

SECTION 02731 - GRAVITY SANITARY SEWERS

PART 1 - GENERAL

1.1 GENERAL

- A. This section covers all work necessary for the installation of gravity sanitary sewers and related items complete, including manholes, junction chambers, diversion chambers, house services, and miscellaneous concrete structures.
- B. Sewer pipe shall be the size and material type shown on the drawings and shall meet all requirements of these specifications and 327 IAC 3.

1.2 PIPE MARKING

Each length of pipe shall bear the name or trademark of the manufacturer, the location of the plant, and the date of manufacture. Each length shall likewise be marked to designate the class or strength of the pipe. The marking shall be made on the exterior or interior of the pipe barrel near the bell or groove end and shall be plainly visible. PVC pipe shall be green. HDPE pipe shall have permanently extruded stripes on three (3) or four (4) sides according to the following schedule:

Sanitary Sewer: Green Stripes

1.3 SUBMITTALS

Before construction and preferably before fabrication, the Contractor shall submit to the Utility and/or designee for approval calculations on the thickness or strength class and drawings showing pipe lengths, joints, and other construction and installation details. All pipe furnished shall be fabricated only in accordance with the drawings and these specifications.

1.4 QUALITY ASSURANCE

- A. Performance Tests: The Contractor shall test all gravity sewers constructed. The Contractor shall constantly check horizontal and vertical alignment. Testing for vertical deflection in the case of non-rigid pipe and sewer watertightness testing in the case of all gravity sewers and hydrostatic testing of ductile iron pipe shall be as specified in this Section.
- B. Line and Grade Requirements: The Contractor shall provide assurance to the Utility and/or designee that the sewer is laid accurately to the required line and grade as shown on the drawings. The Contractor shall utilize a

laser beam instrument to lay and check the alignment and grade between manholes. Before proceeding with the next section of sewer, the last section shall be checked for proper line and grade. Variations from a uniform line and grade as shown on the drawings and described below shall be cause for the line to be rejected.

1. Variance from established line and grade shall not be greater than $1/32$ of an inch per inch of pipe diameter and not to exceed $1/2$ inch, provided that such variation does not result in a level or reverse sloping invert; provided also that the variation in the invert elevation between adjoining ends of pipe, due to non-concentricity of joining surface and pipe interior surfaces, does not exceed $1/64$ inch per inch of pipe diameter or $1/2$ inch maximum.

C. Test Sections

1. Initial Performance Test: An initial performance and leakage test will be performed on the first sections of sanitary sewer constructed of approximately 600 feet in length of each size and type sewer material installed. No additional sewer pipe shall be installed until the first section of sewer of each size and type of sewer material has satisfactorily passed the test for line and grade and the leakage test.
2. Subsequent Performance Testing: After the initial performance test and leakage test and as work progresses, the Utility or designee may designate additional sections for testing as conditions in his opinion warrant. If a review of the Contractor's workmanship leads the Utility or designee to question whether or not the tolerances and standards specified are being met, the Utility or designee, reserves the right to select other locations and lengths to be tested. The Utility or designee shall notify the Contractor of the location where a test is to be required not later than 15 days after the sewer installation has been completed. Unless otherwise authorized, the Contractor shall arrange to commence the test within 15 days after the sewer has been installed or 15 days after receiving notification by the Utility or designee, whichever date is later.
3. Final Performance Testing for Acceptance: Before acceptance for all new sanitary sewers, the Contractor and the Utility or designee shall check all sewers, even if previously checked, for accurate alignment and grade. Also, all sanitary sewers shall be tested as specified in Articles 3.10 through 3.14 of this Section for watertightness. The program of testing whether by infiltration,

exfiltration, air testing, or vacuum testing shall be determined by the Utility.

1.5 LENGTH OF OPEN TRENCH

Except by permission of the Utility or designee not more than 100 feet of trench shall be opened at any one time. Not more than 30 feet of trench may be opened in advance of the completed pipe laying operation, and not more than one street crossing may be obstructed by the same trench at any one time.

1.6 RELATION TO WATER MAINS AND STORM SEWERS

- A. All storm sewer crossings must be in accordance with the WPWD Standards Section 03500. Should specific conditions prevent this separation, the Contractor shall notify the WPWD for specific instructions regarding the treatment of the separation. Sanitary sewers must be laid at least 10 feet horizontally from any existing or proposed storm sewer and whenever the sanitary sewer crosses a storm sewer, it should be laid at least 18 inches below or above the main.
- B. All water main crossings must be in accordance with 327 IAC 3-6-9 and 327 IAC 8-3.2-9 and at least a 45 degree angle.
- C. Sewers must be laid at least 10 feet horizontally from any existing or proposed water main. The distance is to be measured outside edge to outside edge. Should specific conditions prevent this separation, the Contractor shall notify the WPWD for specific instructions regarding the treatment of the separation. Special conditions (existing conditions) may allow installation of the sewer closer to a water main, provided that the water main is in a separate trench or on an undisturbed earth shelf located on one side of the sewer and at an elevation so the bottom of the water main is at least 18 inches above the top of the sewer. It will be necessary to install 150 psi water main pipe and joints as sewer pipe for the congested areas.
- D. Whenever the sewer crosses a water main, it should be laid at least 18 inches below the main, or the water main should be relaid with fittings to cross over the sewer. The crossing shall be arranged so that the sewer joints will be equidistant and as far as possible from the water main joints. Any joints within a distance of 10 feet from either side of the crossing must be compression joints. All crossings must be at a minimum of 45 degrees from center lines of the sanitary sewer and the water main.
- E. When it is impossible to obtain proper horizontal and vertical separation as stipulated above, the sewer pipe shall be designed and constructed equal

to 150 psi water pipe, and shall be pressure tested to assure watertightness prior to backfilling. Maximum distance between sewer pipe joints and water pipe shall be provided where vertical separation is a problem.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. All pipe shall be a type approved by IDEM.
- B. Sewers 15 Inches or Smaller
 - 1. Sewers 15 inches in diameter or smaller shall be PVC composite pipe, polyvinyl chloride pipe or ductile iron pipe.
 - 2. PVC Composite Sewer Pipe and Fittings: PVC composite sewer pipe and fittings shall conform to ASTM D2680, latest revision.
 - 3. Polyvinyl Chloride Pipe and Fittings
 - a. PVC pipe and fittings shall conform to ASTM D3034 SDR 35 or 26 Type PSM, latest revision.
 - b. SDR 26 PVC pipe and fittings shall be used in depths exceeding 14 feet.
 - c. Maximum diameter of PVC sewer pipe to be used is 15 inches.
 - 4. Ductile Iron Pipe and Fittings: Ductile iron pipe and fittings shall conform to the requirements of ANSI/ASTM A746, Ductile Iron Gravity Sewer Pipe.
 - a. Thickness class requirements of ductile iron pipe to be used in conveyance of sanitary sewage by gravity shall be minimum thickness of Class 350 unless otherwise noted for standard length pipe.
 - b. Outside surfaces of the pipe and fittings shall be bituminous coated complying with ANSI/AWWA A21.51/C151 and ANSI/AWWA A2110/C110.
 - c. Inside surfaces of all pipes, fittings and adapters shall be lined with cement mortar and a bituminous seal coat. Cement mortar lining and bituminous seal coat shall meet the requirements of ANSI/AWWA A21.4/C104.

- d. Ductile iron pipe and fittings shall be push-on type conforming to ANSI A21.11 (AWWA C111), latest revision. Fittings shall be ductile iron and shall comply with ANSI Specification A21.10, latest revision, with mechanical joints for 150 psi working pressure.
 - e. Polyethylene encasement for ductile iron force mains shall be installed and shall meet the requirements of ANSI/AWWA C105/A21.5. Installation of the polyethylene encasement shall be omitted if written approval is made by the ductile iron pipe manufacturer and/or the Utility. Contractor/Developer shall be required to provide soils testing results for corrosivity at no additional charge to the Utility or designee if omission of the polyethylene encasement is proposed. All fittings and adapters shall be wrapped in a minimum of 3 mil or greater plastic.
5. Joints for PVC Sewer Pipe
- a. Joints on PVC sewer pipe shall be the integral bell type gasketed joint designed so that when assembled the elastomeric gasket inside the bell is compressed radially on the pipe spigot to form a positive seal. The joint shall be so designed to avoid displacement of the gasket when installed in accordance with manufacturer's recommendations. The joint shall comply with the physical requirements of ASTM D3212, and the gasket shall be the only element depended upon to make the joint flexible and watertight.
 - b. All PVC Pipe entering a manhole shall have a manhole waterstop gasket as supplied by the manufacturer firmly clamped around the pipe at the manhole.

C. Sewers Greater than 15 inches

- 1. Ductile Iron Pipe and Fittings: Ductile iron pipe and fittings shall conform to the requirements of ANSI/ASTM A746, Ductile Iron Gravity Sewer Pipe.
 - a. Thickness class requirements of ductile iron pipe to be used in conveyance of sanitary sewage by gravity shall be minimum thickness of Class 350 unless otherwise noted for standard length pipe.

- b. Outside surfaces of the pipe and fittings shall be bituminous coated complying with ANSI/AWWA A21.51/C151 and ANSI/AWWA A2110/C110.
- c. Inside surfaces of the entire pipe, fittings and adapters shall be lined with cement mortar and a bituminous seal coat. Cement mortar lining and bituminous seal coat shall meet the requirements of ANSI/AWWA A21.4/C104.
- d. Ductile iron pipe and fittings shall be push-on type conforming to ANSI A21.11 (AWWA C111), latest revision. Fittings shall be ductile iron and shall comply with ANSI Specification A21.10, latest revision, with mechanical joints for 150 psi working pressure.
- e. Polyethylene encasement for ductile iron force mains shall be installed and shall meet the requirements of ANSI/AWWA C105/A21.5. Installation of the polyethylene encasement shall be omitted if written approval is made by the ductile iron pipe manufacturer and/or the Utility. Contractor/Developer shall be required to provide soils testing results for corrosivity at no additional charge to the Utility or designee if omission of the polyethylene encasement is proposed. All fittings and adapters shall be wrapped in a minimum of 3 mil or greater plastic.

D. Fittings

- 1. Fittings such as wyes and bends shall be made in such a manner as will provide strength and watertightness at least equal to the class of the adjacent main line pipe to which they are jointed and shall conform to all other requirements specified for pipe of corresponding class and internal diameter. Joints shall be of the same type as used on the adjoining pipe.
- 2. Fabricated branches for wyes and tees shall be securely attached to the wall of the pipe in a watertight manner and shall be flush with the inside surface of the pipe. The branches shall have their axes perpendicular to the longitudinal axis of the pipe. Wye branches shall have their axes approximately 60 degrees for clay pipe and 45 degrees for concrete pipe from the longitudinal axis of the pipe, measured from the bell end. Pipe reinforcement shall not be interrupted beyond a radial distance of 3 inches outside of the fitting.

- E. Manholes and Other Structures: Manholes shall be constructed of monolithic concrete or precast manhole sections. Precast manhole sections shall conform to requirements of ASTM C478, latest revision.
1. Materials for manholes, junction chambers, diversion chambers, and miscellaneous concrete structures shall comply with the following:
 - a. Concrete for precast manhole sections shall be 3000 psi concrete. Monolithic manholes shall use 4000 psi concrete. Ready-mix concrete shall conform to ASTM C94 Alternate 2. Maximum size of aggregate shall be 1-1/2 inches. Slump shall be between 2 and 4 inches.
 - b. Forms for chamber and structures shall be plywood or other approved material. Steel forms shall be used for the inside face of monolithic concrete manholes.
 - c. Reinforcing steel shall conform to ASTM A615, Grade 40 deformed bars, or ASTM A616 and Grade 40 deformed bars.
 - d. Mortar Materials
 - (1) Sand - ASTM Designation C144, passing a No. 8 sieve.
 - (2) Cement - ASTM Designation C150, Type 1.
 - (3) Water - shall be potable.
 - e. All joints shall be fully sealed and waterproofed. Rubber gaskets for precast concrete manhole sections shall meet the requirements of ASTM C443. The gasket shall be the sole element depended upon to make the joint flexible and watertight.
 - f. The manufacturer of the precast manholes shall provide core-drilled openings to produce a smooth, uniform, cylindrical hole of the proper size to accommodate a resilient connector meeting the requirements of ASTM C923 for all sewers entering and leaving the manhole. The resilient connectors shall be either Press-Seal Gasket Corp., which provides PSX gasket or Press Wedge II; or similar flexible manhole sleeves furnished by Kor-N-Seal by NPG Systems, Inc.; or approved equal.

- g. Precast manhole sections shall be steam cured and shall not be shipped from the point of manufacture for at least five days after having been cast. The exterior surface of each section shall be thoroughly coated with a coal tar epoxy type coating as manufactured by TNEMEC Co, Tnemec-46H413 Hi-Build Tneme-Tar; or approved equal by the Engineer. Final dry mils thickness shall be a minimum of 12 mils. Monolithic concrete manholes and other concrete structures shall be cured for a minimum of seven days and then coated in the field with a coal tar epoxy type coating as mentioned above.
 - h. Manhole castings shall be of good quality cast iron and/or ductile iron, conforming to ASTM A48. Castings shall have a total weight of not less than 335 pounds and shall conform to the design of the manhole casting as shown on the standard detail sheet. Castings shall have three bolt holes equally spaced around base of frame and shall be securely anchored to cone section to provide a water tight-fit with three 3/8-inch stainless steel bolts with trowelable butyl wrapped in plastic. Unless specifically designated otherwise, manhole castings shall be the non-locking type.
 - i. Manhole steps shall be made from a steel reinforcing rod encapsulated in a copolymer polypropylene resin. The manhole steps shall equal or exceed OSHA requirements. Manhole steps manufactured by M. A. Industries, Inc., PS-1-PF, Clay & Bailey Mfg. Co., or approved equal, are acceptable.
 - j. Any other special manholes, junction chambers, diversion chambers, and miscellaneous concrete structures shall be constructed as detailed on the drawings.
 - k. Precast manhole sections shall have lifting eyes cast into the wall for lifting the section. Lifting holes through the precast section will not be allowed.
- F. Grease Trap: Grease trap tank shall be constructed of 6000 psi concrete, a minimum of 1,000 gallons, and located on the outside of the building. All tank joints shall be sealed watertight with butyl rubber extrudible preformed gasket material. All outside riser ring surfaces shall be waterproofed 1/8" with trowelable grade butyl rubber back plaster. The

Contractor shall provide a submittal to the Utility or designee on the specifications for the grease trap prior to construction.

PART 3 - EXECUTION

3.1 INSPECTION AND REJECTION OF PIPE

- A. The quality of all materials, the process of manufacture, and the finished pipe shall be subject to inspection and approval by the Utility or designee. Such inspection may be made at the place of manufacture or on the construction site after delivery, or at both places; and the pipe shall be subject to rejection at any time on account of failure to meet any of the specifications' requirements even though sample pipes may have been accepted as satisfactory at the place of manufacture.
- B. Prior to being lowered into the trench, each pipe shall be carefully inspected, and those not meeting the specifications shall be rejected and shall be removed from the construction site.
- C. Any pipe which is damaged, bleached, or deemed unsuitable by the Utility or designee will be rejected and replaced solely at the Contractor's expense.

3.2 HANDLING PIPE

- A. Each pipe section shall be handled into its position in the trench only in such manner approved by the Utility or designee. The Contractor will be required to furnish slings, straps, and other approved devices to permit satisfactory support of all parts of the pipe when it is lifted.
- B. Any fitting showing a crack and any fitting or pipe which has received a severe blow that may have caused an incipient fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the work.
- C. In any pipe showing a distinct crack and in which it is believed there is no incipient fracture beyond the limits of the visible crack, the cracked portion, if so approved, may be cut off by and at the expense of the Contractor before the pipe is laid so that the pipe used may be perfectly sound. The cut shall be made in the sound barrel at a point at least 12 inches from the visible limits of the crack.

- D. All cutting shall be done with a machine having steel cutters or knives adapted to the purpose. All cut ends shall be examined for possible cracks caused by cutting.

3.3 NOTICE OF CONSTRUCTION

The Utility and/or designee shall be notified 48 hours in advance when the pipes are to be laid in the trench. At least 15 feet of the pipe shall, under ordinary circumstances, be laid before covering begins.

3.4 LAYING PIPE

- A. All pipes shall be reinspected 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.
- B. All pipes shall be laid accurately to the required line and grade as shown on the drawings, and in the manner prescribed by the pipe manufacturer and appropriate ASTM Specifications, to form a close, concentric joint with the adjoining pipe and to bring the invert of each section to the required grade. The supporting of pipe on block will not be permitted.
- C. Pipe laying shall proceed upgrade, beginning at the lower end of the sewer.
- D. All sewers shall be designed and constructed to give mean velocities, when flowing full, of not less than 2.0 feet per second (0.6 m/s), based on Manning’s formula using an “n” value of 0.013. The following are the recommended minimum slopes which should be provided; however, slopes greater than these are desirable. Refer to 327 IAC 3-6-12 for anchoring requirements for extremely steep slopes.

Nominal Sewer Size		Minimum Slope in Feet Per 100 Feet (m/100m)
8 inch	(200 mm)	0.40
10 inch	(250 mm)	0.28
12 inch	(300 mm)	0.22
14 inch	(350 mm)	0.17
15 inch	(375 mm)	0.15
16 inch	(400 mm)	0.14
18 inch	(450 mm)	0.12
21 inch	(525 mm)	0.10
24 inch	(600 mm)	0.08
27 inch	(675 mm)	0.067
30 inch	(750 mm)	0.058

Nominal Sewer Size		Minimum Slope in Feet Per 100 Feet (m/100m)
33 inch	(825 mm)	0.052
36 inch	(900 mm)	0.046
39 inch	(975 mm)	0.041
42 inch	(1050 mm)	0.037

- E. Watertight work in conformance with 327 IAC 3 is required, and the Contractor shall construct the sewers with the type of joint specified therein.
- F. All pipes shall be laid to the line and grade as shown on the drawings. Variations from a uniform line and grade as shown on the drawings shall be cause for the line to be rejected. Do not lay pipe in water or when the trench or weather conditions are unsuitable for proper installation.
- G. Every pipe and fitting shall be cleaned of all debris, dirt, and other foreign material before being laid, and shall be kept clean until accepted in the completed work. When bell and spigot pipe is laid, the bell of the pipe shall be cleaned of tar or other obstruction and wiped out before the clean spigot of the next pipe is inserted into it. The joint shall be made in a satisfactory manner in accordance with the recommendations of the manufacturer on particular type of joint. All joint work shall be done by experienced workmen.
- H. PVC (polyvinyl chloride) gravity sewer pipe and fittings, ASTM D3034 SDR 35, shall be installed in accordance with the directions contained in ASTM D2321. Only materials classified as Class I will be acceptable for bedding, haunching, and initial backfill of the pipe placed and compacted in accordance with ASTM D2321.
- I. Joints on PVC pipe shall be the integral bell type gasketed joint designed so that when assembled the elastomeric gasket inside the bell is compressed radially on the pipe spigot to form a positive seal. The joint shall be so designed to avoid displacement of the gasket when installed in accordance with the manufacturer's recommendations. The gasket shall be the only element depended upon to make the joint flexible and watertight.
- J. All PVC pipe entering a manhole shall have manhole waterstop gasket as supplied by the manufacturer firmly clamped around the pipe.
- K. All PVC pipe shall have a deflection test performed by the Contractor 30 days after the last stick of pipe has been placed in the presence of the Utility or designee.

- L. All pipe shall be bedded as described in this specification under Pipe Bedding. Bell holes shall be excavated in advance of pipe laying so the entire pipe barrel will bear uniformly on the prepared subgrade.
- M. Each length of pipe shall be mechanically pulled "home" with a winch or come-along against the section previously laid and held in place until the trench and bedding are prepared for the next pipe section. Care shall be taken in laying the pipe so not to damage the bell end of the pipe. Mechanical means consisting of a cable placed inside the pipe with a winch, jack, or come-along shall be considered to pull the pipe home where pushing the pipe will not result in a joint going completely home and staying in place. Pushing the pipe home shall be done by means of a block and push bar. Use of hydraulic excavating equipment as the means of pushing or moving the pipe to grade will not be permitted.
- N. The Contractor shall use laser beam equipment to maintain accurate alignment and grade. A qualified operator shall handle the equipment during the course of construction. If bending of the laser beam due to air temperature variations or dust in the air is apparent "within the pipe" units, a fan shall be provided to circulate the air. However, air velocity shall not be so excessive as to cause pulsating or vibrating of the beam. Survey instruments may be used for checking alignment and grade if questions arise about the accuracy of the work.
- O. Open excavation shall be satisfactorily protected at all times. At the end of each day's work, the open ends of all pipes shall be protected against the entrance of animals, earth, or debris by bulkheads or stoppers. The bulkheads or stoppers shall be perforated to allow passage of water into the installed pipe line to prevent flotation of the pipe line. Any earth or other material that may find entrance into the main sewer or into any lateral sewer through any such open end of unplugged branch must be removed at the Contractor's expense.
- P. The Contractor shall conduct a leakage test as described in Sewer Tests of the specification on the first section of sewer of each size and type sewer material installed. No additional sewer pipe shall be installed until the first reach of sewer of each size and each type sewer material has satisfactorily passed the leakage test.
- Q. The Contractor shall prevent all ground water and surface water from entering the existing sewer system during construction of a new sewer or force main extension.

- R. Sanitary sewer designs that require crossing a county legal drain shall be approved and constructed per the latest standards of the Hamilton County Surveyor's Office.
- S. Sanitary sewers shall be covered with at least a foot of bedding material and thirty six (36) inches of approved backfill material.
- T. At least 15 feet of the pipe shall, under ordinary circumstances, be laid before backfilling begins.

3.5 PIPE BEDDING AND HAUNCHING

- A. Each pipe section shall be laid in a firm foundation of bedding material and haunched and backfilled with care.
- B. Prior to pipe installation, carefully bring bedding material to grade along the entire length of pipe to be installed. To provide adequate support for the pipe, the following bedding procedures are recommended.
 - 1. When Class I material is used for bedding, little or no compaction is necessary due to the nature of the angular particles. A depth of 6 inches is generally sufficient to provide uniform bedding.
- C. Bedding material shall have a minimum thickness beneath the pipe of 6 inches or one-eighth of the outside diameter of the pipe, whichever is greater, and shall extend up the sides of the pipe one-sixth of the outside diameter of the pipe.
- D. For rigid pipe, such as ductile iron, backfill between the bedding material and a plane 12 inches over the top of the pipe shall be granular backfill.
- E. For flexible pipe such as PVC, the placement of embedment material, consisting of bedding, haunching, and initial backfill, must be done with care. The ability of the pipe to withstand loading in a trench depends a large part on the method employed in its installation. Class I material, as defined in specification Section 02222, Article 2.1, paragraph A, shall be used as embedment material for flexible pipe. Bedding thickness shall be as specified in paragraph C of this Section. The haunching material (the material from the bedding to the pipe springline) and initial backfill (the material from the pipe springline to a plane 12-inches over the top of pipe), shall be hand placed. Care must be taken to not cause damage by compacting the material directly over the pipe.

- F. In yielding subsoils, the trench bottom shall be undercut to the depth necessary and backfilled with graded, crushed stone to form a firm foundation.
- G. Where excavation occurs in rock or hard shale, the trench bottom shall be undercut and a minimum of 6 inches crushed stone bedding placed prior to pipe installation. Additional payment for rock excavation shall be made on "unit cost" projects only, and as prescribed under basis for payment.

3.6 MANHOLES AND OTHER STRUCTURES

- A. Manholes shall meet all requirements of 327 IAC 3-6-16.
- B. Manholes and other structures are to be constructed at locations shown on the drawings and in accordance with the following specifications:
 - 1. Precast concrete manhole sections shall conform to ASTM C478, except as modified herein:
 - a. The joint design of the precast sections shall consist of a bell or groove on one end of the unit of pipe and a spigot or tongue on the adjacent end of the joining section.
 - b. The joint shall consist of a round rubber gasket confined in a groove in the spigot end of the precast manhole section and shall conform to Sections 6.1.6, 6.1.7 and 9 of ASTM C443, latest revision and a 6 inch wide flexible butyl rubber joint sealant between the outside joints. Inside manhole joints are to be sealed with hydroplug or non-shrink grout and brushed smooth.
 - 2. Openings in manhole sections for sewer connections shall be core-drilled at the point of manufacture and shall be done to produce a smooth, uniform, cylindrical hole of proper size to accommodate a resilient connector meeting requirements of ASTM C923. The resilient connectors shall be either Press-Seal Gasket Corp., PSX Gasket or Press-Wedge II; or similar flexible manhole sleeves furnished by Kor-N-Seal by NPC Systems, Inc.; or approved equal.
 - 3. Manhole bases shall be cast-in-place concrete, reinforced as shown on the Standard Detail Sheet, or monolithic base and first section combination. Manhole bases shall be cast or placed on a minimum of 6 inches of compacted crushed stone.

4. Manhole channels or inverts shall be preformed and poured with Class "B-1" concrete to the spring line of the connecting pipe. The finished invert shall be a semi-circular shaped smooth channel directing the flow to the downstream sewer.
5. Monolithic concrete manholes, junction chambers, and other cast-in-place concrete structures shall be cured for a minimum of seven days. The exterior surfaces shall then be coated thoroughly with a coal tar epoxy type coating as manufactured by TNEMEC Co., Tneme-46H413 Hi-Build Tneme-Tar; or approved equal by the Utility. Coating shall be 12 mil minimum dry film thickness. Each joint of precast concrete manhole sections, lifting holes, and holes left by the removal of cores shall be fully mortared and shall be coated with a 12 mil minimum dry film thickness of coal tar epoxy as specified upon reaching its final set.
6. Any additional holes cut in the field shall be drilled with a core-drill or in a manner approved by the Utility or designee.
7. Manhole frames and lids shall weigh not less than 335 pounds and be of good quality cast iron, conforming to ASTM A48. Unless specifically designated otherwise, manhole castings shall be the non-locking type. All manhole frames shall be cast with three holes equally spaced around base of frame and shall be securely anchored to cone section with three 3/8-inch stainless steel bolts, nuts, and washers. The joint between the casting frame and cone section shall be first sealed with cement mortar and then coated with a pliable butyl rubber or a coal tar epoxy coating upon reaching its final set to become a watertight joint.
8. Manhole steps shall be made from a steel reinforcing rod encapsulated in a copolymer polypropylene resin. Steps shall be placed as shown on the approved drawings.

3.7 HOUSE/BUILDING SERVICES

- A. The Contractor shall install 6-inch diameter house/building service sewer shall be installed as shown on the Standard Detail Sheet. The house/building service shall extend from a "wye" or "tee" fitting in the main sewer line to the property line or easement line, unless stated otherwise. Tapping into manholes for laterals shall not be permitted.
- B. A backwater prevention valve shall be provided for each sanitary sewer lateral. The backwater prevention valve shall be located outside the

structure and readily accessible at all times. The backwater prevention valve shall be a clean-out/check valve per detail S-13.

- C. The Contractor shall contact the individual property owners for the preferred location of the house/building service to best suit the property owner's needs. If the Contractor is unable to contact the property owner in advance of laying the main sewer by or across the property, the Contractor shall so notify the Utility or designee in writing.
- D. Fittings for house/building service connections on a main line sewer 15 inches in diameter or smaller shall be tees or 45-degree wyes and shall be of the same material as the main line sewer, unless otherwise approved by the Utility.
- E. House/building services and connections on main line sewers greater than 15 inches in diameter shall be of a type that will maintain the structural integrity of the main line sewer and provide a watertight connection. Intrusion of house/building services into the flow way of the main line sewer shall not be permitted.
- F. Six-inch lateral pipe shall connect to the main line sewer at an angle of 15 degrees to 45 degrees from the spring line and shall include the necessary bends and straight pipe sections to reach the property line at the elevations specified. A pipe stopper or a bell cap shall be placed on/in the last bell. This stopper or bell cap should be compatible with the type of infiltration/exfiltration test performed on the sewer.
- G. The Contractor shall furnish and use the proper fittings, couplings, and adapters suited to make the transition between different pipe materials which will maintain the structural integrity and the watertightness of the entire sewer system.
- H. At the discretion of the Utility, when and where improper installation practices are suspected or questionable bedding materials and methods are employed, or where the installations are severe, the Contractor will have to perform deflection testing on the 6 inch house laterals as specified in Article 3.9.
- I. Backfill around fittings and lateral pipe shall be carefully placed and compacted to prevent damage from backfill settlement and shall be installed in same manner as described for sewer installation.
- J. The Contractor shall keep accurate horizontal and vertical location measurements of each house/building service installed. The location of all house/building services shall be shown on digital as-builts as described in

Section 01001, Article 1.14. The accuracy of the measurements shall be the Contractor's responsibility.

3.8 STUBS, CONNECTIONS, BULKHEADS, AND MISCELLANEOUS ITEMS OF WORK

- A. Where special junction chambers are to be constructed or where existing sewers carrying sanitary sewage are encountered, the Contractor shall provide and maintain temporary connections to prevent a nuisance.
- B. Where called for shop connections and stubs for future sewer connections shall be provided.
- C. New sewer main connections to existing manholes shall be core drilled in to the existing structure and providing a watertight connection.
- D. The Contractor shall not connect any existing sewers or house/building services prior to the completion of the exfiltration/infiltration tests, air tests, and acceptance of the sewer without the permission of the Utility.
- E. Dog house manholes will not be permitted.

3.9 VERTICAL DEFLECTION TESTING

For PVC pipe, the entire length of installed mainline pipe shall be tested for acceptance with an approved go-no-go mandrel under the observation of the Utility or designee. The testing shall be conducted after the final backfill has been in place for at least 30 days. No pipe shall exceed a deflection of 5%. The deflection test shall be run using a mandrel having a diameter equal to 95% of the inside diameter of the pipe in accordance with ASTM D3034 Appendixes. The pipe shall be measured in compliance with ASTM D2122. All pipe exceeding the allowable deflection shall be replaced, repaired, and retested.

3.10 INFILTRATION LIMITS

- A. Maximum infiltration/exfiltration limits for all new sanitary sewers shall not exceed 200 gallons per inch of diameter per mile of pipe per 24 hours for any section of the system. All sections of the sewer shall be tested, and any sections not meeting this infiltration standard shall be repaired and retested.
- B. The Contractor shall note the special provision under Article 3.4, Paragraph P, that the first section of sewer of each size and type of sewer shall be given a satisfactory leakage test before proceeding with any additional construction.

3.11 SEWER WATERTIGHTNESS TESTING

- A. Infiltration testing must be performed in accordance with 327 IAC 3-6-19.d. Tests for watertightness shall be conducted on all installed sewers in the presence of and in the manner accepted by the Utility or designee. The Contractor shall furnish and install all equipment necessary for the sewer tests.
- B. Watertightness tests shall be conducted on short sections of the sewer as soon as the manholes have been constructed and the backfilling completed.
- C. Where the section tested is in excess of the allowable limits, the Contractor shall correct the construction of the sewer so that the section tested is within the allowable limit. All methods and materials used in the repair shall be approved by the Utility or designee.
- D. The program of testing shall fit the conditions as determined by the Utility or designee using Air Test for Leakage. When ductile iron pipe with push-on type joints are used for sewer construction, a hydrostatic pressure test shall be performed.

The existing or lowest manhole shall have a monitoring well installed to the depth of the bottom of the pipe for the purposes of measuring ground water elevation.

Immediately before air testing, the ground water level shall be determined by the use of the monitoring well.

Alternate groundwater monitoring methods shall require the prior written approval of the Utility.

- 1. The Air Test for Leakage
 - a. The air test for leakage shall be used to test sewer watertightness on all sewer pipes unless otherwise noted.
 - b. The ends of the sewer section being tested shall be sealed and properly blocked. The seal at one end shall have an orifice through which to pass air into the pipe. An air supply shall be connected to the orifice at one end of the section. The air supply line will contain an off-on gas valve and a pressure gauge having a range from 0 to 25 psi. The gauge shall have minimum divisions of 0.10 psi and shall

have an accuracy of the nearest ± 0.1 psi. The seals at each manhole shall be properly blocked to prevent displacement while the line is under pressure.

2. Procedure for Conducting a Low Pressure Air Test
 - a. Clean pipe to be tested by propelling a snug fitting inflated ball through the pipe by water pressure or other adequate method. This step is important because it not only flushes out construction debris but the water used to flush the pipe dampens the pipe wall. The rate of air loss through pipe wall permeation can be significant on dry pipes.
 - b. Plug all pipe outlets with pneumatic plugs having a sealing length equal to or greater than the diameter of the pipe to be tested. The pneumatic plug shall be able to resist internal testing pressures without requiring external bracing.
 - c. The groundwater level surrounding the section of sewer under testing shall be determined by one of the procedures previously outlined in paragraph D. If the groundwater table is above the pipe, then test pressures shall be increased by the corresponding increment (e.g., if the groundwater table is above the lowest crown of the pipe, the air pressure should be increased 0.433 times each foot of water.)
 - d. Once the pipe outlet plugs are securely in place, pressurized air is introduced to the system. The air shall be fed through a single control panel with three individual hose connections as follows:
 - (1) from control panel to pneumatic plugs for inflation in sewer pipe;
 - (2) from control panel to sealed line for introducing the pressurized air;
 - (3) from sealed line to control panel. This line will enable continuous monitoring of the air pressure rise in the sealed line.
 - e. The air shall be introduced slowly to the section of pipe under evaluation until the internal air pressure is raised to 7.0 psig greater than the hydrostatic pressure head created by the existence of groundwater that is over the pipe section.

- f. A minimum of two minutes shall be provided for the air pressure to stabilize to conditions within the pipe. (This stabilization period is necessary for variations in temperature to adjust to the interior pipe conditions.) Air may be added slowly to maintain a minimum pressure of 7.0 psig for at least two minutes.
- g. After the stabilization period, when the pressure reaches exactly 7.0 psig, the stopwatch shall be started; and when the pressure reaches 6.0 psig, it is stopped. The portion of the line being tested shall be acceptable if the time in minutes for the air pressure to decrease from 7.0 psig to 6.0 psig is greater than the time shown in the following table:

<u>Pipe Diameter (Inches)</u>	<u>Time (Minutes)</u>
4	2.0
6	3.0
8	4.0
10	5.0
12	5.5
15	7.5
18	8.5
21	10.0
24	11.5

- h. In areas where the groundwater is above the top of the pipe, the test pressures shall be increased by 0.433 per foot of groundwater (e.g., if the groundwater is 11-1/2 feet, the 7.0 to 6.0 pressure drop will be increased by 5 psi; the time then will be measured for a pressure drop from 12.0 psi to 11.0 psi.)

3. Safety Precautions During Air Test

- a. The air test may be dangerous if, because of ignorance or carelessness, a line is improperly prepared. It is extremely important that the various plugs be installed and braced in such a way as to prevent blowouts. Inasmuch as a force of 250 pounds is exerted on an 8-inch plug by an internal pipe pressure of 5 psi, it should be realized that sudden expulsion of a poorly installed plug or of a plug that is

partially deflated before the pipe pressure is released can be dangerous.

- b. As a safety precaution, pressurizing equipment should include a regulator set at perhaps 10 psi to avoid over-pressurizing and damaging an otherwise acceptable line. No one shall be allowed in the manholes during testing.

3.12 HYDROSTATIC TESTING

- A. A hydrostatic test on ductile iron pipe with push-on type joints has two purposes: one is to set the gaskets in place, and the other is to provide a leakage test.
- B. Said test shall include all ductile iron sewer pipes with push-on type joints installed by the Contractor. The Contractor shall make arrangements with the Utility and/or designee for scheduling the test after the sewer pipe has been accepted as being ready for testing. The test shall be performed in the presence of the Utility and/or designee on the day mutually agreed upon.
- C. Water for testing may be obtained from the Utility or designee. The cost of the water supplied for such testing is to be paid by the Developer. The Contractor shall furnish all necessary equipment, piping, pumps, fittings, gauges, and operating personnel to properly conduct the test.
- D. Hydrostatic test on ductile iron pipe with push-on type joints installed as gravity sewers and siphons shall be in accordance with the following provisions:
 1. The ends of the sewer section being tested shall have test plugs or caps adapted with a tap of adequate diameter to fill and pressurize the system with water.
 2. When a section is terminated at a manhole with a plain end (spigot), the pipe must extend into the manhole of sufficient length to accommodate a restraining cap. The benchwall shall be formed in the manhole after the test section has been approved.
 3. Water shall be introduced into the section to be tested at the lower end. The upper end shall have an orifice at the top of the plug or cap to expel air when filling the system with water. All air shall be expelled from the pipe.

4. The test plugs or caps shall be capable of withstanding an internal pressure of 175 psi.
 5. The system shall be tested in conformance with Section 13 of AWWA Specifications 600, at 50 pounds per square inch over a period of not less than one hour. The system will not be acceptable until all leaks have been repaired.
 6. Hydrostatic test may be dangerous if, because of ignorance or carelessness, a line is improperly prepared. It is extremely important that the various plugs be installed in such a way as to prevent blowouts. Inasmuch as a force of 2500 pounds is exerted on an 8-inch plug by an internal pipe pressure of 50 psi, it should be realized that sudden expulsion of a poorly installed plug or cap can be dangerous. As a safety precaution, no one shall be allowed in the manholes when the pipe is pressurized.
- E. A hydrostatic test on ductile iron pipe with push-on type joints installed as force main shall be in accordance with Article 3.12, paragraph D., with the following exception:
1. The force main shall be subjected to an internal pressure equal to 50% more than the maximum operating pressure, but in no case less than 50 psig or greater than 120 psig.

3.13 MANHOLE VACUUM TESTING

- A. A vacuum test shall be conducted by the Contractor on all manholes to ensure watertightness and manhole integrity.
- B. The equipment required to conduct a vacuum test on manholes includes inflatable pipe plugs, test head, vacuum pump, flexible air hose, and a vacuum gage. The test equipment shall be capable of drawing a vacuum of 10 inch Hg. The equipment shall be designed specifically for the purpose of testing manholes and shall be as manufactured by P.A. Glazier, Inc., Worcester, Massachusetts 10002, or approved equal.
- C. The procedure for conducting an air test on manholes shall be in accordance with these specifications and ASTM C1244-05a. :
 1. Each manhole shall be tested after assembly and once the casting or backfilling has occurred around the structure.
 2. All lift holes shall be plugged with non-shrink grout.

3. All pipes entering the manhole shall be securely plugged and adequately braced against the inside of the manhole to prevent being drawn out of the pipe.
4. A vacuum of 10 inches of mercury (Hg) shall be drawn, the vacuum line closed, and the vacuum pump shut off. With the valves closed, the time shall be measured for the vacuum to drop to 9 inches. The manhole shall pass if the time is greater than the following:

Minimum Test Times for Various Manhole Diameters in Seconds
ASTM C1244-05a

Depth, ft.	Diameter, in.								
	48	54	60	66	72	78	84	90	96
<4	10	12	13	15	16	18	19	21	23
6	15	18	20	22	25	26	29	31	34
8	20	23	26	29	33	35	38	41	45
10	25	29	33	36	41	44	48	52	56
12	30	35	39	43	49	53	57	62	67
14	35	41	46	51	57	62	67	72	78
16	40	46	52	58	67	70	76	83	89
18	45	53	59	65	73	79	86	93	100
20	50	53	65	72	81	88	95	103	111
22	55	64	72	79	89	97	105	114	122
24	59	64	78	87	97	106	114	124	133
26	64	75	85	94	105	114	124	134	144
28	69	81	91	101	113	123	133	145	155
30	74	87	98	108	121	132	143	155	166

3.14 CLOSED CIRCUIT TELEVISION INSPECTION

- A. All sections of sanitary sewers shall be cleaned and flooded prior to insertion of televising equipment to be inspected by closed circuit television.
- B. All unacceptable conditions found during television inspection must be corrected by the Contractor and re-televised.
- C. Unacceptable conditions are conditions that adversely affect the ability of the system to function as designed or to be properly maintained and may include, but are not limited to, the following:
 1. Protruding taps
 2. Cracked or faulty pipe
 3. Misaligned or deformed pipe

4. Debris in line
5. Infiltration / exfiltration
6. Excessive gaps at joints
7. Bellies or sags with a depth greater than or equal to 10% (or a maximum of 1-1/2 inches) of pipe diameter and/or a length greater than 25 feet.

D. See Specification Section 02750 Sewer Televising for procedures.

3.15 DIGITAL AS-BUILTS/RECORD DRAWINGS

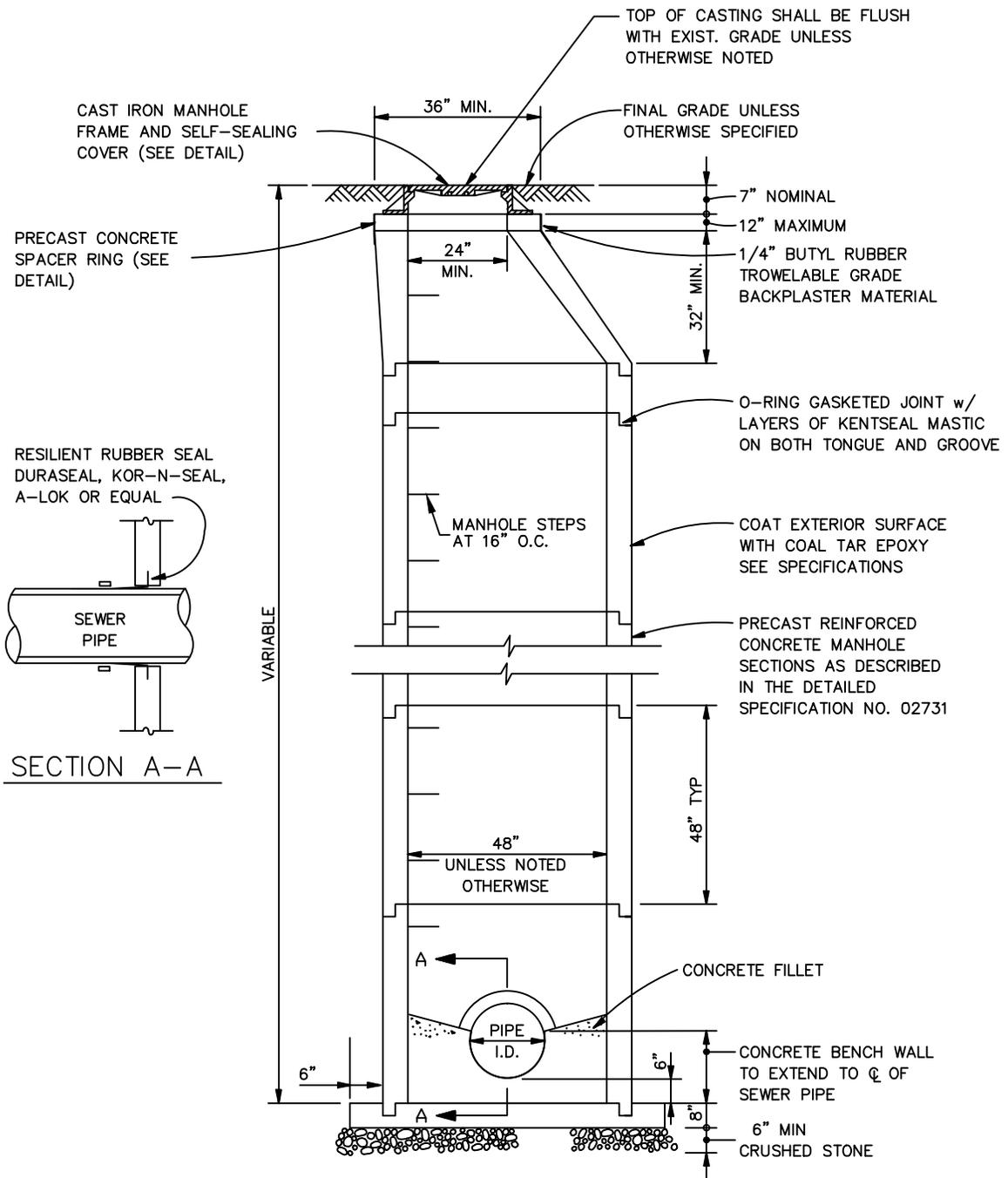
- A. The Developer shall prepare or be responsible for the preparation and submittal of digital as-builts in state plane coordinates as described in Section 01001, Article 1.14.

PART 4 - FIGURES

4.1 STANDARD DETAILS

<u>Figure</u>	<u>Description</u>
S-1	Standard Sanitary Manhole Detail
S-2	Standard Sanitary Manhole Spacer Ring Detail
S-3	Standard Sanitary Manhole Frame and Cover Details
S-4	Force Main Discharge Detail
S-5	Sewer Pipe Bedding Details
S-6	Concrete Encasement Detail
S-7	Drop Pipe Details
S-8	Alternate Drop Pipe Details
S-9	Jacking and Boring Detail
S-10	House/Building Service Connection Detail-1
S-11	House/Building Service Connection Detail-2
S-12	House/Building Service Bedding Detail
S-13	House/Building Service Clean-out/Check Valve Detail
S-14	Grease Trap Detail
S-15	Type 2 Clean-out Detail
S-16	Closed Bottom Air/Vacuum Release Manhole Detail

END OF SECTION 02731



STANDARD SANITARY MANHOLE DETAIL

CITY OF WESTFIELD, INDIANA



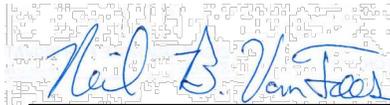
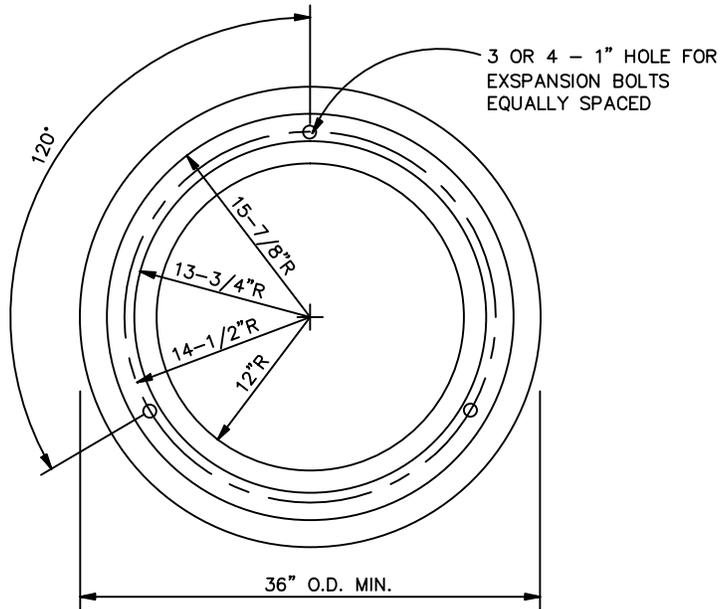
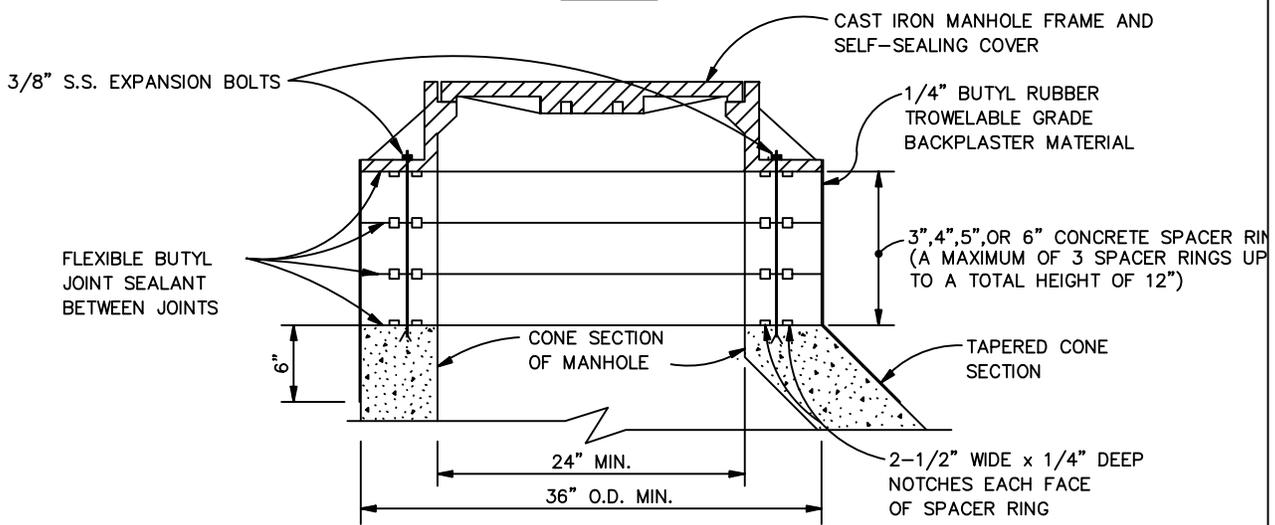

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FIGURE S-1



PLAN



SECTION

STANDARD SANITARY MANHOLE SPACER RING DETAIL



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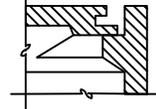
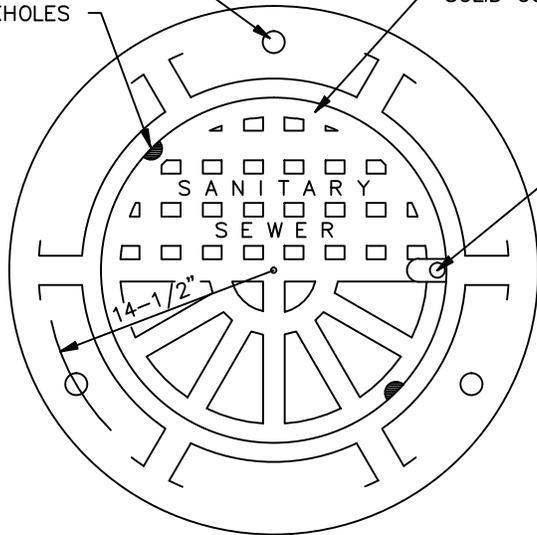
FIGURE S-2

THREE 3/8" S.S.
EXPANSION
BOLTS, EQUALLY SPACED
120° APART

TWO CONCEALED
PICKHOLES

SOLID COVER

COVER BOLT ONLY IN FLOODWAY
SEE NOTE 2



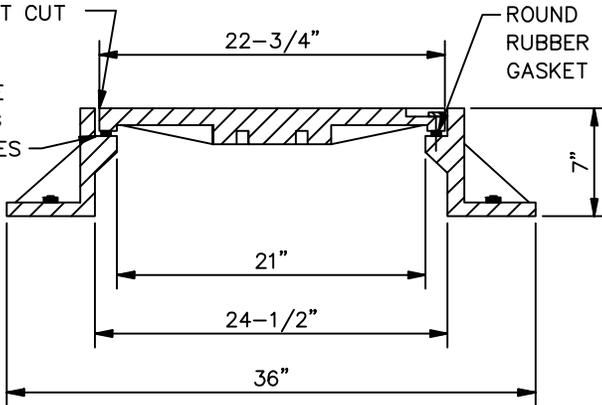
PICKHOLE
DETAIL
NO SCALE

PLAN

VERTICAL
BEARING
STRAIGHT CUT

MACHINE
BEARING
SURFACES

ROUND
RUBBER
GASKET



SECTION

NOTES:

1. TOTAL WEIGHT OF FRAME AND LID = 335 lbs (MIN)
TYPE 1 SELF SEALING COVER IS NOT BOLTED TO FRAME AND SHALL BE USED UNLESS TYPE 11 IS SPECIFICALLY INDICATED
2. TYPE 11 SELF SEALING COVER IS BOLTED TO FRAME WITH FOUR 1/2" BRONZE HEXAGONAL HEAD COUNTERSUNK BOLTS
3. CASTING SHALL BE CATALOG NO. 1022-2 AS MANUFACTURED BY EAST JORDAN IRON WORKS, INC. OR NEENAH R-1772-C AS MANUFACTURED BY NEENAH FOUNDRY.

STANDARD SANITARY MANHOLE
FRAME AND COVER DETAILS

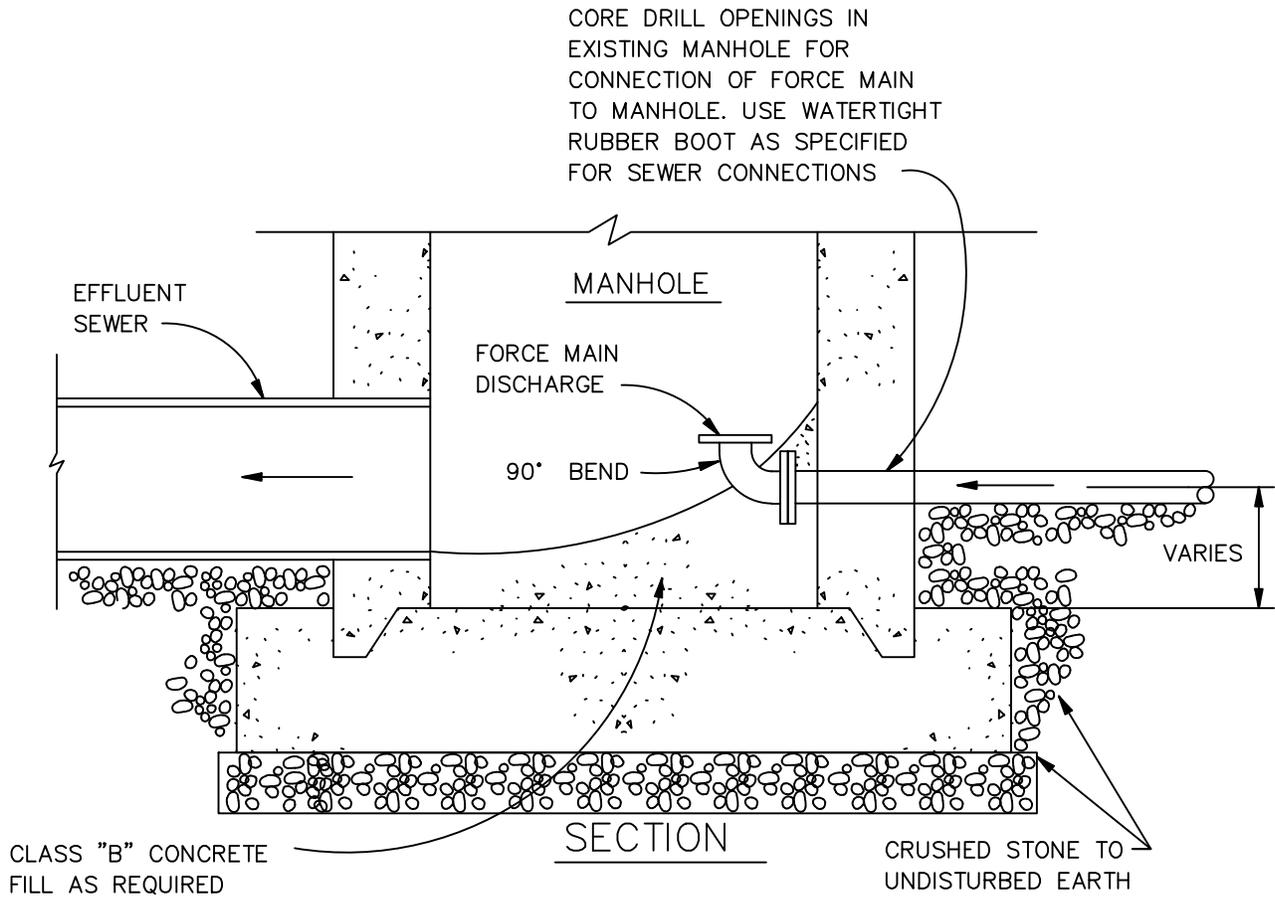


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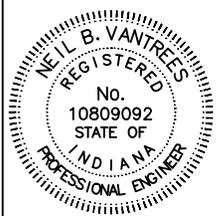
4/1/14
DATE

FIGURE S-3



*AFTER INSTALLATION MANHOLE TO BE LINED WITH SPECTRA TECH

FORCE MAIN DISCHARGE DETAIL

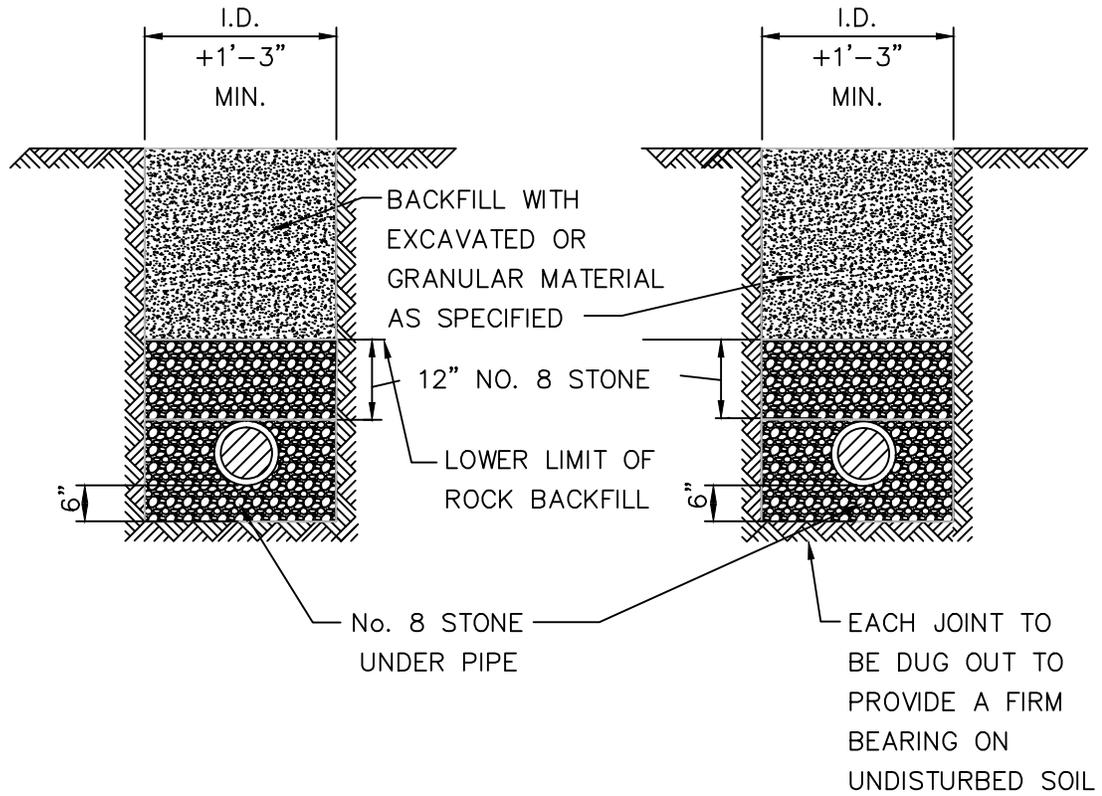


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FIGURE S-4



ROCK EXCAVATION

EARTH EXCAVATION

NOTES:

THIS DETAIL SHALL APPLY TO ALL SANITARY SEWER PIPE
 ALL STONE TO BE INDOT CLASS 1 STONE

SEWER PIPE BEDDING DETAIL

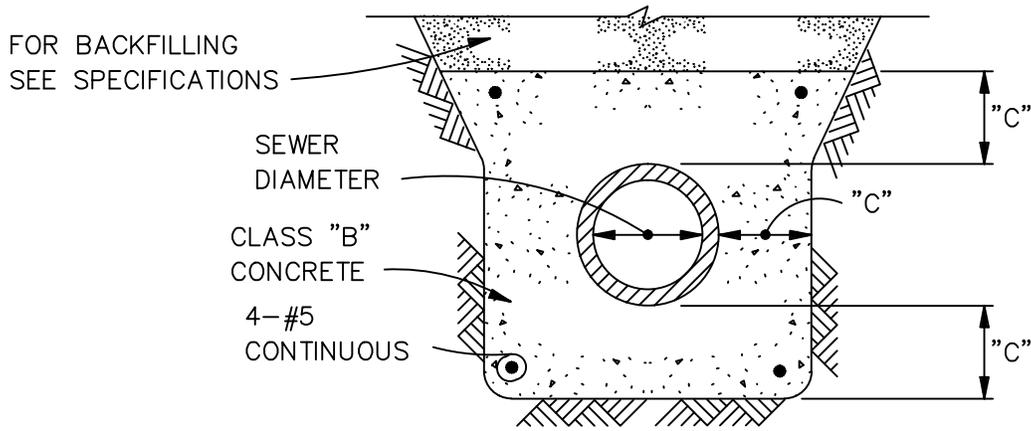


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FIGURE S-5



NOTE:

"C" = 6" MINIMUM
OR AS INDICATED
ON THE PLANS.

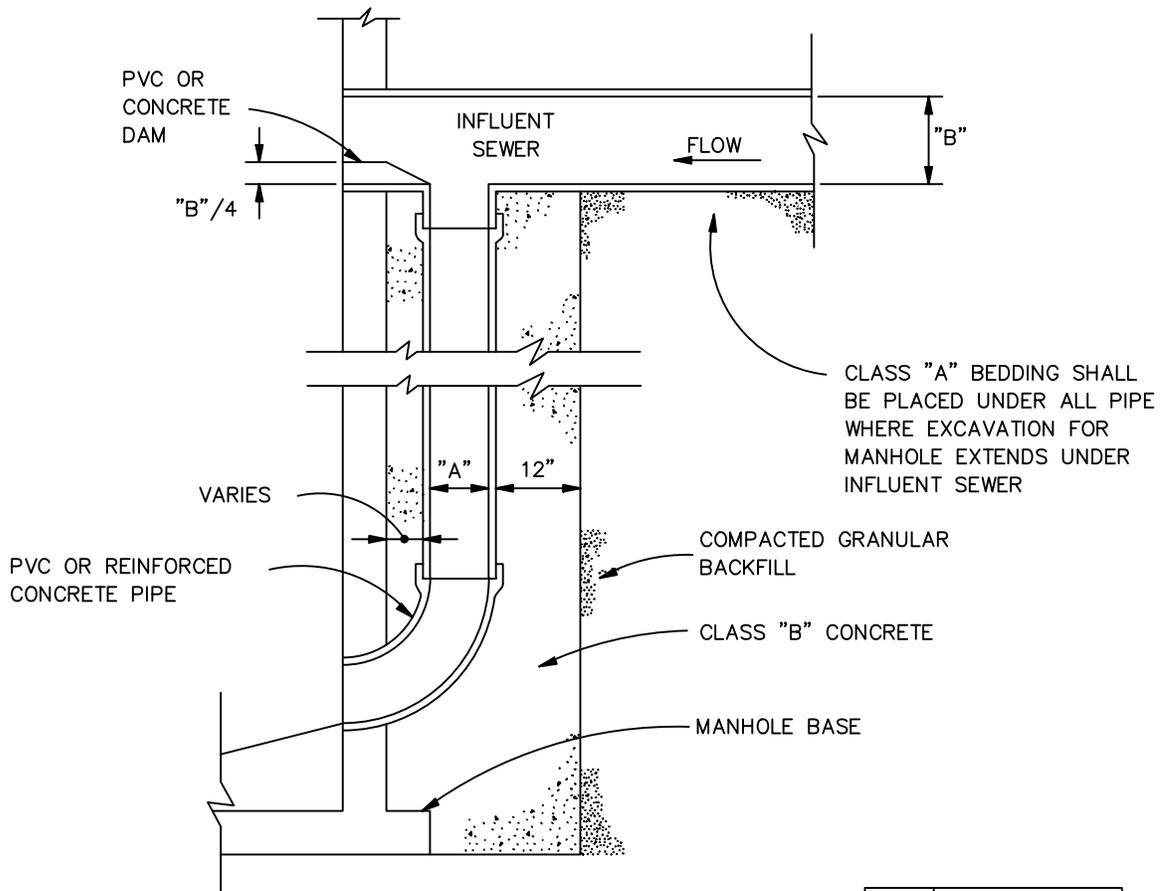
CONCRETE ENCASEMENT DETAIL



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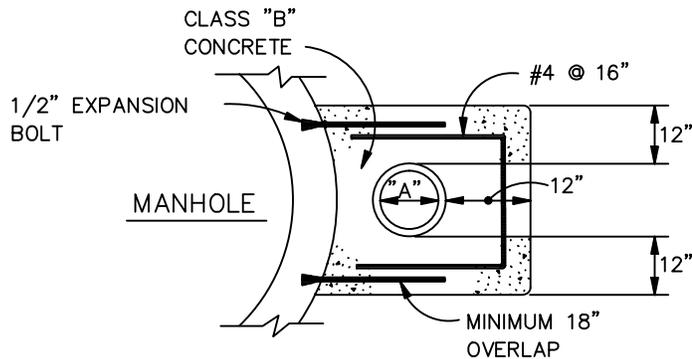
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FIGURE S-6



SECTION

"A"	"B"
8"	21" OR LESS
12"	24" TO 36"



SECTION PLAN

DROP PIPE DETAILS

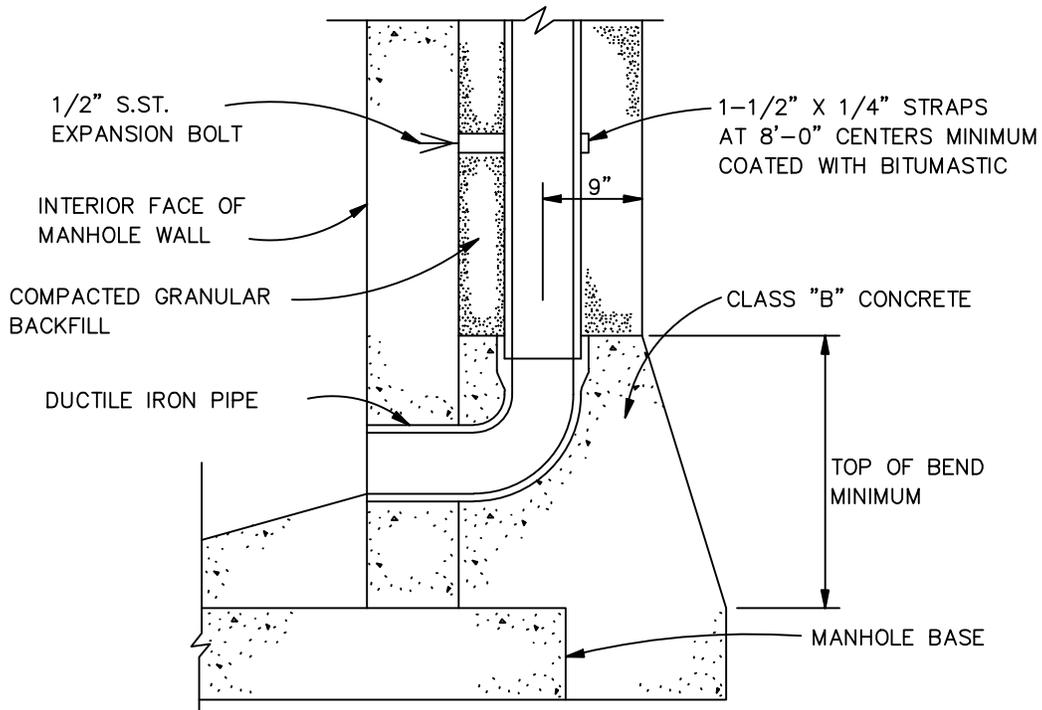


CITY OF WESTFIELD, INDIANA

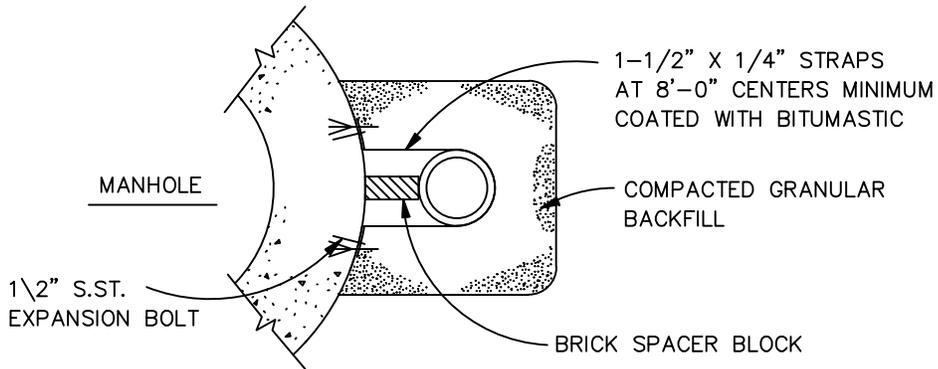
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FIGURE S-7



SECTION



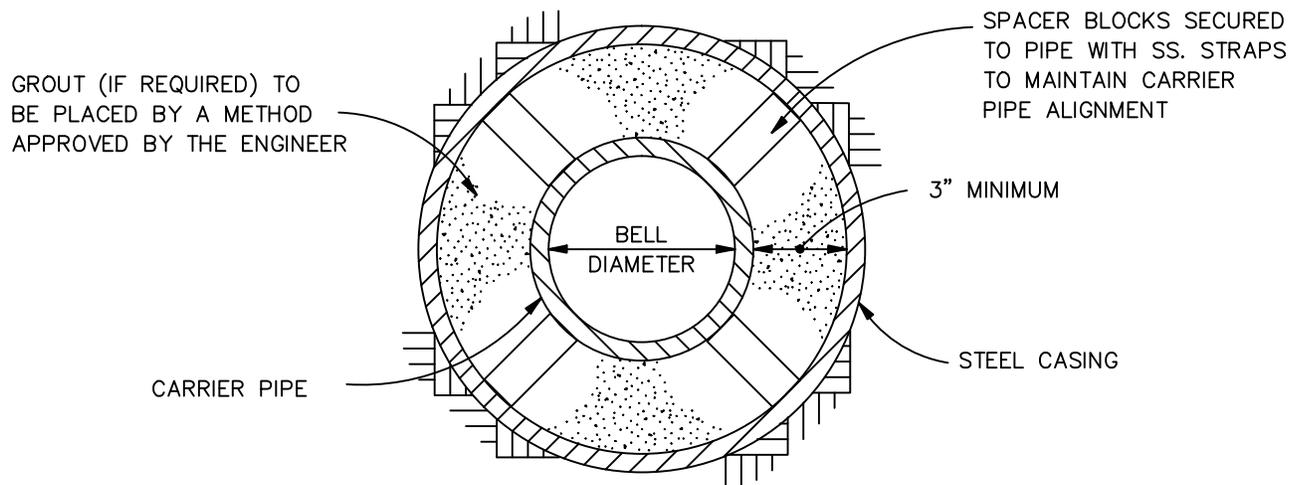
SECTIONAL PLAN

ALTERNATE DROP PIPE DETAILS



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DATE



JACKING AND BORING DETAIL



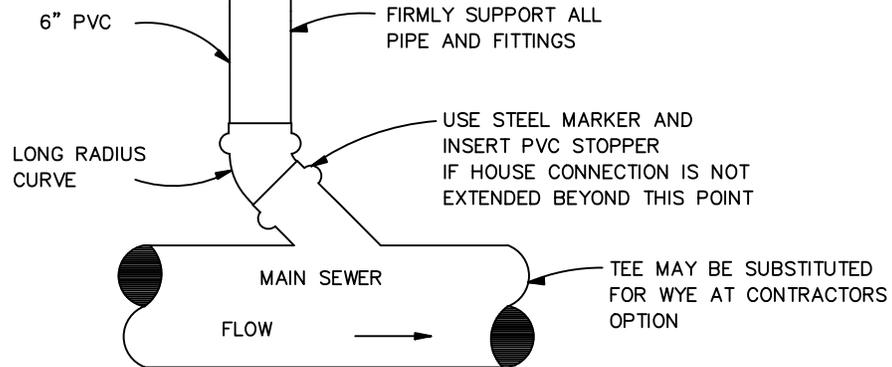
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FIGURE S-9

INSERT WATERTIGHT PLUG.
HOUSE CONNECTION SHOULD NOT BE EXTENDED FOR USE UNTIL THE MAIN SEWER AND HOUSE CONNECTION HAS PASSED THE AIR TEST AND BEEN ACCEPTED BY THE OWNER.

CONTRACTOR TO MARK END OF EACH LATERAL WITH 3" DIAMETER PVC PIPE DRIVEN FLUSH WITH EXISTING GROUND. ACCURACY OF THE MEASUREMENTS LOCATING LATERALS SHALL BE THE CONTRACTOR'S RESPONSIBILITY. TO BE USED ONLY IF LATERAL IS NOT EXTENDED FOR IMMEDIATE USE.



PLAN VIEW

NOTES:

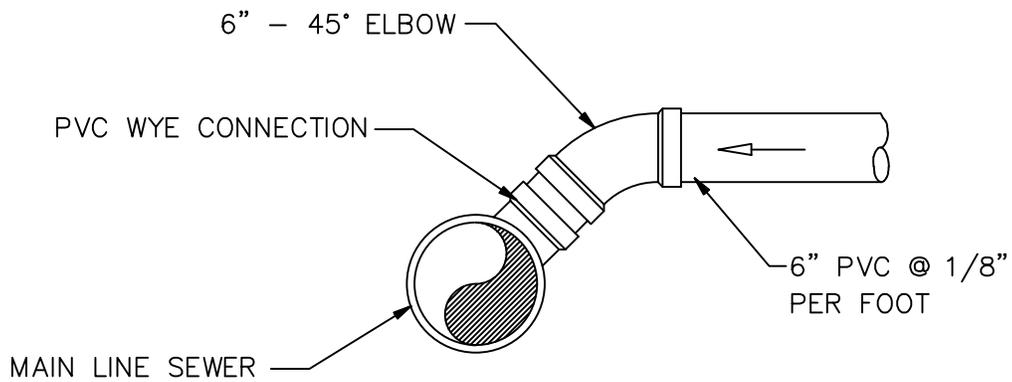
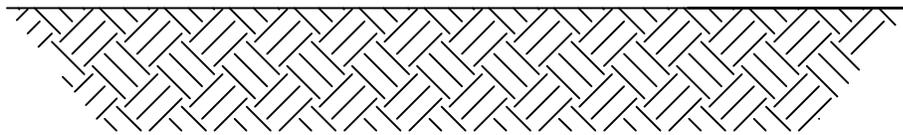
1. WYE BRANCHES OR TEES SHALL BE INSTALLED WHERE INDICATED ON THE DRAWINGS. THEY SHALL BE EXTENDED TO PROPERTY LINE OF STREETS OR ALLEYS OR TO DISTANCES AS SHOWN ON THE DESIGN DRAWINGS AND SHALL BE OF 6" PVC SDR 35 UNLESS OTHERWISE SHOWN.
2. DEPTH AT PROPERTY LINE SHALL BE APPROXIMATELY 8'-0" UNLESS SEWER DEPTH IS LESS, IN WHICH EVENT A MINIMUM SLOPE OF 1/8" PER 1'-0" SHALL BE USED.
3. HOUSE SERVICE PIPE SHALL BE PVC SDR 35 CONFORMING TO ASTM D3034 WITH GASKETED JOINTS CONFORMING TO ASTM D3212 UNLESS OTHERWISE INDICATED.
4. HOUSE SERVICE PIPE SHALL BE INSTALLED PER SAME SPECIFICATIONS & DETAIL AS FOR MAIN LINE SEWER.

HOUSE/BUILDING SERVICE
CONNECTION DETAIL 1



CITY OF WESTFIELD, INDIANA

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DATE



SECTIONAL VIEW

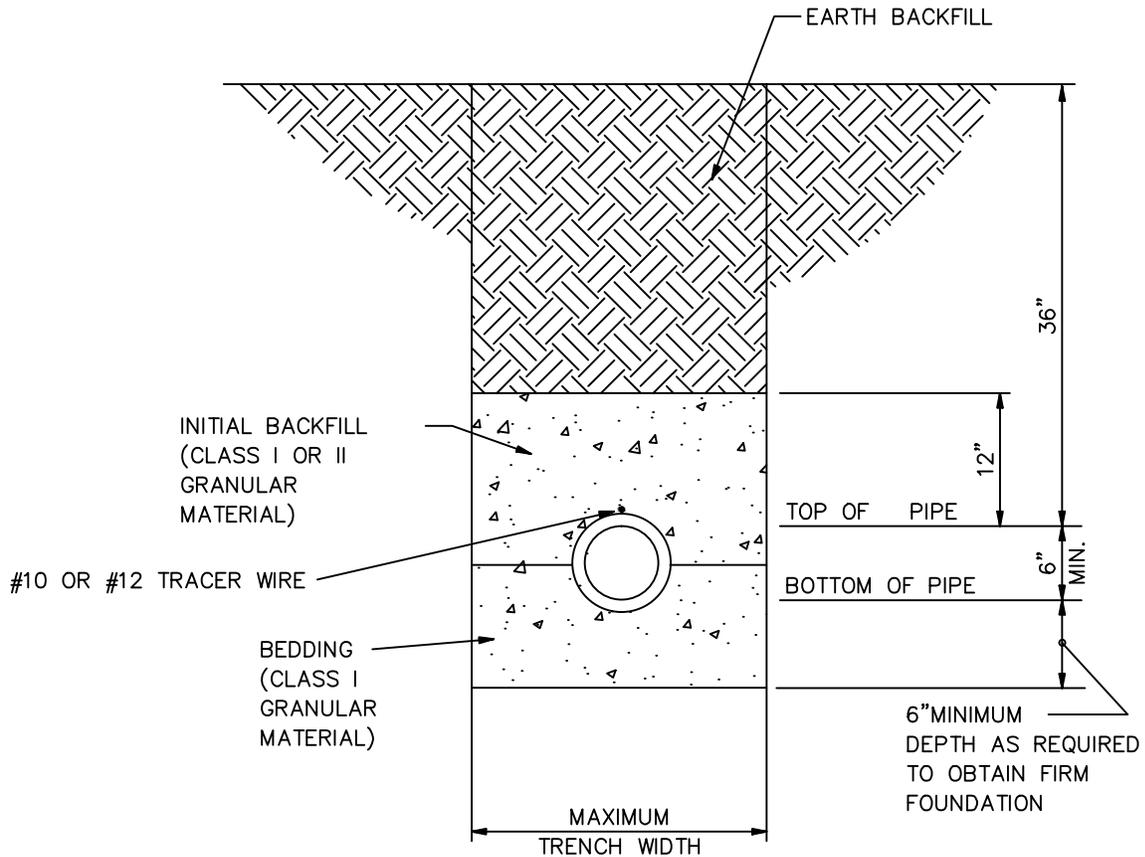
HOUSE/BUILDING SERVICE
CONNECTION DETAIL 2



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DATE

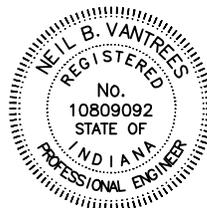
FIGURE S-11



NOTES:

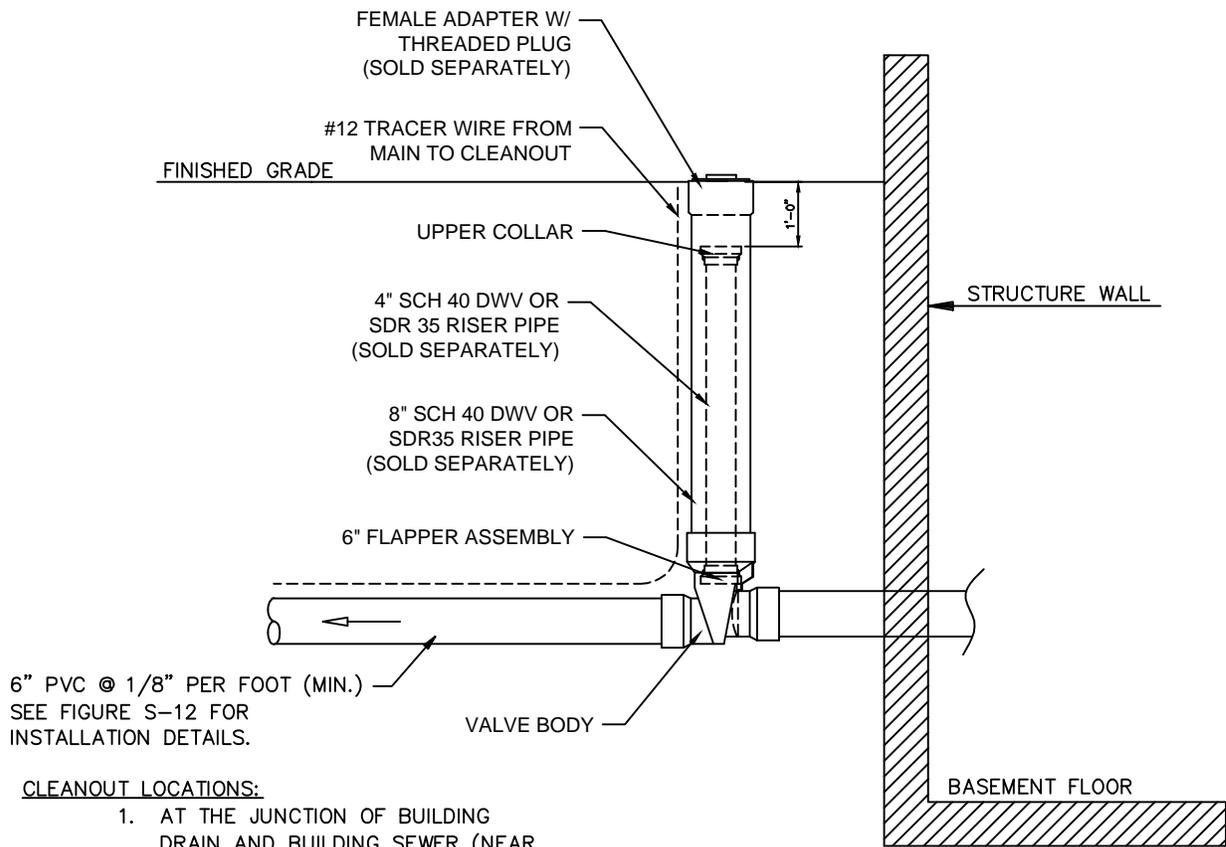
1. NOMINAL PIPE SIZE. (6" MIN.)
2. INSTALLATION OF FLEXIBLE PVC PIPE SHALL BE IN ACCORDANCE WITH SPECIFICATIONS CONTAINED IN ASTM D2321
3. CLASS I GRANULAR MATERIAL SHALL BE 1/4" TO 1 1/2" GRADED STONE, PER ASTM D2321 (#8 CRUSH STONE)
4. CLASS II GRANULAR MATERIAL SHALL BE COARSE SANDS AND GRAVELS MAX. PARTIAL SIZE OF 3/4"
5. SEE FIGURE S-5 FOR MAIN LINE SEWERS PIPE BEDDING DETAILS.
6. #10 OR #12 TRACER WIRE TO BE EXTENDED FROM SEWER MAIN TO 8" CLEAN OUT/CHECK VALVE RISER

HOUSE/BUILDING SERVICE BEDDING DETAILS



CITY OF WESTFIELD, INDIANA

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CLEANOUT LOCATIONS:

1. AT THE JUNCTION OF BUILDING DRAIN AND BUILDING SEWER (NEAR EXTERIOR FACE OF BUILDING)
2. IF BUILDING SEWER IS MORE THAN 100 FEET FROM MAIN LINE SEWER, CLEAN-OUTS SPACING SHALL NOT EXCEED 100 FEET.
3. A CLEANOUT IS REQUIRED AT EACH BEND THAT IS GREATER THAN 45 DEGREES.
4. THERE SHALL BE NO BASEMENT DRAINS CONNECTED TO SERVICE CONNECTION

CHECK VALVE REQUIREMENTS

1. ALL HOUSES ARE REQUIRED TO HAVE A CHECK VALVE
2. NO CHECK VALVES ARE TO BE LOCATED IN THE BASEMENT
3. USE RECTORSEAL, CANPLAS OR APPROVED EQUAL

GENERAL REQUIREMENTS

THE LOWEST FLOOR ELEVATION RECEIVING GRAVITY SERVICE MUST BE A MIN.THREE (3.0) FEET ABOVE TOP NEAREST MANHOLE RIM.

HOUSE/BUILDING SERVICE
CLEAN-OUT/CHECK VALVE DETAIL



CITY OF WESTFIELD, INDIANA

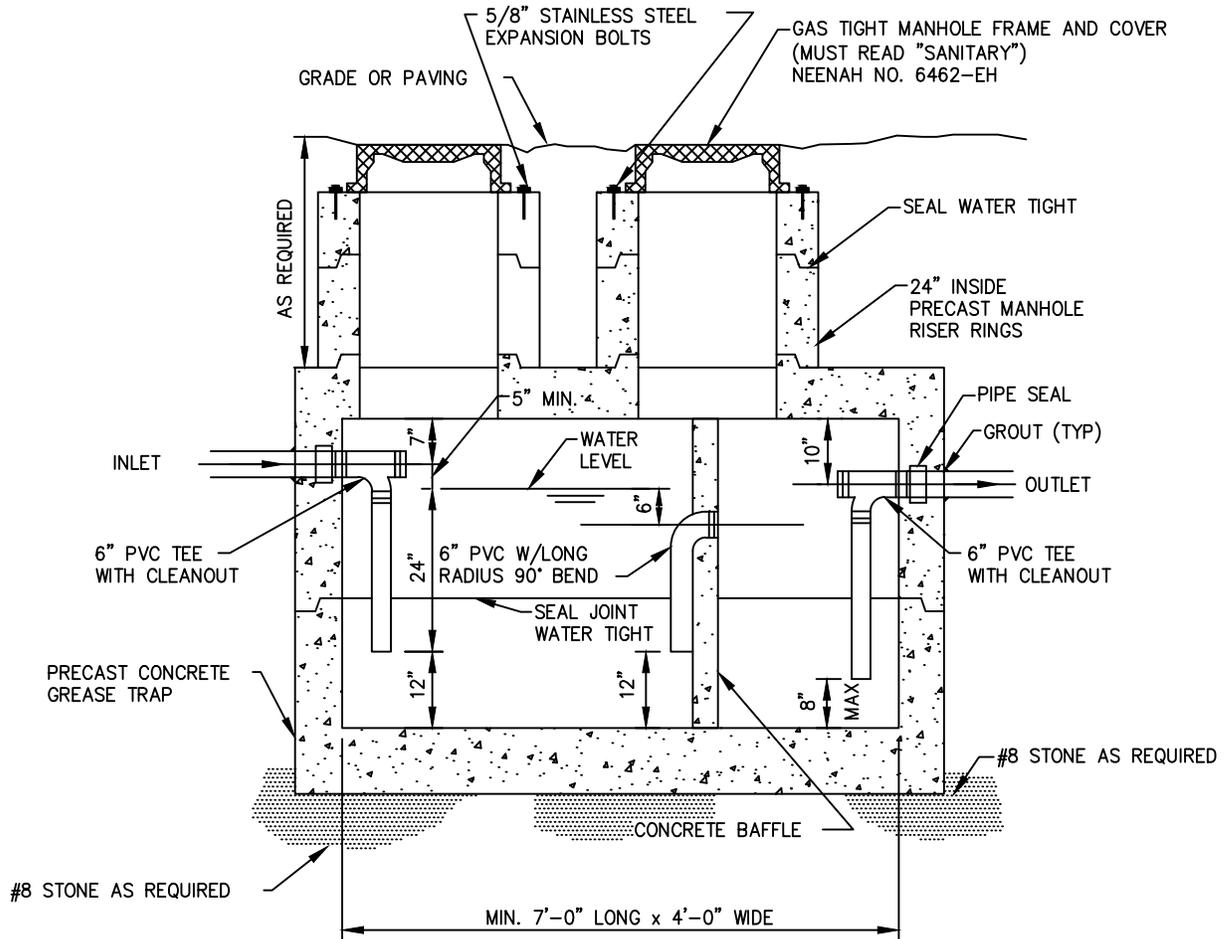
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FIGURE S-13

GENERAL NOTES

1. ALL TANK JOINTS SHALL BE SEALED WATERTIGHT WITH BUTYL RUBBER EXTRUDIBLE PREFORMED GASKET MATERIAL, HAMILTON KENT-SEAL OR EQUAL.
2. ALL OUTSIDE RISER RINGS SURFACES SHALL BE WATERPROFFED $\frac{1}{8}$ " WITH TROWLEABLE GRADE BUTYL RUBBER BACK PLASTER.
3. PIPE SEALS SHALL BE TUF-TITE, POLYLOK, OR EQUAL.



GREASE TRAP DETAIL

CITY OF WESTFIELD, INDIANA



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FIGURE S-14

20" VESTAL CASTING WITH 12" LID, LETTERED "SEWER CLEANOUT" WITH PENTAGONAL BOLT/LOCK

MINIMUM 1" & MAXIMUM 4" CLEARANCE FROM TOP OF CAP TO BOTTOM OF CASTING.

6" PVC CAP

HDPE PIPE TO EXTEND MINIMUM 3" ABOVE STONE.

#10 OR #12 TRACER WIRE

6" CLEARANCE FROM TOP OF PIPE TO TOP OF #8 STONE.

20" Ø FRACTO HDPE METER PIT, 7.2 LBS/FT, MIN. 3' DEEP OR EQUAL.

6" MINIMUM (TYP.)

6" SDR 35 PVC PIPE

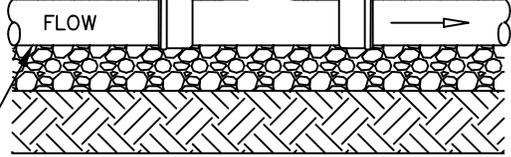
(6"x6"x6") TEE-WYE

PLACE 8" DIAMETER HDPE PIPE AROUND LATERAL PRIOR TO BACKFILLING. HDPE PIPE TO EXTEND INTO CONCRETE.

MINIMUM 4" CONCRETE CAP FROM THE SPRING LINE TO 6" OVER PIPE, NOT TO EXTEND BEYOND FIRST PIPE JOINT OF WYE. MINIMUM CONCRETE STRENGTH OF 3500 PSI, 28 DAY COMPRESSIVE STRENGTH.

6" FROM TOP OF PIPE TO BOTTOM OF METER PIT. CONTRACTOR SHALL NOT ALLOW METER PIT TO CONTACT LATERAL/TEE-WYE CONCRETE CAP.

6" SEWER LATERAL



*WHEN REQUIRED BY WESTFIELD PUBLIC WORKS

DRAWING NOT TO SCALE

TYPE 2 CLEAN-OUT DETAIL



CITY OF WESTFIELD, INDIANA

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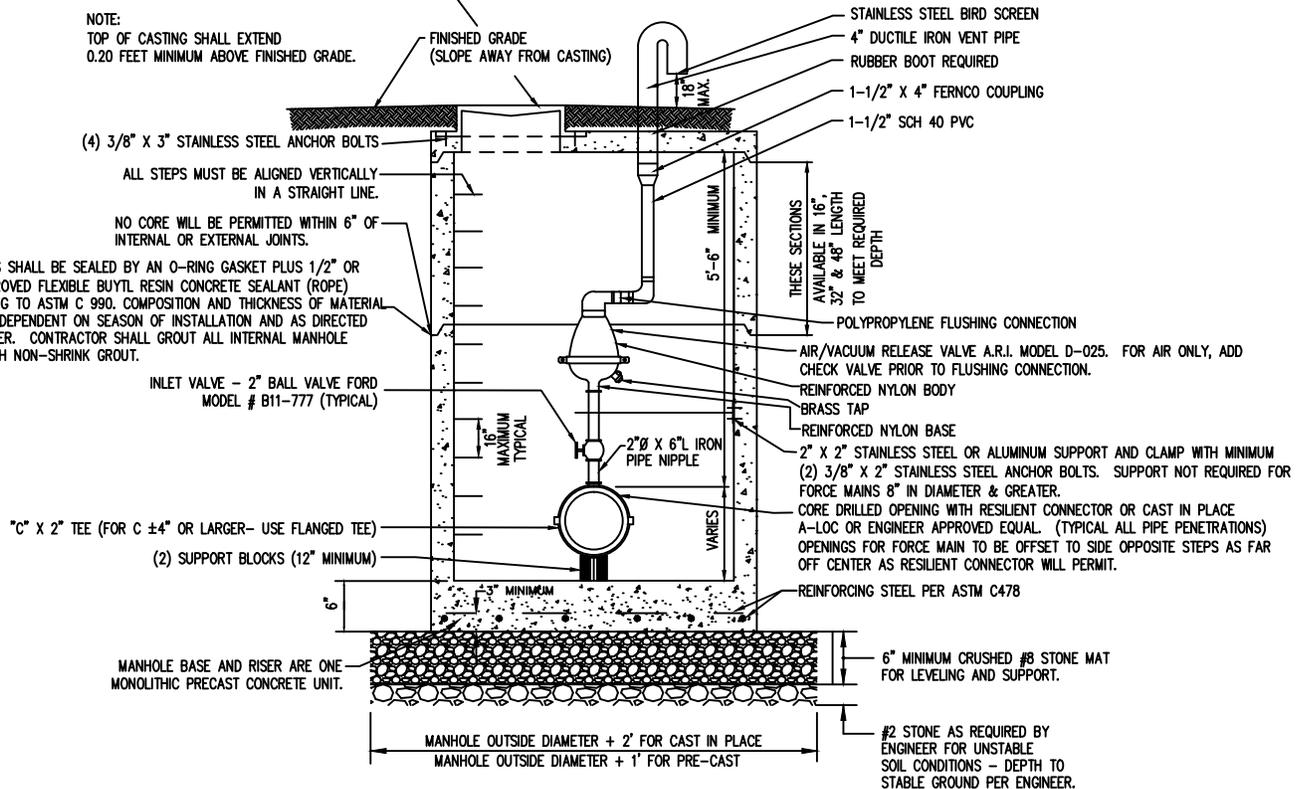
FIGURE S-15

NOTE:
FORCE MAIN TO BE LOCATED SUCH THAT AIR/VACUUM DOES NOT INTERFERE WITH ACCESS OPENING.

EAST JORDAN 1050-Z1 OR NEENAH R-1915-G WITH SELF SEALING HEAVY DUTY SOLID LID. LID TO BE STAMPED WITH 1-1/2" LETTERS, RECESSED, FLUSH WITH LID TO READ "SANITARY SEWER".

NOTE:
TOP OF CASTING SHALL EXTEND 0.20 FEET MINIMUM ABOVE FINISHED GRADE.

NOTE:
MANHOLE SECTIONS SHALL CONFORM TO ASTM C 478 UTILIZING 4,000 PSI CONCRETE. JOINTS SHALL CONFORM TO ASTM C 443. FOUR (4) FOOT DIAMETER MANHOLE FOR 6" FORCE MAIN OR SMALLER OR FIVE (5) FOOT DIAMETER MANHOLE FOR 8" FORCE MAIN OR LARGER.



NOTE: DIMENSION "C" IS SIZE OF FORCE MAIN

CLOSED BOTTOM AIR/VACUUM RELEASE MANHOLE DETAIL

NO SCALE

CLOSED BOTTOM AIR/VACUUM RELEASE MANHOLE DETAIL

CITY OF WESTFIELD, INDIANA



Neil B. Vantrees 4/1/14
DATE

FIGURE S-16