

# Charles Town Utility Board

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## **Sewer System Specifications**

May 2016



## FORWARD


In the 1930's, the City of Charles Town installed their first sewer lines in the downtown area. A wet well was constructed at the current Charles Town Wastewater Treatment site to hold sewer and that was then pumped to sand filters or drying beds. Several adjacent streets in the downtown are connected to the system in the 1950's. Then, in the 1960's, construction began for sewer lines to serve both Ranson and Charles Town. In the 1970's, Charles Town received federal grant funding to construct a larger more conventional sewer plant. The facility, still in operation today, has been expanded and upgraded to meet both sewer service demands and Chesapeake Bay environmental standards.

The City of Charles Town's and Ranson's population between 1980 and 2000 remained constant with only a 1.8% increase. However, in the past 10 years, with an increase in the amount of commercial and housing developments being constructed, the population has been increasing. Residential developers proposing to provide housing for expanding Washington D.C. area suburbs will lead to another increase in the City of Charles Town population, thus requiring an increase in the sewer services.

Nearly all of the CTUB's growth, to date, has occurred due to government funded projects constructed to meet public health, environmental, and quality of life needs. However, an increasing amount of private development is occurring and is proposed for the future. DEVELOPERS are petitioning for rights to connect to the utility infrastructure. DEVELOPERS are further petitioning CTUB to assume ownership, operation and maintenance of the DEVELOPER constructed new (in some cases, existing) water and sewer infrastructure.

Thus, it becomes necessary for the CTUB, in order to monitor this infrastructure growth, to develop uniform standards and procedures. This standardization is also necessary to minimize maintenance, repairs, facilitate operation and management of the CTUB's total system, and to ensure compliance with the regulations of the WV Public Service Commission (PSC), WV Bureau of Public Health (BPH), WV Department of Environmental Protection (DEP), WV Department of Highways, and other regulatory entities particular to a development project.

These DESIGN STANDARDS have been approved by the CHARLES TOWN UTILITY BOARD on April 27, 2016.

  
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Chairman

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## **INTRODUCTION**

This “Sewer System Specification” manual is meant to be a user-friendly guide in matters relating to water facilities within Charles Town Utility Board (CTUB) service area and is not all inclusive. Basic policies, standards, and construction requirements of CTUB are set forth herein to aid CTUB employees, contractors and developers, and the general public.

SECTION 1 defines the general requirements for acceptance of developer-furnished sewer utilities. The CTUB reserves the right to modify these requirements or add additional requirements/conditions which may be deemed necessary by a particular project.

The goal of the CTUB “Sewer System Specifications” is to set forth a minimum level of quality and to not impose an undue burden on the CTUB’s existing or future customers. Should other regulatory agency requirements differ from these specifications, the more stringent shall apply.

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# **SEWER SYSTEM SPECIFICATIONS**

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**APPLICATION PROCESS / PERMITS / INSPECTION / FEES****1.0 APPLICATION PROCESS****1.1 PRELIMINARY APPLICATION**

- A. The DEVELOPER shall submit a written request to the CTUB describing the project. The description shall include:
  - 1. Location of project (include City/County road map with project site indicated)
  - 2. Location of proposed connection to CTUB main
  - 3. Number and type of dwelling(s) or facility proposed.
  - 4. Terms of connection proposed
- B. CTUB, unless otherwise warranted, shall discuss the application at the next regular meeting. (CTUB meets the 2<sup>nd</sup> & 4<sup>th</sup> Wednesday of each month) If, in the opinion of the CTUB, the project appears feasible, the Board will notify the DEVELOPER and forward the DEVELOPER a standard connection agreement form. If, in the opinion of the CTUB, the project does not appear feasible or is not in the interest of the CTUB'S customer base, the Board will notify the DEVELOPER, in writing, of that decision.

**2.0 PERMITS AND APPROVALS****2.1 APPLICATION REQUEST**

DEVELOPERS requesting connection to the CTUB Infrastructure are responsible for obtaining any and all permits necessary for the intended project and any costs required for the permit. This includes, but is not limited to, the necessary permits from the West Virginia Department of Public Health; the West Virginia Department of Highways; West Virginia Department of Environmental Protection; and/or railroads for pipe line crossings and longitudinal occupancies; etc.

Permits submitted to the West Virginia Department of Public Health for approval must be signed by an official of CTUB. The DEVELOPER is responsible for any permitting fees.

**2.2 RIGHTS-OF-WAY AND EASEMENTS**

DEVELOPERS requesting connection to the CTUB Infrastructure are responsible for obtaining the rights-of-way and easements that are necessary for the intended project and for the connection to the CTUB'S sewer infrastructure, including rights-of-way and easement from private individuals as well as those from public agencies such as the WV Department of Highways and from corporate entities such as railroads, gas, electric, and telecommunication utilities.

The rights-of-way and easements shall be written so as to facilitate transfer of same to the CTUB.

### 2.3 INSPECTIONS

The DEVELOPER shall conduct all work in accordance with the rules and regulations of those respective agencies. Any and all inspections and/or flagmen costs incurred and deemed necessary by the governing agencies at any and all locations where work under this project is performed shall be borne by the DEVELOPER.

The use of equipment on state highways and all related construction activities shall comply with the provisions of the West Virginia Department of Highways.

## **3.0 REVIEW PROCESS**

### 3.1 ENGINEERING

Once the CTUB has approved the project application in principle, the DEVELOPER must submit detailed construction drawings for review. All projects requiring a WV BPH Construction Permit must have the plans signed by a Registered Professional Engineer in the State of West Virginia.

The DEVELOPER will be responsible for the cost of the CTUB in obtaining supplementary Engineering review, if deemed necessary, including any fees associated with Engineering review of the construction drawings.

### 3.2 NOTIFICATION

The CTUB shall notify the DEVELOPER within fifteen (15) working days of acceptance of the design or, in writing, of review comments requiring follow-up action.

### 3.3 SCHEDULE

The DEVELOPER shall submit a construction schedule showing dates of commencement and completion of the project prior to work commencing, which schedule shall be updated throughout the construction period on a monthly basis.

## **4.0 AGREEMENT PROCESS**

### 4.1 DEVELOPER'S AGREEMENT

Concurrent with the design review process, the CTUB and the DEVELOPER must prepare and execute an Alternative Mainline Extension (or Project) Agreement. The agreement must satisfy WV Public Service Commission regulations and other legal requirements. The CTUB hereby establishes the use of the Alternative Mainline Extension Agreement Form (Appendix C) as the basic instrument to be used for all the CTUB – Developer Agreements. The agreement format may be modified accordingly to fit unique projects with approval of CTUB.

- A. The DEVELOPER must bear the expense of the CTUB engineering review. Any project proposing a booster pump station or a pressure-reducing vault must have an engineering review.

- B. The DEVELOPER shall bear the expense of any legal costs associated with processing the agreement and preparations of deeds, etc. necessary to transfer ownership of the project to the CTUB.
- C. The DEVELOPER shall provide, in writing or by signed mainline extension agreement, a one-year warranty of the project beginning at date of transfer of ownership of the project to CTUB.
- D. The project's sewer infrastructure, once completed and accepted by the CTUB, shall become the property of the CTUB.
- E. Inspection.
  - 1. The CTUB reserves the right to inspect the project on either a full time or interim basis. If the CTUB provides inspection on a full time basis, the cost of the inspection will be born by the DEVELOPER.
  - 2. Due to the CTUB's limited manpower, resources and operation schedule, the CTUB and DEVELOPER may negotiate the inspection process to an extent acceptable to both parties.
- F. Security Deposit.

The CTUB may require a security deposit for projects that require a significant amount of the CTUB'S resources for review, peripheral meetings with other entities/parties, and/or inspection services.
- G. Service Fees

The CTUB will normally set all meters and will assess the PSC approved tap fee and security deposit from the DEVELOPER, homebuilder, homebuyer or party requesting sewer service. The CTUB shall not charge a fee if the service connection is installed by the DEVELOPER under an approved arrangement by the CTUB.
- H. Fees

CTUB's website ([www.ctubwv.com](http://www.ctubwv.com)) contains applicable PSC approved tariff charges for service fees, Capacity Improvement Capital Cost fee, application for sewer service, security deposit, etc.

## **5.0 ASSEST TRANSFER PROCESS**

### **5.1 FIELD COPIES OF CONSTRUCTION INFORMATION**

The DEVELOPER shall keep a minimum of one (1) complete copy of the Contract construction plans and specifications (including all revisions and addendums) and all shop drawings issued at the project site. All information shall be kept in a neat and good order and shall be given to the CTUB.

## 5.2 EQUIPMENT AND WORKMANSHIP GUARANTEE

All pipe material and equipment furnished under the project shall be new and guaranteed by the DEVELOPER and manufactures to be free from defects in design, materials, and workmanship. The DEVELOPER shall replace, without cost to CTUB, any pipe, equipment or materials which prove to be defective or which show undue wear within two years after having been placed in satisfactory operation and accepted by the CTUB. Proper pipe bedding and compaction of subgrade must be maintained to compliment the installation.

## 5.3 AS-BUILT DRAWINGS

- A. The DEVELOPER shall keep one copy of all Contract Documents, including working drawings, at the site, in good order, and annotated to show all changes made during the construction process. These as-built drawings shall be available to the CTUB, kept current during the project, and shall be delivered to CTUB upon completion of the project. In the unlikely event that as-built drawings are not delivered to the CTUB, the DEVELOPER risks release of Bonds.

### 1. Sewer Lines

- a. Location of all valves, manholes, vaults and meters with reference ties as needed.
- b. Location of all sewer line with reference ties as needed.
- c. Length, size and type of all sewer line installed.

### 2. Existing Utilities Encountered

- a. Location, size and type of utility encountered with reference ties as needed.
- b. Note any repairs made to damaged utilities.
- c. Location, size and type for any relocated utilities with reference ties as needed.

NOTE: Location must be established by shown distances, reference ties, or co-ordinates and not by physical placement on a map alone.

- B. The DEVELOPER shall deliver to CTUB CAD files of all the sewer lines encountered or installed as part of the project. The digital information shall be provided on WV North NAD 83 datum.

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## SEWER SYSTEMS

These Design Standards are intended as a reference for integrating sewage collection systems, including pump stations and force mains, into the Charles Town Utility Board (herein called the CTUB) Sewage System. Specific types or brands of equipment or material are specified to maintain uniformity within the CTUB's system, minimize maintenance and repair problems, and facilitate operations.

All collection system sewer pump stations and force mains will require the review and approval of the CTUB prior to submission for state approval. In cases where a particular project requirement is not defined herein, the CTUB reserves the right to review and define the requirement.

### 6.0 SEWER DESIGN STANDARDS

All sanitary sewer systems shall be designed in accordance with the West Virginia Division of Health "Sewage Treatment and Collection Systems Design Standards" Title 64-Series 47. Failure to specifically mention a particular requirement in this manual does not excuse developer from meeting requirement.

#### 6.1 GRAVITY SEWERS

- A. *Infiltration Allowance* – An infiltration allowance of 200 gallons per inch diameter per mile per day may be added to the per capita flows to arrive at the average daily flow (ADF).
- B. *Peak Flows* – The sewer collection needs to be designed to carry a peak flow, when flowing full, of:
 

Laterals	4 ADF
Trunk and Interceptor and Outfall Sewers	2.5 ADF
- C. *Minimum Size* – No gravity sewer shall be less than 8" in diameter. The only exception is when there is no possibility of future expansion, no more than 30 mobile homes or 15 residences can be served by a 6" diameter gravity sewer. 4" diameter pipe will not be allowed for the CTUB's sewer collection system.
- D. *Cover* – A minimum of 3 feet of earth covering is required on all sewer lines.
- E. *Slope* – All new sewers shall be so designed and constructed to give velocities, when flowing full, of not less than 2.0 feet per second based on Kutter's and Manning's formula using an "n" value of 0.013. The following table lists the minimum slopes to be provided. Slopes greater than these are desirable.

Sewer Size	Minimum Slope in feet per 100 feet
6"	0.62
8"	0.40
10"	0.28
12"	0.22
14"	0.17
15"	0.15
16"	0.14
18"	0.12
21"	0.10
24"	0.08
27" and larger	0.07

Under special conditions, slopes slightly less than those specified may be permitted with approval of CTUB.

Sewers shall be laid in straight line with uniform slope between manholes. Sewers on 20% slope or greater shall be anchored securely with concrete anchors, or approved equal, spaced as follows: (See Standard Detail # 9)

1. Not over 36 feet center to center on slopes between 20% and 35%
2. Not over 24 feet center to center on slopes between 35% and 50%
3. Not over 16 feet center to center on slopes greater than 50%

- F. *Alignment* – Sewers shall be laid with straight alignment between manholes.
- G. *Increasing Size* – When a sewer joins a larger one, the invert of the larger sewer line should be lowered sufficiently to maintain the same energy gradient.
- H. All sewers shall be designed to prevent damage from superimposed loads.
- I. *Bedding* – No. 8 or No. 10 limestone shall be used for bedding unless otherwise approved by CTUB.
- J. There shall be no physical connection between a drinking water supply system and a sewer system.
- K. *Horizontal Separation* – A minimum of 10 feet separation between sewer lines and water lines must be maintained. In cases where the 10 feet minimum cannot be maintained, the sewer line shall be 18" lower than the water line and constructed of a pressure type pipe. When the lines are placed within 5 feet of each other, permanent identification tape must be buried directly above the lines denoting "Sewer Line" or "Potable Water Line".



- L. **Vertical Separation** – A minimum of 18” of separation between the top of the sewer lines and the bottom of the water lines must be maintained. In case where the 18” cannot be maintained the sewer line shall cross at midpoint of a 20’ long joint of the water line and be constructed of pressure type pipe. A sewer line shall not be constructed over top of a water line. If the standard vertical installation requirements cannot be maintained the sewer line shall be encased so that the casing extends at least 15 feet each side of the crossing with a minimum of 18” of vertical separation.

## 6.2 MANHOLES

- A. **Location** – Manholes shall be provided at the end of each sewer line; at all changes in slope, size or alignment; at all intersections; and at distances not greater than 400 feet for sewers 15 inches in diameter or less, and 500 feet for sewers 18 inches to 30 inches in diameter.
- B. **Materials** – Shall be pre-cast concrete meeting requirement of American Society for Testing and Materials (ASTM)
- C. **Diameter** – The minimum base diameter shall be 48” (Minimum opening 24”)
- D. **Steps** – Non-corrosive steps embedded in the walls, offset and spaced 12 to 18 inches apart.
- E. **Flow Channel** – The inside base of the manhole shall be filled with concrete to form a bench sloping toward the flow channel. Both the flow channel and the bench shall be welled to a smooth surface.
- F. **Water Tightness** – Watertight manhole covers are to be used wherever the manhole covers may be flooded by street runoff or high water. Pipe connections to manholes and joints on manholes shall be watertight. Concrete manholes shall be waterproofed on the exterior where groundwater conditions are unfavorable.

## 6.3 GRINDER PUMPS

Until further notice, grinder pump installation, operation and maintenance shall **NOT** be the responsibility of the CTUB. Neither the Bureau of Public Health nor Public Service Commission requires CTUB to furnish sewer to customers requiring grinder pump, unless the customer chooses to bear responsibility and cost of pump installation, operation and maintenance.

## 7.0 MATERIALS

### 7.1 FORCE MAINS

#### A. General

Due to the CTUB’s limited manpower resources and operational budget, the CTUB is not encouraging developments using force main collection systems or grinder pumps to petition for connection to the CTUB’s Sewer System.

Should a proposed development sewer system having force main components merit connection consideration by the CTUB, the CTUB reserves the right to have an engineering review conducted of the project including material specification with cost of such review to be paid by developer. See Standard Details #2, #3, #5, #9, and #18 for general force main requirements.

**B. Ductile Iron Pipe**

1. Ductile Iron Pipe shall be manufactured in accordance with the requirements of ANSI/AWWA C151/A21.51. Push-on joints and mechanical joints for such pipe shall be in accordance with ANSI/AWWA C111/A21.11.
2. Pipe thickness shall be designed in accordance with ANSI/AWWA C150/A21/50, and shall be based on laying conditions and internal pressure.
3. Wall thickness, for 4" through 12", shall be CL52 and wall thickness, for 14" through 24", shall be CL51.
4. Pipe shall be cement mortar lined in accordance with ANSI/AWWA C104/A21/4 double thickness with laying lengths of either 18 ft. or 20 ft. nominal lengths.
5. Pipe larger than 14" shall be shipped with an appropriate percentage of fully gauged pipe to facilitate fitting requirements.
6. Ductile Iron, for use as restrained joint, shall be mechanical joint pipe using wedge action restraining glands. Pipe shall be used as indicated on drawings or details.

**C. Mechanical Joint Fittings**

1. Mechanical joint fittings in sizes 4" through 24" shall meet the requirements of AWWA C153. Fittings shall be manufactured from a high strength, Impact resistant ductile iron, having a minimum tensile of 70,000 PSI with minimum yield of 50,000 psi and a minimum elongation of 5%.
2. Fitting wall thickness shall be CL54 through 12" diameters and CL56 through 24" diameters. Fittings shall be rated at 350 psi.
3. Cement lining- all accessories, glands, bolts and gaskets shall conform to ANSI A21.11 AWWA C111 latest revision.
4. Joint accessories- all accessories, glands, bolts and gaskets shall conform to ANSI A21.11 AWWA C111 latest revision.
5. Fittings shall be listed with Underwriters Laboratories. All fittings must be manufactured domestically.
6. Where fittings are used with PVC piping systems, appropriate gaskets shall be furnished if required. Tees shall be used for lateral connections.

**D. Non Detectable Warning Tape**

1. Composition of tape shall be polyethylene and have a film thickness of 4.0 Mil. Nominal and width of 6”.
2. Color shall be bright green with black printed lettered on one side, stating, “Caution- Sewer Line Buried Below.”
3. Tape shall be 6” as manufactured by Pro-Line or approved equal.
4. Said tape shall be installed 12 to 18 inches below ground, above pipelines. This tape shall be installed in conjunction with main lines, including service connections.

**E. Sewer Saddles**

1. Ductile Iron sewer saddles shall be manufactured of ductile iron meeting ASTM 536, Grade 65-45-12. Iron body shall be prim coated.
2. Saddle straps, shall be manufactured of, stainless steel, per ASTM A240. Straps shall be available in three (3) sizes, dependent upon specific requirements to accommodate diameters from 6” through 27”. Bolts, shall be stainless steel, PER ASTM A193, type 304 ½ n.c. rolled thread, Teflon coated. Nuts shall be stainless steel, per ASTM A194 Type 304. Washers shall be stainless steel. Per ASTM A240 Type 304.
3. Saddle gaskets shall be virgin SBR per ASTM D2000 MBA 710, compounded for water and sewer service. The gasket shall be able to conform itself to the existing pipe and provide a positive seal against infiltration. In sizes above 24”, a gasket shall be provided in addition to the standard gasket to accomplish an adequate seal.
4. Saddles shall be available with 4” and 6” outlets designed to accept PVC through clay as required.

**F. PVC Pressure Pipe (1 ½” through 4”)**

1. PVC pressure pipe shall be manufactured to steel pipe size (IPS) outside dimensions with DR’s and tolerances in compliance with ASTM D2241 PVC Plastic Pipe, DR and PR. Pipe shall be manufactured to steel pipe O.D.’s (IPS) in size 1 ½” through 4”. Pipe shall be joined by means of a rubber ring bell joint, which shall be an integral and homogeneous part of the pipe. Pipe shall conform to all requirements of ASTM D2214 for PVC pipe.
2. Pressure ratings and class shall be as indicated on drawings. If drawings do not show class, the highest class shall be required. Pipe shall have two to one (2 to 1) safety factor with class and SDR’s as follows:
  - a. SDR 21
  - b. Class 235

3. When used for potable water systems, pipe shall bear the N.S.F. seal.
4. Materials shall meet the following requirements:
  - a. ASTM D1784 PVC Compound
  - b. ASTM D2214 PVC Standard Specifications
  - c. ASTM D3139 Joints for PVC pressure pipe
  - d. UNI-B-1 Thermoplastic pipe joints
5. Certificates of compliance of the above specifications shall be required from the manufacturer before acceptance of delivery or award of contract.

G. Pressure Sewer (6" through 12")

1. PVC molecular oriented pipe shall be manufactured to conform to the following standards : AWWA C909
  - a. ASTM F1483- Standard specification for oriented poly vinyl chloride PVCO pressure pipe
  - b. ASTM D1784- Standard specification for rigid poly vinyl chloride (PVC) compounds and chlorinated poly vinyl chloride (CPVC) compounds.
  - c. Performance requirements standard specification for poly vinyl chloride (PVC) pressure treated pipe (SDR Series).
  - d. ASTM D3139- Standard specification for joints for plastic pressure pipe using flexible elastomeric seals.
  - e. ASTM D2774- Standard practice for underground installation of thermoplastic pressure piping.
  - f. UNI-B-1- Recommended specification for thermoplastic pipe joints, pressure and non-pressure applications.
  - g. NSF standard NO. 61- drinking water system components- health effects.
  - h. PVCO Pressure pipe shall be rated for 150 PSI with a safety factor of 4 to 1.
  - i. PVCO shall have a minimum hydrostatic design basis (HDB) of 1700 PSI.
  - j. PVCO in sizes 6" through 12" shall have outside diameter of ductile iron pipe and shall require no special repair material, tapping material, other than what is currently being utilized.
  - k. Pipe shall be as manufactured by E.T.I. Uponor, Inc.

H. PVC Gasket Pressure Fittings (1 ½" through 4")

1. PVC gasket pressure fittings in sizes 1 ½" through 4" shall be manufactured of PVC compounds meeting ASTM D1784. Fittings shall be one piece injection

molded in sizes available. When certain sizes are not available, factory fabricated pressure fittings shall be acceptable.

2. Bells shall be gasket joint, conforming to ASTM D3139, with gaskets conforming to ASTM F477.
3. Fittings shall be N.S.F. approved. All fittings shall have a working pressure of 200 psi.
4. All fittings shall be compatible with PVC pipe, having an O.D. of steel pipe.
5. Fittings shall be as manufactured by the Harrington Corporation.

I. Schedule 80 PVC Pipe and Fittings

1. All schedule 80 PVC pipe shall conform to ASTM D1785 classification, material conforming to 12454-B and be gray in color.
2. Schedule 80 PVC pipe fittings shall be manufactured in conformance with ASTM D2464 specification, material conforming to 12454-B and shall be threaded with the following exceptions;
  - a. Socket wall thickness over the threads of threaded type fittings shall be a minimum of 25% greater than the thickness of the schedule 80 Pipe.
  - b. Body wall thickness shall be 50% greater than the thickness of the schedule 80 pipe.
3. All threads shall be machine tapped conforming to ANSI specification B2.1.
4. The "quick burst" strength of the fittings shall be equal or exceed the "quick burst" strength of the equivalent schedule 80 PVC pipe.
5. Pipe and fittings shall be as manufactured by R&G Sloan MFG. Co, INC.; flow control, Inc.; or equal.

7.2 GRAVITY SEWER LINE

A. Scope

1. The gravity sewer line shall be PVC pipe, schedule SDR 35.

B. PVC Sewer Pipe

1. All pipes and fittings shall meet or exceed all requirements of ASTM Specification D-3034 and/or other requirements of Uni-Bell Uni-B4. Pipes shall be 12.5 feet or 20-foot lengths as supplied by the manufacturer. Shorter pipe pieces shall be provided or cut to suit actual distance between manholes. Thickness of pipe shall give a size dimension ratio of 35 and a minimum "pipe stiffness" (F/Y) of 46 when measured at 5 deg. deflection and tested according to ASTM D-2412, latest revision.

- a. Sewer main fittings shall be made from PVC compounds as defined and described in ASTM designations D-1784 for rigid PVC compounds and all PVC fittings supplied shall be marked with manufacturers name or trademark, nominal size, material designation and ASTM designation.
  - b. PVC SDR 35 fittings in sizes 4" through 8" shall be manufactured by the injected molding process.
  - c. PVC SDR fittings in sizes 10" through 27" shall be manufactured by the factory fabricated process.
  - d. The Minimum bell depth on the above mentioned fittings shall be as specified per ASTM D-3032, section 6.2 and 7.3.2, 4" through 8" and section 7.11 on 10" and larger, as shown in the following sizes:

▪ 4"	1.75
▪ 6"	3.00"
▪ 8"	4.00"
▪ 10"	5.00"
▪ 12"	6.00"
▪ 15"	7.5"
▪ 18"	Manufacturers Pipe Bell
▪ 21"	Manufacturers Pipe Bell
▪ 24"	Manufacturers Pipe Bell
▪ 27"	Manufacturers Pipe Bell
  - e. Sealing gaskets shall have minimum cross section area of 0.20 square inch.
  - f. Fittings shall be so designed as to have a minimum load resistance on an 8 x 6 WYE of 900 lbs. at a deflection of 5%.
2. Joints shall be either O-ring type "OR" mechanical seal joint meeting material requirements of ASTM 1784 and joint requirements of ASTM 3212. Couplings shall be of same class as pipes. When rubber rings are used as joint gaskets, they may be used with a separate coupling or an integral wall bell and spigot joint. Gasket quality shall meet ASTM F-477. **No solvent cement joints will be permitted in field construction, except as specifically authorized by CTUB.**
  3. Physical and chemical tests shall be performed in accordance with the referenced ASTM specifications and shall be conducted at 73°F±3° F. Deflection should not exceed 7%.
  4. Certifications of compliance of the above specifications shall be required from the manufacturer before acceptance of delivery or award of contract.
  5. Lateral piping
    - a. Polyvinyl chloride, (PVC) pipe and fittings, in sizes 4" through 6" for use in lateral piping shall meet the requirements of schedule 40.

**C. DETECTABLE WARNING AND IDENTIFICATION TAPE**

1. Composition of detectable tape shall consist of .50 mil. Thick, solid core, encased in a reinforced protective plastic jacket that is resistant to alkalis, acids, and other destructive elements commonly found in soil. Overall thickness shall be 4.5 mil. nominal and the tape width shall be 6" inches.
2. Color shall be bright GREEN with printed black letters on one side stating "CAUTION, SEWER LINE BURIED BELOW."
3. Tape shall be 6" detectable tape as manufactured by Proline Safety Products.
4. The marking tape shall be installed 12 to 18-inches below ground above pipelines. This tape shall be installed in conjunction with main lines including service connections.

**D. MANHOLES**

1. Quality Assurance
  - a. Source Quality Control:
    - 1) Maintain uniform quality of products and component compatibility by using the products of one manufacturer for precast reinforced concrete manholes.
    - 2) Obtain certificate of construction compliance with ASTM C 478 from the precast reinforced concrete manhole manufacturer and submit certificate as part of required submittals.
    - 3) Obtain certificate of material compliance with ASTM A 48, Class 30 tensile strength from the manhole frame and cover manufacturer. Furnish certification that tensile test bars were from same pour as castings. Submit certificates as part of required submittals.
2. References
  - a. American Society for Testing and Materials.
    - 1) ASTM A 48, Specification for Gray Iron Castings.
    - 2) ASTM C 139, Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes.
    - 3) ASTM C 478, Specification for Precast Reinforced Concrete Manhole Sections.

- 4) ASTM C 923, Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes.
3. American Association of State Highway Transportation Officials (AASHTO) Standards as referenced throughout these Specifications.
4. American Water Works Association:
  - a. AWWA C 302, AWWA Standard for Reinforced Concrete Water Pipe - Noncylinder Type, Not Prestressed.
5. Federal Specifications:
  - a. Fed. Spec. SS-S-210A, Sealing Compound, Preformed Plastic, for Expansion Joints and Pipe Joints (Type 1 Rope Form).
6. Basic Materials
  - a. Concrete Masonry Units for Manholes: Commercially manufactured solid precast segmental concrete masonry units meeting requirements of ASTM C 139.
  - b. Manhole Steps: Design as indicated on Drawings.
    - 1) Reinforced Plastic Step: Composed of a 1/2 inch Grade 60, ASTM A 615 deformed steel reinforcing bar completely encapsulate in Grade 49108, ASTM D 4104 polypropylene copolymer compound, Type II; M.A. Industries, Inc., Type PS4, or equal.
  - c. Manhole Frame and Cover: Gray iron castings conforming to ASTM A 48, Class No. 35B minimum or ASTM-A-536 Grade 80-55-06 for ductile iron, designed for AASHTO Highway Loading Class HS-20. Provide castings of uniform quality, free from blowholes, porosity, hard spots, shrinkage distortion or other defects. Frame and cover design and dimensions as indicated on Detail.
    - 1) Finish: Bearing surfaces machined to prevent rocking and rattling under traffic. Casting surfaces shot blast cleaned and coated with asphalt paint, non-tacky drying.
    - 2) Manhole Clean Out Cover shall have CTUB name (Cast In Place Detail No. 7).
    - 3) Watertight castings shall be furnished with a bolt down lid and gasket, model number Neenah R1916.
    - 4) Standard castings shall be furnished with a compression sealing gasket, model number Neenah R1642.



## 7. Pre-cast Reinforced Concrete Manhole Components

- a. Materials and Construction: Conforming to requirements specified in ASTM C 478, except as follows:
  - 1) Concrete: Composition and compressive strength conforming to ASTM C 478 except use Type II or Type III cement in manhole components and increase compressive strength to 4500 psi (at 28 days) in precast bases.
  - 2) Casting and Curing: Wet cast and steam curing process in accordance with Section 3.6.11 and 3.7.2 of AWWA C 302.
  - 3) Manhole Steps: Factory installed in manhole components, pre-aligned vertically, spaced on equal centers, and located the minimum distance from ends of risers and top sections as indicated on Drawings.
  - 4) Manhole Component Seals: Manhole component joints factory formed for self-centering concrete to concrete bearing employing a rubber compression gasket and preformed plastic sealing compound.
    - i. Rubber Compression Gasket: Composition conforming to ASTM C 361 or ASTM C 443.
    - ii. Preformed Plastic Sealing Compound: Preformed butyl rubber sealant tape meeting the requirements of Fed. Spec. SS-5-210-A. Conserve as manufactured by Concrete Sealants, or equal.
  - 5) Precast Bases and Riser Sections: Design, materials and construction as specified previously.
  - 6) Pipe Openings: Custom preformed during manufacturing in each base and riser section requiring such, to accommodate type of pipe and pipe opening seal provided.
    - i. Pipe Opening Seals: Resilient gasket type, cast integrally with manhole component conforming to requirements specified in ASTM C 923 and of the following acceptable pipe seals:
      - A-Lok Products Corporation; A-LOK Manhole Pipe Seal.

- Scales Manufacturing Corporation; RES-SEAL.
  - Press Seal Gasket Corporation; PRES-WEDGE II.
  - Thunderline Corporation; LOCK-SEAL Modular Wall and Casing Seal.
  - Dual Seal Gaskets Inc.; DUAL SEAL II.
  - Link Seal.
- 7) Precast Top Sections: Designs as required by Drawings, of materials and construction as specified previously except additional and differing requirements as follows:
- i. Hold down Bolt Inserts: Factory cast in top section no less than two 3/4 inch threaded inserts or slotted inserts to accommodate manhole frame hold down bolts. Threaded inserts of three inches depth. Both insert types designed for an ultimate load in tension of 12,500 pounds. Inserts factory plugged for shipping. Coordinate insert location with manhole component manufacturer to assure proper location in top sections.
  - ii. Eccentric Cone Tops: Manufacture to same minimum wall thickness and with same area of circumferential steel reinforcement as riser sections.
- 8) Precast Grade Rings: Leveling and adjusting units of three inches or four inches thickness of materials and constructions as specified previously. Factory cast grade rings with hold down bolt holes matching location of same in manhole frame. Design must provide for full bearing of manhole frame.
- 9) Lifting holes shall not penetrate wall.
- b. Connection to Existing Manholes
- 1) Existing manholes shall be core-drilled for any new pipe connecting to the manhole.
  - 2) The use of a rubber sleeve installed per manufacturer's requirements is required for connection.
  - 3) Developer to verify connection is watertight.

**E. CAST-IN-PLACE CONCRETE**

1. Cement:
  - a. Portland Cement: ASTM C 150 of the following Type(s):
    - 1) Type II, Moderate Sulfate Resistance.
  - b. Only one brand and manufacturer of approved cement shall be used for exposed concrete.
2. Normal weight Concrete Aggregates: Processed aggregate meeting requirements of ASTM C 33 and subject to the following limitations:
  - a. Coarse Aggregate Size: Maximum size of coarse aggregate shall not exceed the following requirements but in no case larger than 1-1/2-inches:
  - b. One-fifth narrowest dimension between sides of forms within which concrete is to be cast.
  - c. Three-fourths of the minimum clear spacing between reinforcing bars or between reinforcing bars and forms.
  - d. One-third the slab thickness for unreinforced slabs.
3. Water: Potable quality, free from deleterious amounts of acids, alkalis, and organic substances.
4. Concrete Admixtures:
  - a. Calcium Chloride: Not permitted.
  - b. Provide admixtures produced and serviced by established, reputable manufacturers and use in compliance with manufacturer's recommendations.
  - c. Air-Entraining Admixture: Use a product conforming to requirements of ASTM C 260.
  - d. Water-Reducing Admixture: Use a product conforming to requirements of ASTM C 494 Type A and that is free of chloride.
  - e. Water-Reducing and Retarding Admixture: Use a product conforming to requirements of ASTM C 494 Type D and that is free of chloride.
  - f. Water-Reducing and Accelerating Admixture: Use a product conforming to requirements of ASTM C 494 Type E and that is free of chloride.

5.     Preformed Expansion Joint Fillers:
  - a.     Nonextruding and Resilient Bituminous Types (Exterior Use): ASTM D 1751.
  - b.     Sponge Rubber and Cork Type: ASTM D 1752.
6.     Waterstops: Ribbed type manufactured from virgin polyvinyl chloride plastic compound conforming to U.S. Corps of Engineers CRD-C 572.
  - a.     6-inch Waterstop: 6 x 3/8-inch, such as Vinylex Corporation; Cat. No. R6-38.
  - b.     Acceptable Manufacturers:
    - 1)     Vinylex Corporation (Catalog Nos. as specified above).
    - 2)     W. R. Grace & Company.
    - 3)     W. R. Meadows, Inc.
    - 4)     Or Equal.
7.     Curing Materials, Sheet Form: Use curing materials that will not stain or affect concrete finish or lessen the concrete strength and comply with the following requirements:
  - a.     Burlap: Materials conforming to AASHTO M 182.
  - b.     Sheet Materials: Material conforming to ASTM C 171.
8.     Liquid Curing Compounds: Material conforming to ASTM C 309, Type 1, free of wax or other adhesive bond breaching ingredients.
  - a.     Note: Where a finish material is to be applied over concrete, provide certification by the curing compound manufacturer certifying the curing compound as non-detrimental to the bond of the finish material.
  - b.     Acceptable Manufacturers:
    - 1)     Master Builders; Master Kure.
    - 2)     Euclid Chemical Company; Kurez Formula E-100.
    - 3)     L & M Construction Chemicals, Inc.; L & M Cure.
    - 4)     Or Equal.
9.     See Section 3.3 for Quality Assurance and Testing Requirements.

**8.0 CONSTRUCTION****8.1 GRAVITY SEWER****A. Laying Gravity Sewer Pipe**

1. Pipes shall be laid to a uniform line and grade as shown on the Drawing or as modified by the Engineer during construction. The DEVELOPER shall use laser beam instrument, located in the bore of the pipe in manhole, to set line and grade.
2. Bottom of sewer line trenches shall have a width as indicated in Standard Detail #1 and #3. Bedding shall be applied for the full trench width and shall extend from six inches below to twelve inches above outside of pipe barrel. Bedding shall be spread by hand and tamped properly for full depth and width. Where bottom of trench, by mistake of the DEVELOPER, has been excavated to a greater depth than specified, it shall be refilled to proper grade using Class C concrete at the expense of the DEVELOPER, unless other arrangements are made with the CTUB for refilling trench to proper grade with other material. (See Standard Detail #1 and #3)
3. All pipes and fittings shall be carefully inspected before placing in work. All defective pipes and fittings shall be removed from site and not placed in the work. When cutting of pipe is necessary to suit actual distances between manholes, cuts shall be made with sharp and proper tools at right angles to axis of pipe. Ends shall be cleaned as laid and kept clean and free of dirt and debris until work is completed. Open ends of pipes shall be plugged at night, while backfilling trenches, and when otherwise directed by Engineer.
4. After pipe is laid, bedding below pipe shall be tamped with a light bent bar tamper. Backfill on sides of and above pipe shall be tamped with a straight bar tamper. Wye branches, unless immediately connected to a lateral, shall have an approved, watertight, factory-sealed stopper on the end to prevent infiltration of dirt and water. These lateral connections shall be sealed and braced to withstand a pressure of 10 psi on the cap or plug so that exfiltration tests can be made. Should any cap, plug or stopper yield under test, the opening shall be resealed by and at the expense of the DEVELOPER. Wooden marking boards (pressure treated) shall be installed at each branch and at end of each lateral, extending six inches above natural ground surface to aid in location of the wye branch or lateral end in the future after its installation and backfill.
5. Any time within 12 months after completion of the work, the CTUB, at his own discretion, may carry out an internal inspection of the sewer lines by closed circuit television. This inspection shall be carried out in the presence of representatives of the CTUB, Engineer and the DEVELOPER and shall be recorded on videotape. Any defects, open joints, infiltration, etc. detected during this inspection shall be rectified by the DEVELOPER at his own expense. Along with internal inspection, the CTUB may test the system to determine vertical deflection of pipes due to compacted

backfill. Tests shall be carried out in the presence of the CTUB, Engineer and the DEVELOPER. If, at any point in the system, the deflection exceeds 7%, the DEVELOPER shall rectify that section at his expense. Therefore, the DEVELOPER shall ensure proper compaction at bottom of the trench, sides of pipe and top of pipe in accordance with ASTM D-2321.

B. Sewers Lines near Water Lines

1. Sewer lines shall be laid at least 10 feet, horizontally, from any existing water line. Should local conditions prevent a horizontal separation of 10 feet, a sewer line may be laid closer than 10 feet to a water line, provided that the top of the sewer line is at least 18 inches below the bottom of the water line.
2. When it is impossible to obtain proper horizontal and vertical separation, as stipulated above, the sewer line shall be encased in concrete instead of being bedded in gravel backfill. The concrete encasement shall run from 10 feet on either side of the width of the water line, which crosses the sewer pipe.

C. Pipeline Test

1. Gravity Line Tests

a. Deflection Testing - PVC Pipe

The DEVELOPER shall test PVC gravity sewer pipe for deflection in the presence of the Engineer. Deflection testing shall be performed after the pipe trench is completely backfilled, and before permanent trench paving or other surface restoration is done. Testing shall be accomplished using a PHOS Deflection Gauge as manufactured by PHOS, Inc., 4646 Carpinteria Avenue, Carpinteria, CA 93013. The gauge shall be attached to a line and pulled through the pipe manually. All pipes failing to meet the deflection limit of 7% or less shall be removed, replaced, and retested at the DEVELOPER'S expense.

b. Pressure Leak Testing

All gravity lines shall be tested by the DEVELOPER in a manner satisfactory to and witnessed by the Owner.

- 1) The DEVELOPER shall make visual tests as directed by Engineer in order to ascertain if joints are tight and sewer is laid to line and grade. The DEVELOPER at his own expense shall then conduct a pressure test, using low-pressure air.
- 2) A pneumatic plug shall be placed at each pipe end. Plugs shall be inflated to 25 psig.

- 3) Low pressure air shall be introduced into sealed line until internal pressure reaches 4 psig greater than average back pressure of any groundwater that may be over the pipe. At least two minutes shall be allowed for air pressure to stabilize. After stabilization period, pressure in the pipe shall be adjusted to a minimum of 3.5 psig plus average backpressure of any groundwater that may be over the pipe and air supply disconnected. The portion of line being tested shall be termed "acceptable" if the time required for pressure to decrease from 3.5 psig to 2.5 psig (plus average back pressure of any groundwater that may be over the pipe) is not less than the time shown in the following tables. If line fails to meet this requirement, the DEVELOPER shall, at his own expense, determine source of leakage. He shall then repair or replace all defective material and/or workmanship and retest the line.

Since the test must be conducted after backfilling, rectifications shall include re-excavation and backfill after repairs and/or replacement. All testing shall be performed on sewers before any road replacement of surface restoration operations are started.

- 4) The DEVELOPER shall note that interruption of sewage service to individual residences shall be no longer than 8 hours. The DEVELOPER shall air test installed sewer section, as previously specified, either between manholes or between selected sewer lengths. When air testing between sewer lengths, the DEVELOPER shall use approved air plugs to segregate the sections to be tested. The individual residential laterals shall be plugged at the property line so the main sewer, the wye and lateral are all pressure tested.

c. Infiltration Testing

In addition to the aforementioned air test, the manholes and pipes may be tested for infiltration. The DEVELOPER shall have on hand at least six stoppers for each size pipe to be installed, and two weirs necessary to measure infiltration. For each section tested, the leakage shall not exceed the rate of 50 gallons per inch diameter per mile of pipe per 24 hours for infiltration. The line shall be accepted only when it meets the two tests and acceptance requirements.

d. Video Inspection

CTUB reserves the right to conduct a video inspection of line. Developer will be required to correct any abnormalities discovered during inspection.

## 8.2 MANHOLES

### A. SUBMITTALS

1. Shop Drawings and Product Data:
  - a. Manufacturer's published detail drawings, modified to suit design conditions if required, and the DEVELOPER prepared drawings as applicable.
  - b. Manufacturer's descriptive literature and specifications covering the product specified. Include installation information.
  - c. Frame and Cover Details

### B. DELIVERY, STORAGE AND HANDLING

1. Transport and handle precast reinforced concrete manhole components and other Products specified herein in a manner recommended by the respective manufacturers of such to prevent damage and defects. Through-wall lifting holes are not permitted in manhole component construction.
2. Store precast reinforced concrete manhole components in accordance with manufacturer's recommendations to prevent joint damage and contamination. Exercise such care in storage of other specified Products as recommended by the respective manufacturers.

### C. SITE CONDITIONS

1. Environmental Requirements:
  - a. Do not set or construct manhole bases on subgrade containing frost.
  - b. To improve workability of Preformed Plastic Sealing Compound during cold weather, store such at temperature above 70 degrees F or artificially warm compound in a manner satisfactory to the Engineer.
  - c. During warm weather, stiffen Preformed Plastic Sealing Compound by placing under cold water or by other means as recommended by the compound manufacturer.

### D. INSPECTION

1. Inspect precast reinforced concrete manhole components in accordance with requirements of ASTM C 478 regarding repairable defects and defects subject to rejection by the Engineer.



**E. PREPARATION**

1. Keep pipe and manhole interiors cleared of debris as construction progresses.
2. Earthwork: Perform earthwork for manhole installation as previously specified in Trenching, Backfilling and Compacting and according to the following:
  - a. Make excavations for manholes to nearly vertical plane beginning at bottom of excavation one-foot beyond manhole base outside diameter (six inches each side) to two-feet beyond manhole base outside diameter dimension for top of excavation limit (one-foot each side).
  - b. If surface pavement of any type is encountered (vehicle or pedestrian ways), cut such pavement to a rectangular shape as opposed to circular shape of manhole. Make limits of cut not to exceed one-foot beyond top of excavation limit as specified previously.
  - c. No additional compensation allowed should excavation limits or surface pavement cut limit be exceeded. Additionally, should bottom of excavation limit be exceeded, provide without additional compensation, concrete cradle or encasement for pipes entering or leaving manhole.

**F. MANHOLE CONSTRUCTION METHODS (See Standard Details #6, #7, #8, #9, #10, and #11)**

1. Precast Concrete Bases: Install bases on a 6 inch deep compacted layer of aggregate meeting requirements of Aggregate Bedding as specified previously in Section Trenching, Backfilling and Compacting.
  - a. When using prefabricated pipe opening seals (i.e., A-LOK, RES-SEAL, PRES-WEDGE II, etc.) for connecting pipes into manholes, and such seals create an annular space on interior and exterior of manhole wall pipe openings after pipe connection is made, fill such annular spaces with preformed plastic sealing compound.
    - 1) Tightly caulk sealing compound into annular spaces in a manner to completely fill the spaces and render the installation watertight.
  - b. Following sealing compound installation, trowel compound surface smooth and flush with interior face of manhole.
  - c. Follow Manufacturer's recommendations in placement of pipe seal.

2. Manhole Wall Erection: Provide precast reinforced concrete straight riser, tapered riser and top sections necessary to construct complete manholes. Fit the different manhole components together to permit watertight jointing and true vertical alignment of manhole steps.
  - a. Rubber compression gaskets are to be used between sections, install gaskets and join sections in accordance with written instructions of manhole component manufacturer.
  - b. Preformed plastic sealing compound is also to be used between sections, install sealing compound in accordance with manufacturer's recommendations, and join sections also in accordance with written instructions of manhole component manufacturer.
    - 1) Prime joint surfaces if required by preformed sealing compound manufacturer.
    - 2) If sealing compound is installed in advance of section joining leave exposed half of two-piece protective wrapper in place until just prior to section joining.
    - 3) Use preformed sealing compound in conjunction with rubber external hydrostatic pressure.
    - 4) Following manhole section installation, trowel sealing compound surface smooth and flush with interior face of manhole.
    - 5) Make pipe connections into manhole walls as specified previously for pipes connecting into manhole bases. Existing manholes must be core drilled to allow use of prefabricated pipe opening seals.
3. Frame and Cover Installation: Where required, make final adjustment of frame to elevation using materials selected in the DEVELOPER'S options. (See Standard Detail # 7)
  - a. Set precast grade rings, bricks or concrete masonry units in Water-Proof Mortar. Mortar thickness not to exceed 3/4 inch maximum and 3/8-inch minimum. Wet, but do not saturate concrete masonry units and precast grade rings immediately before laying. Saturate brick immediately before laying.
  - b. Precast grade ring: Pre-set to proper plane and elevation using wedges or blocks of cementitious material not exceeding one square grade ring permitted. Incorporate wedges or blocks in fresh mortar in a manner to completely encase each. Crown fresh mortar to produce squeeze-out between grade rings. Tool exposed joints with appropriately shaped tool and compact mortar edge into joints. Clean off excess mortar prior to initial mortar set.

- c. Concrete Masonry Leveling Unit: Lay segmental concrete masonry units to line and in radial courses with completely filled mortar joints. Flush cut exposed horizontal and vertical joints on manhole interior and exterior. Leave exterior surface ready for parging.
- d. Brick Leveling Units: Lay brick to line and in header courses. Lay each course to stagger one half brick over previous course. Completely fill joints and make close joints not exceeding 1/4 inch on inside face of manhole. In making closures, use no portion of a brick less than the width of a brick, and whenever practical use whole brick laid with long side at right angles to inside face of manhole wall. Finish brick work with neatly struck and pointed joints. Clean brick work by removing mortar smears and drippings.
- e. Parge the outside of finished brick or concrete masonry leveling units with a minimum of 1/2 inch thick waterproof mortar.
- f. Bolt manhole frames in place on manhole top section, or on leveling units if required, after installing 1/2 inch thick preformed plastic sealing compound on bearing surface of manhole frame. Remove excess sealing compound squeeze-out after manhole frame is bolted in place.
- g. Use bolts of sufficient length to properly pass through leveling units, if any, engage full depth of manhole top section inserts and allowing enough threaded end to pass through manhole frame to properly tighten nut and washer. Tighten manhole frame bolts after mortar has cured.

#### G. VACUUM TESTING

- 1. Vacuum Testing: Vacuum testing of a finished manhole shall be performed with an approved vacuum testing apparatus such as supplied by NPC Systems, Inc. of Milford, NH, and operated according to the recommendations of Peter Glazier and Associates of Worcester, Massachusetts. Apparatus supplied by other manufacturers may also be acceptable, but must have the approval of the Engineer before the test is begun.
  - a. Specifications for Vacuum Testing:
    - 1) All pipes entering the manhole shall be plugged, taking care to securely brace the plug from being drawn into the manhole.
    - 2) The test head shall be placed at the inside of the top of the cone section and the seal inflated in accordance with the manufacturers' recommendations.

- 3) A vacuum of 10 inches of mercury shall be drawn 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 60 seconds for 48" diameter, 75 seconds for 60", and 90 seconds for 72" diameter manholes.
- 4) If the manhole fails the initial test, necessary repairs shall be made with a non-shrink grout while the vacuum is still being drawn. Retesting shall proceed until a satisfactory test is obtained.
- 5) Owner shall witness and approve in writing all tests.

### 8.3 CAST-IN-PLACE CONCRETE

#### A. QUALITY ASSURANCE

1. Testing Agency: Meeting requirements of The American Society for Testing and Materials Recommended Practice for Inspection and Testing Agencies for Concrete and Steel in Construction ASTM E 329.
2. Source Quality Control:
  - a. Laboratory Tests: Materials stated herein require advance examination or testing according to methods referenced, or as required by the Engineer.
  - b. Compression Test Cylinders: For Laboratory trial batches, make in accordance with American Concrete Institute ACI 301 Method 1. Test to consist of three compression test cylinders for each class of concrete with one broken at seven days and two broken at 28 days; ASTM C 192 and ASTM C 39.

#### B. REFERENCES

1. American Association of State Highway and Transportation Officials, AASHTO M 182 Burlap cloth made from Jute or Kenaf.
2. American Concrete Institute:
  - a. ACI 211.1; Standard Practice for Selecting Proportions for Normal, Heavyweight, and mass Concrete.
  - b. ACI 301; Specifications for Structural Concrete for Buildings.
  - c. ACI 304; Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
  - d. ACI 305R; Hot Weather Concreting.

- e. ACI 306R; Cold Weather Concreting.
  - f. ACI 308; Standard Practice for Curing Concrete.
  - g. ACI 318; Building Code Requirements for Reinforced Concrete.
3. American Society for Testing and Materials:
- a. ASTM C 31; Methods of Making and Curing Concrete Test Specimens in the Field.
  - b. ASTM C 33; Specification for Concrete Aggregates.
  - c. ASTM C 39; Test Method for Compressive Strength of Cylindrical Concrete Specimens.
  - e. ASTM C 42; Methods of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
  - f. ASTM C 94; Specification of Ready-Mixed Concrete.
  - g. ASTM C 143; Test Method for Slump of Portland Cement Concrete.
  - h. ASTM C 150; Specification for Portland Cement.
  - i. ASTM C 171; Specification for Sheet Materials for Curing Concrete.
  - j. ASTM C 172; Methods of Sampling Freshly Mixed Concrete.
  - k. ASTM C 173; Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
  - l. ASTM C 192; Method of Making and Curing Concrete Test Specimens in the Laboratory.
  - m. ASTM C 231; Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
  - n. ASTM C 260; Specification for Air-Entraining Admixtures for Concrete.
  - o. ASTM C 309; Specification for Liquid Membrane - Forming Compounds for Curing Concrete.
  - p. ASTM C 494; Specification for Chemical Admixtures for Concrete.

- q. ASTM D 1751; Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
- r. ASTM D 1752; Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
- 4. U.S. Army Corps of Engineers Specifications:
  - a. U.S. Corps of Engineers CRD-C 572 Specification for Waterstop.

C. SUBMITTALS

- 1. Product Data: Submit manufacturer's descriptive product data and current specifications covering named manufactured products herein. Include installation instructions.
- 2. Samples: Submit samples of materials being used when requested by the Engineer including names, sources and descriptions.
- 3. Test Reports: Submit two copies of laboratory trial mix designs proposed in accordance with Method 1 ACI 301 or one copy each of 30 consecutive test results and the mix design used from a record of past performance in accordance with ACI 301 Method 2.
- 4. Design Mix: Prior to production of concrete, submit for approval a design mix indicating materials proportions and water-cement ratio. Use materials in such proposed design mix as specified herein. Make such adjustments in the proposed design mix as directed by the Engineer. Make such adjustments at no increase in Contract Price.
- 5. Certificates: Furnish the Engineer, and local authorities requiring same, certificates originated by the batch mixing plant certifying conformance with ASTM C 94.
- 6. Delivery Tickets: A delivery ticket shall accompany each load of concrete from the batch plant.
  - a. Tickets must be signed by the DEVELOPER'S representative, noted as to time and place of pour and kept in a record at the site. Make such records available for inspection upon request by the Engineer.
  - b. Information presented on the ticket shall include the tabulation covered by ASTM C 94, 16.1.1 through 16.2.8, as well as any additional information the local codes may require.

**D. PROJECT CONDITIONS**

1. ACI Compliance: Cast-in-place concrete work shall conform to ACI 301 except as modified by these Specifications or the Drawings.
2. Sequencing: Where other construction work is relative to concrete pours, or must be supported by or embedded in concrete, those performing such related work must be given 5 days' notice to introduce or furnish embedded items before concrete is placed.
3. Concrete Encasement of Pipes: Encase pipes under structures or buildings indicated by the Drawings to be encased in concrete for the full length of the pipe run under the structure.
4. Concrete Encasement of Conduits: Encase conduit runs as indicated on the Drawings.

**E. CONCRETE QUALITY**

1. DEVELOPER Note: Use Class A concrete for all concrete work except where indicated otherwise on the Drawings.
2. Selection of Proportions for Normal weight Concrete: ACI 211.1.
3. Proportions of Ingredients: Establish proportions, including water-cement ratio on the basis of either laboratory trial batches or field experience, with the materials specified herein.
  - a. Laboratory Trial Batches: ACI 301, Method 1 and ACI 318.
  - b. Field Experience: ACI 301, Method 2 and ACI 318.
4. Water-Cement Ratio: Class A Concrete only shall have a maximum water cement ration of 0.45.
5. Classes of Concrete:
  - a. Class A: 4000 psi minimum compressive strength at 28 days; 564 pounds per cubic yard minimum cement content.
  - b. Class B: 3000 psi minimum compressive strength at 28 days; 517 pounds per cubic yard minimum cement content.
  - c. Class C: 2000 psi minimum compressive strength at 28 days; minimum cement content per cubic yard in accordance with current ready-mix plant standard practice.

## F. ADMIXTURES

1. Air Entraining: Provide air-entrained concrete for all concrete work except where indicated otherwise on the Drawings or specified otherwise herein. Total air content required as follows:

Maximum-size coarse aggregate, in.	Air Content percent by volume
1-1/2	5 +/- 1
3/4 or 1	6 +/- 1
3/8 or 1/2	7 1/2 +/- 1

- a. Do not provide air-entrained concrete where a surface hardener is indicated on the Drawings or specified herein.
2. Water-Reducing Admixture: Unless high temperatures occur or placing conditions dictate a change, all concrete shall contain the water-reducing admixture.
3. Water-Reducing and Retarding Admixture: When high temperatures occur or placing conditions dictate, the Engineer may require a change from the water-reducing admixture (Type A) to a water-reducing and retarding admixture (Type D).
4. Water-Reducing and Accelerating Admixture: When low temperatures occur or placing conditions dictate, the Engineer may require a change from the water-reducing admixture (Type A) to a water reducing and accelerating admixture (Type E).
5. Slump: Proportion and produce concrete to a slump as indicated below. The slump ranges apply when vibration is used to consolidate the concrete.

Types of Construction	Slump, in.	
	Maximum*	Minimum
Reinforced foundation walls and footings	3	1
Plain Footings, caissons, and substructure walls	3	1
Pavements and Slabs	3	1
Mass Concrete	2	1

\* May be increased 1 in. for methods of construction other than vibration.

## G. INSPECTION

1. Inspect work for deficiencies, which would prevent proper execution of the finished work. Do not proceed with placing until such deficiencies are corrected.



**H. JOINTS AND EMBEDDED ITEMS**

1. Construction Joints:
  - a. Place construction joints where indicated on the Drawings.
  - b. Secure Engineer's Approval prior to making additional or revised locations of construction joints.
2. Bond fresh concrete with hardened previously poured new concrete in accordance with the following:
  - a. Thoroughly clean hardened concrete of foreign matter and laitance and saturate with water. Initial concrete pour shall have a rough surface.
  - b. Cover the hardened concrete with a heavy coating of grout of same material composition and proportions of concrete being poured except coarse aggregate omitted. Grout shall have a slump of 6-inches minimum.
  - c. Place new concrete on grout before it has attained its initial set.
  - d. Other bonding methods must be approved by Engineer prior to their use.
3. When concreting is to be discontinued for more than forty-five (45) minutes and if the construction plane is to be horizontal, install keyways and embed dowel bars in the concrete before initial hardening. Use keyways and dowels in vertical concrete construction only when indicated or directed by the Engineer.
4. Expansion Joints and Contraction Joints:
  - a. Install where indicated on the Drawings.
  - b. Do not extend reinforcing or other embedded metal items through expansion and contraction joints; except where indicated otherwise on Drawings.
5. Waterstops:
  - a. Install in construction joints, expansion joints and where required for water tightness.
  - b. Hold end joints to a minimum.
  - c. Make water tightness of joints the same as continuous waterstop material and to permanently develop not less than 50 percent of the mechanical strength of the parent section and to permanently retain their flexibility.

- d. Adequately support waterstops to prevent displacement and deformity of the waterstops during concrete pours.
  - e. In substructures and other structures required to be water tight, install waterstops if concreting is discontinued for a sufficient length of time, which in the opinion of the Engineer, may result in seepage cracks in concrete.
6. Other Embedded Items: Place sleeves, inserts, anchors and embedded items required for adjoining work prior to concreting. Place accurately, and support against displacement.

I. PRODUCTION OF CONCRETE

1. Ready-Mixed Concrete:
- a. Batched mixed and transported in accordance with ASTM C94.
  - b. Plant equipment and facilities shall conform to the Check List for Certification of Ready Mixed Concrete Production Facilities of the National Ready Mixed Concrete Association.

J. PLACING

1. General: In general, conduct concrete placement work in accordance with ACI 304 and such additional requirements as specified herein.
2. Preparation:
- a. Prepare formwork in advance and remove snow, ice, water and debris from within forms. Formwork as specified in Section 3.1.
  - b. Pre-position reinforcement in advance of concrete pours. Concrete reinforcement as specified in Section 3.2.
  - c. Pre-position expansion joint material, anchors and embedded items.
  - d. Wet subgrades in accordance with ACI to eliminate water loss from concrete.
  - e. Do not place concrete on frozen surfaces.
3. Conveying:
- a. Handle concrete from mixer to final deposit rapidly by methods, which will prevent segregation or loss of ingredients to maintain required quality of concrete.
  - b. Do not convey concrete through aluminum or aluminum alloy.

- c. Do not place concrete by pumps or other similar devices without prior written approval of Engineer.
- 4. Depositing:
  - a. Do not allow concrete to drop vertically more than 4 feet.
  - b. Deposit in approximately horizontal layers of 12 to 18 inches.
  - c. Do not allow concrete to flow laterally more than 3 feet.
  - d. Carry on placing at such a rate that concrete, which is being integrated with fresh concrete is still plastic.
  - e. Do not deposit concrete on concrete, which has hardened sufficiently to cause the formation of seams or planes of weakness within sections.
  - f. Do not use concrete, which has partially hardened or has been contaminated by foreign materials.
  - g. Do not subject concrete to procedures, which will cause segregation.
  - h. Do not place concrete in forms containing standing water.
  - i. Make placement within sections continuously to produce monolithic unit.
  - j. Do not begin placing of concrete in beams or slabs until concrete previously placed in walls or columns has attained initial set.
  - k. Do not bend reinforcement out of position when placing concrete.
- 5. Consolidation:
  - a. Consolidate concrete by vibration, spading, rodding or other manual methods. Work concrete around reinforcement, embedded items and into corners: eliminate all air or stone pockets and other causes of honeycombing, pitting or planes of weakness.
  - b. Use vibration equipment of internal type and not the type attached to forms and reinforcement.
  - c. Use vibrators capable of transmitting vibration to concrete in frequencies sufficient to provide satisfactory consolidation.
  - d. Do not leave vibrators in one spot long enough to cause segregation. Remove concrete segregated by vibrator operation.

- e. Do not use vibrators to spread concrete.
  - f. Have sufficient reserve vibration equipment to guard against shutdown of work occasioned by failure of equipment in operation.
6. Cold Weather Concreting: In general, perform cold weather concrete work in accordance with ACI 306R and the following additional requirements.

- a. Temperature of concrete delivered at the job-site shall conform to the following temperature limitations:

Minimum concrete temperature, deg. F.

Air temperature deg. F.	For sections with least dimension less than 12 in.	For sections with least dimension 12 in. or greater
30 to 45	60	50
0 to 30	65	55

- b. If water or aggregate is heated above 100 degrees F., combine water with aggregate in the mixer before cement is added. Do not mix cement with water or with mixtures of water and aggregate having a temperature greater than 100 degrees F.
  - c. Provide equipment for heating concrete materials and protecting concrete during freezing or near-freezing weather. Do not use foreign materials or materials containing snow or ice.
  - d. Surfaces, which the concrete is to come in contact with, must be free of frost, snow and ice.
  - e. Concrete placed in forms shall have a temperature of 50 degrees F. or higher after placement. Maintain this temperature a minimum of 5 days. Provide additional time if necessary for proper curing.
  - f. Housing, covering or other protection used in curing shall remain intact at least 24 hours after artificial heating is discontinued. Do not place dependence on salt or other chemicals for the prevention of freezing.
7. Hot Weather Concreting: In general, perform hot weather concrete work in accordance with ACI 305R and the following additional requirements:

- a. Temperature of concrete delivered at the job site shall not exceed 90 degrees F.
- b. Cool ingredients before mixing to prevent temperature in excess of 90 degrees F.
- c. Make provisions for windbreaks, shading, fog spraying, sprinkling or wet cover when necessary.

#### K. FINISHING

- 1. Form Tie Repairs: Following form removal repair holes vacated by removable components of form ties in accordance with the following:
  - a. Hammer-pack holes with stiff mortar of same mix and ingredients as employed in surrounding concrete. Prepare mortar not more than 30 minutes prior to use.
  - b. Render mortar patchwork inconspicuous. Maintain mortar patches damp and cure as specified herein for Curing and Protection.
- 2. Finishes: Finish exposed concrete surfaces true and even, free from open or rough areas, depressions or projections. Bring concrete up in vertical pours to the required elevation, strike-off with a straight edge and float-finish.
  - a. Spade Finish: Obtained by forcing a flat spade or similar device, down adjacent to the form and pulling the top of the spade away from the form to bring mortar to the surface next to the forms. After forms are removed satisfactorily, correct concrete surface irregularities.
  - b. Floated Finish: After concrete has been placed, consolidated, struck off and leveled, do not work further until ready for floating. Begin floating when water sheen has disappeared and when the surface has stiffened sufficiently to permit the operation. During or after first floating, check plainness of surface with a ten-foot straightedge applied at not less than two different angles. Cut down high spots and fill low spots during this procedure to produce a surface with true planes within 1/4 inch in ten feet as determined by a ten foot straightedge placed anywhere on the slab in any direction. Following straightedge checking, refloat slab immediately to uniform sandy texture.
  - c. Smooth Rubbed Finish: Obtained by rubbing a Spade Finished vertical surface not later than one day after form removal. Wet surface and rub with carborundum brick or other abrasive until uniform color and texture are produced. Do not use cement grout other than the cement paste drawn from the concrete itself by the rubbing process.

- d. Steel Trowel Finish: Obtained by power troweling and hand troweling a Floated Finish. First troweling after power floating shall produce a smooth surface, which is relatively free of defects, but which may still show some trowel marks. Perform additional troweling by hand after the surface has hardened sufficiently. Perform final troweling when a ringing sound is produced as the trowel is moved over the surface. Thoroughly consolidate surface by hand trowel operations. Produce finished surface essentially free of trowel marks, uniform in texture and appearance, with true planes within 1/4 inch in ten feet, as determined by a ten foot straightedge placed anywhere on the slab in any direction.
  - e. Broom or Belt Finish: Immediately after concrete has received a Floated Finish, give surface a coarse transverse scored texture by drawing a broom or burlap belt across the surface.
3. Application for Finishes:
- a. Spade Finish:
    - 1) Surfaces to be backfilled with earth.
    - 2) Surfaces to be concealed by surface applied finish materials, excluding painting.
    - 3) Surfaces to be rubbed.
  - b. Floated Finish:
    - 1) Bottoms of tanks (i.e., Tank, Type Structures, and Chambers).
    - 2) Surfaces to receive Steel Trowel Finish.
    - 3) Surfaces to receive Broom or Belt Finish.
    - 4) Floor areas for reception of tile.
  - c.. Smooth Rubbed Finish, Exterior Applications:
    - 1) Exposed vertical surfaces of concrete structure, of whatever nature, down to one foot below finished grade elevation of earth.
    - 2) Exposed vertical surfaces of troughs, channels and such other passages for the flow of liquids.

## d. Smooth Rubbed Finish, Interior Applications:

- 1) Exposed vertical surfaces of concrete structures, including overhead sloped or horizontal surfaces.
- 2) Inside vertical surfaces of tank type structures, including wet wells, down to one foot below the average water level.
- 3) Inside vertical surfaces of troughs, channels and such other passages for the flow of liquids.
- 4) Interior surfaces to be painted.

## f. Steel Trowel Finish:

- 1) Interior floor surfaces intended for pedestrian and vehicle traffic, and floor surfaces receiving decorative coverings.
- 2) Interior bottom surfaces of troughs, channels and such other passages for the flow of liquids.
- 3) Interior floor surfaces receiving an integral hardener or sealer.

## g. Broom or Belt Finish: Exterior concrete walks, steps and platforms.

## L. CURING AND PROTECTION

1. General: Immediately after placement, protect concrete from premature drying, excessive hot or cold temperatures and mechanical injury. Perform curing by either water curing, sheet form curing or sealing methods in accordance with ACI 308. Cure concrete continuously for a minimum of seven days at ambient temperatures above 40 degrees F.
2. Hot Weather Curing: See Hot Weather Concreting this Section.
3. Cold Weather Curing: See Cold Weather Concreting this Section.

## M. FIELD QUALITY CONTROL

1. Testing and Inspection:
  - a. Materials and operations shall be tested and inspected as work progresses. Failure to detect defective work will not prevent rejection when defect is discovered, nor will it obligate the Engineer for final acceptance.
  - b. Secure composite sample in accordance with ASTM C 172.

- c. Mold and cure three test specimens for each strength test in accordance with ASTM C 31.
- d. Test specimens in accordance with ASTM C 39. Test one specimen at 7 days for information and two at 28 days for acceptance.
- e. Make one strength test for each day's pour or 50 cu. yd. of concrete, unless waived by the Engineer, but not less than one test for each structure.
- f. Make slump tests for each strength test and whenever consistency of concrete appears to vary. In accordance with ASTM C 143.
- g. Make air content test for each strength test in accordance with ASTM C 231 or ASTM C 173 except if aggregate with high absorptions are used, use the latter test method.
- h. At his cost, the DEVELOPER shall deliver test cylinders to a testing facility within twenty-five (25) miles of the project as directed by the Engineer. DEVELOPER will pay for testing facility services.

2. Evaluation and Acceptance:

- a. The strength level of the concrete will be considered satisfactory if 90 percent of the strength test results and the averages of all sets of three consecutive strength test results equal or exceed specified strength and no individual test result is below specified strength by more than 500 psi.
- b. If the strength of cylinders falls below specified compressive strengths, the Engineer shall have the right to order a change in the mix proportions for the remaining concrete being poured.
- c. If required by the Engineer, obtain and test core specimens from hardened concrete in accordance with ASTM C 42.

8.4 MATERIALS, HOUSE CONNECTIONS, CLEANOUTS AND MAINLINE CLEANOUTS. (See Standard Details # 12, #13, #14, #15, #16, #17, #18 and #19)

A. Description

The DEVELOPER shall furnish and install the wye branches, riser pipe, service laterals, transition fittings, and incidentals where shown on the plans or where directed by the CTUB and as specified herein.



B. Wye Branches

Wye branches shall be of the proper size.

C. Riser Pipe

Where the cover on the wye branch is in excess of what the property being served require, a 45-degree bend and sufficient riser pipe shall be added to terminate (to the nearest even length of riser pipe) at a depth sufficient to serve the property, but not less than 4-feet unless approved by Engineer.

D. Services

House services where the property being served does not require the full depth may be brought up to grade in the manner described for riser pipe with payment for all pipe as house service only. House services from main sewers with less than 10 feet depth will be extended on a straight uniform grade from the main to the point of terminus. Depths of house services at the point of termination will be supplied by the CTUB, but in general will be held to a minimum of 6 feet when the depth of the main sewer permits. The responsibility of the DEVELOPER. In no case shall the termination point be beyond the easement or right-of-way limits.

1. Installation – Specifications for sewer pipe installation are applicable for all house services. Unless otherwise shown on the plans or directed by the CTUB, all house services shall be installed in a trench with a maximum width at the top of the pipe barrel of 24 inches.

E. Cleanout

A cleanout shall be installed at the property line. The cleanout shall be as shown on the plans and details.

F. Closures

The outlet of each wye branch, riser, or house service shall be securely sealed with a watertight closure that can be later removed without damage to the outlet. This closure shall be capable of withstanding the test pressures specified for the main sewer and house services.

1. PVC – All closures at the end of PVC wye branches, risers, or house services shall be made by installing a length of PVC pipe to the wye branch, riser or house service and installing a PVC cap or plug to the end. A sufficient length of pipe should be installed to permit removal of the closure and extending the line in the future. All closures shall have elastomeric gasket joints.

## 8.5 SPECIAL SEWER PIPE CASING

A. Roadway and special location casings (See Standard Detail #24)

Roadway encasements shall conform to conditions set forth in the applicable permitting entities requirements, i.e. WV DOH, CSX Railroad, Gas and Electric Utilities. Encasements under development roadways shall conform to Standard Detail # 24.

B. Stream Crossings (See Standard Detail #25)

Stream crossing encasements shall conform to conditions set forth in the WV Public Lands Corporation permit. In general, the permitting entity requirements will closely mirror construction as detailed in Standard Details # 1, #2 and # 25.

C. Concrete encasement (See Standard Detail # 25)

Where indicated on construction plans or where field conditions dictate, such as water – sewer main separation conflicts, concrete encasements of sewer mains shall conform to “Typical Pipe Encasement” on Standard Detail Sheet #25. Wherever concrete is to be placed next to ductile iron piping, the piping shall be wrapped with polyethylene protective wrapping.

## 8.6 HOME OWNER INSTALLED SERVICE LATERALS

A. Requirements

1. Pipe

- a. Pipe shall be 4” minimum SDR 35 or Schedule 40 installed at 2% minimum slope.

2. Excavation

- a. Lateral should be placed with minimum of 3 feet of cover unless otherwise approved by CTUB.

3. Connection

- a. Connection of home owner lateral to existing lateral shall be by fitting of same type as pipe. Where grade change precludes use of standard fitting, a Fernco fitting may be used.

4. Bedding

- a. Laterals shall be installed with minimum of 6” bedding below pipe and 12” over pipe. Bedding shall be No. 8 or No. 10 limestone or other material as approved by CTUB.

B. Inspection

- 1. The lateral and connections shall be inspected and approved by a representative of CTUB prior to covering with bedding. **(See Sewer**

**Lateral Report, Appendix E).** The intent of this requirement is to minimize the possibility of I & I running into the sewer system.

8.7 Project Completion Submittals

A. As-built Drawings shall include, at a minimum:

1. Sewer Lines
2. Elevations of sewer manhole rim, invert of line in, and invert of line out.
3. Distance from manhole to service lateral connections.
4. For new systems, locations of the end of all installed lateral with reference ties as needed to assure ability to relocate.
5. Distances between manholes and reference ties to manholes as needed.
6. Length of service lateral installed.
7. Location of clean-outs with reference ties as needed.
8. Location, size, type and length of casing pipe.
9. Location, size and type of pipe installed.
10. Location, size, type and invert elevation of mainline clean-out with reference ties as needed.
11. Water Tanks, Pump Stations, Treatment Plants, Basins, etc.
  - a. All information necessary to describe location, configuration and composition of facility including utilities, equipment, drains, fencing, roadways and other related items.
12. Existing Utilities Encountered
  - a. Location, size and type of utility encountered with reference ties as needed.
  - b. Note any repairs made to damaged utilities.
  - c. Location, size and type for any relocated utilities with reference ties as needed.

NOTE: Location must be established by shown distances, reference ties, or co-ordinates and not by physical placement on a map alone. Elevations of sewer manhole rim, invert of line in, and invert of line out.

13. Two full-size (24" X 36" or 22" x 34") and two 1/2-size (11" x 17") paper copies of as-built drawings shall be furnished to CTUB.

14. One full-size mylar (24" x 36" or 22" x 24") copy of as-built drawings shall be furnished to CTUB.
15. AutoCAD digital files of the drawings shall be furnished to CTUB.

B. Operating and Maintenance Manual

1. Manuals shall include operating and maintenance information on all systems and items of equipment. The data shall consist of catalogs, brochures, bulletins, charts, schedules, working drawings corrected to as-built conditions and assembly drawings and wiring diagrams describing location, operation, maintenance, lubrication, operating weight, lubrication chart showing manufacturer-recommended lubricants for each rotating or reciprocating unit, and other information necessary for the Engineer to establish an effective operating and maintenance program. The following data shall also be included:
  - a. Title page giving name and location of facility.
  - b. Four eight-inch by ten-inch color pictures of the facility, views as directed by CTUB.
  - c. Photographs (color) of each piece of equipment in place.
  - d. "Name Plate" data of all equipment.
  - e. Performance curves for all pumps installed.
  - f. Approved working drawings of each piece of equipment.
  - g. Manufacturers' cuts and dimension drawings of each piece of equipment, and details of all replacement parts.
  - h. Manufacturers' erection, operation, and lubrication instructions for all equipment and apparatus.
  - i. Complete wiring diagrams of all individual pieces of equipment and systems including one line diagram; schematic or elementary diagrams; and interconnection and terminal board identification diagrams.
  - j. Complete piping and ductwork layout and interconnecting drawings.
2. All items noted in paragraph 1 that are of sheet size of 8-1/2 inches by 11 inches shall be bound in loose leaf 3-ring type binders with black plastic-coated or blue canvas covers. Binders shall be Vernon Line Royal Number R-6372 or Number R-372.

3. Working drawings 24-inches by 36-inches or similar in size shall be folded such that they can be bound into the 3-ring binder, their title block is exposed, and they can be folded out without being removed from the binder. Alternatively, they may be folded as described and placed in clear pockets which are bound in the manual. Drawings descriptive of a single item of equipment shall be grouped together.
4. AutoCAD digital files of the drawings shall be furnished to CTUB.

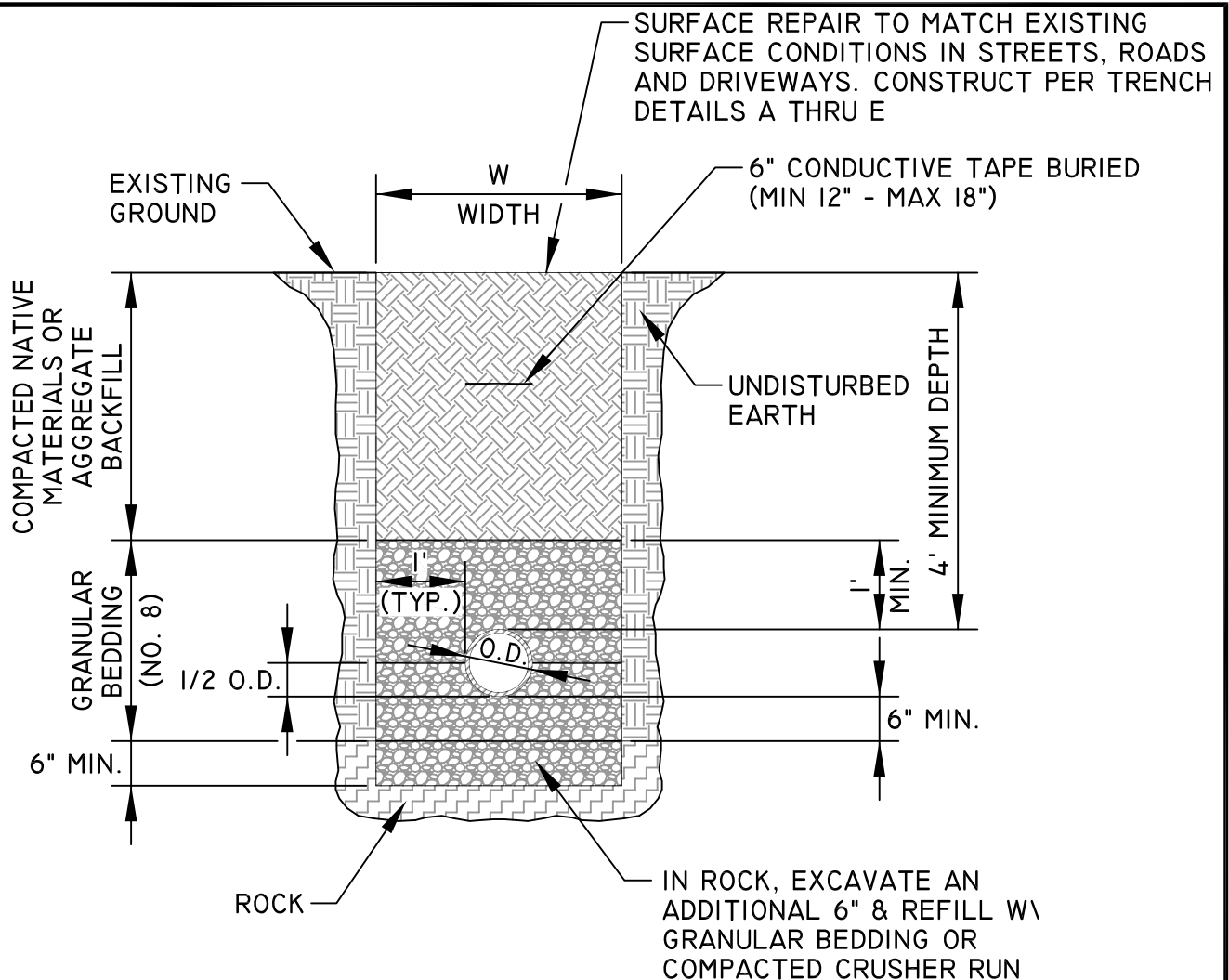
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## **APPENDIX A**

### **Standard Sewer Details**

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#### NOTES:

1. W = MAXIMUM PERMISSIBLE TRENCH WIDTH, BASED UPON,  $W = O.D. + 24"$ , UNLESS APPROVED BY THE ENGINEER.
2. TRENCHES TO BE SHEETED AND BRACED AS REQUIRED.
3. PROVIDE BEARING FOR FULL LENGTH OF BARREL, DIG HOLES FOR THE BELL.
4. BACKFILL ON SIDES TO 1/2 O.D. OF PIPE TO HOLD PIPE IN PLACE PRIOR TO PLACING ADDITIONAL BEDDING.
5. BACKFILL TO BE COMPACTED IN 6" LAYERS TO 95% OF MAXIMUM DENSITY AT OPTIMUM MOISTURE (+2%) IN ROADS AND STREETS. COMPACT TO MATCH EXISTING GROUND IN OTHER AREAS.
6. MAINTAIN MINIMUM OF 4' OF COVER TO THE TOP OF PIPE.
7. A CASING PIPE SHALL BE REQUIRED IN ROAD CROSSINGS WHERE SHOWN ON PLANS
8. ALL WATER LINES REQUIRE PERMIT FROM APPLICABLE REGULATORY ENTITIES. PERMIT REQUIREMENTS SUPERCEDE WHAT IS SHOWN ON THIS DETAIL.

#### Charles Town Utility Board

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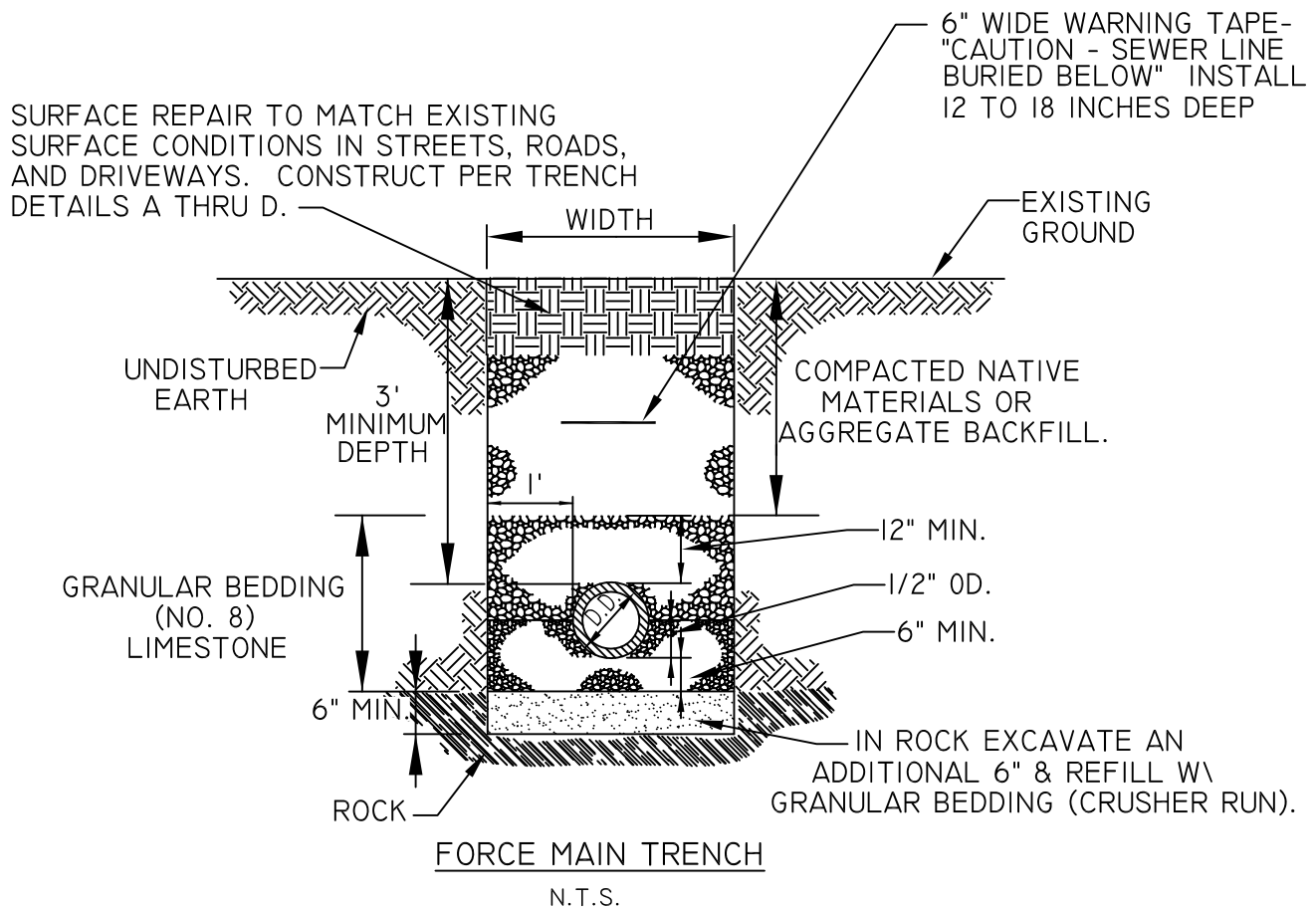
## SEWER LINE TRENCH DETAIL

STANDARD DETAIL No.

**S-1**

NOT TO SCALE

SEPTEMBER 2015



#### NOTES:

1. W = MAXIMUM PERMISSIBLE TRENCH WIDTH, BASED UPON, W = O.D. + 24", UNLESS APPROVED BY THE ENGINEER.
2. TRENCHES TO BE SHEETED AND BRACED AS REQUIRED.
3. PROVIDE BEARING FOR FULL LENGTH OF BARREL, DIG HOLES FOR THE BELL.
4. BACKFILL TO BE COMPACTED IN 6" LAYERS TO 95% OF MAXIMUM DENSITY AT OPTIMUM MOISTURE (+2%) IN ROADS AND STREETS. COMPACT TO MATCH EXISTING GROUND IN OTHER AREAS.
5. MAINTAIN MINIMUM OF 3' OF COVER TO THE TOP OF PIPE.
6. A CASING PIPE SHALL BE REQUIRED IN ROAD CROSSINGS WHERE SHOWN ON PLANS

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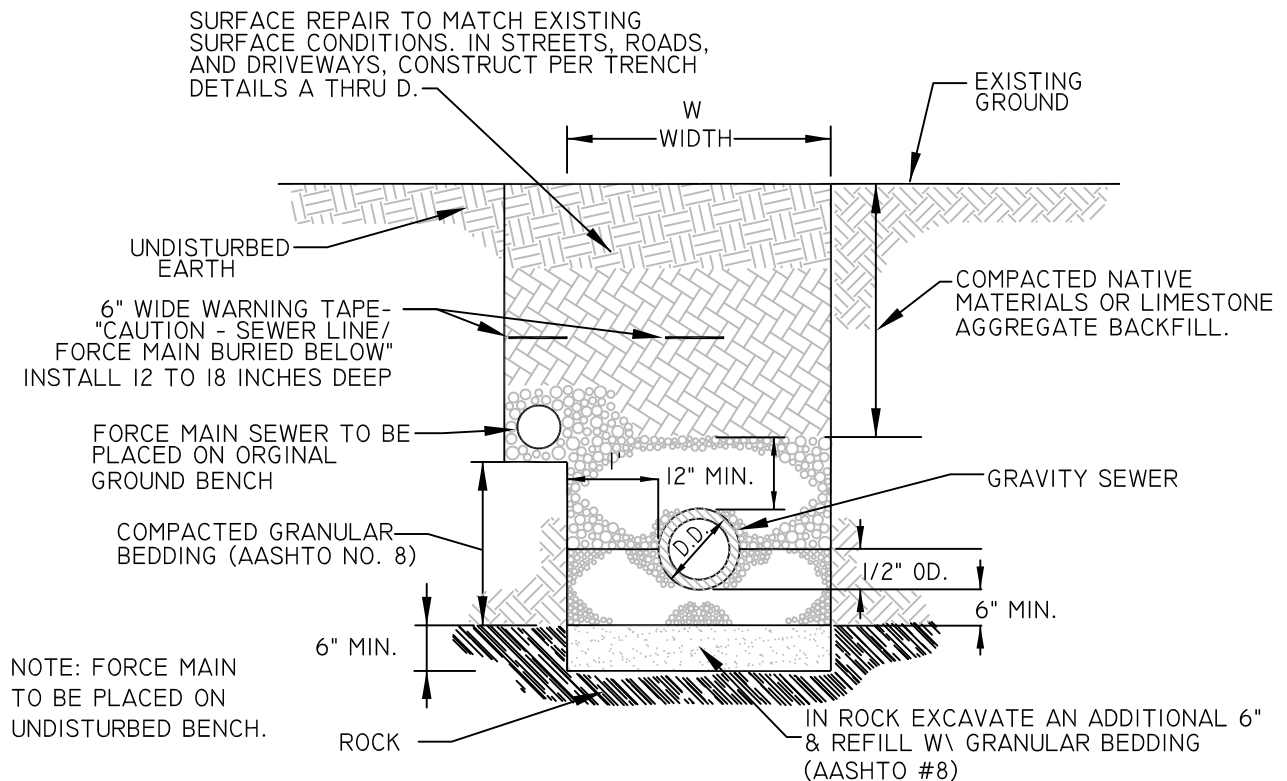
## FORCE MAIN TRENCH DETAIL

STANDARD DETAIL No.

**S-2**

NOT TO SCALE

SEPTEMBER 2015



#### NOTES:

1. W = MAXIMUM PERMISSIBLE TRENCH WIDTH, BASED UPON,  $W = O.D. + 24"$ , UNLESS APPROVED BY THE ENGINEER.
2. TRENCHES TO BE SHEETED AND BRACED AS REQUIRED.
3. PROVIDE BEARING FOR FULL LENGTH OF BARREL, DIG SLOTS FOR THE BELLS.
4. BACKFILL TO BE COMPACTED IN 6" LAYERS TO 95% OF MAXIMUM DENSITY AT OPTIMUM MOISTURE (+2%) IN ROADS AND STREETS. COMPACT TO MATCH EXISTING GROUND IN OTHER AREAS.
5. CONSTRUCT 1' WIDE BENCH ON UNDISTURBED EARTH AFTER BACKFILL TO BENCH LEVEL FOR FORCE MAIN.
6. MAINTAIN A MINIMUM OF 3 FEET OF COVER TO THE TOP OF PIPE.
7. A CASING PIPE SHALL BE REQUIRED IN ROAD CROSSINGS WHERE SHOWN ON PLANS

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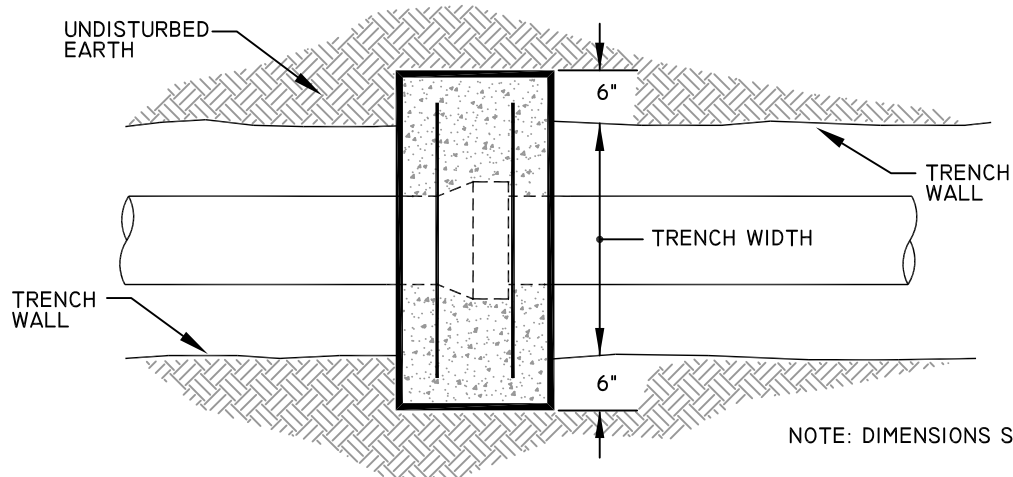
## SEWER PIPE/ FORCE MAIN TRENCH DETAIL

STANDARD DETAIL No.

**S-3**

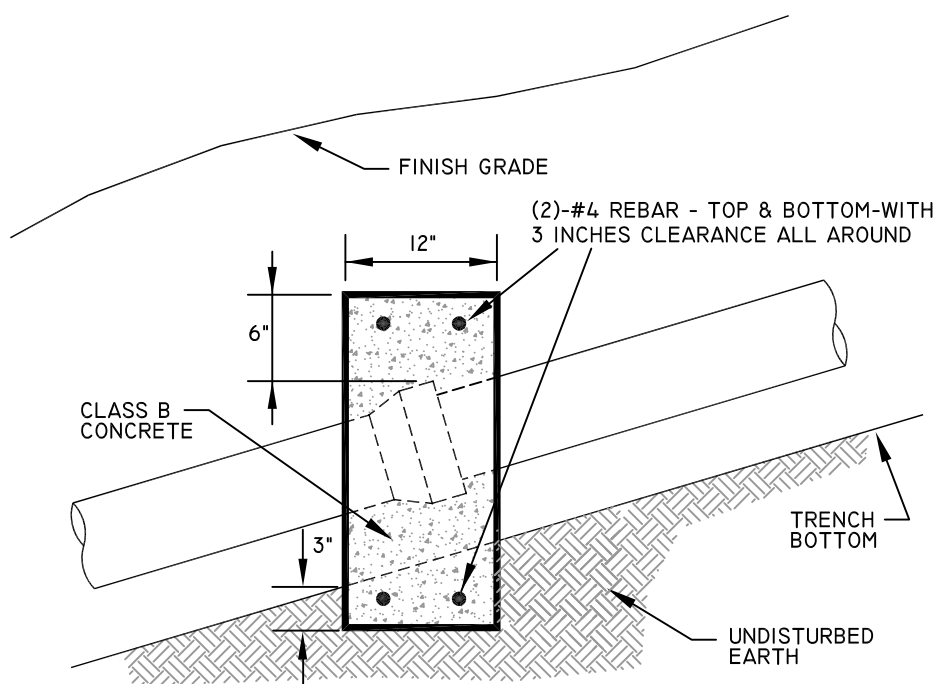
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SEPTEMBER 2015



NOTE: DIMENSIONS SHOWN ARE MINIMUM

### PLAN N.T.S.



### SECTION N.T.S.

1. PROVIDE ANCHORS ON GRADES OF 20% AND GREATER OR WHERE SPECIFIED.
2. PROVIDE ANCHORS 36 FT. O.C. ON GRADES BETWEEN 20% AND 34%.
3. PROVIDE ANCHORS 24 FT. O.C. ON GRADES BETWEEN 34% AND 50%.
4. PROVIDE ANCHORS 16 FT. O.C. ON GRADES 50% OR GREATER.
5. WHEN NECESSARY EXTEND ANCHOR TO 12" BELOW FINISH GRADE TO PREVENT WASHOUT OF BACKFILL BY SURFACE WATER.
6. ANCHORS SHALL BE PLACED AT JOINTS NOT TO EXCEED O.C. DISTANCES.

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## SLOPE ANCHOR DETAIL

STANDARD DETAIL No.

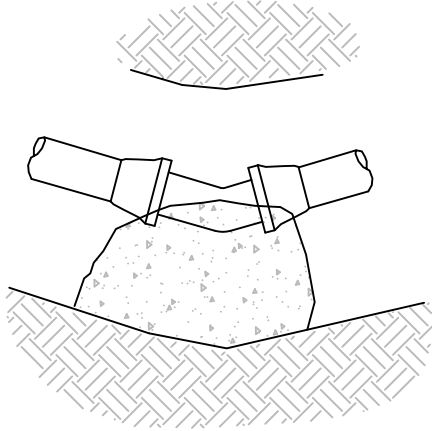
**S-4**

NOT TO SCALE

SEPTEMBER 2015

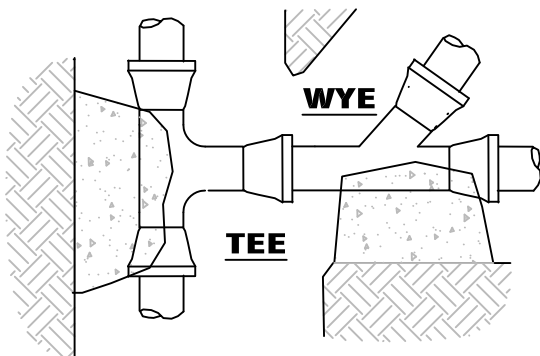
22.5 &amp; 45 DEGREE CONTACT AREA (SF)

PIPE SIZE	PRESSURE CLASS				
	100	150	200	250	300
2	1	1	1	1	1
4	1	1	2	2	2
6	2	2	3	4	5
8	3	4	5	7	8
10	4	6	8	10	12
12	5	9	12	15	18
14	8	12	16	20	24

**22.5° & 45° BENDS**

TEE CONTACT AREA (SF)

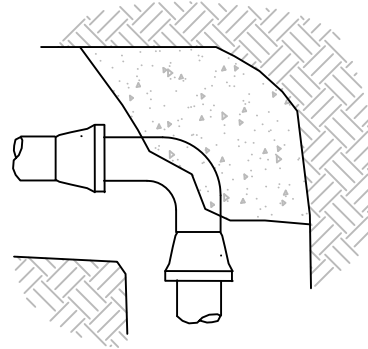
PIPE SIZE	PRESSURE CLASS				
	100	150	200	250	300
2	1	1	1	1	1
4	1	2	2	2	3
6	2	3	4	5	6
8	4	5	7	9	10
10	5	8	11	13	16
12	7	12	15	19	23
14	10	16	21	26	31



SAME CONTACT  
AREA AS TEE

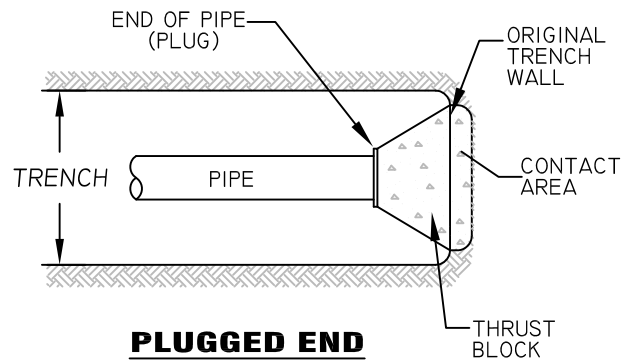
90 DEGREE BEND CONTACT AREA (SF)

PIPE SIZE	PRESSURE CLASS				
	100	150	200	250	300
2	1	1	1	1	1
4	2	2	3	3	4
6	3	4	5	7	8
8	5	7	10	12	15
10	7	11	15	19	22
12	9	16	21	27	32
14	12	22	29	36	44

**90° BEND**

PLUGGED END CONTACT AREA (SF)

PIPE SIZE	PRESSURE CLASS				
	100	150	200	250	300
2	1	1	1	1	1
4	1	2	2	2	3
6	2	3	4	5	6
8	4	5	7	9	10
10	5	8	11	13	16
12	7	12	15	19	23
14	10	16	21	26	31

**PLUGGED END****THRUST BLOCK GENERAL NOTES**

1. ALL CONCRETE SHALL BE 3000 P.S.I. (AE)
2. THRUST BLOCKS SHALL BE IMBEDDED IN UNDISTURBED SOIL.
3. SOIL BEARING CAPACITY IS ASSUMED AT 3000 LB. SQ. FT. FOR WEAKER SOILS THRUST BLOCK AREAS SHALL BE INCREASED AS REQUIRED.
4. WRAP PIPE WITH POLYETHYLENE TO PREVENT CONTACT BETWEEN PIPE AND THE CONCRETE.
5. WITH APPROVAL OF ENGINEER, MEGA-LUG JOINT RESTRAINTS MAYBE SUBSTITUTED FOR THRUST BLOCKS PER MANUFACTURER'S RECOMMENDATION(TO BE FURNISHED BY CONTRACTOR). FOR DUCTILE IRON, USE UNIFLANGE 1400 OR EBBA 1100 AND FOR C900 PVC, USE UNIFLANGE 1500 OR EBBA 2000PV.

**Charles Town Utility Board**

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# PIPE BUTTRESS DETAIL

STANDARD DETAIL No.

**S-5**

NOT TO SCALE

SEPTEMBER 2015

TO EXCEED 12" UTILIZING  
E II CEMENT MORTAR

EXISTING GRADE

24"

9"

40"

9"

3" MIN

3" MIN

9" MIN  
12" MAX

VARIES

4'

5"

JOINTS SEALED WATERTIGHT  
W/ BUTYL RUBBER ROPE OR  
RUBBER GASKET

12" MIN

VARIES

8" MIN

4"

6"

5/8" BOLT INSERT  
ANCHOR CAST IN  
PLACE BY MFG.

PARGE WITH PORTLAND  
CEMENT MORTAR

3500 PSI TYPE II PORTLAND CEMENT  
CONCRETE MONOLITHIC BASE & RISER

GRADED AGGREGATE - SUBBASE  
COMPACTED AS SPECIFIED TYP.

1500 PSI TYPE II PORTLAND CEMENT  
CONCRETE FILLER

FLEXIBLE SEAL CAST IN  
PLACE BY MFG.

1. PRECAST MANHOLE SHALL BE MANUFACTURED IN ACCORDANCE WITH ASTM C 478 UTILIZING TYPE II PORTLAND CEMENT. 3500 PSI MIX MINIMUM.
2. 0.1' FALL TYPICAL INVERT IN TO INVERT OUT OR MATCH CROWNS FOR DIFFERING PIPE DIAMETERS.
3. COMPLETE MANHOLE SHALL PASS VACUUM TEST PRIOR TO ACCEPTANCE.

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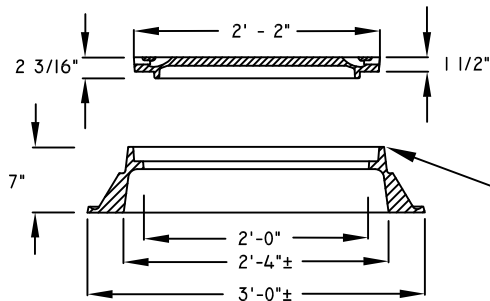
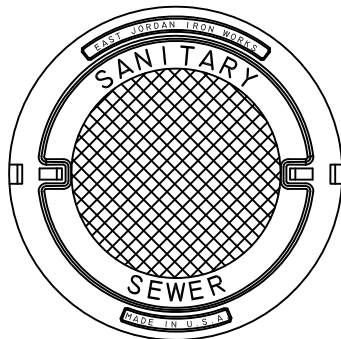
## PRECAST MANHOLE W/ ECCENTRIC TOP DETAIL

STANDARD DETAIL No.

**S-6**

NOT TO SCALE

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FRAME AND COVER TO HAVE  
TAPERED FIT ALL AROUND

**NOTES:**

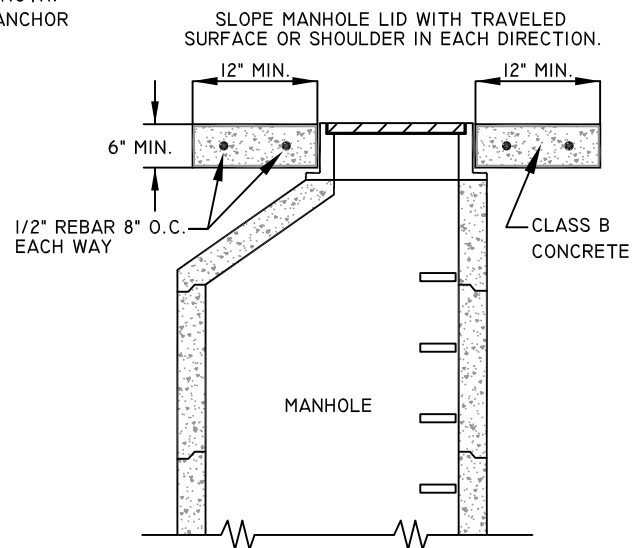
1. MANHOLE COVERS SHALL NOT HAVE VENT HOLES
2. AVERAGE WEIGHT IS 400 LBS
3. DIMENSIONS ABOVE ARE FOR EAST JORDAN IRONWORKS PRODUCTS
4. APPROVED SUPPLIERS:  
EAST JORDAN IRON WORKS  
HIGHWAY: FRAME - PROD. NO. 1045Z UNDIPPED  
COVER - PROD. NO. 1040A UNDIPPED, SELF SEALING  
FRAME & COVER - PROD. NO. 1045AGS UNDIPPED, SELF SEALING  
WATERTIGHT: FRAME & COVER PROD. NO. 1045ZPT/1010APT, UNDIPPED

**NEENAH**

- HIGHWAY: FRAME & COVER R-1642, UNDIPPED, SELF SEALING  
WATERTIGHT: FRAME & COVER R-1916, UNDIPPED

5. FRAME AND COVER TO COMPLY WITH ASTM A48, CLASS 30 TENSILE STRENGTH.
6. USE THREADED STAINLESS STEEL STANDARD HEXAGON HEAD BOLTS TO ANCHOR FRAME AND COVER TO MANHOLE.

**MANHOLE FRAME AND COVER**



**ANCHOR DETAIL  
FOR FRAME & COVER  
IN PAVED ROAD SURFACE AREAS  
AND SHOULDERS OF ROAD**

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**MANHOLE FRAME & COVER  
ANCHOR FOR FRAME & COVER  
DETAIL**

STANDARD DETAIL No.

**S-7**

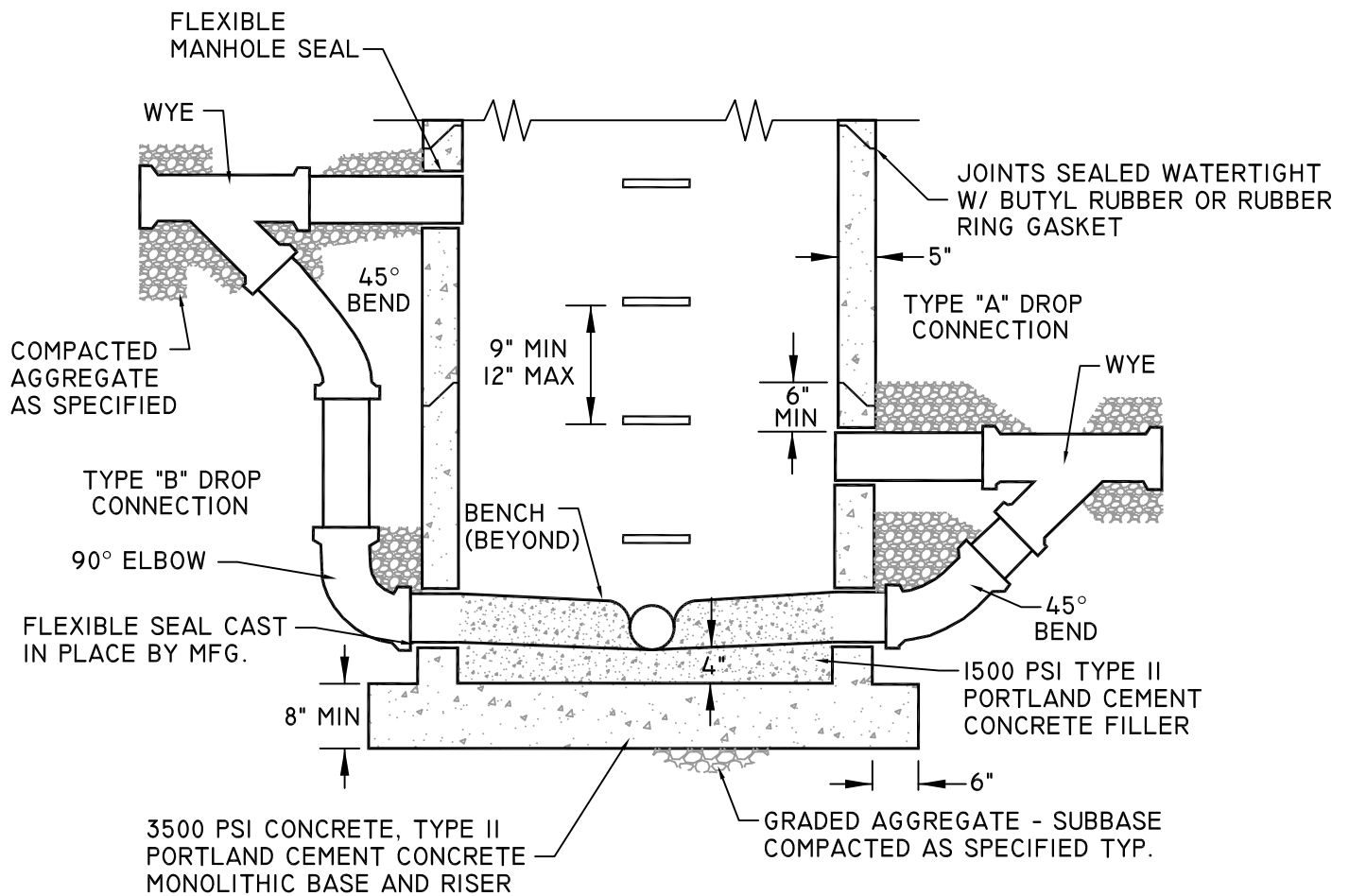
NOT TO SCALE

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DROP CONNECTIONS			
SIZE OF SEWER	TYPE A		TYPE B MIN. DROP
	MAX DROP	MIN DROP	
8"	3'-9"	1'-9"	3'-9"
10"	4'-0"	2'-0"	4'-0"
12"	6'-0"	2'-6"	6'-0"
15"	6'-0"	2'-6"	6'-0"

NOTES:

- I. PRECAST MANHOLE SHALL BE MANUFACTURED IN ACCORDANCE WITH ASTM C 478 UTILIZING TYPE II PORTLAND CEMENT.



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**DROP MANHOLE  
DETAIL**

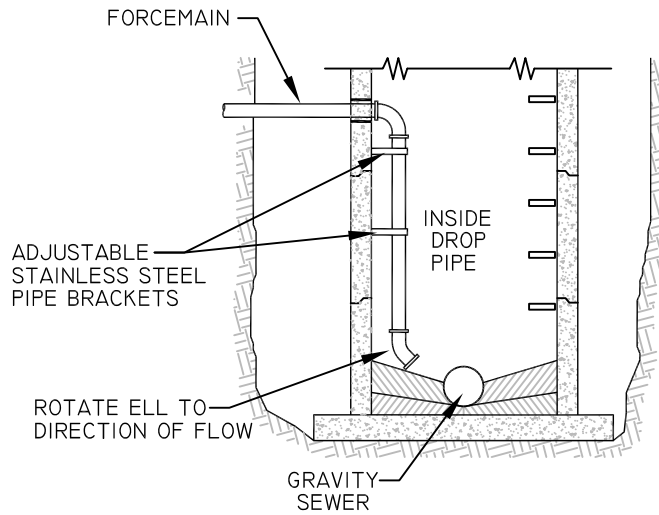
STANDARD DETAIL No.

**S-8**

NOT TO SCALE

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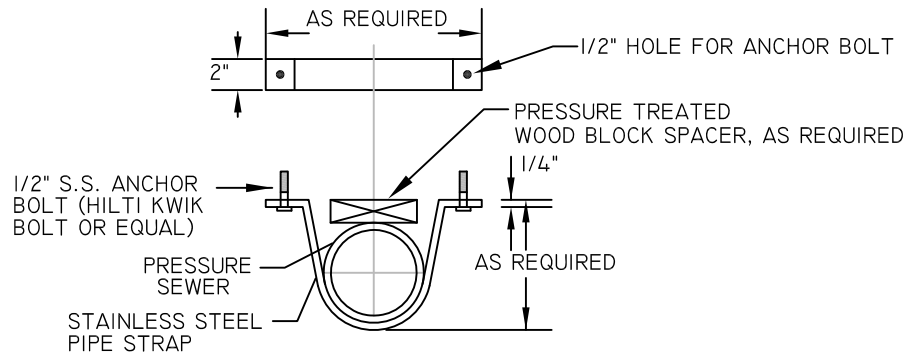




## **FORCE MAIN INLET**

**NOTES:**

1. FORCE MAIN CONNECTIONS WITHIN MANHOLE SHALL BE RESTRAINED.
2. ANCHOR FORCE MAIN TO MANHOLE USING ADJUSTABLE STAINLESS STEEL PIPE BRACKETS. 2 BRACKETS MIN. AND 3' MAX. SPACING.
3. FOR IRREGULAR HOLES SEAL PIPE ON BOTH SIDES WITH HYDRAULIC CEMENT.
4. ANCHOR FORCE MAIN TO MANHOLE USING ADJUSTABLE STAINLESS STEEL PIPE BRACKETS. 2 BRACKETS MIN. WITH MAX SPACING OF 3'.
5. COST OF FORCE MAIN INLET SHALL BE INCLUDED IN UNIT BID PRICE FOR FORCE MAIN.



## **FORCEMAIN ANCHOR STRAP DETAIL**

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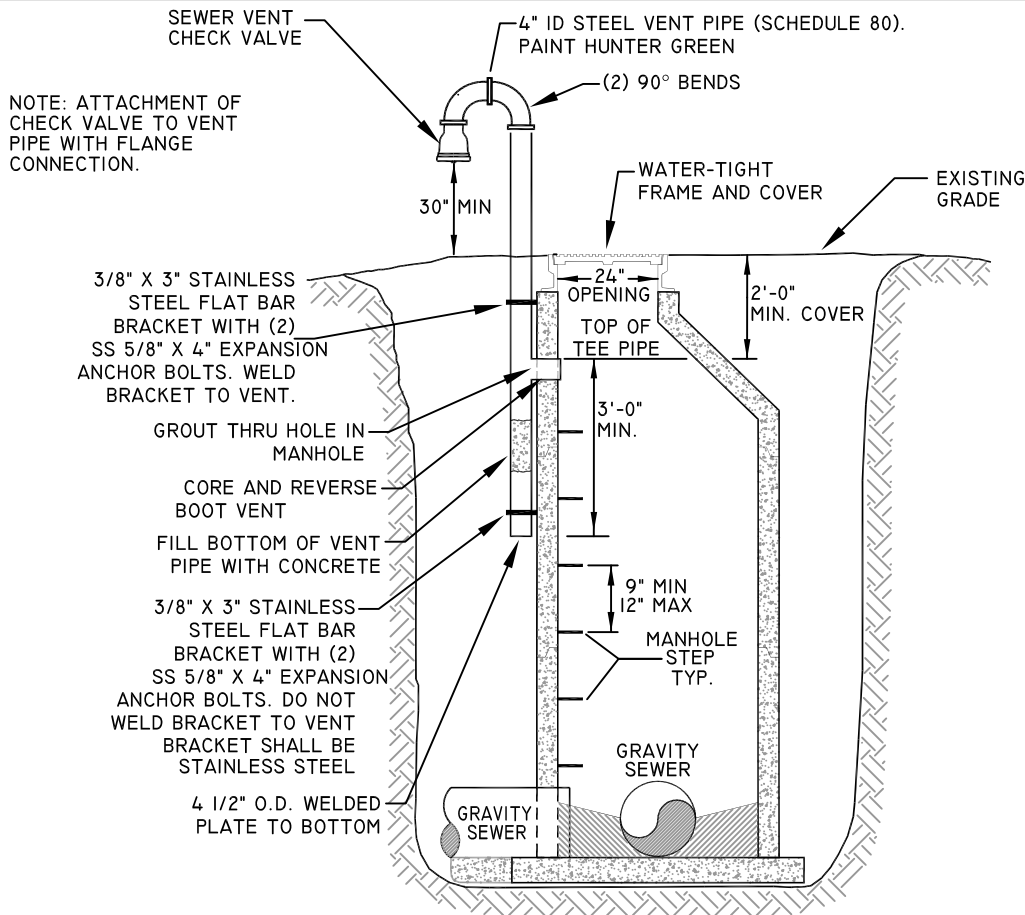
### **FORCEMAIN MANHOLE FORCEMAIN ANCHOR STRAP DETAIL**

STANDARD DETAIL No.

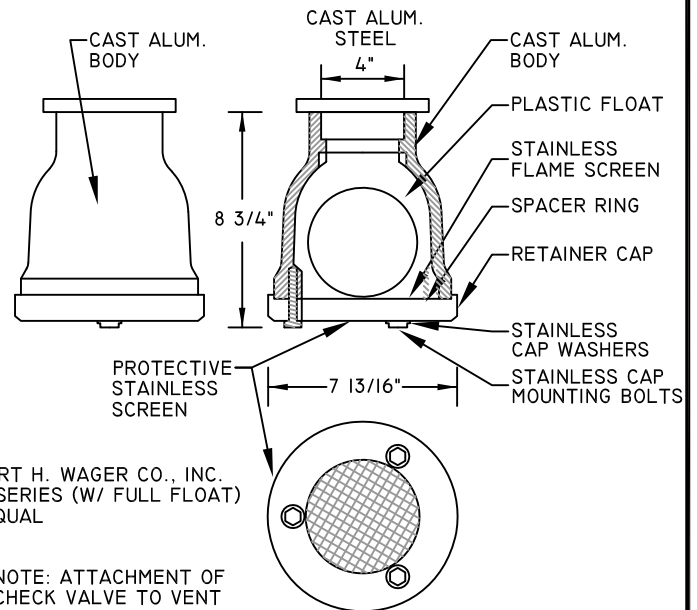
## **S-9**

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## **MANHOLE VENT ASSEMBLY**



## **SEWER VENT CHECK VALVE**

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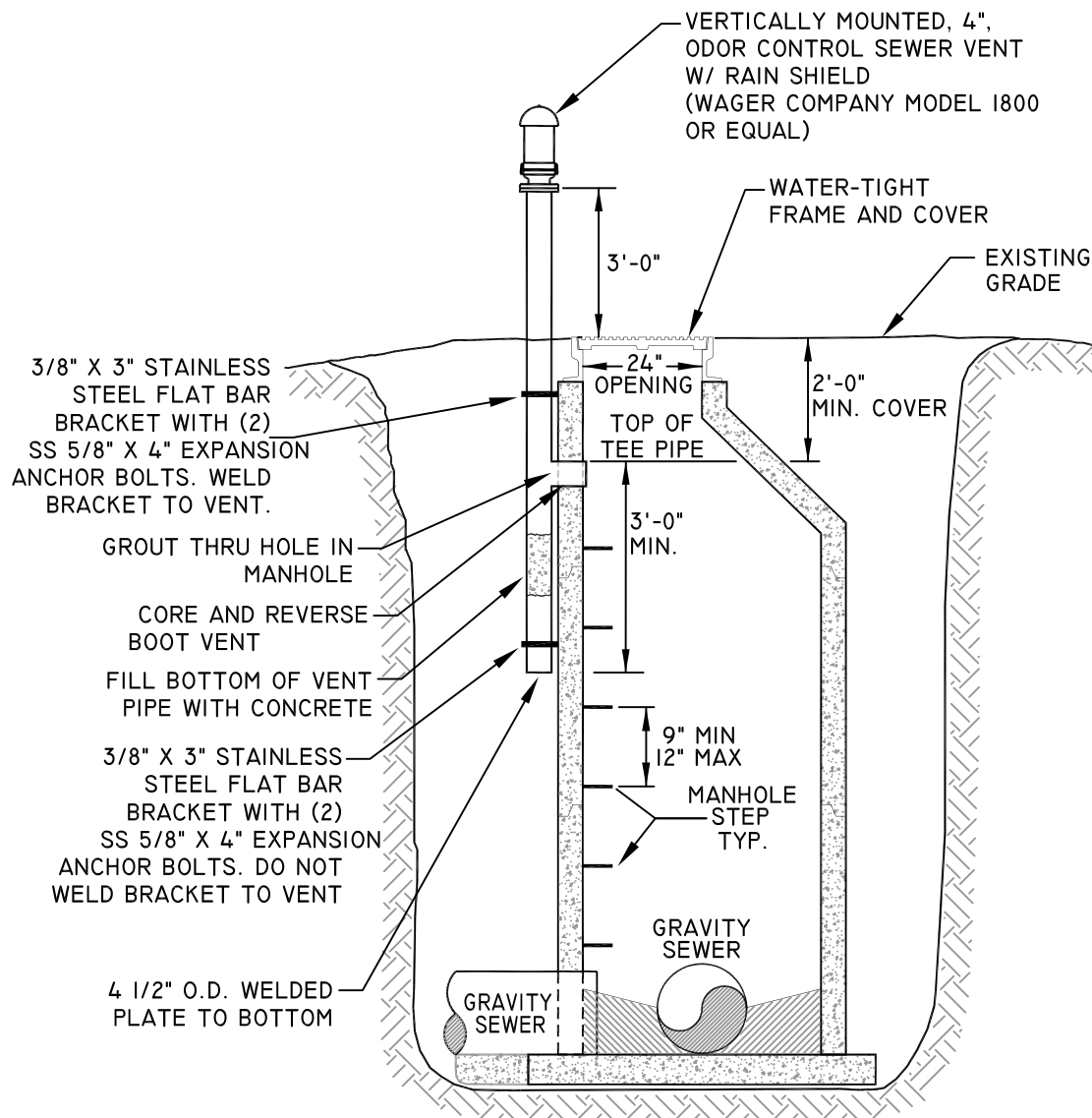
## **MANHOLE VENT & SEWER VENT CHECK VALVE DETAILS**

STANDARD DETAIL No.

**S-10**

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## MANHOLE ODOR CONTROL VENT ASSEMBLY DETAIL

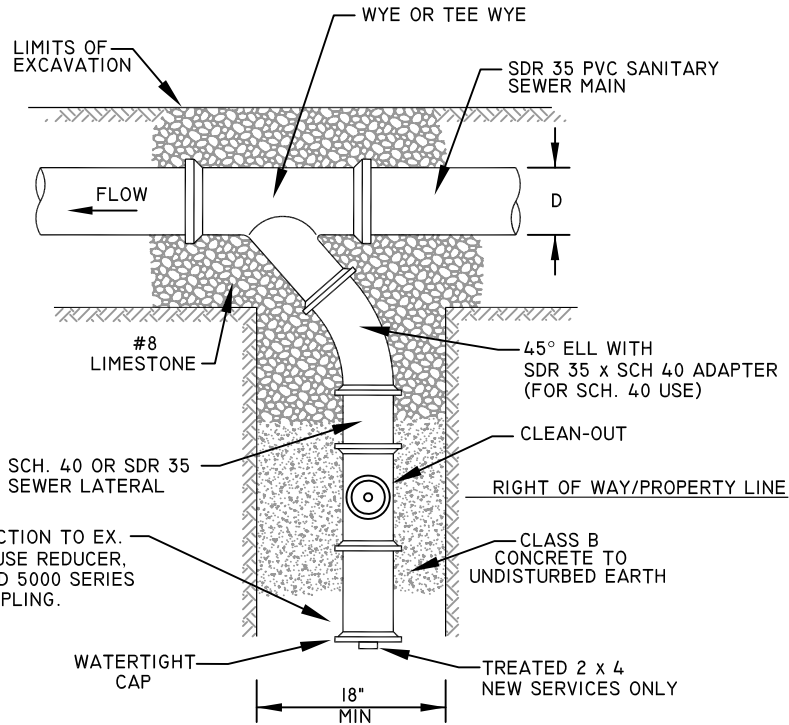
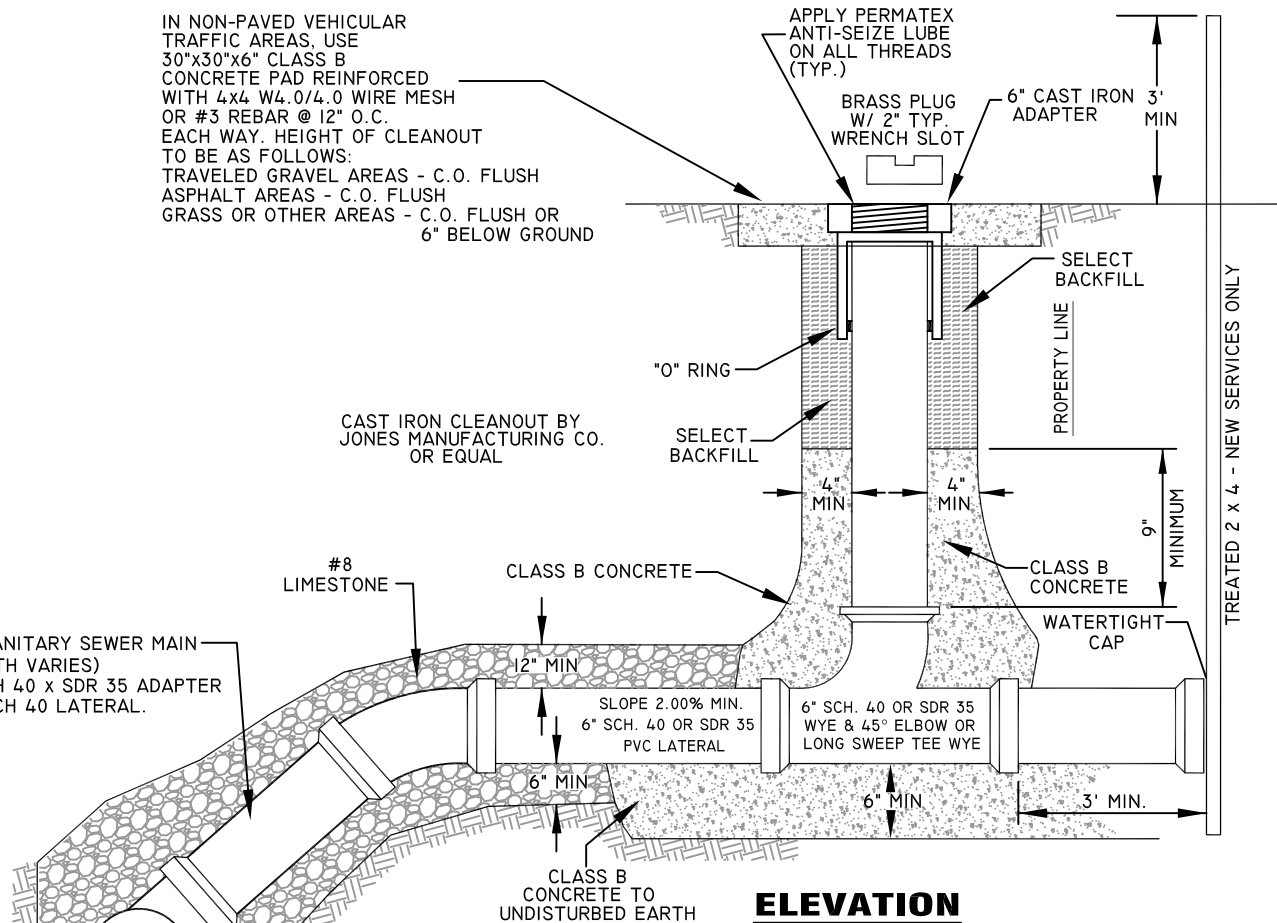
STANDARD DETAIL No.

**S-11**

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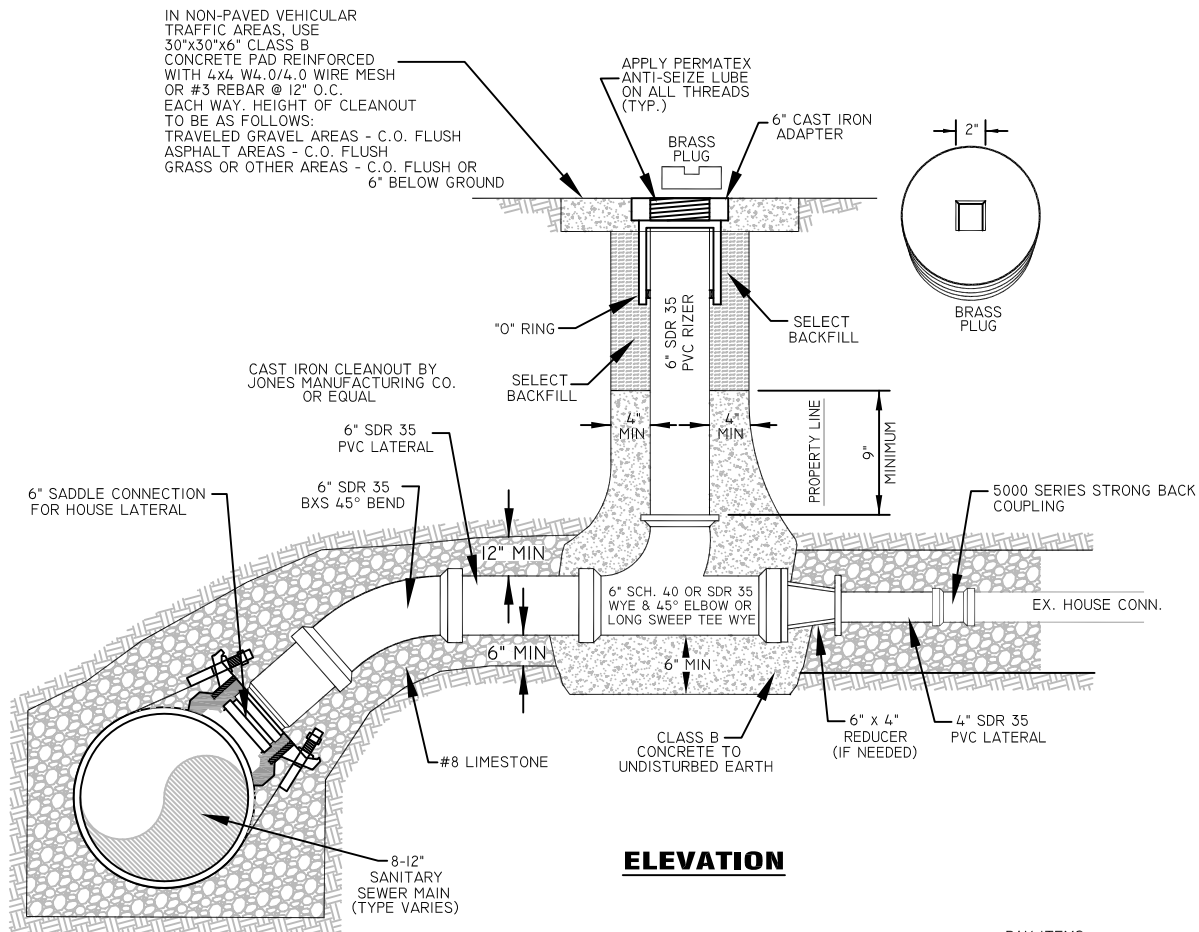
## NEW LATERAL CONNECTION DETAIL

STANDARD DETAIL No.

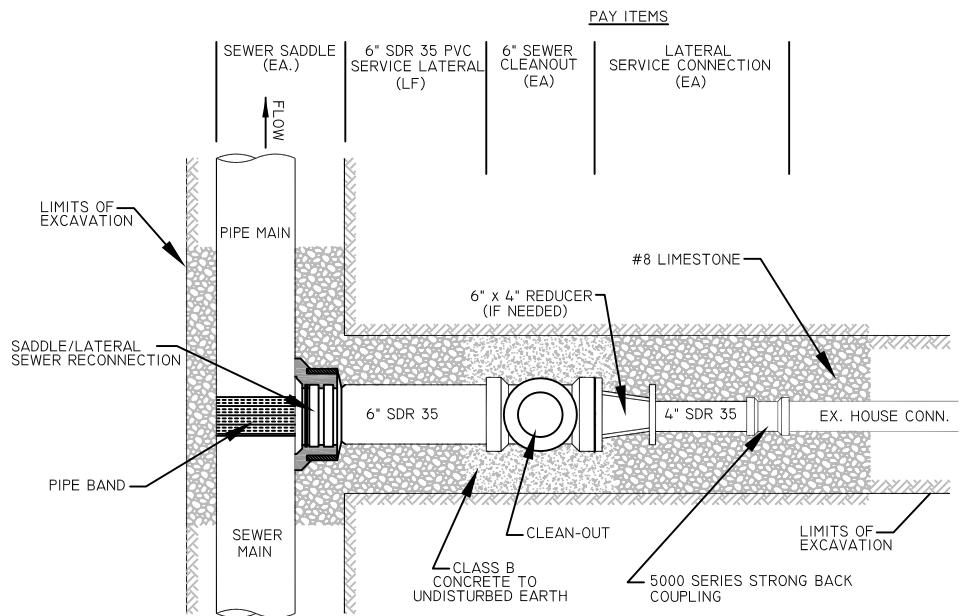
**S-13**

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**ELEVATION**



**PLAN**

**NOTES:**

1. FOR LATERAL SERVICE CONNECTIONS GREATER THAN 5', ADDITIONAL FOOTAGE WILL BE PAID AS LINEAR FEET OF SDR 35 PVC SERVICE LATERAL.
2. SCHEDULE 40 PVC MAY BE USED INSTEAD OF SDR 35 FOR LATERAL PIPE WITH SDR 35 x SCH 40 ADAPTER.
3. USE 6" SEWER SADDLE FOR REPLACEMENT OF EXISTING LATERAL CONNECTIONS.
4. USE 4" SEWER SADDLE FOR NEW 4" LATERAL CONNECTIONS ON EXISTING LINES.

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**REPLACEMENT  
LATERAL CONNECTION  
DETAIL**

STANDARD DETAIL No.

**S-14**

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ADJUSTABLE STRAP:

BOLTS ARE 1/2" UNC ROLLED THREAD  
LUBRICANT COATED BOLT OR NUT.  
NUTS AND BOLTS ARE STAINLESS  
STEEL. MIN. 4" AND MAX. 6".

SERVICE LATERAL

SADDLE CASTING:

DUCTILE IRON PER ASTM 536,  
GRADE 65-45-12. PROTECTED WITH  
A YELLOW CORROSION-RESISTANT  
PAINT.

BAND:

3 1/2" WIDE, STAINLESS STEEL  
BAND FOR SPREADING OUT  
CLAMP FORCE ON PIPE.

GASKET:

SBR PER ASTM D 200 MBA 710  
COMPUDED FOR WATER AND  
SEWER SERVICE. GASKETS  
ARE ESPECIALLY FORMULATED  
WITH ANTIOXIDANT/ANTIOZONANT  
AGENT TO INCREASE SHELF LIFE.

EXISTING MAIN SEWER LINE

NOTES:

1. SADDLE SHALL BE CAPABLE OF ATTACHING TO VARIOUS SIZES AND MATERIALS OF GRAVITY SEWER MAIN LINES. SADDLE SHALL BE INSTALLED SO SEWER LATERAL IS AT 45° FROM VERTICAL AT MAINLINE.
2. ROMAC ORIGINAL, STYLE "CB" SEWER SADDLE.
3. PIPE STOP CAPABLE OF WITHSTANDING 1000 POUNDS OF OF THRUST IS MOLDED INTO THE CB SADDLE GASKET. CARE MUST BE TAKEN DURING SYSTEM DESIGN & INSTALLATION TO ASSURE THAT THIS THRUST LIMIT IS NOT EXCEEDED.
4. NEW LATERAL CONNECTIONS USE 4" SADDLE OR SIZE OF LATERAL IF LARGER.
5. FOR SEWER LATERAL REPLACEMENTS USE 6" SADDLE AND USE PIPE REDUCER TO CONNECT TO LATERAL.
6. A PVC REDUCER IS REQUIRED FOR LOW PRESSURE SEWER MAINS.

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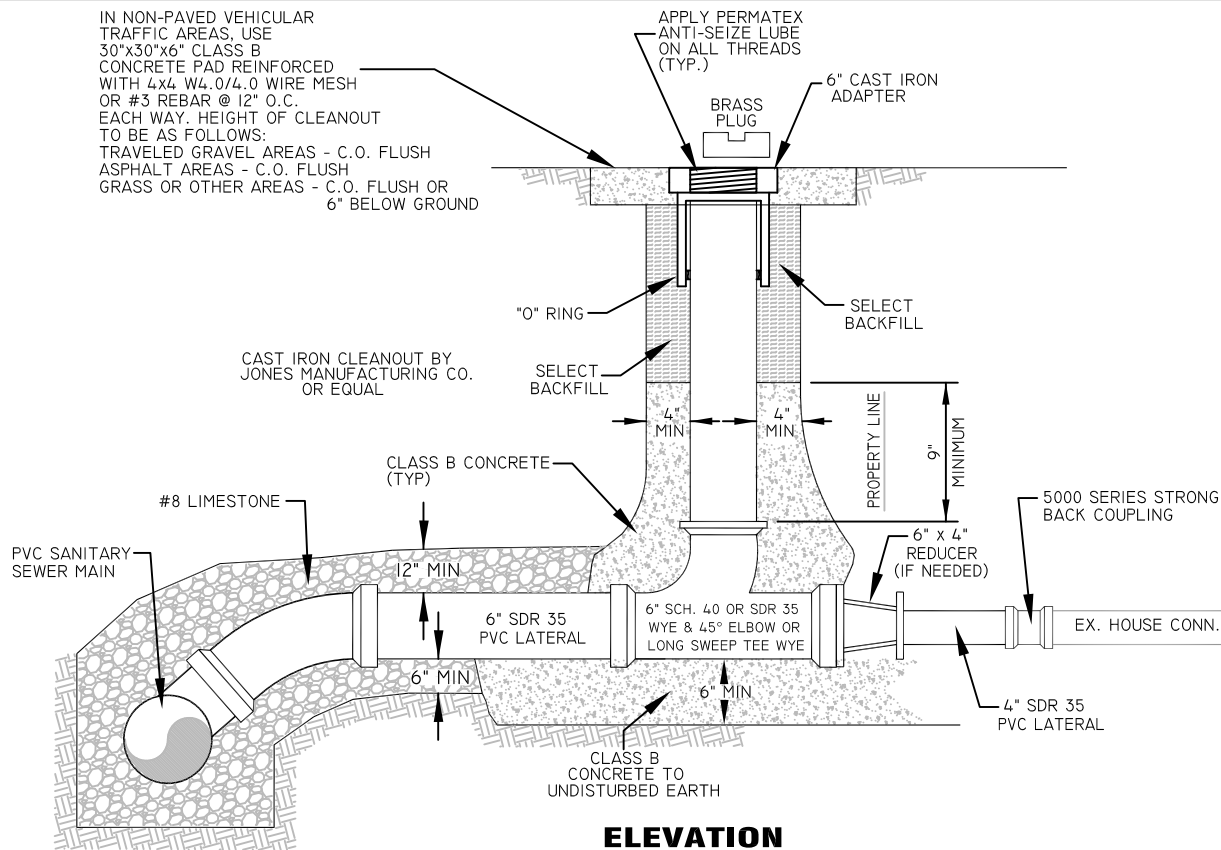
**SEWER SADDLE  
DETAIL**

STANDARD DETAIL No.

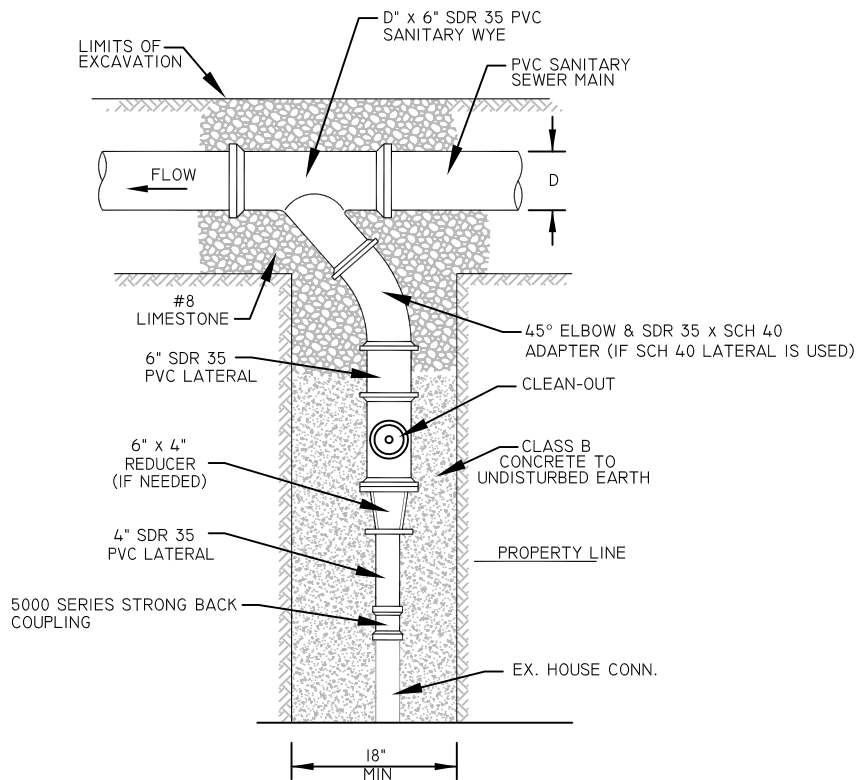
**S-15**

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**ELEVATION**



**PLAN**

NOTES:

1. FOR RE-CONNECTION TO EXISTING SERVICE LINE USE APPLICABLE FITTING, HYMAX OR FERNCO.
2. SCHEDULE 40 PVC MAY BE USED INSTEAD OF SDR 35 FOR LATERAL PIPE WITH SDR 35 x SCH 40 ADAPTER.

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**EXISTING LATERAL  
 CONNECTION  
 DETAIL**

STANDARD DETAIL No.

**S-16**

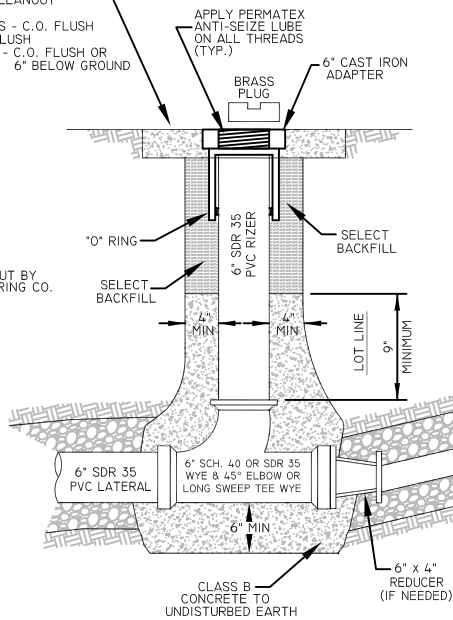
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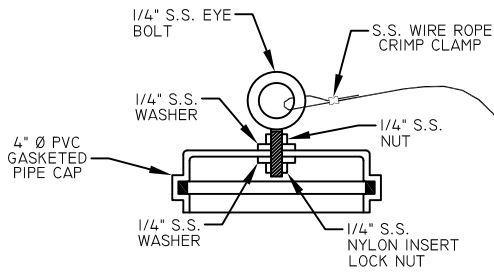


IN NON-PAVED VEHICULAR TRAFFIC AREAS, USE 30"x30"x6" CLASS B CONCRETE PAD REINFORCED WITH 4x4 W4.0/4.0 WIRE MESH OR #3 REBAR @ 12" O.C. EACH WAY. HEIGHT OF CLEANOUT TO BE AS FOLLOWS:  
TRAVELED GRAVEL AREAS - C.O. FLUSH ASPHALT AREAS - C.O. FLUSH GRASS OR OTHER AREAS - C.O. FLUSH OR 6" BELOW GROUND

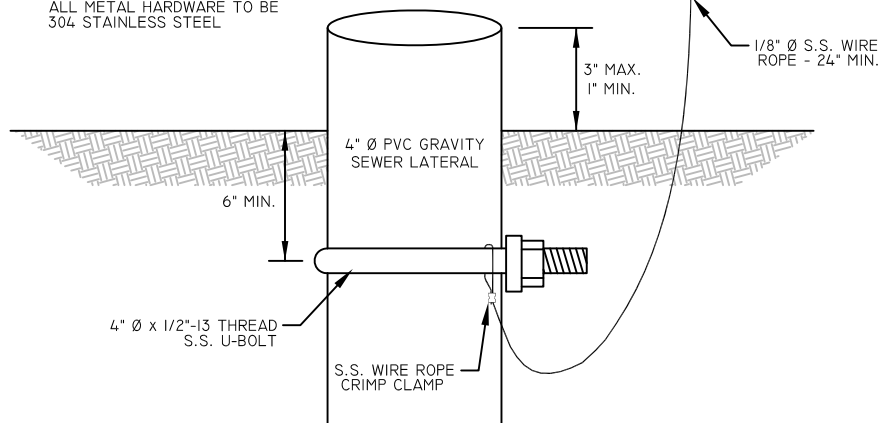
CAST IRON CLEANOUT BY JONES MANUFACTURING CO. OR EQUAL



**ELEVATION**



NOTE: ALL METAL HARDWARE TO BE 304 STAINLESS STEEL



**MOBILE LATERAL CAP**

NOTE: SCHEDULE 40 PVC MAY BE USED INSTEAD OF SDR 35 FOR LATERAL PIPE WITH SDR 35 x SCH 40 ADAPTER.

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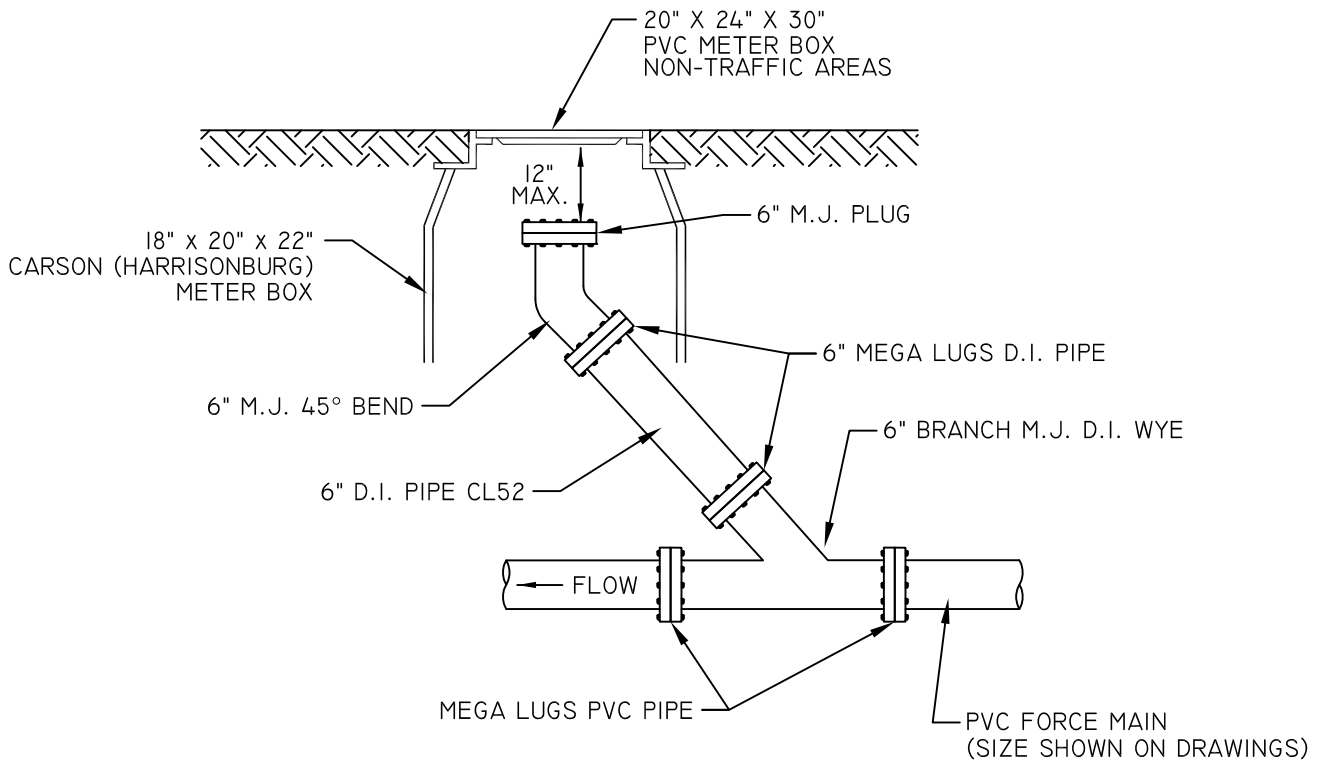
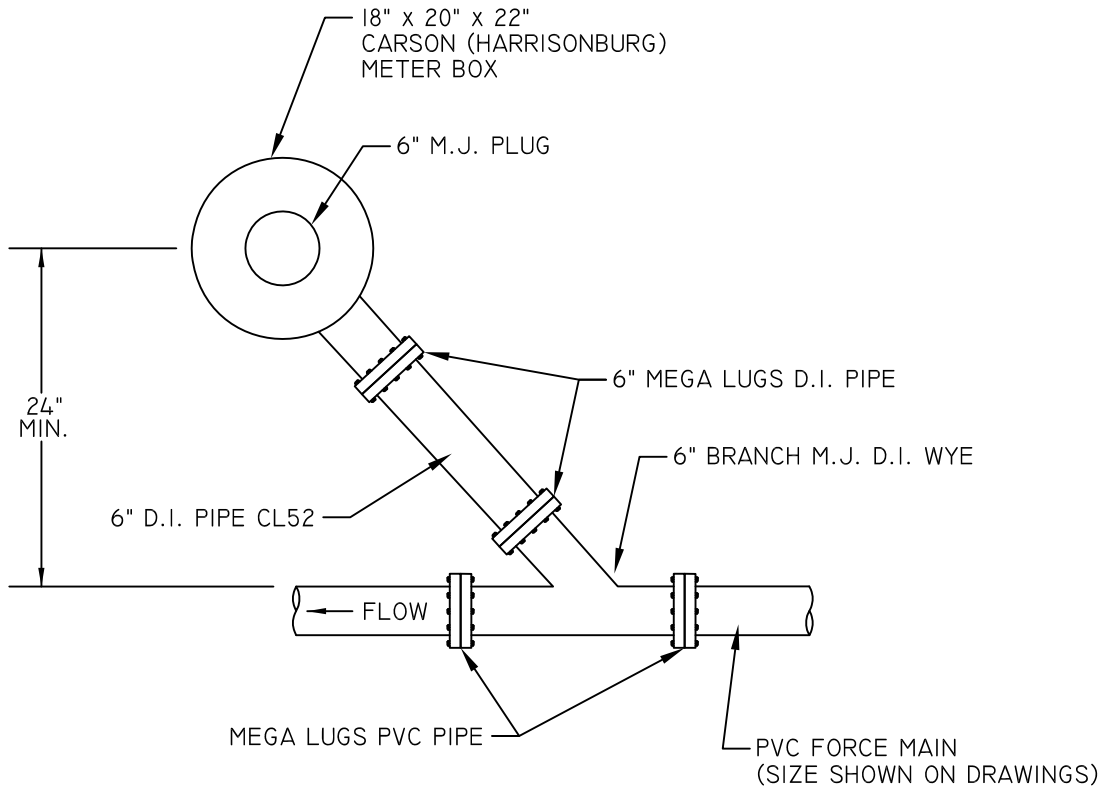
# MOBILE HOME CONNECTION DETAIL

STANDARD DETAIL No.

**S-17**

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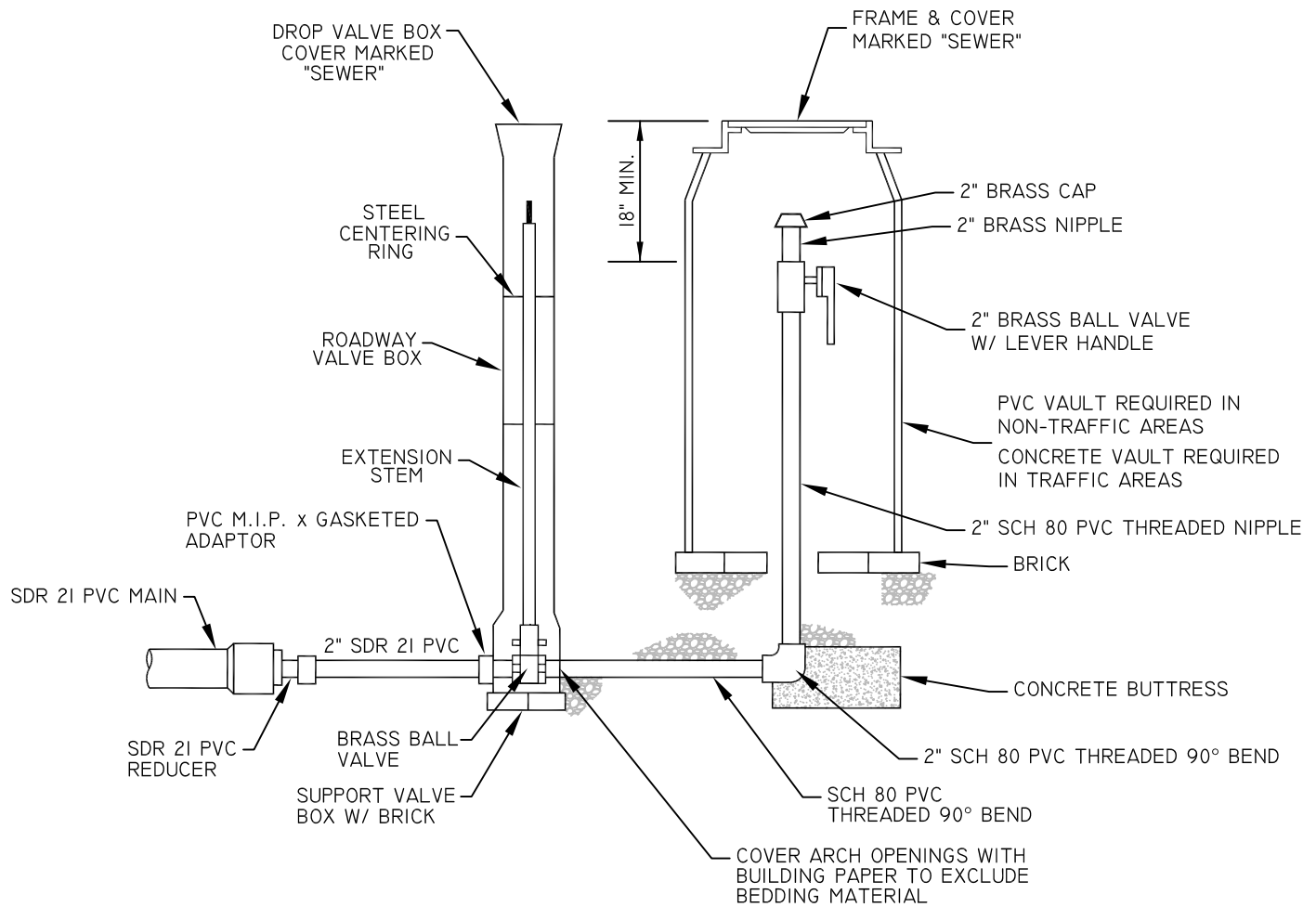
## FORCE MAIN CLEAN OUT DETAIL

STANDARD DETAIL No.

**S-18**

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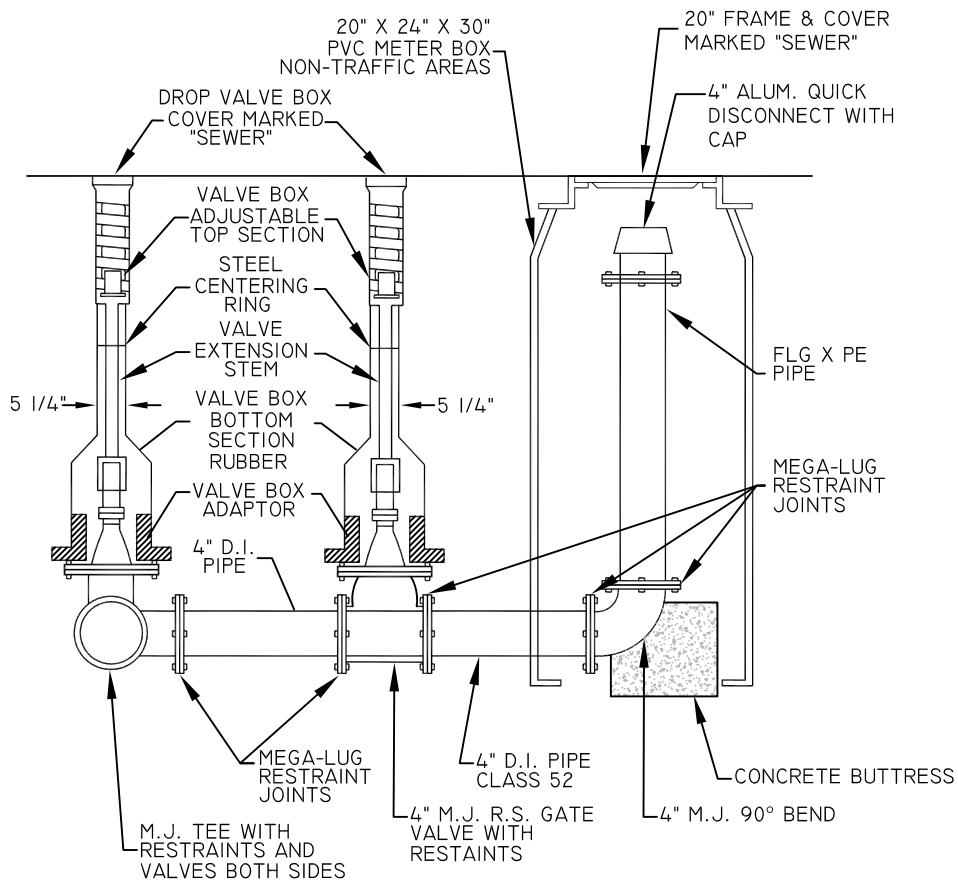
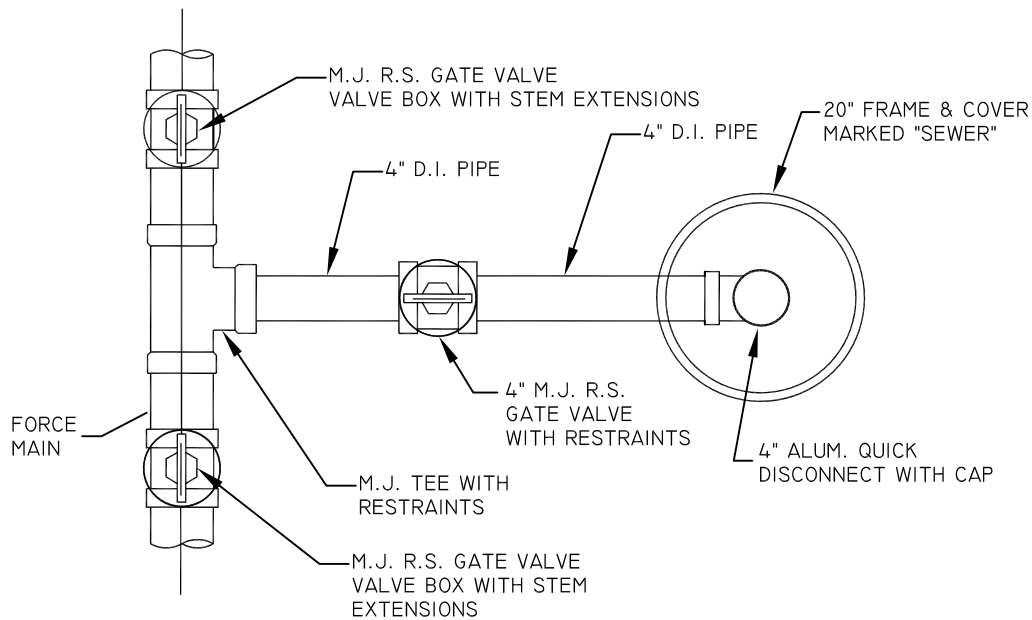
## FORCE MAIN TERMINAL CLEAN OUT DETAIL

STANDARD DETAIL No.

# S-19

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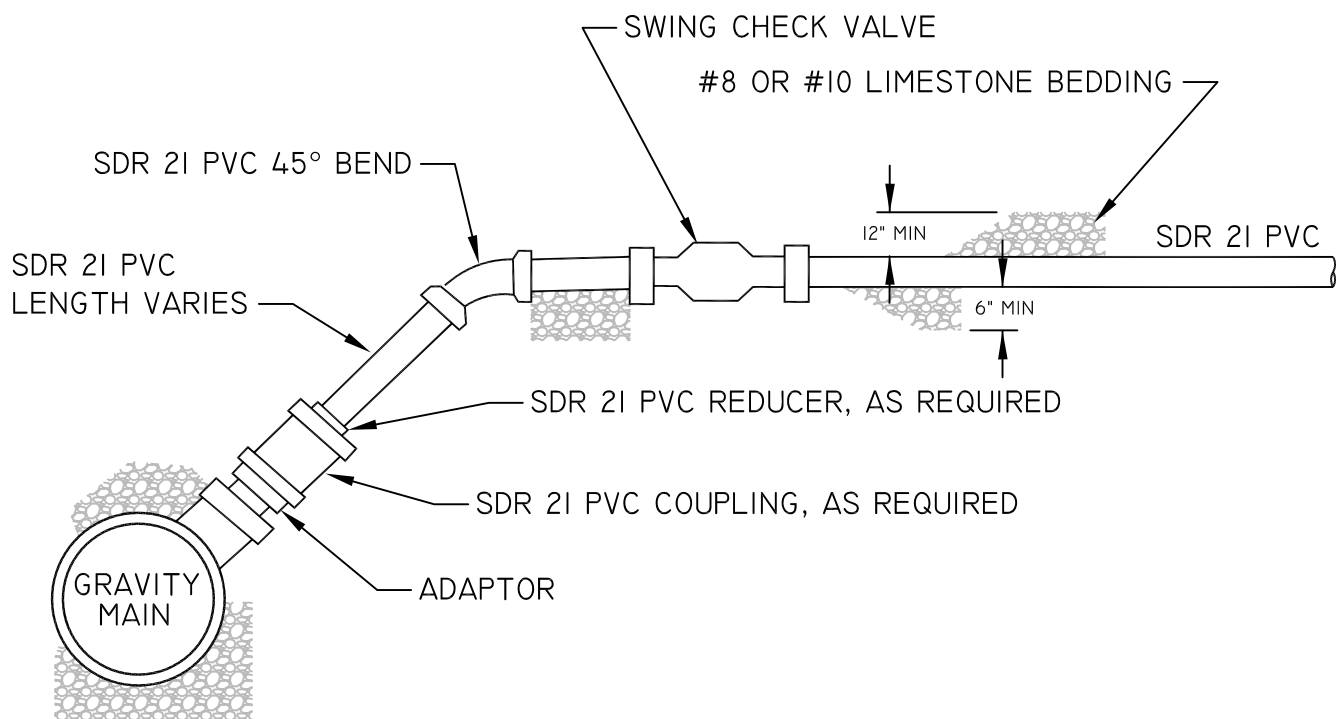
## FORCE MAIN FLUSHING CONNECTION 6" - 16" LINE DETAIL

STANDARD DETAIL No.

# S-20

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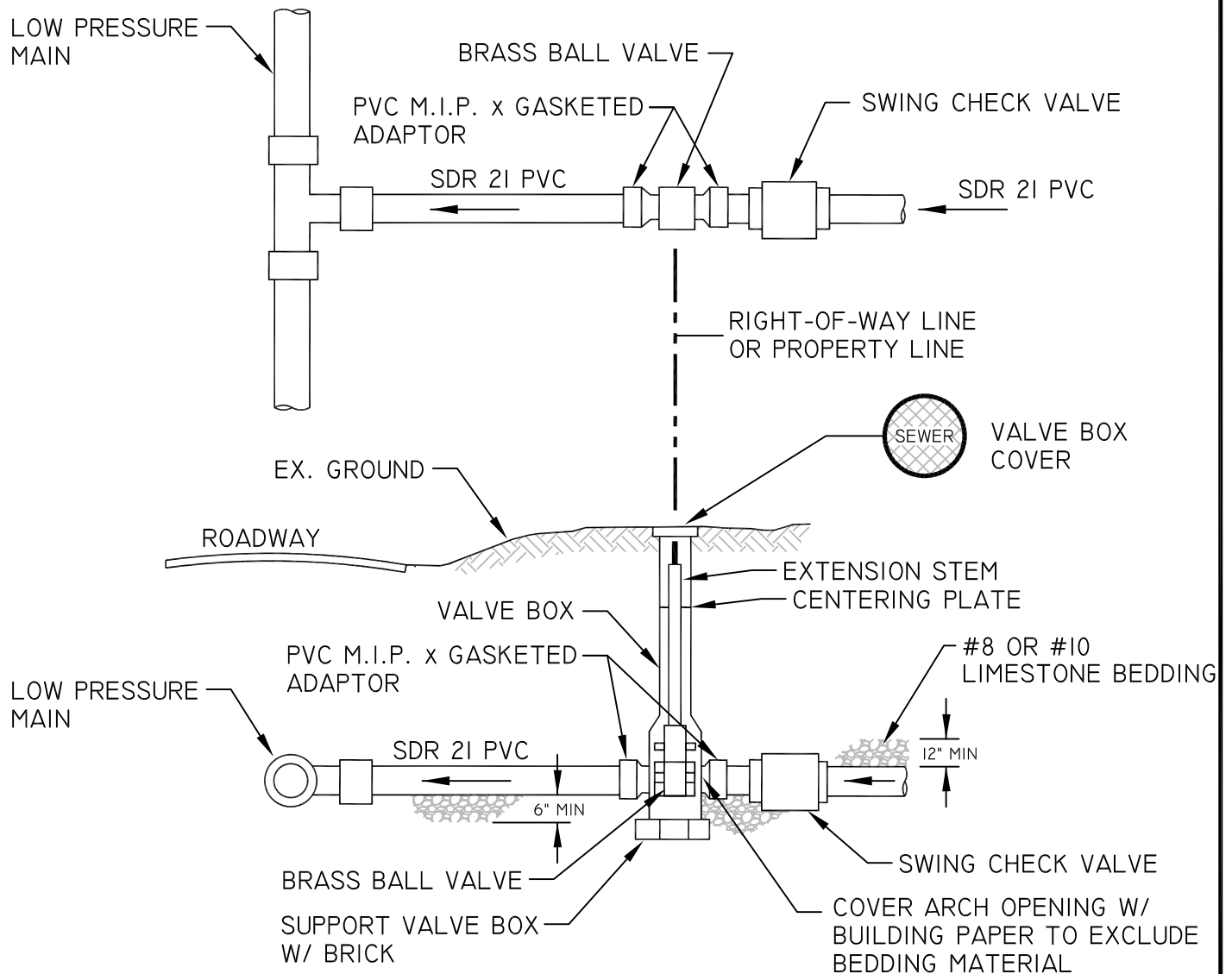
## FORCE MAIN TO GRAVITY CONNECTION DETAIL

STANDARD DETAIL No.

# S-21

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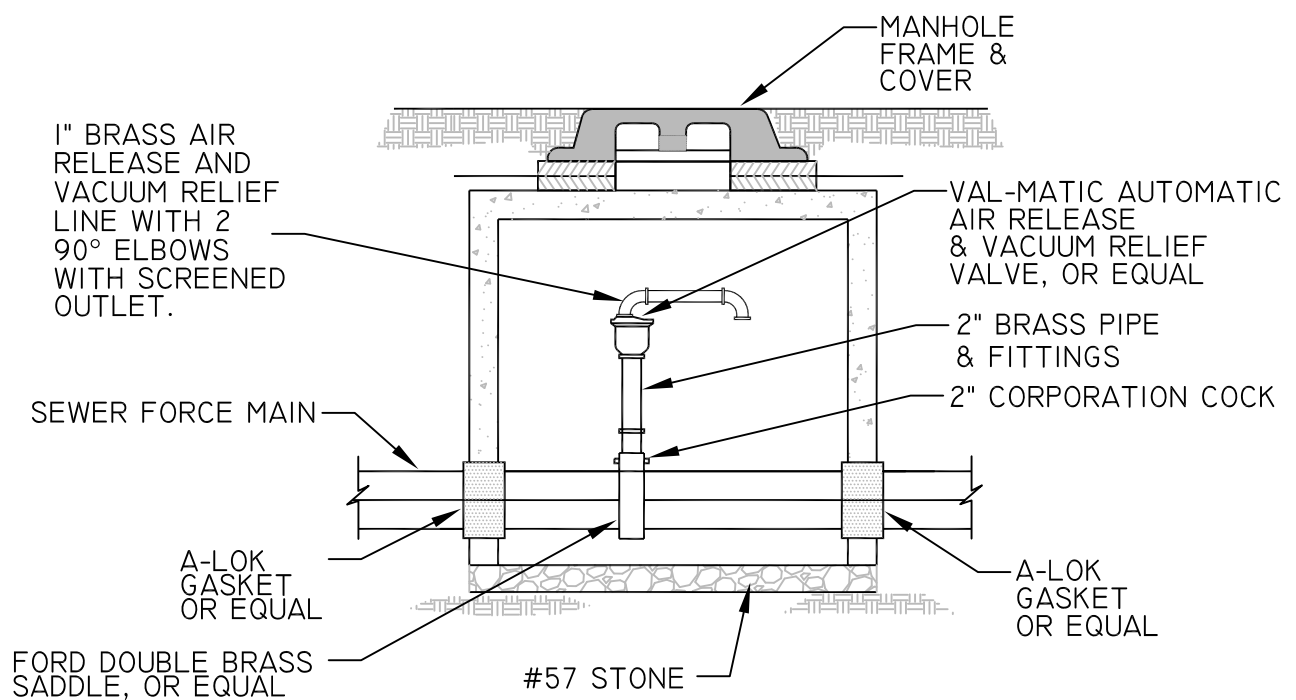
## FORCE MAIN LATERAL CONNECTION DETAIL

STANDARD DETAIL No.

# S-22

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## AIR RELEASE & VACUUM RELIEF VALVE DETAIL

STANDARD DETAIL No.

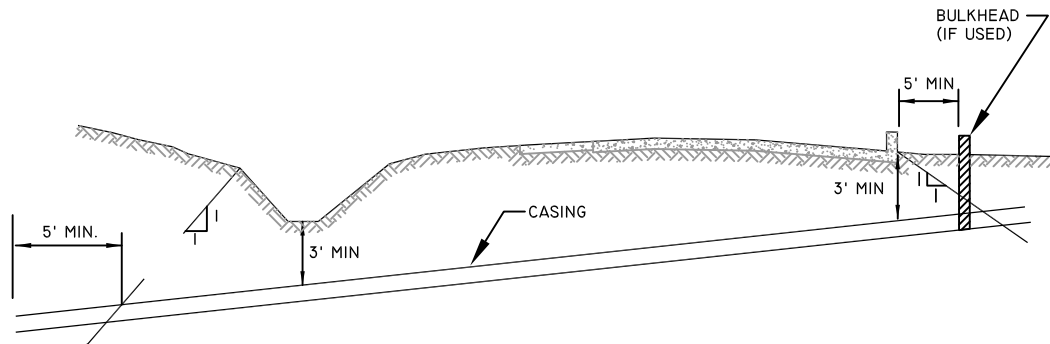
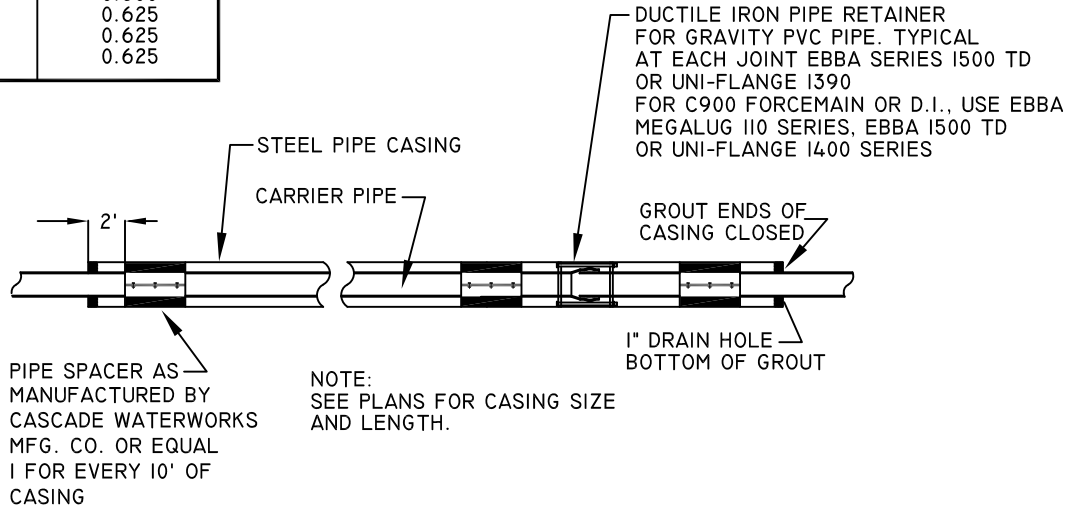
**S-23**

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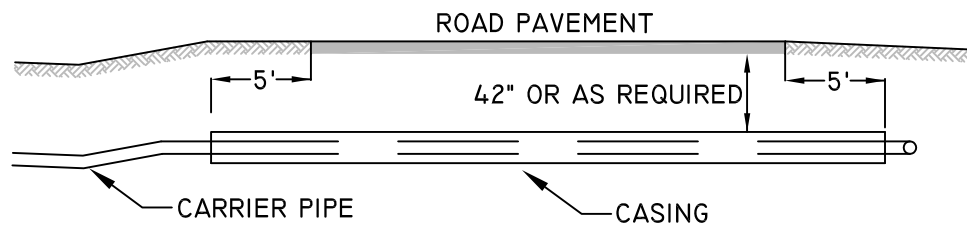
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# **CASING SCHEDULE**

CARRIER PIPE DIA. (IN.)	CASING PIPE DIA. (IN.)	NOM. WALL THICKNESS
4	10	0.313
6	12	0.313
8	16	0.313
10	24	0.375
12	24	0.375
16	30	0.500
20	36	0.500
24	42	0.500
30	48	0.500
36	54	0.625
42	60	0.625
48	66	0.625



NOTE: PERMIT REQUIRED FROM WV DEPARTMENT OF HIGHWAYS IF CROSSING UNDER STATE ROAD. WVDOH PERMIT REQUIREMENTS SUPERCEDE WHAT IS SHOWN ON THIS DETAIL.



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## **PIPE CASING DETAIL**

STANDARD DETAIL No.

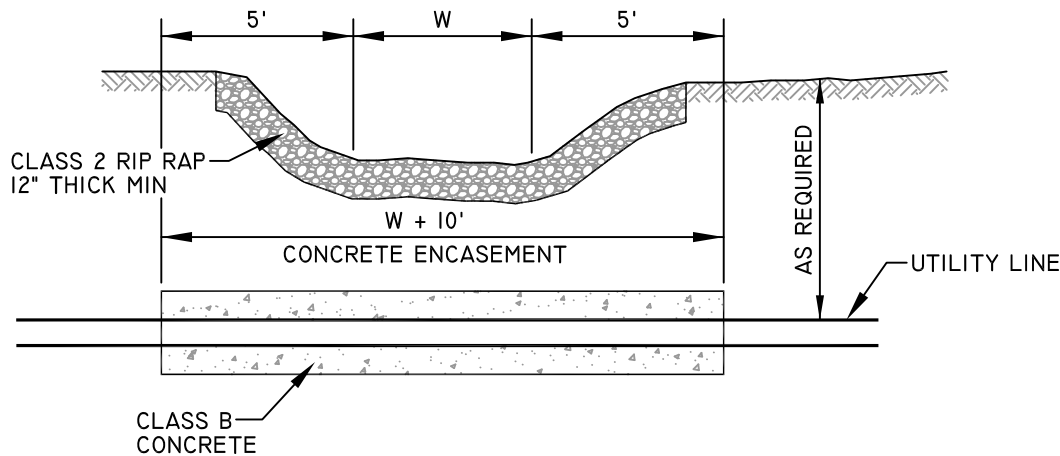
**S-24**

NOT TO SCALE

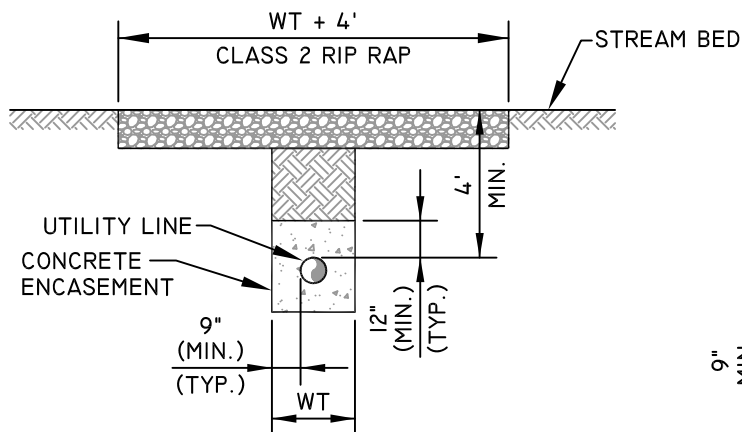
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NOTE: STREAMS TO BE DIVERTED DURING CONSTRUCTION TO PREVENT CONCRETE GETTING INTO WATER.



## ELEVATION

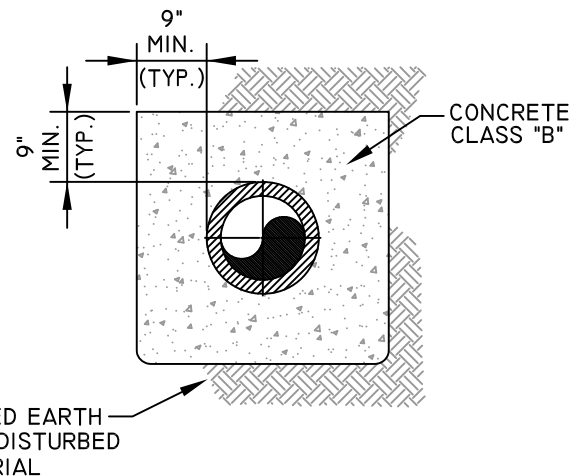


NOTES: WT= MAXIMUM PERMISSIBLE TRENCH WIDTH BASED UPON WT= O.D. + 24", UNLESS OTHERWISE APPROVED BY ENGINEER.

DO NOT BACKFILL TRENCH UNTIL CONCRETE HAS SET SUFFICIENTLY TO SUPPORT WEIGHT OF BACKFILL OR AS DIRECTED BY THE ENGINEER.

## TYPICAL SECTION

NOTE: FOR STREAM CROSSING. PLACE 12" MINIMUM CONCRETE OVER PIPE.



## SECTIONAL ELEVATION

## TYPICAL PIPE ENCASEMENT

NOT TO SCALE

NOTES: STREAMS TO BE DIVERTED DURING CONSTRUCTION TO PREVENT GREEN CONCRETE FROM GETTING INTO WATER.

ALL STREAM CROSSINGS REQUIRE PERMIT FROM THE STATE AND ARMY CORP OF ENGINEERS. PERMIT REQUIREMENTS SUPERCEDE REQUIREMENTS SHOWN ON PLANS.

NOTE: ROCK RIP RAP AND GABION STONE SHALL BE NON-ACIDIC AND OF ADEQUATE HARDNESS WITH SIZES AS FOLLOWS:

CLASS 0 (GABION)	4" TO 7"
CLASS I	3" TO 12"
CLASS II	6" TO 24"
CLASS III	36" TO 42"

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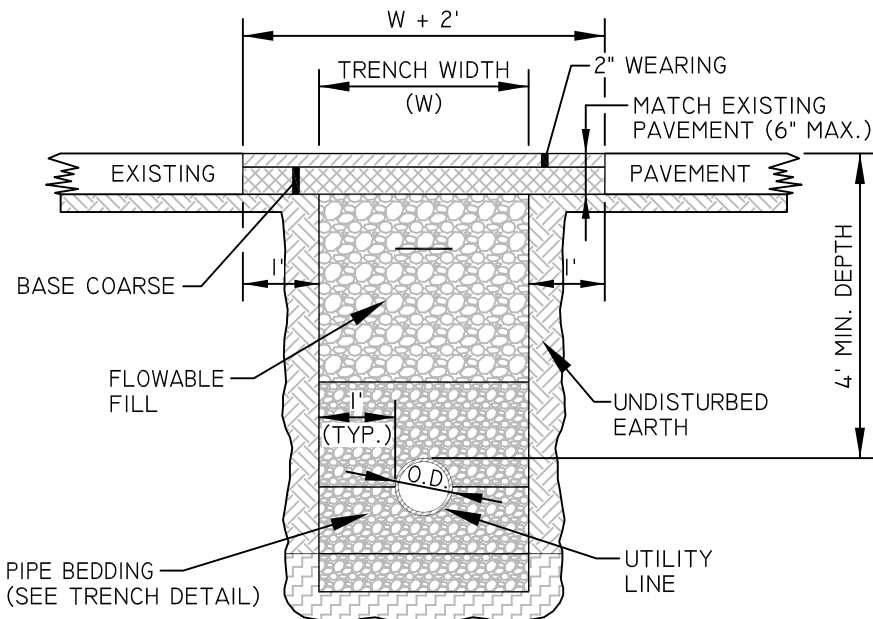
## STREAM CROSSING & PIPE ENCASEMENT DETAIL

STANDARD DETAIL No.

**S-25**

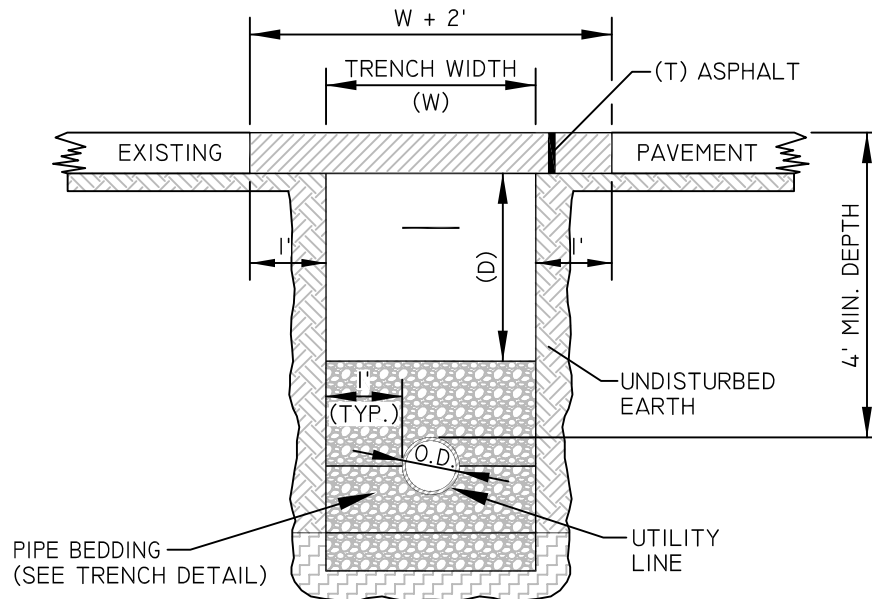
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## **TYPE A TRENCH REPAIR ASPHALT PAVEMENT W/ FLOWABLE FILL**

**NOT TO SCALE**



(T) ASPHALT

5" STATE HIGHWAY - 3" BASE, 2" WEARING

3" CITY STREETS & ALLEYS - 2" BASE, 1" WEARING

3" DRIVEWAYS - 2" BASE, 1" WEARING

(D)

PAVED STATE HIGHWAY - 6" LIFTS OF #8 AGGREGATE ABOVE BEDDING

PAVED CITY STREETS, ALLEYS & DRIVEWAYS - 6" LIFTS OF #8 AGGREGATE ABOVE BEDDING

FOR UNPAVED DRIVEWAYS, USE EARTH BACKFILL ABOVE BEDDING WITH TOP 6 INCHES TO BE #8 AGGREGATE

NOTE: IF MORE STRINGENT, PERMIT REQUIREMENTS  
SUPERCEDE ABOVE DEPTHS

## **TYPE B TRENCH REPAIR ASPHALT PAVEMENT**

**NOT TO SCALE**

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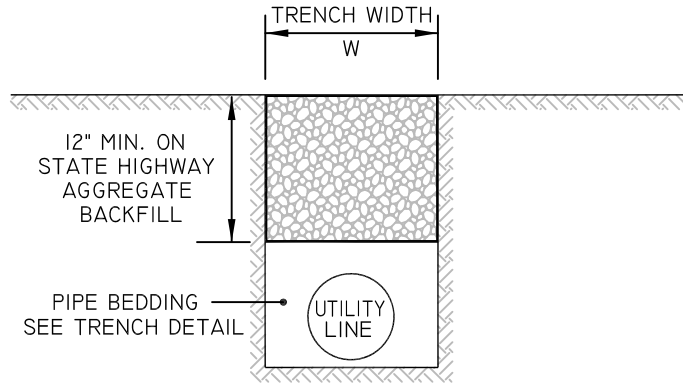
## **TYPE A & B TRENCH REPAIR DETAIL**

STANDARD DETAIL No.

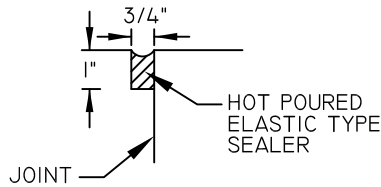
**S-26**

NOT TO SCALE

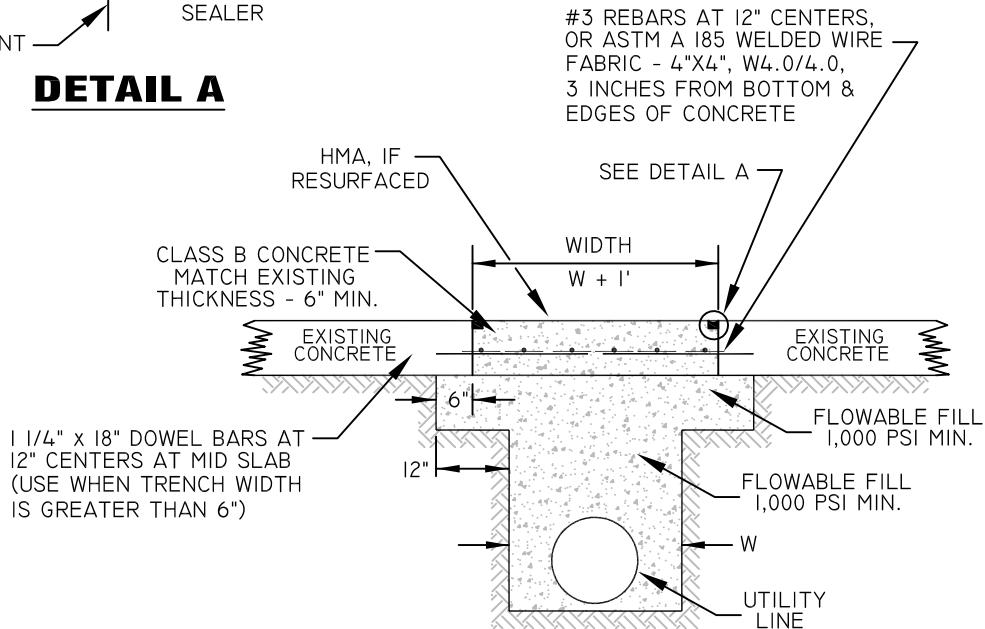
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### **TYPE C TRENCH REPAIR** **UNPAVED ROADWAY**



#### **DETAIL A**



### **TYPE D TRENCH REPAIR** **CONCRETE SIDEWALK OR** **DRIVEWAY TRENCH REPAIR**

#### **Charles Town Utility Board**

832 S. GEORGE STREET, P.O. Box 359, CHARLES TOWN, WV 25414  
PHONE: (304) 725-2316 • FAX: (304) 725-4313

### **TYPE C & D** **TRENCH REPAIR** **DETAILS**

STANDARD DETAIL No.

**S-27**

NOT TO SCALE

SEPTEMBER 2015



## **APPENDIX B**

### **WW-12**

#### **Permits to Construct Sewer Line Extensions**

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ES-77  
08/2032

**WEST VIRGINIA DEPARTMENT OF HEALTH AND HUMAN RESOURCES**

**Bureau for Public Health  
Office of Environmental Health Services  
572'Capitol Ut gg v.'Tq qo '535  
''''Ej ct igu qp.'Y X'47523/5939  
Rj qp g<526/77:/4; : 3''Hcz<526/77:/28; 3**

**SEWAGE COLLECTION AND TREATMENT SYSTEMS  
Forms and Required Information**

Please read carefully and submit SIX (6) COPIES of the required information. Omission of any of the required information will result in needless delay. **PLEASE ENCLOSE A CHECK for the application fee in the amount of \$300, payable to *WV Department of Health and Human Resources*.**

PROJECT NAME: \_\_\_\_\_

COUNTY: \_\_\_\_\_ DATE: \_\_\_\_\_

APPLICATION FORMS AND DESIGN DATA SHEETS

**Forms**

- \_\_\_\_\_ Completed Sewage Form SJ
- \_\_\_\_\_ Completed Sewage Form EG-4 and/or Engineering Report With Calculations
- \_\_\_\_\_ Municipal/Private Sewage Treatment Wasteload Allocation, with Part B section completed by the Office of Water Resources
- \_\_\_\_\_ Completed Mobile Home Park Forms EG-1 and EG-2, if applicable

REQUIRED INFORMATION TO ACCOMPANY APPLICATION

**Location Maps**

- \_\_\_\_\_ US Geological Survey (USGS) topographic map showing the project location, property lines, point of sewage discharge and any downstream water intakes or impoundments (8½" x 11" photocopy is acceptable).

**Plans**

- \_\_\_\_\_ Plans **must be signed and sealed** by a WV Registered Professional Engineer.
- \_\_\_\_\_ Size of plans: Plans shall not be less than 18" x 24" in size, nor greater than 27" x 40", for microfilming purposes. Recommend 24" x 36" plans.
- \_\_\_\_\_ Provide a site plan showing:
  - \_\_\_\_\_ Layout with dimensions and property lines.
  - \_\_\_\_\_ Proposed home sites, mobile home sites, camping trailer or camp sites, schools, or other buildings.

- \_\_\_\_\_ Location of and distances to known water intakes or wells; sewage treatment facility discharge points.
- \_\_\_\_\_ Location of existing and proposed water lines, valves, storage tanks, meter stations, pressure reducing stations, booster stations and water treatment facilities.
- \_\_\_\_\_ Location and size of existing and proposed sewer lines, manholes, cleanouts, sewage lift stations and sewage treatment facilities.
- \_\_\_\_\_ Profile of proposed sewers and force mains including sewer/water crossings.
- \_\_\_\_\_ Plans, in addition to the site plans, provide plans of all new sewage treatment plants, sewage stabilization ponds, sewage aerated lagoons, sewage polishing ponds, sewage filters, and sewage pump stations with dimensions (lengths, heights, widths, areas, volumes and elevations, including the 25 and 100 year flood elevations.)

### **Report and Specifications**

- \_\_\_\_\_ Provide a report and specifications setting forth:
  - \_\_\_\_\_ General description of the proposed project and location.
  - \_\_\_\_\_ Number of units to be served and possible expansion of the facility.
  - \_\_\_\_\_ Specifications of all new sewage structures.
  - \_\_\_\_\_ Specifications of sewage treatment facilities, sewer cleanouts, sewer manholes and sewage pump stations.
  - \_\_\_\_\_ Engineering calculations for the sizing of sewage treatment facilities, sewage collection system, sewage pump stations, and sewage force mains.
  - \_\_\_\_\_ 25 and 100-year flood elevations.

### **Documentation**

- \_\_\_\_\_ Provide documentation consisting of:
  - \_\_\_\_\_ Legal document (rights of way or easements) granting permission to cross land of adjacent property owners with sewage facilities. This is not required if the applicant has the right of eminent domain.
  - \_\_\_\_\_ Contract documents, if the project is to be bid.
  - \_\_\_\_\_ Documentation from a municipality or public service district if they are going to assume responsibility for the long term operation and maintenance of the sewage facilities (Not required, if the applicant is a municipality or public service district).
  - \_\_\_\_\_ If the sewage facilities are not going to be operated and maintained by a municipality or public service district, **will require**:
    - \_\_\_\_\_ Articles of Incorporation and By-Laws of a Property Owners Association, particularly where lots or housing units are sold, such as in a subdivision or townhouse complex, **or**
    - \_\_\_\_\_ Articles of Incorporation of a Private Utility regulated by the WV Public Service Commission, **or**
    - \_\_\_\_\_ Legal document (notarized) stating who shall be responsible for the operation and maintenance of the sewage facilities, if the project being served by the sewage facilities will be owned by the owner of the sewage facilities. Examples would be a mobile home park, travel trailer park, campground, church, restaurant, shopping complex or office building.



ES-77A  
06/2010

**WEST VIRGINIA DEPARTMENT OF HEALTH AND HUMAN RESOURCES**

**Bureau for Public Health  
Office of Environmental Health Services  
350 Capitol Street, Room 313  
Charleston, WV 25301-3713  
Phone: 304-558-2981 Fax: 304-558-0691**

**SEWER LINE AND/OR WATER LINE EXTENSIONS  
Forms and Required Information**

Please read carefully and submit FIVE (5) COPIES of the required information. Omission of any of the required information will result in needless delay. **PLEASE ENCLOSE A CHECK for the application fee in the amount of \$300, payable to WV Department of Health and Human Resources.**

PROJECT NAME: \_\_\_\_\_

COUNTY: \_\_\_\_\_ DATE: \_\_\_\_\_

APPLICATION FORMS AND DESIGN DATA SHEETS

**Forms**

- \_\_\_\_\_ Completed Sewage Form ES-69
- \_\_\_\_\_ Completed Sewage Form EG-4 and/or Engineering Report With Calculations
- \_\_\_\_\_ Completed Water Form EW-100
- \_\_\_\_\_ Completed Water Form EG-5 and/or Engineering Report With Calculations
- \_\_\_\_\_ Completed Mobile Home Park Forms EG-1 and EG-2, if applicable

REQUIRED INFORMATION TO ACCOMPANY APPLICATION

**Location Maps**

- \_\_\_\_\_ US Geological Survey (USGS) topographic map or county road map showing the project location (8-1/2" x 11" photocopy is acceptable).

**Plans**

- \_\_\_\_\_ Plans **must be signed and sealed** by a WV Registered Professional Engineer.
- \_\_\_\_\_ Scale for plan view of water lines: 1"=200' or less.
- \_\_\_\_\_ Size of plans: Plans shall not be less than 18" x 24" in size, nor greater than 27" x 40", for microfilming purposes. Recommend 24" x 36" plans.
- \_\_\_\_\_ Provide a site plan showing:
  - \_\_\_\_\_ Layout with dimensions and property lines.
  - \_\_\_\_\_ Proposed home sites, mobile home sites, camping trailer or camp sites, schools, or other buildings.

- \_\_\_\_\_ Location of and distances to known water intakes or wells; sewage treatment facility discharge points.
- \_\_\_\_\_ Location of existing and proposed water lines, valves, storage tanks, meter stations, pressure reducing stations, booster stations and water treatment facilities.
- \_\_\_\_\_ Location and size of existing and proposed sewer lines, manholes, cleanouts, sewage lift stations and sewage treatment facilities.
- \_\_\_\_\_ Profile of proposed sewers and force mains including sewer/water crossings.
- \_\_\_\_\_ Plans, in addition to the site plans, provide plans of all new water booster stations, water meter stations; water pressure reducing stations; water storage tanks; and sewage pump stations with dimensions (lengths, heights, widths, areas, volumes and elevations, including the 25 and 100 year flood elevations.)

### **Report and Specifications**

Provide a report and specifications setting forth:

- \_\_\_\_\_ General description of the proposed project and location.
- \_\_\_\_\_ Number of units to be served and possible expansion of the facility.
- \_\_\_\_\_ Specifications of all new water and sewage structures.
- \_\_\_\_\_ Specifications of sewer and water pipe, valves, water booster stations, water storage tanks, meter stations, water pressure reducing stations, sewer cleanouts, sewer manholes and sewage pump stations.
- \_\_\_\_\_ Hydraulic calculations for the water distribution system. (Note that a minimum 20 psi pressure must be maintained in the distribution system under all flow conditions, including fire flows plus peak demand flows.)
- \_\_\_\_\_ Engineering calculations for the sizing of water booster stations, water storage tanks, sewage pump stations, and sewage force mains.
- \_\_\_\_\_ 25 and 100-year flood elevations.

### **Documentation**

Provide documentation consisting of:

- \_\_\_\_\_ Letter granting permission to connect to public or privately owned water distribution system or sewage collection system when such is the proposal.
- \_\_\_\_\_ Legal document (rights of way or easements) granting permission to cross land of adjacent property owners with water and sewer lines. This is not required if the applicant has the right of eminent domain.
- \_\_\_\_\_ Contract documents, if the project is to be bid, particularly if the project has WV Infrastructure and Jobs Development Council funding or WV Bureau For Public Health Drinking Water Revolving Fund funding.

FORM SJ

INSTRUCTIONS FOR FILING APPLICATION FOR PERMIT

For

PROPOSED SEWAGE COLLECTION  
AND TREATMENT SYSTEM

Prepared by:

WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION  
DIVISION OF WATER AND WASTE MANAGEMENT

And

WEST VIRGINIA DEPARTMENT OF HEALTH AND HUMAN  
RESOURCES  
BUREAU FOR PUBLIC HEALTH  
OFFICE OF ENVIRONMENTAL HEALTH SERVICES

## **Introduction**

These instructions have been prepared to guide developers, contractors, consulting engineers, architects, municipal officials, boards of education, and others interested in the construction and installation of sewage collection systems and treatment systems. This publication concerns factors to be considered in planning the system, method of procedure in filing an application for permits in accordance with Chapter 16, Article 1, Section 9 and Chapter 20, Article 5A, Section 5 to construct and/or modify a sewage system of the State. It also concerns the information required to be submitted with the application.

## **Section A – General Instructions**

### **1. Who must apply:**

In accordance with the laws of the State of West Virginia, permits are required from the Department of Health and Human Resources Bureau for Public Health, and the Department of Environmental Protection, Division of Water and Waste Management to construct and/or modify sewage collection systems, sewage treatment systems, and to discharge the effluent from such systems into the waters of the State.

### **2. Where to obtain forms:**

The joint Department of Environmental Protection and West Virginia Department of Health and Human Resources forms may be obtained at the offices listed in Item 6 of this section.

### **3. Where to file:**

- a. Six (6) copies of the application forms, plans, and specifications and completed waste load allocation must be mailed to:

West Virginia Department of Health and Human Resources  
Bureau for Public Health  
Environmental Engineering Division  
350 Capitol Street, Room 313  
Charleston, West Virginia 25301-3713

A copy of the application shall be retained by the applicant.

### **4. When to file:**

Because of status and regulations promulgated pursuant thereto, the deadline for filing applications is 180 days prior to construction of new facilities. In accordance with the Interagency Agreement between the Bureau for Public Health and the Division of Water and Waste Management, less time may be required to obtain permits.

**5. Fees:**

A permit fee of \$300 by check or money order shall accompany the application. The check or money order shall be made payable to the "West Virginia Department of Health and Human Resources." A separate fee made payable to the Department of Environmental Protection will also be assessed, based upon the size of the proposed sewage treatment facility. Cash will not be accepted.

**6. Completion of forms:**

Unless otherwise specified in the detailed instructions, each item in the forms must be answered. To indicate each item has been considered, enter "N/A" for not applicable, where a particular item does not fit the circumstances or characteristics of your operation or activity.

Assistance and advice regarding requirements for filing permit applications can be obtained at the following locations:

- |  |   |
|--|---|
| 1. Division of Water and Waste Management<br>601 57 <sup>th</sup> Street SE<br>Charleston, West Virginia 25304-2345<br>Telephone: 304-926-0495 | 2. Northern Regional Office<br>1304 Goose Run Road<br>Fairmont, WV 26554<br>ATTENTION: Municipal<br>Telephone: 304-363-3533 |
|--|---|

Bureau for Public Health:

- |  |  |
|--|--|
| 1. St. Albans District Office<br>808 B Street<br>St. Albans, WV 25177<br>Telephone: 304-722-0611                       | 2. Wheeling District Office<br>117 Methodist Bldg., 1060 Chapline St.<br>Wheeling, WV 26003<br>Telephone: 304-238-1145 |
| 3. Kearneysville District Office<br>1948 Wiltshire Road, Suite 6<br>Kearneysville, WV 25430<br>Telephone: 304-725-9453 | 4. Beckley District Office<br>100 East Prince Street<br>Beckley, WV 25801<br>Telephone: 304-256-6666                   |
| 5. Philippi District Office<br>209 South Main Street<br>Philippi, WV 26414<br>Telephone: 304-457-2296                  |  |

When considering the construction of a sewage collection and treatment system, the following conditions should be carefully investigated:

1. Availability and adequacy of a stream to accept discharge from a sewage treatment plant.
2. Distance of point of effluent discharge from a source of water supply. In general, discharge of a sewage treatment facility within approximately two (2) miles of a source of water supply will be required to have additional treatment beyond the secondary stage. Depending upon specific circumstances surrounding the project, this distance may be increased.
3. Distance of a point of effluent discharge from a public use or recreational area used for water contact sports.
4. Requirements of the Division of Water and Waste Management for discharge into the stream, in accordance with the WV Administrative Regulations, Title 46, Series 3, Section 6, Waste Load Allocations for Sewage Discharges, are to be issued by the Division of Water and Waste Management to potential applicants for a permit to assist with planning of wastewater treatment works which will meet prescribed effluent requirements and not violate State Water Quality Standards for the receiving waters.

Attached Waste Load Allocation Forms, two (2) copies, should be completed and returned with a suitable location map to:

Division of Water and Waste Management, DEP  
601 57<sup>th</sup> Street SE  
Charleston, West Virginia 25304-2345

These forms will be returned to the applicant with the bottom portion completed, indicating the requirements which must be met by the facility. This is the first step in applying for permits. The applicant then must include this completed Waste Load Allocation form in with the submission of the application, plans, and specifications to the Bureau for Public Health.

5. Topographic and geologic conditions of the site.
6. Feasibility of combining the proposed sewage collection and treatment system with neighboring existing treatment facilities.
7. Provision of supervision of plant maintenance by a competent certified operator.

ALL wastewater treatment plants shall be designed in accordance with design standards prescribed by the West Virginia Department of Health and Human Resources, Bureau for Public Health, or the West Virginia Department of Environmental Protection, Office of Water and Waste Management.

## **Section B – Line by Line Instructions**

### **Item I**

Enter the facility's official or legal name.

### **Item II – A & B**

Give the name, title, and work telephone number of a person which is thoroughly familiar with the operation of the facility and with the facts reported in this application and who can be contacted by the agencies, if necessary.

### **Item III – A, B, C, & D**

Give the complete mailing address of the office where correspondence should be sent.

### **Item IV – A & B**

Give the address or location of the facility identified in Item I of this form. If the facility lacks a street name or route number, give the most accurate alternative geographic information (e.g., distance from nearest city, town, or community, and distance from nearest intersection of County or State Routes).

### **Item V – A & B**

Give the name as it is legally referred to, and phone number including area code of the person, firm, public organization, or any other entity which operates the facility described in this application. They may or may not be the same name as the facility. The operator of the facility is the legal entity which controls the facility's operation rather than the plant or site manager.

### **Item V – C**

Indicate whether the entity which operates the facility also owns it by marking the appropriate box.

### **Item V – D**

If Item V-C is marked "No," give name and address of owner.

### **Item V – E**

Enter the appropriate letter in the box provided to indicate the legal status of the operator of this facility. Indicate "public" for a facility solely owned by local government such as town, city, county, etc.

## **Item VI**

List all existing environmental permits by number, type (Landfill, UIC, RCRA, etc.), dates of issuance and expiration, and address of and agency issuing permit. If you have previously filed an application but have not yet received a permit, provide the number of the applications.

## **Item VIII – A, B, & C**

State statute provides for severe penalties for submitting false information on this application form. State regulations require this application to be signed as follows:

1. For a corporation: by a principal executive officer of at least the level of vice president.
2. For a partnership or sole proprietorship: by a general partner or the proprietor, respectively.
3. For a municipality, State, Federal, or other public agency: by either a principal executive officer or ranking elected official.

## **Item IX**

- A. Assign a three-digit number beginning with 001 for the point of discharge covered by the first description. Discharge outlet numbers must be consecutive for each additional discharge described; hence, the second outlet number would be 002, the third 003, etc.
- B. Give the name of the discharge point which distinguishes this discharge point from all other discharge points from the facility (e.g., Ursus Creek Discharge; Varga STP Outlet No. 2). Do not use colloquial terms.
- C. State the precise location where the effluent from the discharge reaches the waterway. If the discharge is an overflow point, give the point where the overflow occurs. If the discharge is a dry waterway, give the point where the discharge meets the waterway.
- D. Use the name of the waterway by which it is usually designated on published maps of the area. If possible, refer to one of the map series published by the US Geological Survey. If the discharge is to an unnamed tributary, so state; and give the name of the first body of water fed by that tributary which is named on the map (e.g., Unnamed ditch to Vaughan Creek).
- E. Give the distance (in miles, to the nearest tenth) from the discharge point on the immediate receiving stream to the mouth of the immediate receiving stream. If discharge is into a large river (e.g., Kanawha, Monongalia, etc.), give mile point on that river.
- F. Indicate whether the discharge contains one or more of the listed substances by marking the appropriate box.



## Item X

- A – Mark appropriate box.
- B – State the total design population.
- C – State the total design number of units.
- D – Give the total area of facility in acres. If it is a municipality or PSD, answer in square miles.

## Item XI

- A.
  - 1 – Give diameter of sewer pipes.
  - 2 – Give the type of material and ASTM designation.
  - 3 – Give length of sewer pipe in linear feet for each size.
  - 4 – Give the minimum distance from top of pipe to surface for the whole collection system.
  - 5 – Indicate type of sewer pipe joint and ASTM designation.
  - 6 – Indicate number of manholes.
  - 7 – Indicate number of cleanouts.
  - 8 – Indicate number of lift stations.
  - 9 – Enter size of force mains (pressure lines).
  - 10 – Enter length of force mains in linear feet for each size.
- B.
  - 1 – Check appropriate box and describe, if necessary.
  - 2 – Indicate design flow in gallons per day.
  - 3 – Indicate type of pretreatment. (Example: bar screen, comminutor, grit chamber, trash trap, etc.)
  - 4 – Enter size of aeration chamber in gallons.
  - 5 – Enter rating of blower(s) (i.e. cubic feet per minute at what PSI, pounds per square inch, and HP capabilities).
  - 6 – Enter clarifier size in gallons and surface area.
  - 7 – Enter dimensions as required in feet.
  - 8 – a. Enter type of disinfection, e.g., chlorination, ultraviolet, etc.  
b. Enter size in gallons.
  - 9 – Enter dimensions as required in feet.
  - 10 – Enter size in gallons.
  - 11 – Describe other units and sizes not mentioned above.

## Item XII

- A. State classification (i.e. Class 1-S, 1, 2, 3, or 4) of certified operator.
- B. State how often operator will be conducting routine operation and maintenance inspections of the sewage collection and treatment facility.
- C. Describe equipment to be utilized in maintenance of treatment facilities (e.g., test kits for pH and chlorine residual, beakers, secchi disk, rubber gloves, squeegee, buckets, etc.).

- D. Describe the method of excess sludge disposal (i.e. how often it is to be removed, where it is to be disposed of, and how it is to be transferred).
- E. Describe provisions of operational reliability for plant during period of power failure, as required by Chapter 3, Section 6 of the West Virginia Administrative Regulations (e.g., emergency power generator, adequate emergency storage capacity, rental generator, flow reduction measures, etc.).

### **Item XIII**

Use this section for narrative explanations of items in this form, where applicable.

### **Item XIV**

All drawings, reports, and specifications required as accompanying information shall be attached to application. All drawings should be identified by the name of the applicant and the activity.

Items in this section should require no further explanation.

**FORM SJ NPDES SEWAGE**

Application No. \_\_\_\_\_

**APPLICATION FOR PERMITS**

Please print or type.

**I. NAME OF FACILITY**

\_\_\_\_\_

**II. FACILITY CONTACT**

A. Name and Title (last, first, & title)

B. Phone (area code)

**III. FACILITY MAILING ADDRESS**

A. Street or Post Office Box

B. City or Town

C. State

D. Zip Code

**IV. FACILITY LOCATION**

A. Street, Route Number, or other specific identifier

B. City, Town, or nearest Post Office

C. County

D. Zip Code

**V. OPERATOR AND OWNERSHIP INFORMATION**

A. Name

B. Phone (area code & number)

C. Is the name listed in Item V-A also the owner? [ ] Yes [ ] No

D. Name and Address of Owner

E. Status of Owner

State [ ]

Public [ ]

Federal [ ]

Private [ ]

Other [ ] (specify)

**VI. APPLICANT REQUEST**

- A. In accordance with Chapter 16, Article 1, Section 9, a certificate to construct a sewage disposal system or part thereof and;
- B. In accordance with Chapter 20, Article 5A, Section 5, a State NPDES Permit to acquire, construct, install, and operate a sewage disposal system or part thereof for a direct or indirect discharge of sewage, industrial waste, or other waste into the waters of the State.

# VII. EXISTING PERMITS AND APPLICATIONS

Issuing Agency & Address	Type of Permit or Application	No. Permit or Application	Effective Date yr/mo/day	Expiration Date yr/mo/day

# VIII. CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

\_\_\_\_\_/\_\_\_\_\_/\_\_\_\_\_  
A. Name and official title (type or print) B. Signature C. Date signed

# IX. DESCRIPTION OF DISCHARGE

A. \_\_\_\_\_  
Discharge outlet number

B. \_\_\_\_\_  
Discharge point name (if any)

C. \_\_\_\_\_  
Discharge Point  
Latitude \_\_\_\_\_° \_\_\_\_\_' \_\_\_\_\_" Longitude \_\_\_\_\_° \_\_\_\_\_' \_\_\_\_\_"

D. \_\_\_\_\_  
Name of receiving stream

\_\_\_\_\_  
tributary of which is tributary of

E. \_\_\_\_\_  
Miles to the mouth of the immediate receiving stream (to the nearest tenth)

F. Does your discharge contain, or is it possible for your discharge to contain, one or more of the following substances added as a result of your operations, activities, or processes: ammonia, cyanide, aluminum, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, zinc, phenols, oil and grease, and chlorine (residual).

A. Yes [ ] B. No [ ]

X. FACILITY DESCRIPTION

A. Service (mark X)

Municipality	[ ]	Shopping Center	[ ]
Trailer Court	[ ]	Apartment Complex	[ ]
School	[ ]	Subdivision	[ ]
Public Service District	[ ]	Other (specify)	[ ]
Park	[ ]		

B. Number of Persons \_\_\_\_\_

C. Number of home sites, mobile homes sites, etc. \_\_\_\_\_

D. Total area of site in acres \_\_\_\_\_

XI. DESCRIPTION OF SEWAGE DISPOSAL SYSTEM

A. Collection System

1. Size of sewer lines	
2. Type of sewer lines	
3. Length of sewer lines of each size	
4. Minimum ground cover on sewer lines	
5. Type of sewer joints	
6. Number of manholes	
7. Number of cleanouts	
8. Number of lift stations	
9. Size of force mains	
10. Length of force mains	

B. Treatment Plant

Type of treatment (mark X)	
a. Extended Aeration [ ]	c. Other (specify) [ ]
b. Stabilization Pond [ ]	
2. Design flow (gallons per day, GPD)	
3. Type of pretreatment	
4. Aeration chamber size	
5. Blower size	
6. Clarifier size and surface area	
7. Polished pond dimensions length X width X depth (at water surface) length X width (at bottom)	

8. a. Type of disinfection b. Chlorine contact chamber size (if applicable)	
9. Stabilization pond dimensions length X width X depth (at water surface) length X width (at bottom)	
10. Post aeration unit size	
11. Other units and size of units	

## XII. DESCRIPTION OF OPERATION AND MAINTENANCE

A. Certified Operation Classification	
B. Frequency of inspection by operator	
C. List various sewage treatment plant operating and wastewater testing equipment	
D. Method of excess sludge disposal	
E. Provisions for operations reliability for the plant during period of power failure	

### XIII. ADDITIONAL INFORMATION

[illegible]

#### XIV. REQUIRED INFORMATION TO ACCOMPANY APPLICATION

- A. US Geological Survey Topographic Map showing property lines, point of discharge, and downstream water intake or impoundment, if any. [       ]
- B. Site plan of the facility showing:
1. Layout with dimensions and property lines. [       ]
  2. Home sites, mobile home sites, camping trailer sites, schools, or other buildings. [       ]
  3. Location of and distances to known water intakes or wells. [       ]
  4. Location of existing or proposed water lines. [       ]
  5. Sewage treatment unit(s). [       ]
  6. Layout and size of sewer lines, manholes, and/or cleanouts, and location of lift stations. [       ]
  7. Distance(s) of sewage treatment plant, stabilization pond and polishing pond from surrounding residences or other buildings. [       ]
  8. Point of discharge of effluent in stream. List mile point. [       ]
  9. Effluent routing details including sample point and protection from erosion at discharge. [       ]
  10. Fence, wall, or building around sewage treatment facilities. [       ]
  11. Access road to treatment facilities. [       ]
  12. Landscaping for the prevention of surface water entering plant, and prevention of erosion from site. [       ]
- C. Profile of sewer lines showing:
1. Existing and finished ground level. [       ]
  2. Manhole locations with invert and top elevations. [       ]
  3. Grade of proposed sewer lines. [       ]
  4. Size, length, and type of proposed sewer lines. [       ]
  5. Any other items in collection system including lift stations, siphons, force mains with air relief valves, grease traps, sand traps, etc. with proper detailing and elevations. [       ]
  6. Waterline crossings. [       ]
- D. Report and Specifications setting forth:
1. General description of project and location. [       ]
  2. Number of units served and possible expansion of facility. [       ]
  3. Type of pipe and joints. [       ]
  4. Specifications for lift stations, if any. [       ]
  5. Specifications for sewage treatment plant. [       ]
  6. Hydraulic calculations. [       ]
  7. Soil characteristics of site for a stabilization pond or polishing pond. Report from US Department of Agriculture Soil Conservation Service required. [       ]
  8. Manhole details. [       ]
  9. Filter details, if any, including type of origin of filter material or sand uniformity coefficient, effective size, and percent passing a number 200 sieve. [       ]
  10. Sewer riser details (mobile home park). [       ]



- |     |   |   |   |
|-----|---|---|---|
| 11. | Discharge Load Allocation (form WRD-MUN 1-81).                    | [ | ] |
| 12. | Test Equipment.   | [ | ] |
| 13. | Aerated sludge holding tank (if required).                        | [ | ] |
| 14. | 10, 25, and 100 year flood elevations.                            | [ | ] |
| 15. | Post aeration.  | [ | ] |
| 16. | Size of sewage treatment plant, lift station, stabilization pond. | [ | ] |
| 17. | Non-potable water for cleaning (if applicable).                   | [ | ] |
| 18. | Provision for outlet marker.                                      | [ | ] |
| 19. | Surge equalization tank (if required).                            | [ | ] |
| 20. | Method of flow measurement (weir, flow meter, etc.).              | [ | ] |
| 21. | Cathodic protection (if any steel units).                         | [ | ] |
| 22. | Provision for level installation of plant (pad or base).          | [ | ] |
| 23. | Provision for protection from freezing (other than buried plant). | [ | ] |
- E. Plans of sewage treatment plant, lift station(s), stabilization ponds, filter, or polishing pond to be installed. [ ]
- F. Documentation consisting of:
- |    |  |   |   |
|----|--|---|---|
| 1. | Legal document stating who shall have responsibility for maintenance of sewage treatment facility  |   |   |
| a. | Owner and/or developer   | [ | ] |
| b. | Private utility approved by Public Service Commission  | [ | ] |
| c. | Property owners association  | [ | ] |
| d. | Existing public or private utility: i.e. municipality, public service district, etc.   | [ | ] |
| 2. | Legal document(s) granting permission to cross lands of adjacent property owners with sewage transmission lines or effluent discharge lines (if applicable). | [ | ] |

## STATEMENT FOR BILLING

The \_\_\_\_\_, of which I am an  
(Name of company or facility)

authorized representative, has applied for a West Virginia National Pollutant Discharge Elimination System permit from the West Virginia Department of Environmental Protection, Office of Water Resources. Under the West Virginia Legislative Rules, Title 47, Series 10, Section 12.1.c.2, the costs of publishing a Class I legal advertisement are to be paid by the applicant who must also send the certificate of publication to the Office of Water Resources within twenty (20) days after publication.

The \_\_\_\_\_, hereby agrees to pay  
(Name of company or facility)

the cost of such legal advertisement. The publishing newspaper should send the certificate of publication and bill to:

\_\_\_\_\_  
(Company or facility name and address)

\_\_\_\_\_  
(Authorized representative)

\_\_\_\_\_  
(Area Code – Phone Number)

\_\_\_\_\_  
(Signature of Authorized Representative)

Sworn and subscribed to before me

this \_\_\_\_\_ day of  
\_\_\_\_\_, 20\_\_\_\_.

\_\_\_\_\_  
(Notary Public)

\_\_\_\_\_  
(Commission Expires)

**WEST VIRGINIA DEPARTMENT OF HEALTH AND HUMAN RESOURCES**

Bureau for Public Health  
Office of Environmental Health Services  
350 Capitol Street, Room 313  
Charleston, WV 25301-3713  
Phone: 304-558-2981 Fax: 304-558-0691

**SEWAGE SYSTEM INFORMATION AND DESIGN DATA SHEET**

Complete all portions of the Design Data Sheet applicable to the project. Omission of required information will result in the application being denied. When both sewer system and water system are to be constructed, Design Data Sheets for both sewage and water must be completed and attached to the application.

Applicant \_\_\_\_\_

Project Location \_\_\_\_\_

County \_\_\_\_\_

Total area of site \_\_\_\_\_ acres Area to be developed \_\_\_\_\_ acres

Type of development Commercial \_\_\_\_\_ Industrial \_\_\_\_\_ Residential \_\_\_\_\_

Existing

Proposed

Number of home sites	_____	_____
manufactured home sites	_____	_____
camping trailer sites	_____	_____
camp sites	_____	_____
other	_____	_____

Can development be expanded? \_\_\_\_yes \_\_\_\_no If so, to what number? \_\_\_\_\_

Sewer line material (ASTM, AWWA or ANSI designation) \_\_\_\_\_

Length of sewer lines of each size \_\_\_\_\_

Number of manholes/cleanouts \_\_\_\_\_

Pump/lift station capacity, gpm \_\_\_\_\_

Distance of sewer lines from water lines (horizontal/vertical) \_\_\_\_\_

ES-69

Office Use Only

06/2010

Date Received \_\_\_\_\_

Date Approved \_\_\_\_\_

Approved by \_\_\_\_\_

Permit Number \_\_\_\_\_

**WEST VIRGINIA DEPARTMENT OF HEALTH AND HUMAN RESOURCES**

Bureau for Public Health  
Office of Environmental Health Services  
350 Capitol Street, Room 313  
Charleston, WV 25301-3713  
Phone: 304-558-2981 Fax: 304-558-0691

**APPLICATION FOR PERMIT TO CONSTRUCT OR MODIFY A WASTEWATER  
COLLECTION AND/OR TREATMENT SYSTEM**

(Please Prepare in 5 Copies)

APPLICANT: \_\_\_\_\_

STREET OR P.O. BOX: \_\_\_\_\_

CITY: \_\_\_\_\_ STATE: \_\_\_\_\_ ZIP: \_\_\_\_\_

TELEPHONE: \_\_\_\_\_ E-MAIL: \_\_\_\_\_

ENGINEERING FIRM: \_\_\_\_\_

STREET OR P.O. BOX: \_\_\_\_\_

CITY: \_\_\_\_\_ STATE: \_\_\_\_\_ ZIP: \_\_\_\_\_

TELEPHONE: \_\_\_\_\_ E-MAIL: \_\_\_\_\_

Please list various units and their size: \_\_\_\_\_

Discharging into: \_\_\_\_\_

Name of sewage collection system

Serving \_\_\_\_\_ people or customers in \_\_\_\_\_

Subdivision, Section, etc.

City and State: \_\_\_\_\_

IN ACCORDANCE WITH CHAPTER 16, ARTICLE 1, SECTION 9 OF THE WEST VIRGINIA CODE,  
AS AMENDED, WE HEREBY MAKE APPLICATION FOR A PERMIT TO CONSTRUCT.

\_\_\_\_\_  
Signature of Applicant or Authorized Agent

\_\_\_\_\_  
Date

NOTE: A \$300 application fee must accompany a permit application. Make check or money order payable to "West Virginia Department of Health and Human Resources". Cash not accepted. Permit applications which include both water and sewer systems require only a single \$300 fee.

## **APPENDIX C**

**Alternative Mainline Extension Agreement**

**Acceptance of Installed Water/Sewer Lines**

**Agreement for Grinder Pump Connection (Sewer)**

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## ALTERNATIVE MAINLINE EXTENSION AGREEMENT

This \_\_\_\_\_ day of \_\_\_\_\_, comes  
\_\_\_\_\_ (UTILITY), whose address is  
\_\_\_\_\_ (hereinafter referred to as the  
"UTILITY"; and, \_\_\_\_\_ whose address is  
\_\_\_\_\_ (Hereinafter  
referred to as the "DEVELOPER"); AND AGREE TO ENTER INTO AN Alternate main Line  
Extension Agreement for the purpose of providing a \_\_\_\_\_ (Water or Sewer)  
distribution system extension to serve \_\_\_\_\_ (Name of  
development), located at \_\_\_\_\_  
(Detailed description of location including Route No., Streets, County and State).

WHEREAS, the UTILITY wishes to make facilities available to the greatest number  
residents as expeditiously as possible and in as prudent a manner as possible; and

WHEREAS, the DEVELOPER is planning to develop certain lands within Jefferson  
County; and

WHEREAS, the planned development of DEVELOPER's property is contingent upon  
DEVELOPER having proper \_\_\_\_\_ (Water or Sewer) facilities; and

WHEREAS, it is in the best interest of the future users of the DEVELOPER's property to  
have \_\_\_\_\_ (Water or Sewer) facilities; and

WHEREAS, it is in the best interest of the UTILITY's and the DEVELOPER's customers  
to expand the UTILITY's facilities to anticipate future developments and growth; and

WHEREAS, the UTILITY has the reserve capacity to serve the DEVELOPER's  
extension, without jeopardizing service to existing customers and possible future customers;  
and

WHEREAS, the DEVELOPER has/have read the Public Service Commission's Water  
Rule 5.5 or Sewer Rule 5.3 or both in their entirety, understands the Rule of Rules, and chooses  
to enter into this Alternate Main Line Extension Agreement.

WHEREAS, the DEVELOPER understands that the extension covered by this  
agreement is being constructed at this time to enhance the profitability of the DEVELOPMENT  
and waives reimbursement for all costs associated with the materials and labor to construct the  
extension as provided in the Commission's Rules and Regulations. A copy of the applicable  
Commission Rule or Rules is attached to this agreement.

WHEREAS, the DEVELOPER understands that the UTILITY is required to provide per  
the Commission's Rule and Regulations a cost estimate for the UTILITY to construct the  
extension described in this agreement and the DEVELOPER waives his right to provide such a  
cost estimate.

WHEREAS, the extension to be constructed by the DEVELOPER under this agreement consists of the following: \_\_\_\_\_

\_\_\_\_\_ (Description of the extension including: approximate lengths of each diameter of main, number of major components such as fire hydrants, manholes, booster pumps and lift stations. Hydraulic calculations are required if small diameter mains are used for any extensive length) (Drawings may be substituted).

WHEREAS, the number of customers or lots to be served by the UTILITY once this extension is completed is \_\_\_\_\_.

WHEREAS, the DEVELOPER is willing to bear the expense of constructing the extension within the DEVELOPMENT and back to a point on the UTILITY's nearest existing main which has sufficient excess capacity to provide service at maximum demand.

WHEREAS, the UTILITY will install service connections to the lots, once the security deposit and the approved tap fee as stated in the UTILITY's tariff which is on file with the Public Service Commission is paid. The UTILITY shall not charge a tap fee if the service connection is installed by the DEVELOPER.

NOW, THEREFORE, and in consideration of the covenants and agreements set forth herein, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the UTILITY and DEVELOPER agree:

## ARTICLE I

### CONDITIONS PRECEDENT

Section 1.01 This agreement and respective terms and obligations of the parties are neither binding nor effective until the Public Service Commission of West Virginia's (PSC) Final Order approving it is issued.

Section 1.02 Neither party to this agreement will be obligated to carry out its obligations hereunder, in the event conditions beyond the control of either party prevents one party to this agreement from meeting its obligations hereunder.

## ARTICLE II

### DESIGN

Section 2.01 The DEVELOPER hereby agrees to employ a registered professional civil engineer, licensed by the State of West Virginia to design the extension. The DEVELOPER will provide the PSC with copies of all drawings and hydraulic calculations upon request.



- Section 2.02 The UTILITY shall bear no financial responsibility for the design of the extension or appurtenances thereto.
- Section 2.03 The UTILITY shall have the design of the extension approved by a professional engineer or other qualified person, prior to the start of construction, including all plans, designs and specifications of the extension and all appurtenances thereto, to ensure that the extension provides sufficient water pressure or sewage line force main pressure I gravity main slope to the DEVELOPMENT and extensions therefrom in accordance with the current specifications, regulatory or UTILITY requirements, and the terms of this Agreement and minimizes line loss. The UTILITY may require such revisions of said plans and specifications by the DEVELOPER as necessary before giving final approval.
- Section 2.04 After approval by the UTILITY, the DEVELOPER shall, at his own expense, submit the plans and specifications for the extension to the UTILITY and to the appropriate State, Federal and local regulatory agencies for their approval.
- Section 2.05 The DEVELOPER shall, consistent with the terms of Article VI of this agreement, administer, design and construct the extension to serve the DEVELOPMENT and existing and future customers of the UTILITY which may result from the development of the extension.
- Section 2.06 The DEVELOPER shall have the extension designed by a Registered Professional Engineer, licensed by the State of West Virginia, to meet both the service requirements of the DEVELOPMENT at full planned capacity, and the service requirements of all other imminent customer growth or reasonably anticipated and projected customer growth on the extension that may include additional water or sewer line capacity sufficient to accommodate future main line extensions that will connect to the extension, as defined by the UTILITY.
- Section 2.07 The UTILITY reserves the right to further extend its main line from and beyond the terminus of each main line extension constructed per this agreement. In such event, the DEVELOPER shall not be entitled to any reimbursement for the attaching of customers to any extension constructed beyond the main(s) constructed per this agreement.

### ARTICLE III

#### PERMITS AND EASEMENTS

- Section 3.01 The DEVELOPER shall, at its own expense, obtain all necessary permits, authorizations and approvals of Federal, State and local agencies prior to

the construction phase of the extension and shall make such changes as required by said agencies.

Section 3.02 The DEVELOPER shall grant the UTILITY construction and permanent easements for the distribution system within the DEVELOPMENT as shown on the plats signed and sealed by a Professional Land Surveyor, licensed by the State of West Virginia which are made part hereof.

Section 3.03 In order that the UTILITY may provide service to adjoining properties of the DEVELOPER's project, the UTILITY shall require and the DEVELOPER shall agree to provide all necessary easements on the DEVELOPER's property from the DEVELOPMENT to adjoining properties, at the locations specified by the UTILITY. Such easement locations shall take into consideration the DEVELOPER's future development plans for this property.

#### ARTICLE IV

#### CONSTRUCTION AND INSPECTION AND FINAL TESTING

Section 4.01 The DEVELOPER will construct the extension under this Agreement, for all residential, commercial or other customers, either proposed or existing, within the area of the DEVELOPMENT.

All construction shall be done in accordance with the approved plans and specifications for the DEVELOPMENT and in accordance with accepted universal standards and codes.

Section 4.02 The UTILITY shall bear no financial or other responsibility for the design and construction of the extension. The UTILITY will provide an inspector to ensure that the construction including the placing of mains, service lines, meter boxes and setters, to connect dwellings to extension.

Section 4.03 The DEVELOPER shall provide to the UTILITY a complete set of plans and specifications and shop drawings of the extension and continually update these plans through the design and construction of the system as needed. Upon completion of construction, the DEVELOPER shall provide to the UTILITY copies of record drawings also known as "as built plans" of the extension.

Section 4.04 At all Times during construction of the extension, the DEVELOPER shall maintain sole ownership of said system.

Section 4.05 The DEVELOPER is to commence construction within 12 months after UTILITY's acceptance and the PSC's approval of this Agreement unless the DEVELOPER and UTILITY agree in writing to an extension of this

Agreement. This Agreement shall apply to future sections of the DEVELOPMENT performed by the DEVELOPER or his assigns.

#### Section 4.06 Inspection and Testing

The DEVELOPER and UTILITY agree to the following:

1. Testing shall be done by the DEVELOPER at his expense under the observation of the UTILITY. All the necessary equipment and labor for the testing shall be provided and paid for by the DEVELOPER.
2. Testing shall be done not less than five (5) days after the extension or portion thereof, has been installed.
3. The DEVELOPER agrees to give the UTILITY at least 48 hours' notice of any test to be done and the UTILITY agrees to provide a qualified representative to witness and approve the test.
4. If the extension fails any of the tests then the DEVELOPER shall remedy the defect at his expense. And the repairs and tests shall be repeated under the supervision of the UTILITY.
5. The UTILITY agrees to notify the DEVELOPER, in writing within five (5) days of the test(s), as to whether the extension is acceptable and if not, what parts are defective and what remedies are required. As soon as the DEVELOPER realizes a failure in testing, he may commence any repairs or changes immediately.

Section 4.07 The UTILITY shall have the right to inspect and approve, prior to the implementation of service, the construction of the DEVELOPER's extension to ensure that water/sewer will be transported thru the DEVELOPER's extension in accordance with current Federal, State and Local regulations and the terms of the Agreement, line loss is minimized, and that the system is constructed in accordance with Plans and Specifications, using materials in compliance with Federal, State and UTILITY's standards. A one-year guarantee of materials and workmanship shall be provided by the DEVELOPER from the date ownership of the extension is transferred.

#### Section 4.08 Disinfection (Water extensions only)

1. All pipelines shall be pressure and leak tested, flushed, and cleaned of debris and dirt prior to application of disinfectant. Flushing shall continue until all debris and turbidity are removed.
2. Methods to be used for disinfection are those detailed in ANSI/AWWA C-651-92 (water mains).
3. The DEVELOPER shall be responsible for contacting the State Health Department Laboratory for procedures to be used to collect

samples from the extension for analysis. The samples shall pass the bacteriological test requirements of the West Virginia State Health Department.

4. In the event the sample does not pass, the DEVELOPER shall take whatever steps necessary to remedy the problem. After correction the problem testing shall be repeated.

#### Section 4.09 Final Testing and Inspection

The UTILITY shall have the right to visually inspect and conduct tests upon the extension before it takes possession of the system. If defects are found, the UTILITY shall notify the DEVELOPER in writing of such defects as soon as possible but in no event, not later than four (4) working days, of such defects and prescribe the action necessary to remedy the problem. Any defects will be repaired by the DEVELOPER. Testing will be done by the DEVELOPER at his expense under the supervision of the UTILITY.

- Section 4.10 The UTILITY shall have the right to conduct, at UTILITY expense, final test of the system to include but not limited to hydrostatic, bacteriological, and visual inspection tests in accordance with UTILITY specifications. DEVELOPER is not to make final hook up to any customers until such time as record (as built) plans are submitted to the UTILITY, all aspects of the extension have been inspected and approved by the UTILITY.

### ARTICLE V

#### TRANSFER OF OWNERSHIP

- Section 5.01 Upon completion of the construction of the entire extension, or specific phases or portions of the extension as agreed to by the DEVELOPER and the UTILITY, and when the DEVELOPER shall have obtained such Federal, State, and required local certifications, authorizations or approvals at the DEVELOPER's expense, the DEVELOPER shall provide the UTILITY with written notice of completion that the entire or specific phase of the extension is completed in all respects. As used in this and subsequent Sections, "completed in all respects" includes, but not limited to, the system or phase of the system being completed, all engineers, material men, contractors and subcontractors of the DEVELOPER have been paid for their work on the extension or specific phase of the extension, and a legal certification from the DEVELOPER that all legal disputes regarding the extension or specific phase of the extension are resolved, and no outstanding liens or potential liens exist regarding the extension or specific phase of the extension, the same be certified in writing by the DEVELOPER. Transfer of ownership may take place in phases as areas of the development are built, provided all conditions as stated in this Section are met.

- Section 5.02 If, after receipt of the notice set forth in Section 5.01, the UTILITY determines that the DEVELOPER's entire extension or specific phase of the extension is in good and proper working condition, that no changes, repairs or additions are necessary, and that the entire extension or specific phase of the extension is complete in all respects in accordance with the plans and specifications and that the property and facilities to be transferred are capable of being accessed by others, the DEVELOPER shall deliver, and the UTILITY shall acquire, in accordance with the terms outlined herein, ownership of the entire extension or specific phase of the extension, including easements, piping equipment and appurtenances necessary for ownership, operation and maintenance of the entire extension or specific phase of the extension and all extensions thereto. At such time the UTILITY shall provide the DEVELOPER written notice of its acceptance of the phase of the distribution system.
- Section 5.03 At the time of transfer of ownership, the DEVELOPER shall deliver to the UTILITY all shop drawings, operating manuals, and written warranties that were required by the construction specifications and drawings.
- Section 5.04 Nothing in this Article shall be construed to prevent the UTILITY from acquiring ownership of the system a section at a time or any portion less than the completion of the entire system.

## ARTICLE VI

### REPRESENTATIONS AND WARRANTIES

- Section 6.01 The UTILITY represents and warrants that the execution, delivery and performance of this Agreement by the UTILITY will have been duly authorized, and this Agreement constitutes a valid and binding obligation of the UTILITY enforceable in accordance with its terms.
- Section 6.02 The DEVELOPER represents and warrants that the extension will be designed and constructed in accordance with the plans and specifications. The DEVELOPER hereby warrants the DEVELOPER's work on all aspects and components of the extension for one (1) year from the date of transfer of ownership to the UTILITY and will make such changes, repairs and additions, at the DEVELOPER'S expense, as are needed to maintain the extension in a proper working condition. However, the UTILITY will be obligated to accept the extension only if a Representative of the UTILITY inspected the extension during construction.

## ARTICLE VII

### SUBSEQUENT CONNECTIONS

Section 7.01 The DEVELOPER shall provide to the UTILITY connection and user agreements for each structure that is to be connected to the extension.

Section 7.02 The DEVELOPER hereby agrees that in the event that the DEVELOPER transfers any portion of the DEVELOPER's property within the development to any individual, corporation, or other entity, the new owner's duties and responsibilities under this agreement will not be reduced or diminished in any way.

## ARTICLE VIII

### MISCELLANEOUS PROVISIONS

Section 8.01 Nothing in this agreement shall be construed to make the UTILITY liable or responsible for any obligations of the DEVELOPER, nor shall this agreement be construed to make the DEVELOPER liable or responsible for any obligations of the UTILITY, except as specifically stated herein.

The DEVELOPER hereby agrees to save and indemnify and keep harmless the UTILITY against all liability claims and judgments or demands for damages arising from accidents to persons or property occasioned by the DEVELOPER, his agents or employees, and against all claims or demands for damages arising from accidents to the DEVELOPER, his agents or employees, resulting from construction of the extension contemplated herein, whether occasioned by said DEVELOPER or his employees or any other person or persons and the DEVELOPER Will defend any and all suites that may be brought against the UTILITY for any expenditures that the UTILITY may take by reason for such accidents.

The DEVELOPER hereby agrees to save and indemnify and keep harmless the UTILITY from all claims, demands, causes of action, or suits of whatever nature arising out of liens upon the extension or upon the DEVELOPMENT property upon which the extension is located, arising out of labor and materials used by the DEVELOPER and his contractors and subcontractors resulting from construction of the extension and said DEVELOPMENT.

Section 8.02 Upon transfer of ownership to the UTILITY, nothing in this agreement shall be construed to provide the DEVELOPER with any ownership or other interest in the extension, which shall become the exclusive property of the UTILITY.

Section 8.03 This agreement constitutes the entire agreement between the UTILITY and the DEVELOPER with respect to the matters addressed and may be amended only in a subsequent writing executed by both parties.

Section 8.04 This agreement may not be assigned by any party without mutual written consent and is binding upon all purchasers, heirs or assigns. The parties hereto agree that the consent to such assignment shall not be unreasonably withheld.

WITNESS the following signatures this \_\_\_\_\_ Day of \_\_\_\_\_.

\_\_\_\_\_  
[Utility] CHARLES TOWN UTILITY BOARD

By: \_\_\_\_\_

Its: \_\_\_\_\_

\_\_\_\_\_  
[Developer]

By: \_\_\_\_\_

Its: \_\_\_\_\_





# CHARLES TOWN UTILITY BOARD ACCEPTANCE OF INSTALLED WATER/SEWER LINES

Applicant Name: \_\_\_\_\_

Applicant Address: \_\_\_\_\_

\_\_\_\_\_

Project: \_\_\_\_\_

\_\_\_\_\_

To be furnished with Application:

Permits: Health Department: \_\_\_\_\_ Other: \_\_\_\_\_

Alternate Line Extension Agreement: \_\_\_\_\_

Contractor: \_\_\_\_\_

As-Built Plans: \_\_\_\_\_

Easements: \_\_\_\_\_

\_\_\_\_\_ certifies that the above described water/sewer lines have  
**Applicant's Name**

been installed in accordance with all permits, Charles Town Utility Board Standards, and as shown on As-Built Plans submitted with this request. Applicant requests Charles Town Utility Board accept water/sewer lines into their system subject to inspection of Charles Town Utility Board (CTUB) during one year warranty period from date of this certificate and acceptable correction by Applicant of any deficiencies identified during one year warranty period.

\_\_\_\_\_  
Applicant's Signature

\_\_\_\_\_  
Date

Based on certification of applicant and upon completion of one year warranty period, Charles Town Utility Board accepts the above described water/sewer lines into their system.

\_\_\_\_\_  
Chairman

\_\_\_\_\_  
Date



CHARLES TOWN UTILTIY BOARD  
AGREEMENT FOR GRINDER PUMP CONNECTION

The property standing in the name of \_\_\_\_\_ as described by Deed recorded in the Office of the Clerk of the County Commission, Jefferson County, West Virginia, in Deed Book \_\_\_\_\_, Page \_\_\_\_\_ cannot be served by the existing gravity sewer system.

To satisfy the applicants request for sewer service, Jefferson County/ Charles Town Utility Board (CTUB), upon payment of connection fee and deposit per tariff, will permit the connection of the sanitary sewer to the gravity system with grinder pump and force main. The Charles Town Utility Board will make the connection to the gravity system.

The operation and maintenance of the grinder pump and force main is the responsibility of the property owner, his heirs or assigns. Charles Town Utility Board's only responsibility is to provide sewer service at sewer main. Charles Town Utility Board assumes no responsibility for installation, operation or maintenance of grinder pump and force main beyond its connection at gravity sewer line.

This agreement shall be covenant and binding upon said property in perpetuity.

Signed this \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_

\_\_\_\_\_  
Applicant

\_\_\_\_\_  
Printed Name of Applicant

STATE OF WEST VIRGINIA

COUNTY OF \_\_\_\_\_

The foregoing instrument was acknowledged before me

This \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_

By \_\_\_\_\_.

My commission expires \_\_\_\_\_

\_\_\_\_\_  
Notary Public

Accepted by Charles Town Utility Board

\_\_\_\_\_  
Chairman

\_\_\_\_\_  
Date

STATE OF WEST VIRGINIA

COUNTY OF \_\_\_\_\_

The foregoing instrument was acknowledged before me

This \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_

By \_\_\_\_\_, Chairman of Charles Town  
Utility Board, on behalf of Charles Town Utility Board.

My commission expires \_\_\_\_\_

\_\_\_\_\_  
Notary Public



## **APPENDIX D**

### **Right-of-Way Agreement (Sewer)**

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**RIGHT-OF-WAY/EASEMENT – SEWER LINE**

KNOW ALL MEN BY THESE PRESENTS:

That in consideration of One Dollar (\$1.00) and other good and valuable consideration paid to \_\_\_\_\_ (hereinafter referred to as "GRANTOR" whether singular or plural), by the **CHARLES TOWN UTILITY BOARD**, (hereinafter referred to as "GRANTEE"), the receipt of which is hereby acknowledged, the GRANTOR does hereby grant, bargain, sell, transfer, and convey unto the GRANTEE, its successors and assigns, a perpetual easement with the right to construct, install, and lay, and thereafter use, operate, inspect, repair, maintain, replace and remove a sewer line generally as shown on plans for the sewer project commonly known as the \_\_\_\_\_, plans prepared by \_\_\_\_\_, and as shown on the record drawings on file at the Charles Town Utility Board, Jefferson County, West Virginia, over, under, across, and through the land of the GRANTOR situated in \_\_\_\_\_ District, Jefferson County, State of West Virginia, said land being described as follows:

That certain parcel(s) of real estate to wit: **Tax Map \_\_\_\_\_, parcel \_\_\_\_\_**, situate, lying and being in the \_\_\_\_\_ District of Jefferson County, West Virginia, and recorded in the Office of the Clerk of the County Commission of Jefferson County, West Virginia, in **Deed Book No. \_\_\_\_\_, at page \_\_\_\_\_**, together with the right of ingress and egress over the land of the GRANTOR, its successors and assigns, for the purposes of this easement.

The temporary construction easement shall be **Thirty (30')** feet in width and shall be in effect until the installation of the pipeline is complete. The permanent easement shall be **Twenty (20') feet** in width, the center line of which shall be the pipeline as constructed, unless the pipeline is within Ten (10') feet of the GRANTOR'S property boundary, in which case the GRANTOR'S property boundary will constitute the edge of the easement, as shown on the final as-built plans as filed at the Charles Town Utility Board Office.

The GRANTOR conveys the right of ingress and egress from County or State road across its property for the installation, maintenance, replacement and repair of the sewer line, or, if necessary, for other utility easements.

The GRANTEE agrees that for and in consideration of the granting of this easement by the GRANTOR, the GRANTEE shall return and restore the real estate of the GRANTOR to its pre-easement condition and to the reasonable satisfaction of the GRANTEE, with the exception of trees. Any trees removed from said easement will not be replaced.

The consideration herein above recited shall constitute payment in full for any damages to the land of the GRANTOR, its heirs and/or assigns, by reason of the installation, operation, and maintenance of the structures or improvements referred to herein. The GRANTEE covenants to maintain the easement in good repair so that no unreasonable damage will result from its use to the adjacent land of the GRANTOR, its heirs and/or assigns.

This is an exempt transfer pursuant to West Virginia Code Section 11-22-1 et seq. and therefore not subject to excise taxation.

The grant and other provisions of this easement shall constitute a covenant running with the land for the benefit of the GRANTEE, its successors and/or assigns.

IN WITNESS WHEREOF, the GRANTOR has executed this instrument this \_\_\_\_\_ day of \_\_\_\_\_, 201\_\_.

\_\_\_\_\_  
(SEAL)

\_\_\_\_\_  
(SEAL)

STATE OF \_\_\_\_\_,

COUNTY OF \_\_\_\_\_, to-wit:

I, \_\_\_\_\_, a Notary Public in and for the County and State aforesaid, do hereby certify that \_\_\_\_\_  
acknowledged the foregoing and hereunto annexed right-of-way/easement before me this \_\_\_\_\_ day  
of \_\_\_\_\_, 201\_\_.

My commission expires: \_\_\_\_\_.

\_\_\_\_\_  
Notary Public

(Notarial Seal)

This instrument was prepared by \_\_\_\_\_.



## **APPENDIX E**

### **Sewer Lateral Report**



CHARLES TOWN UTILITY BOARD

SEWER LATERAL REPORT

DATE: \_\_\_\_\_ BY: \_\_\_\_\_

STREET: \_\_\_\_\_ PLAN SHEET: \_\_\_\_\_

HOUSE NO./ADDRESS: \_\_\_\_\_

PROPERTY OWNER: \_\_\_\_\_

LOCATION: Between MH \_\_\_\_\_ and MH \_\_\_\_\_ (Complete Sketch Below)

SIZE OF LATERAL AT PROPERTY LINE: \_\_\_\_\_ Inches

ABNORMAL FLOW EVIDENT: \_\_\_\_\_

CONDITION OF LATERAL/REMARKS: \_\_\_\_\_

\_\_\_\_\_

NEW LATERAL INSTALLED: \_\_\_\_\_ Feet of \_\_\_\_\_ PVC

FITTINGS USED: \_\_\_\_\_

(Sketch layout on back of sheet)

CLEAN OUT INSTALLED? Yes \_\_\_\_\_ No \_\_\_\_\_

REMARKS: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ ○

MH or CO # \_\_\_\_\_

(Show lateral on sketch above with distance from lateral to manhole or mainline cleanout.)

