gaskets, or poured-in-place pipe sleeves shall be used for water tightness between the pipe and manhole.

3. When new holes are required in the manhole, they shall be core drilled or star drilled in a circle of the required diameter and then knocked out. In no instance shall new holes be sledge-hammered out. Pipe connection shall be provided with a concrete collar or a watertight seal.

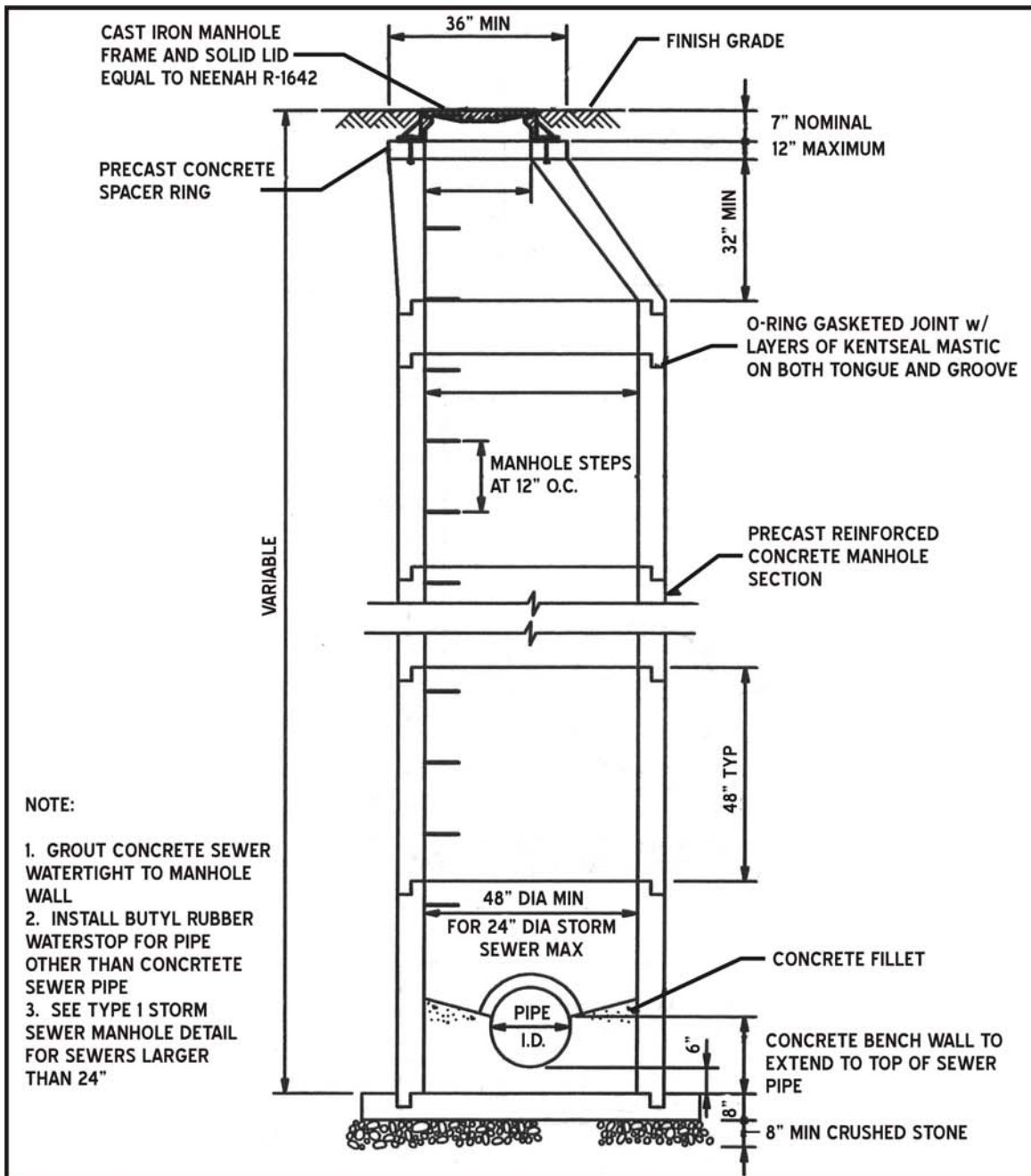
3.09 Grade Adjustment of Existing Structures

A. Both adjusting castings to grade and reconstruction of structures shall conform to the applicable provisions of the Indiana Department of Transportation Standard Specification, current edition.

3.10. Record Drawings

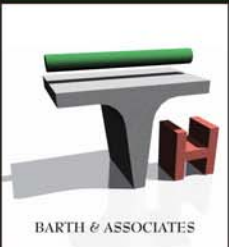
A. No sewer system shall be accepted by the local utility unless the installer provides at least two sets of "Record Drawings" drawings. The "Record Drawings" drawings shall show the actual location of the sewer and/or the detention structure, the actual sewer and/or detention structure elevations (referenced in MSL), and lengths, lateral locations and depths, and final casting grades. All lateral measurements shall be referenced to permanent landmarks. Also required are the data and calculations showing final detention basin volume. A registered engineer shall certify "Record Drawings" drawings and shall be provided in a hard copy format and a digital format in either AutoCAD or Adobe pdf.

END OF SECTION 02720



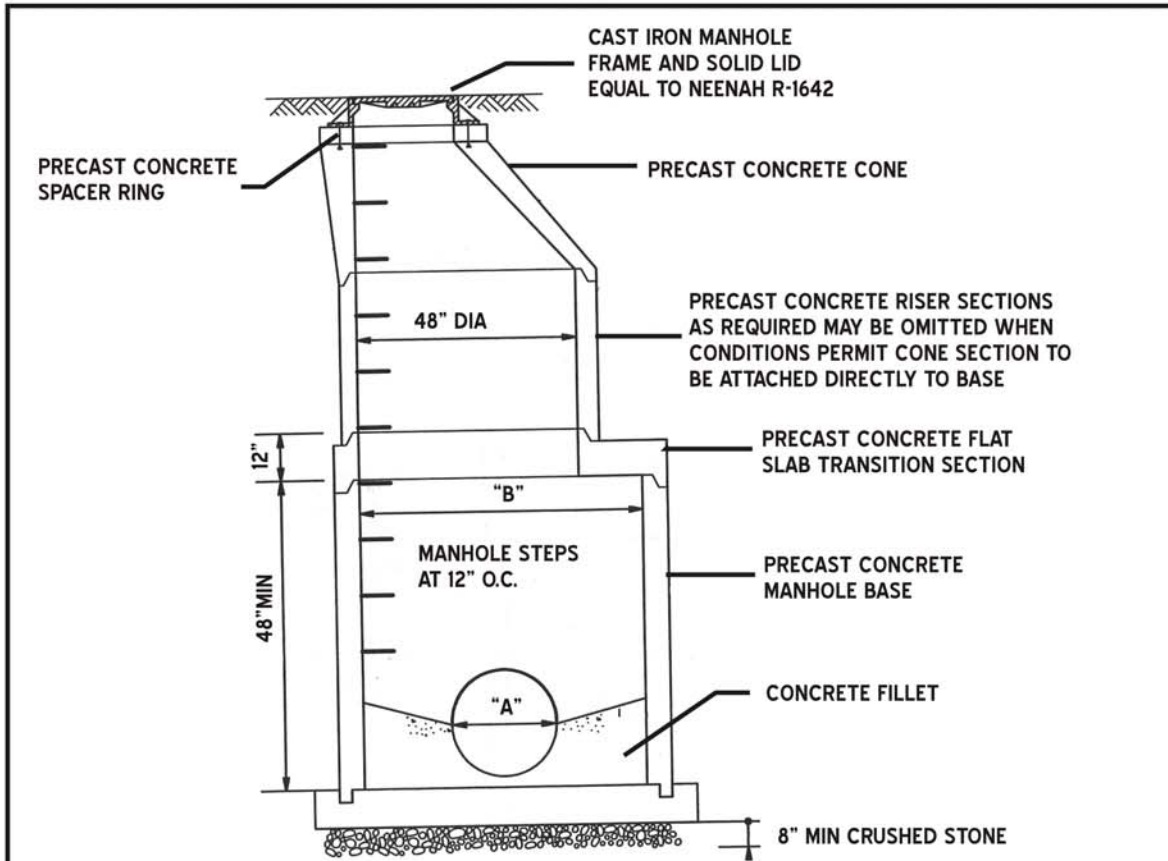
Decatur County

DWG #STS-1



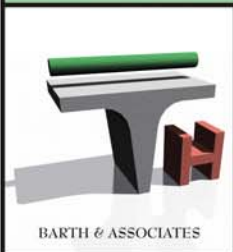
STORM SEWER MANHOLE DETAILS





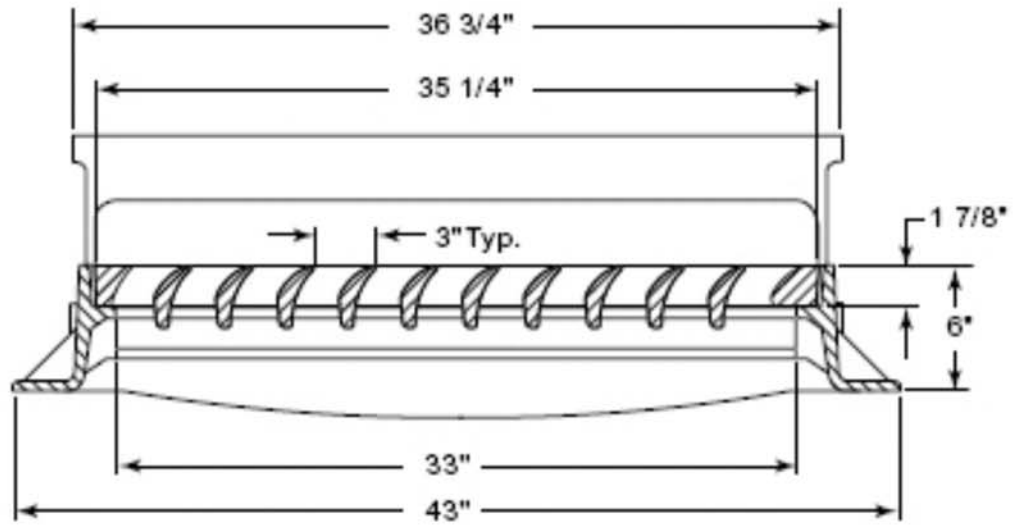
PIPE DIA "A"	INTERSECTING ANGLE	PIPE DIA "B"
30"	0° TO 44°	30"
30"	44° TO 90°	30"
36"	0° TO 44°	36"
36"	44° TO 90°	36"

Decatur County DWG #STS-2

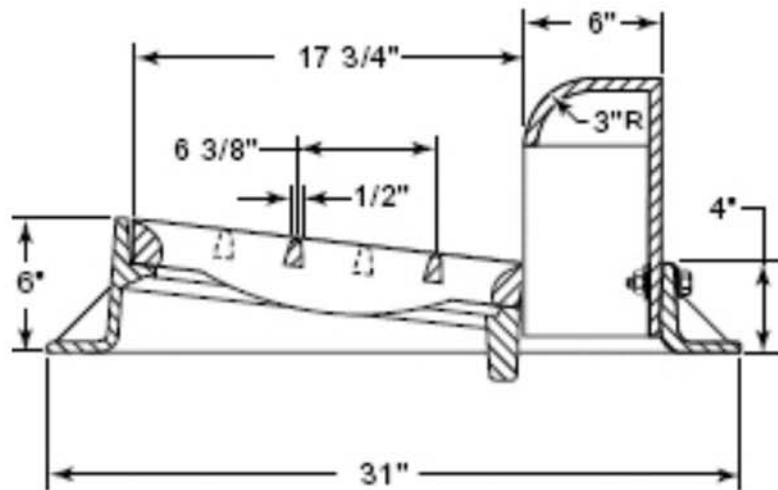


**STORM SEWER
TYPE 1
MANHOLE DETAILS**





ELEVATION

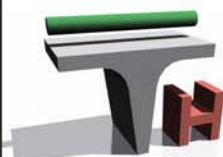


EQUAL TO NEENAH R-3067-L

SECTION

Decatur County

DWG #STS-3



BARTH & ASSOCIATES

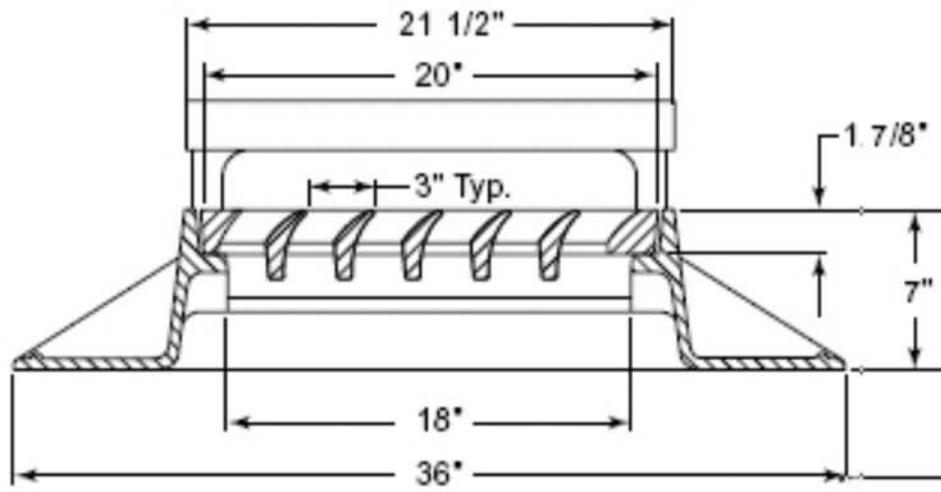
STORM SEWER STRAIGHT CURB INLET CASTING TYPE 1



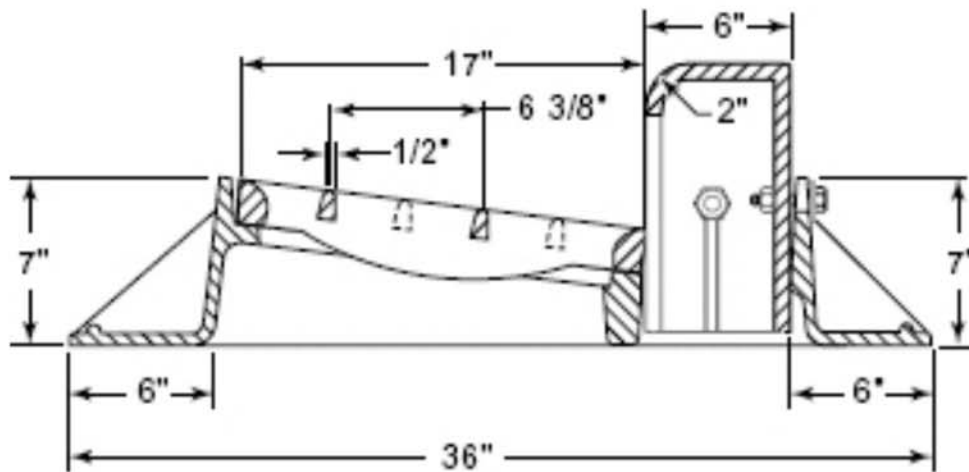
Decatur County, Indiana

Construction Standards

DCAP Adopted - 01/07



ELEVATION

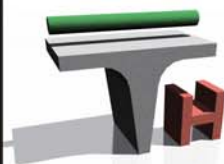


SECTION

EQUAL TO NEENAH R-3065-L

Decatur County

DWG #STS-4



BARTH & ASSOCIATES

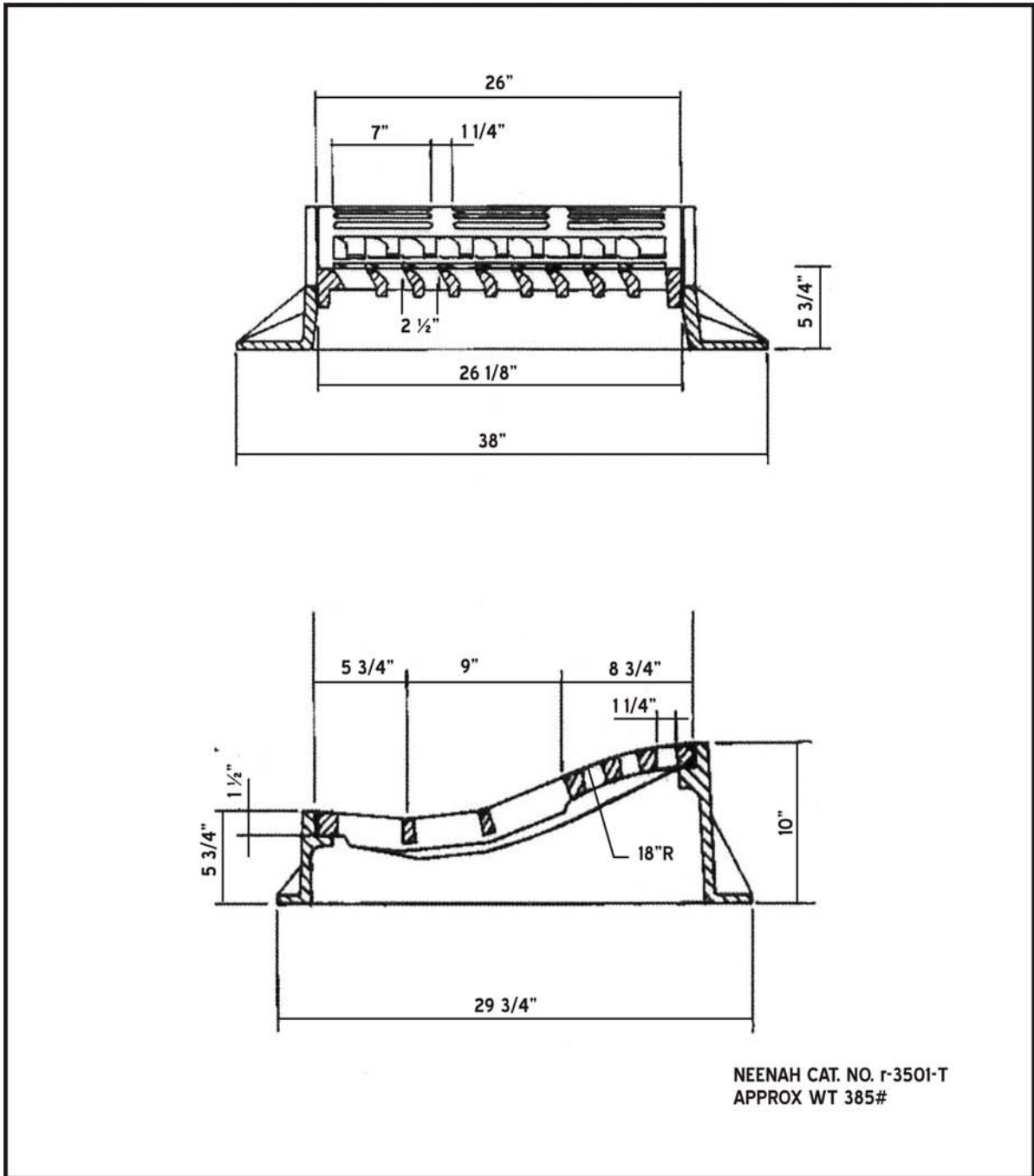
**STORM SEWER
STRAIGHT CURB INLET
CASTING TYPE 2**



Decatur County, Indiana

Construction Standards

DCAP Adopted - 01/07



Decatur County DWG #STS-5



BARTH & ASSOCIATES

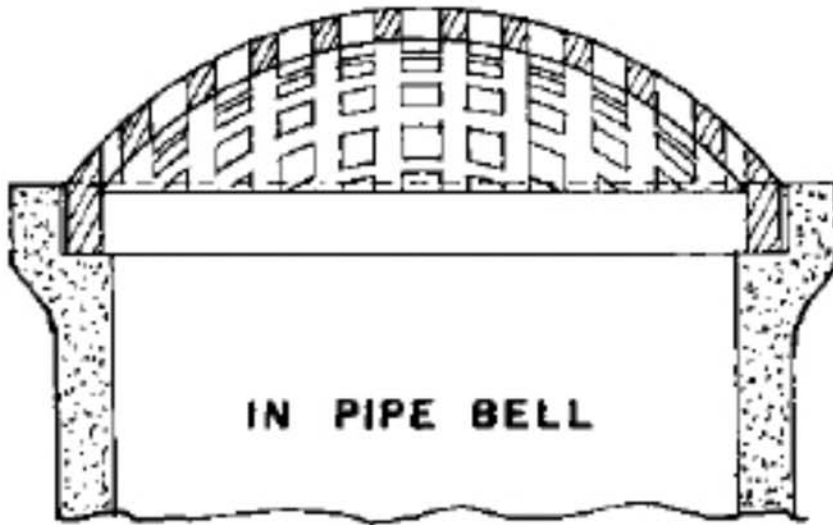
STORM SEWER ROLLED CURB INLET DETAILS



Decatur County, Indiana

Construction Standards

DCAP Adopted - 01/07



Dimensions in inches

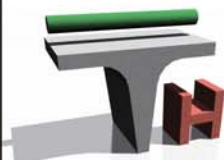
Catalog No.	Size Pipe	Diameter	Thickness at Rim	Overall Height
R-4350-1	8	10 ³ / ₈	2	4
R-4350-A*	10	12	1	4
R-4350-B	12	14 ³ / ₄	2 ¹ / ₂	5 ¹ / ₂
R-4350-C	15	18 ¹ / ₄	2 ¹ / ₂	6 ¹ / ₄
R-4350-D	18	22	3	7 ¹ / ₂
R-4350-E	24	29	3	9

*Vertical radial slots.

EQUAL TO NEENHA R-4350

Decatur County

DWG #STS-6



BARTH & ASSOCIATES

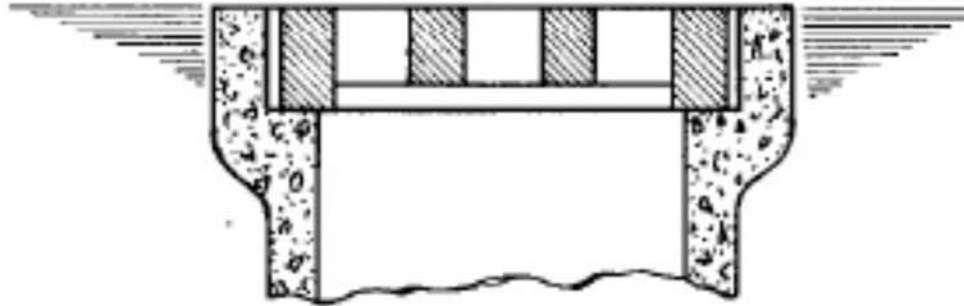
**STORM SEWER
BEEHIVE INLET TYPE 4
DETAILS**



Decatur County, Indiana

Construction Standards

DCAP Adopted - 01/07



Dimensions in Inches				
Catalog No. Heavy Duty	Catalog No. Light Duty	Pipe Size	Grate Dia.	Grate Thickness*
R-4030-4†	N/A	4	5 3/4	1 1/2
R-4030-6‡	R-4040-6	6	8	2
R-4030-8‡	R-4040-8	8	10 3/8	2 1/4
R-4030-10‡	R-4040-10	10	12 5/8	2 1/2
R-4030-12‡	R-4040-12	12	14 3/4	2 1/2
R-4030-15‡	R-4040-15	15	18 1/4	2 3/4
R-4030-18†**§	R-4040-18	18	22	2 3/4
R-4030-21†**§	R-4040-21	21	25 1/2	3
R-4030-24†**	R-4040-24	24	29	3 1/4
R-4030-27**	R-4040-27	27	32 3/4	3 1/2
R-4030-30**§	R-4040-30§	30	36	3 3/4

*For light duty series, this figure includes legs.
 **Slotted openings.
 †Slight Crown.
 ‡Square openings.
 §Not recommended for bicycle traffic.

EQUAL TO NEENHA R-4030

Decatur County

DWG #STS-7



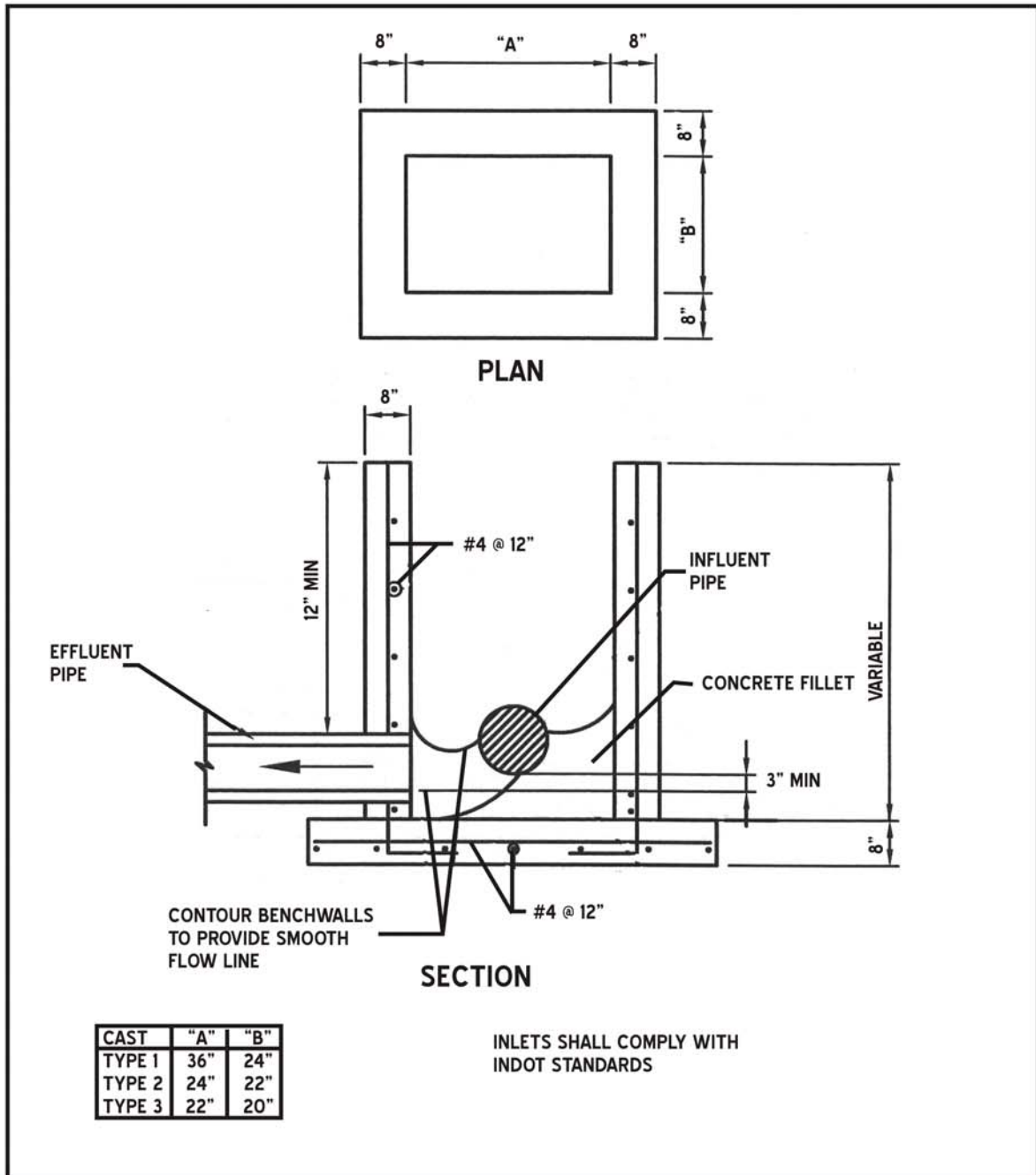
STORM SEWER FLAT INLET TYPE 5 DETAILS



Decatur County, Indiana

Construction Standards

DCAP Adopted - 01/07



Decatur County DWG #STS-8



**STORM SEWER
INLET STRUCTURE
DETAILS**



Decatur County, Indiana

Construction Standards

DCAP Adopted - 01/07