

**RULES AND REGULATIONS  
TRUMBULL COUNTY, OHIO  
SANITARY SEWER SYSTEMS**

Adopted January 1, 2010

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RESOLUTION

A RESOLUTION REGULATING THE USE OF PUBLIC AND PRIVATE SEWERS AND DRAINS, PRIVATE SEWAGE DISPOSAL, THE INSTALLATION AND CONNECTION OF BUILDING SEWERS, AND THE DISCHARGE OF WATERS AND WASTES INTO THE PUBLIC SEWER SYSTEM(S); AND PROVIDING PENALTIES FOR VIOLATIONS THEREOF.

ADOPTED \_\_\_\_\_, 20\_\_\_\_\_.

Commissioner \_\_\_\_\_ offered the following preamble and resolution and moved its adoption, which motion was seconded by Commissioner \_\_\_\_\_.

WHEREAS, it is provided in Section 6117.01 et. seq. of the Ohio Revised Code, that the Board of County Commissioners of any County may create sewer districts and may acquire, construct, maintain and operate a system of sanitary sewers and sewage treatment works or disposal works, for the purpose of preserving and promoting the public health and welfare and they may make, publish, and enforce rules and regulations for the construction, maintenance, protection and use of such sewerage systems, and they may fix reasonable rates or charges of rents to be paid to the County for the use and maintenance of such sewers or sewage treatment or disposal works; and

WHEREAS, the Board of County Commissioners have heretofore created, or will create, sewer districts in Trumbull County, and have, or will have, in operation therein a sanitary sewerage system for the purpose of collecting sewage and conveying the same away from the premises where produced to a sewage treatment plant; and

WHEREAS, the Board of County Commissioners, in order to promote the public health and welfare has found it necessary to revise and enforce certain rules and regulations pertaining thereto and to fix reasonable rates or charges for rents to be paid by every person, firm or corporation whose premises are served by a connection to such sewers or sewage treatment or disposal plant. The user charge portion of said rates or charges shall be placed in a fund to be used to pay the cost of management, operation and maintenance of the sewers and sewage treatment plants. The sums established for replacement shall be set aside in a replacement fund and used only for the cost of replacement. Revenues received from rates and charges over and above user charges may be used for the enlargement of sewer or sewage treatment or disposal plants; for the payment of the interest and principal on any debt incurred for the construction of such sewers or sewage treatment or disposal plant; or for the creation of a sinking fund for the payment of such debt;

NOW, THEREFORE, BE IT RESOLVED, by the Board of County Commissioners of Trumbull County, Ohio, that it is necessary, for the purpose of preserving and promoting the public health and welfare, to revise, publish, and enforce rules and regulations pertaining to the construction, maintenance, protection, and use of water and sewerage systems in the Sanitary Sewer Districts in Trumbull County, and to fix reasonable rates or charges for the use of such sewers and sewage treatment or disposal plant as follows:

ARTICLE I  
DEFINITIONS

Unless the context specifically indicates otherwise, the meaning of terms in these rules and regulations shall be as follows:

SECTION 101. "ACT" means the Clean Water Act (33 U.S.C. 1251 et seq), as amended. Public Law 92-500, and any amendments thereto; as well as any guidelines, limitations and standards promulgated by the U.S. Environmental Protection Agency pursuant to the Act.

SECTION 102. "BIOCHEMICAL OXYGEN DEMAND (BOD)" means the quantity of oxygen, expressed in parts per million by weight, utilized in the biochemical oxidation of organic matter under standard laboratory conditions for five days at a temperature of twenty degrees centigrade. The laboratory determinations shall be made in accordance with the Environmental Protection Agency "Guidelines Establishing Test Procedures for Analysis of Pollutants" (Ref. 40 CFR, Part 136 and amendments thereto).

SECTION 103. "BUILDING SEWER" shall mean that part of the sanitary sewer system which connects the plumbing of the house or building to a public sanitary sewer. The building sewer begins three feet from the outside face of the building wall.

SECTION 104. "BUILDING DRAIN" means that part of the horizontal piping of a building drainage system which extends from a point three feet outside of the building wall and which receives rain water, surface water, ground water, sub-surface water, condensate, cooling water or other similar discharge and conveys it to a public storm drain.

SECTION 105. "CATEGORICAL PRETREATMENT STANDARDS" means the National Pretreatment Standards specifying quantities or concentrations of pollutants or pollutant properties which may be discharged or introduced into the sewage disposal system by specific Industrial Users.

SECTION 106. "CHEMICAL OXYGEN DEMAND (COD)" shall mean the quantity of oxygen utilized in the chemical oxidation of organic matter under standard laboratory procedures expressed in milligrams per liter.

SECTION 107. "COMBINED SEWER" shall mean a sewer intended to receive both sewage and storm or surface water.

SECTION 108. "COMPATIBLE POLLUTANT" means the BOD, suspended solids, pH and fecal coliform bacteria, plus additional pollutants identified in the NPDES permit if the Wastewater Treatment Plant was designed to treat such pollutants, and in fact does remove such pollutants to a substantial degree. Examples of such additional pollutants may include: a) COD; b) total organic carbon; c) phosphorus and phosphorus compounds; d) nitrogen and nitrogen compounds; e) fats, oils, and greases of animal or vegetable origin except as prohibited under Section 403.

SECTION 109. "COUNTY" shall mean Trumbull County, Ohio.

SECTION 110. "COOLING WATER" or "INDUSTRIAL COOLING WATER" means the unpolluted water discharged from any system of condensation, air-conditioning cooling, refrigeration or other similar use which meet the criteria established

by the OEPA for effluents discharged to water courses in Trumbull County, Ohio.

SECTION 111. "DEBT SERVICE" means the payment requirements to retire the Sewage Disposal System debt through cash generated during the period of time that the debt is outstanding. Any incremental charge for the recovery of "Debt Service" may be included in the sewer service charge.

SECTION 112. "DEBT SERVICE FUND" means a fund to which monies are deposited which are collected for the purpose of Debt Service as defined in Section 111 above. Unless the collection of such monies complies with the User Charge requirements, the monies in this fund shall not be used for any cost or expense of providing waste treatment services.

SECTION 113. "DOMESTIC SEWAGE OR SANITARY SEWAGE" shall mean sewage derived principally from dwellings, business buildings, institutions and the like, originating as wastes from kitchens, water closets, lavatories, bathrooms, showers, and laundries.

SECTION 114. "FLOATABLE OIL" means oil, fat, or grease in a physical state such that it will separate by gravity from wastewater by treatment in an approved pretreatment facility.

SECTION 115. "FOUNDATION DRAINS" shall mean sub-surface drains laid around the foundation of a building, either within or outside of the building foundation for the purpose of carrying ground or sub-surface water to some point of disposal.

SECTION 116. "GARBAGE" means the residue from the preparation and dispensing of food, and from the handling, storage and sale of food products and produce.

SECTION 117. "GROUND GARBAGE" means the residue from the preparation, cooking and dispensing of food that has been shredded to such degree that all particles will be carried freely in suspension under the flow conditions normally prevailing in public sewers with no particle greater than one-half inch in any dimension.

SECTION 118. "INCOMPATIBLE POLLUTANT" means any pollutant which is not a compatible pollutant as defined in Section 108.

SECTION 119. "INDIRECT DISCHARGE" means the discharge or the introduction of non-domestic pollutants from a source regulated under the Act into the sewage disposal system.

SECTION 120. "INDIVIDUAL OR PRIVATE SEWAGE DISPOSAL SYSTEM" means an independent sewage disposal system found to be adequate and approved by the Health Department.

SECTION 121. "INDUSTRIAL SEWAGE" shall mean the liquid wastes from industrial or commercial processes as distinct from "domestic sewage".

SECTION 122. "INTERCEPTOR" means a device designed and installed so as to separate and/or retain deleterious, hazardous or undesirable matter from normal wastes, and permits normal wastewater to discharge into the disposal terminal by gravity.

SECTION 123. "INTERFERENCE" means a discharge which, along or in conjunction with a discharge or discharges from other sources, both: Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal.

SECTION 124. "NATURAL OUTLET" means any outlet into a watercourse, pond, ditch, lake or other body of surface water.

SECTION 125. "NEW SOURCE" shall mean any building, structure, facility or installation from which there is or may be a discharge of pollutants, the construction of which commenced after the publication of proposed Pretreatment Standards under Section 307(c) of the act as defined under 403.3(k).

SECTION 126. "NON-SIGNIFICANT INDUSTRIAL USER" is defined as an Industrial User which discharges only sanitary wastes or sanitary wastes and non-contact cooling water. The discharge from a Non-Significant Industrial User contains conventional pollutants of normal strength and does not present a threat to the Wastewater Treatment Plant.

SECTION 127. "NORMAL STRENGTH SEWAGE OR WASTES" as defined for the purpose of determining surcharge shall mean sewage having an average daily suspended solids concentration of not more than 250 parts per million, an average daily BOD concentration of not more than 200 parts per million, an average chlorine demand of not more than 30 parts per million, and shall not contain any of the characteristics prohibited by Section 403 of not more than the respective limitations as provided for therein.

SECTION 128. "NPDES PERMIT" means the National Pollutant Discharge Elimination System permits issued to Trumbull County, Ohio.

SECTION 129. "OEPA" shall mean the Ohio Environmental Protection Agency.

SECTION 130. "OPERATION AND MAINTENANCE COSTS" shall mean all expense of collecting, pumping, treating and disposing of wastewater.

SECTION 131. "PASS THROUGH" means a discharge which exits the POTW into waters of the United States in quantities and concentrations which alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of the POTW's NPDES permit.

SECTION 132. "PARTS PER MILLION (PPM)" means a weight-to-weight ratio; the parts-per-million value multiplied by the factor 8.345 shall be equivalent to pounds per million gallons of water. "Milligrams per liter" (mg/l) is a synonymous term.

SECTION 133. "PERSON" means any and all persons, natural or artificial, including any individual, firm, company, municipal or private corporation, association, society, institution, enterprise, governmental agency or other entity.

SECTION 134. "pH" means the logarithm of the reciprocal of the weight of hydrogen ions in grams per liter of solution.

SECTION 135. "POLLUTANT" means the dredged spoil, solid waste, incinerator residue, wastewater, garbage, wastewater sludge, munitions, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal, commercial, domestic and agricultural waste discharged into water.

SECTION 136. "PRETREATMENT" means the reduction of the amount of pollutants, the elimination of pollutants, or the alteration of the nature of pollutant properties in wastewater to a less harmful state prior to or in lieu of discharging or otherwise introducing such pollutants into the sewage disposal system.

SECTION 137. "PUBLIC SEWER" means a sewer in which all owners of abutting properties have equal rights, and is owned and/or controlled by the County.

SECTION 138. "REPLACEMENT COSTS" shall mean expenditures for obtaining and installing equipment, accessories, or appurtenances which are necessary during the useful life of the sewage works to maintain or regain the capacity and performance for which such works were designed and constructed. Unless specifically excluded, the term operation and maintenance shall include replacement.

SECTION 139. "REPLACEMENT FUND" means a fund to which monies are deposited which are collected for the purpose of replacement as defined in above. The monies deposited in this fund and any interest earned thereon shall be used solely for the purpose of replacement.

SECTION 140. "SANITARY ENGINEER" shall mean and designate the Sanitary Engineer of Trumbull County, Ohio.

SECTION 141. "SANITARY SEWER" shall mean a pipe or conduit designed for the purpose of carrying domestic sewage or industrial sewage from the point of origin to a sewage treatment or disposal works or to a place of disposal and which is not intended to carry storm, surface, cooling, ground, or sub-surface waters.

SECTION 142. "SANITARY SEWER FUND" means a fund to which monies received from user charges are deposited and from which is paid all costs and expense incurred for operation and maintenance of the County's sewage disposal works.

SECTION 143. "SEWAGE" synonymous with "WASTEWATER" means the spent water of a community. From the standpoint of source, it may be a combination of the liquid and water-carried wastes from residences, commercial buildings, industrial plants, and institutions, together with any groundwater, surface water, and storm water that may be present.

SECTION 144. "SEWAGE WORKS" shall mean all of the facilities for collecting, pumping, treating and disposing of sanitary sewage.

SECTION 145. "SEWER" means a pipe or conduit for collecting and transporting sewage.

SECTION 146. "SEWER SERVICE CHARGE" means the basic fee levied on all users of the County sewage disposal system whose wastes do not exceed in strength the concentration values established as representative of normal sewage. This charge to include the Users Charge as hereinafter defined and any

other charge related to the construction and use of the County sewer system that may be permitted by law, including debt service.

SECTION 147. "SHALL" is mandatory; "MAY" is permissive.

SECTION 148. "SIC MANUAL" means the Standard Industrial Classification Manual, 1972, Office of Management and Budget, as amended and supplemented.

SECTION 149. "SIGNIFICANT-MAJOR INDUSTRIAL USER" means:

(a) Except as provided in part (b) of this section, the term Significant-Major Industrial User is defined as an Industrial User which meets any of the following criteria:

(i) Is a high-flow (over 25,000 gallons per day) Industrial User which is currently monitored by County personnel as part of the quarterly report requirement.

(ii) Is known or suspected of violating one of the prohibited discharge provisions of 40 CFR part 403.5.

(iii) Contributes 10 percent or more of the allocated load of a priority pollutant to the Wastewater Treatment Plant.

(iv) Contributes 20 percent or more of the allocated sludge load of a priority pollutant.

(b) The Sanitary Engineer may at any time, on its own initiative or in response to a petition received from an Industrial User, determine that a Non-Categorical Industrial User is a Non-Significant Industrial User if the Industrial User has no reasonable potential to adversely affect the POTW's operation or for violating any pretreatment standard or requirement.

SECTION 150. "SIGNIFICANT-MINOR INDUSTRIAL USER" means:

(a) Except as provided in part (b) of this section, the term Significant-Minor Industrial User is an Industrial User which meets any of the following criteria:

(i) Discharges priority pollutants at loadings which would normally not present a threat to the Wastewater Treatment Plant meeting its effluent limitations or sludge use criteria.

(ii) Discharges only sanitary wastewaters, but has priority pollutants present at the facility which could enter the sanitary sewer as a result of a spill or a cleaning or maintenance activity.

(iii) Discharges conventional pollutants that would possibly cause a problem at the Wastewater Treatment Plant if a slug of a pollutant entered the sanitary sewer system.

(b) The Sanitary Engineer may at any time, on its own initiative or in response to a petition received from an Industrial User, determine that a Non-Categorical Industrial User is a Non-Significant Industrial User if the Industrial User has no reasonable potential to adversely affect the POTW's operation or for violating any pretreatment standard or requirement.

SECTION 151. "SLUG LOAD" shall mean any pollutant, including oxygen demanding pollutants released in a discharge at a flow rate and/or pollutant concentration which will cause interference with the POTW.

SECTION 152. "SPECIFICATION FOR MATERIALS" means standards of specifications identified by the following abbreviations:

ANSI: American standards approved by the American National Standards Institute, Inc., 1430 Broadway, New York, New York, 10018.

ASTM: Standards and tentative standards published by the American Society for Testing of Materials, P.O. Box 7510, Philadelphia, Pennsylvania, 19101.

Commercial standards representing recorded voluntary recommendations of the trade, issued by the United States Department of Commerce and obtainable from the Superintendent of Documents, Government Printing Office, Washington, D.C., 20234.

SECTION 153. "STANDARD METHODS" means the examination and analytical procedures set forth in the Environmental Protection Agency "Guidelines Establishing Test Procedures for Analysis of Pollutants" (Ref. 40 CFR, Part 136 and amendments thereto).

SECTION 154. "STORM SEWER" or "STORM DRAIN" shall mean a sewer which carries storm, surface, cooling, and drainage water, but excludes domestic and industrial sewage.

SECTION 155. "STORMWATER RUNOFF" means that portion of the rainfall that is drained into the sewers.

SECTION 156. "SURCHARGE" means the assessment in addition to the user charge which is levied on those persons whose wastes are greater in strength than the concentration values established as representative of normal sewage.

SECTION 157. "SUSPENDED SOLIDS" means solids that either float on the surface of, or are in suspension or will settle in water, sewage or industrial waste, and which are removable by a laboratory filtration device. Quantitative determination of suspended solids shall be made in accordance with the Environmental Protection Agency "Guidelines Establishing Test Procedures for Analysis of Pollutants" (Ref. 40 CFR, Part 136 and amendments thereto).

SECTION 158. "TOXIC POLLUTANTS" shall include but not necessarily be limited to aldrin-dieldrin, benzidine, cadmium, cyanide, DDT-endrin, mercury, polychlorinated byphenyls (PCB's) and toxaphene. Pollutants included as "toxic" shall be those promulgated as such by the USEPA.

SECTION 159. "UNPOLLUTED WATER OR LIQUID" means any water or liquid containing none of the following: free or emulsified grease or oil; acids or alkalines; substances that may impart taste and odor or color characteristics; toxic or poisonous substances in suspension, colloidal state or solution; odorous or otherwise obnoxious gases. It shall contain not more than 2,500 parts per million by weight of dissolved solids and not more than ten parts per million each of suspended solids or biochemical oxygen demand (BOD). Analytical determinations shall be made in accordance with the Environmental Protection Agency "Guidelines Establishing Text Procedures for Analysis of Pollutants" (Ref. 40 CFR, Part 136 and amendments thereto).

SECTION 160. "UPSET" means an exceptional incident in which a User unintentionally and temporarily is in a state of noncompliance with the standards set forth in this ordinance due to factors beyond the reasonable control of the User and excluding noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation thereof.

SECTION 161. "USEPA" shall mean the United States Environmental Protection Agency.

SECTION 162. "USER CHARGE" means the charge to each recipient of waste treatment services within the County's service area, representing a proportionate share of the costs of operation and maintenance including replacement of all waste treatment service provided.

SECTION 163. "USER CLASS" means the division of users within the County's service area by the origin of the sewage discharged and by the similarity of the function of such users. Stated in four (4) general classes, they are:

(A) "Commercial User", a commercial business discharging wastewater; users not categorized as residential or industrial.

(B) "Industrial User", a person who discharges to the County's sewage disposal system liquid wastes resulting from processes employed in industrial or manufacturing, or from the development of any natural resource.

(C) "Other Public Authority User", shall mean a special class of user who usually contributes a primarily segregated domestic waste or waste from sanitary conveniences. This class usually includes hospitals, sanitariums, prisons, or charitable institutions, schools and all other government user (Federal, State and Local).

(D) "Residential User", shall mean single family or equivalent residences which discharge only wastes from sanitary conveniences.

SECTION 164. "WASTEWATER TREATMENT PLANT" or "WWTP" means an arrangement of devices and structures for treating and disposing of sewage and sludge.

SECTION 165. "WATERCOURSE" means a channel in which a flow of water occurs, either continuously or intermittently.

ARTICLE II

USE OF PUBLIC SEWERS REQUIRED

SECTION 201. The discharge of any sanitary sewage, industrial sewage or polluted waters to any natural outlet, except where suitable treatment has been provided in accordance with subsequent provisions of these rules and regulations is prohibited.

SECTION 202. Except as hereinafter provided, the construction or maintenance of any privy, privy vaults, septic tanks, cesspool, or other facility intended or used for the disposal of sewage shall be prohibited.

SECTION 203. The owner of all houses, buildings or properties used for human occupancy, employment, recreation, or other purpose abutting on any street, alley, or right-of-way in which there is located a public sanitary sewer, is hereby required at his expense to install suitable toilet facilities therein, and to connect such facilities directly with the proper public sewer in accordance with the provisions of these rules and regulations, within ninety (90) days after date of official notice to do so.

SECTION 204. Where a public sanitary sewer is not available under the provisions of Section 203, a private sewage disposal system complying with the requirements of Trumbull County shall be constructed.

SECTION 205. Additional sanitary sewer extensions to areas where service are not conveniently available shall be made according to one of the following plans:

PLAN 1. Property owners in such an area may petition the Board of County Commissioners (hereinafter designated " Board") for the installation of such extensions, thereby agreeing, among other things, to the assessments and methods of financing provided in Chapter 6117, Ohio Revised Code. Thereafter, the Board shall determine whether it is in the public interest to proceed with such extension in accordance with said Chapter 6117.

PLAN 2. The Board may permit, subject to approval of the Ohio Environmental Protection Agency, the owner or owners of property to be served with sewer to have such sewer extensions installed by private contract (see Procedures and Agreement to be followed on all Private Sewer and Water Extension Improvements) under Section 307.73 of the Ohio Revised Code. However, the installation of the sewer extensions to the County's sanitary sewer system shall be under the control and supervision of the Board and its agents. Such control and supervision shall include prior approval of plans, specifications, profiles, materials and installation, when complete, be conveyed to Trumbull County, together with an easement of 20 feet, or 10 feet on each side of the installation, for use during maintenance, inspection, replacement and repair, provided, however, that no such easement shall be required if the extension is installed in a State, County, Township highway or road right of way. The Board will also require that monies or a bond with a compensated corporate surety qualified to do such business in the State of Ohio, be deposited with the County in an amount not less than 20 percent of the estimated construction cost. These monies and/or the bond shall be for any defect in any work or materials associated with the improvement. Any sums expended by the County or its agents for inspection, maintenance, repairs or for replacement during the period of installation shall be paid to the County from said extended the sewer (see Private Agreement Language-Appendix A). After the expiration of said two-

year period, any sums remaining in any deposit of monies shall be returned and any bond shall be released.

PLAN 3. The Board will extend the sewer to new areas on its initiative. The decision to take such action will be at the sole discretion of the Board, and will depend on many factors including but not limited to the availability of sufficient surplus funds, the availability of grants and/or loans to spur economic development, the ability to service additional bonds, the needs of the area requesting service and the number of persons willing to contract and pay for such service. Any local costs by the County shall be recaptured if not by assessment by a reimbursement.

PLAN 4. The Board shall extend the sewers to new areas is such is ordered by the Ohio Environmental Protection Agency as provided in Chapter 6117.34 of the Ohio Revised Code.

A. Both sewer mains and trunk sewers shall be located and sized as determined by the Trumbull County Sanitary Engineer's Department, based on engineering considerations and district requirements in accordance with the County's General Plan of Sewage or reports determining the specific needs of an area. All construction shall be inspected by the Trumbull County Sanitary Engineer's Department or his designated Representative. Five (5) day notice shall be given to the Trumbull County Sanitary Engineer's Department prior to commencing any construction.

Unless special conditions warrant the installation of smaller sewer mains, all sewer mains shall be a minimum of eight inches (8") size.

In cases where sewer mains must be larger than eight inches (8") to also perform the function of trunk sewers, combination service-trunk mains shall be constructed.

Sewer mains shall be constructed along the full frontage of a premise when platted, or when in the opinion of the Sanitary Engineers, unplatted and undeveloped premises may be constructed to the point selected by the Trumbull County Sanitary Engineer's Department

In special cases, the Sanitary Engineer's Department may waive the above requirements when there is no possibility of a sewer main being needed beyond the premises. However, the requirements that no premises shall be served with sewage until an equitable and equivalent payment for a sewage main has been made, shall not be abrogated.

The above determinations by the Trumbull County Sanitary Engineer's Department are subject to the approval of the Trumbull County Commissioners.

B. All new or modified sewer lines shall be tested, before the sewer service shall be received. All testing shall be conducted or supervised by the Trumbull County Sanitary Engineer's Department. In cases of a Private Extension costs for such testing shall be boreed by the responsible party named in the Agreement. Newly constructed lines shall be tested not sooner than thirty (30) days from completion unless authorized by the Trumbull County Sanitary Engineer due to extenuating circumstances. Any request for a variance shall be made in writing to the Trumbull County Sanitary Engineer's Department.

C. All new and modified sewer lines shall be pressure tested as directed by the Trumbull County Sanitary Engineer's Department and test must be completed before service will be received.

D. All sanitary sewer work shall be done in accordance with the Trumbull County Sanitary Engineer Department requirements and specifications (see appendix B). These specifications are subject to change with regard to current construction standards and materials choose by the Trumbull County Sanitary Engineer's Department.

E. The part of the service beyond the right-of-way shall be installed and maintained by the owner of the property, at the owner's expense.

## Article III

### Building Sewers and Connections

SECTION 301. No unauthorized person shall uncover, make any connections with or openings into, use, alter, or disturb any public sewer or appurtenance thereof without first obtaining a written permit from the Sanitary Engineer.

Provided however, no new permit will be issued when it has been determined by the Sanitary Engineer that there does not exist sufficient capacity in the Sewage Works, including collecting, pumping, treating and disposing of wastes as may be discharged by the applicant of such new permit.

SECTION 302. There shall be three (3) classes of building sewer permits: (1) for residential, (2) for commercial service, and (3) for service to establishments producing industrial sewage. In each case, the owner or his agent shall make application on a special form to be obtained from the Trumbull County Sanitary Engineer. The permit application shall be supplemented by any plans, specifications or other information considered pertinent in the judgment of the Sanitary Engineer. A permit and inspection fee of Fifty Dollars (\$50.00) for a residential service, One Hundred Dollars (\$100.00) for a commercial service, and One Hundred and Fifty Dollars (\$150.00) for an industrial service shall be paid to the Sanitary Engineering Department at the time the permit is obtained. A tap-in fee shall also be paid in conjunction with the permit fee. The tap-in fee shall be in accordance with the Sanitary Engineer Department's established rates, methods and procedures dealing with individual sewer districts as authorized by the Trumbull County Commissioners and Article VI, User Charge Requirements.

SECTION 303. Permits to open, alter, or disturb any public sewer or appurtenance thereof will be issued only to a person, firm, or corporation engaged in the business as a drain or sewer builder and has obtained a license therefore from the Trumbull County Sanitary Engineer.

SECTION 304. The person, firm, or corporation to whom a permit is issued will be held responsible for the proper installation of the building sewer in accordance with the rules and regulations contained herein and shall indemnify and save harmless the County of Trumbull from any loss or damage that may directly or indirectly be occasioned by the installation of the building sewer.

SECTION 305. All cost and expense incident to the installation and connection of the building sewer shall be borne by the owner. No permits shall be issued to owners or their agents who are delinquent in payment of costs and expenses from previous permits, installations or connections.

SECTION 306. The applicant for the building sewer permit shall notify the Sanitary Engineer at least forty-eight (48) hours in advance as to when the building sewer is ready for inspection and connection to the public sewer. The connection shall be made under the supervision of the Sanitary Engineer or his representative. The Sanitary Engineer or his representative may require such tests as are necessary to insure there are no roof or sub-surface drains connected to the building sewer.

SECTION 307. A separate and independent building sewer shall be provided for every building; except where one building stands at the rear of another on an interior lot and no private sewer is available or can be constructed to the rear building through an adjoining alley, court, yard, or driveway, the

building sewer from the front building may be extended to the rear building; provided a proper easement for use and maintenance of said sewer is stated on application. The premises to be served must front the road, street or right-of-way in which the service main is located. No service line shall be installed which does not abut the street, road or right-of-way or where a service main is to be located.

SECTION 308. Old or existing building sewers may be used in new buildings or alterations only when they are found, on examination and test by the Sanitary Engineer, to conform to the requirements contained herein for new building sewers.

SECTION 309. The building sewer shall be constructed of 6-inch internal diameter PVC polyvinyl chloride, ASTM specification D3034-81 or equal; cast iron soil pipe ASTM specification A 74-42 or equal; or other suitable material approved by the Sanitary Engineer. All joints shall be made with rubber or pre-molded plastic joints cast in the bell or molded on the spigot at the factory. Sanitary sewer specification involving materials and construction methods are found in Appendix B.

SECTION 310. The building sewer shall be laid at uniform grade and in straight alignment insofar as possible. Changes in direction shall be made only with properly curved pipe and fittings.

SECTION 311. All joints and connections shall be made gas tight and water tight. The Sanitary Engineer may require the sewer tapper to demonstrate the water tightness of the joints by such tests as may be necessary.

SECTION 312. The building sewer shall have a minimum fall of one-fourth inch per lineal foot from the building to the public sewer. The Sanitary Engineer may, by special permission in each case, authorize the building sewer to be constructed with a fall as little as one-eighth inch per lineal foot if he determines such procedure to be desirable.

SECTION 313. The interior of each length of pipe shall be made perfectly clean and free from offsets, fins, and projections before the next length is connected thereto. All building sewers shall be graded by line and pole, the line being first leveled from the building to the lateral or public sewer and then lowered at the lateral end to obtain the required fall.

SECTION 314. Building sewers shall not be constructed any closer in parallel than three (3) feet to any exterior wall, cellar, basement, or cistern. The building sewer within ten (10) feet of the building wall, cellar or basement shall be ductile iron pipe and shall be a minimum of three (3) feet in depth. A 4-inch by 6-inch increase shall be connected to the cast iron pipe extending under the building foundation.

SECTION 315. Where the building sewer will cross unstable soil or close to a tree or trees where roots may enter the joints, extra heavy ductile iron or PVC class SDR 26, shall be required.

SECTION 316. All excavation required for the installation of a building sewer shall be open trench with substantially vertical side, using such sheeting as may be necessary. The bottom of the excavation shall be shaped as nearly as possible to fit the lower half of the sewer to provide for uniform bearing. In the event the trench is excavated below the required grade of the

pipe, the excess space shall be filled with No.57 crushed stone. No backfill shall be placed until the work has been inspected.

SECTION 317. Water and gas service shall not be laid in the same trench as the building sewer.

SECTION 318. The building sewer shall be backfilled to an elevation at least 6-inches over the top of the pipe by tamping in 6-inch layers. Soil containing stones larger than 3-inches in the greatest dimension shall not be used for this portion of the backfill. The balance of the backfill may be deposited in any manner which will not damage the pipe or disturb the alignment or grade of the sewer, except that the balance of the backfilling shall be done and with such material as may be required by the permit referred to in Section 320 herein.

SECTION 319. The connection of the building sewer into the public sewer shall be made by the "Y" branch, if such branch is available at a suitable location. The cap or plug must be removed with care to avoid damage to the bell of the branch or to the lateral sewer. If the public sewer is twelve (12) inches in diameter or less, and no properly located "Y" branch is available, the owner shall at his own expense install a "Y" branch in the public sewer at the location specified by the Sanitary Engineer. Where the public sewer is greater than twelve (12) inches in diameter, and no properly located "Y" branch is available, an approved saddle with a "Y" branch shall be installed into the public sewer to receive the building sewer, with entry in the downstream direction at an angle of about forty-five (45) degrees. A forty-five (45) degree elbow may be used to make such connection. This connection shall be watertight and made in the presence of the inspector from the County Sanitary Engineering Department.

SECTION 320. The person to whom a permit is issued shall be responsible for obtaining any required permits to open cut any street, road or alley, from the appropriate political body or official having authority or jurisdiction over such work. He shall enclose each opening which he may make in the public street, roads, or alleys with sufficient barriers and shall maintain SAFETY LIGHTS at night, take all necessary precautions to guard the public effectually against all accidents from the beginning of the work.

SECTION 321. The permit holder will be required to repair or restore any drains or service lines damaged or disturbed by him during the construction of the building sewer.

SECTION 322. No person shall discharge or cause to be discharged any storm water, surface water, ground water, roof run-off, sub-surface drainage, cooling water or unpolluted industrial process water to any sanitary sewer.

SECTION 323. It shall be unlawful to discharge into the building sewer the surface water which collects in basement or foundation excavations. If the building sewer is completed before the plumbing is to be connected, the sewer builder shall provide a 4-inch water tight cap or plug in the 4-inch by 6-inch increaser which shall not be removed until the plumber is ready to connect the plumbing to the building sewer. Any surface water accumulation shall be pumped out onto the surface of the ground with a portable pump.

SECTION 324. No person, drain-layer, plumber or contractor shall connect the sub-surface foundation drains to the building sewer which discharges into the sanitary sewer. A sump pump will be installed in all basements for the

purpose of receiving and discharging the ground water from said foundations up into a storm sewer, or roadside gutter or ditch when gravity flow is not available.

SECTION 325. For grease, oil, and inorganic material such as sand, grit, etc., interceptors shall be provided when in the opinion of the Sanitary Engineer, they are necessary for the proper handling of liquid wastes containing floatable grease in excessive amounts or any flammable wastes, sand, or other harmful ingredients; except that such interceptors shall not be required for private living quarters or dwelling units. All interceptors shall be of a type and capacity approved by the Sanitary Engineer, and shall be located as to be readily and easily accessible for cleaning and inspection. In the maintaining of these interceptors the owner(s) shall be responsible for the proper removal and disposal by appropriate means of the captured material and shall maintain records of the dates, and means of disposal which are subject to review by the Sanitary Engineer. Any removal and hauling of the collected materials not performed by the owner(s)' personnel must be performed by approved waste disposal firms.

SECTION 326. In order to determine the volume and concentration of waste discharged by any person, facility or existing sanitary system for the purpose of determining the applicable sewerage service charge, the Sanitary Engineer may use as the figure representing the volume of sewage discharge into the sewer system (a) the amount of water supplied to the premises; (b) the volume of sewage discharged to the sewer system as determined by an approved sewer flow monitoring equipment taken at a control manhole installed and maintained by the owner, at the owner's expense; or (c) a figure determined by any combination of the foregoing. Such requirement shall be at the discretion of the Sanitary Engineer's Department. Furthermore, under item (b), flow monitoring equipment shall be certifiably calibrated on an annual basis.

ARTICLE IV

USE OF PUBLIC SEWERS CONTROLLED TO INCLUDE PRETREATMENT

SECTION 401. GENERAL PROVISIONS - PURPOSE AND POLICY

Sections 401 through Section 422 inclusive sets forth uniform requirements for discharges into the County Sewage Disposal System and enables the County to protect public health in conformity with all applicable State and Federal laws relating thereto. The objectives are:

(1) To prevent the introduction of pollutants into the County Sewage Disposal System which will interfere with the normal operation of the system or contaminate the resulting sludge;

(2) To prevent the introduction of pollutants into the County Sewage Disposal System which do not receive adequate treatment and which will pass through the system into receiving waters or the atmosphere or otherwise be incompatible with the system;

(3) To improve the opportunity to recycle and reclaim wastewater and sludge from the system

SECTION 402. GENERAL DISCHARGE PROHIBITIONS

Any waters or wastes which are discharged or are proposed to be discharged which contain compatible or incompatible pollutants other than sanitary sewage and which may have a deleterious effect upon the sewage disposal system, processes, equipment, or receiving water, including violation of applicable water quality standards, or which otherwise create a hazard to life or constitute a public nuisance, the Sanitary Engineer shall:

(a) Reject the discharge of such wastes or,

(b) Require pretreatment of quantities and rates of discharge to an acceptable condition for discharge to the public sewers and/or,

(c) Require payment to cover the added cost of handling, treating and disposing of the wastes in accordance with Section 603 of Article VI.

Provided however, no person, firm or corporation shall contribute, discharge or cause to be discharged, directly or indirectly any of the following described substances into the County's Sewage Disposal System:

(1) Any liquids, solids, or gases which by reason of their nature or quantity are, or may be, sufficient either alone or by interaction to cause fire or explosion or be injurious in any other way to persons or the operation of the Sewage Disposal System including, but not limited to, wastestreams with a closed cup flashpoint of less than 140 degrees Fahrenheit or 60 degrees Centigrade using the test method specified in 40 CFR 261.21.

(2) Solid or viscous substances which will or may cause obstruction to the flow in a sewer or other interferences with the operation of the system.

(3) Any wastewater having a pH less than 5.0 or higher than 10.0 or having any other corrosive property capable of causing damage or hazard to structures, equipment, or personnel of the system.

(4) Any wastewater containing toxic pollutants in sufficient quantity, either singly or by interaction to injure or interfere with any wastewater treatment process, constitute a hazard to humans or animals, or to exceed the limitations set forth in Categorical Pretreatment Standards.

(5) Any noxious or malodorous liquids, gases, or solids which either singly or by interaction are capable of creating a public nuisance or hazard to life or are sufficient to prevent entry into the sewers for their maintenance and repair.

(6) Any substance which may cause the WWTP's effluent or treatment residues, sludges, or scums, to be unsuitable for reclamation and reuse or to interfere with the reclamation process. In no case, shall a substance discharged to the Sewage Disposal System cause noncompliance with sludge use or disposal criteria, guidelines or regulations developed under Section 504 of the Act; any criteria, guidelines, or regulations affecting sludge use or disposal developed pursuant to the Solid Waste Disposal Act, the Clean Air Act, the Toxic Substances Control Act, or State standards applicable to the sludge management method being used.

(7) Any substance which will cause the wastewater treatment plant to violate its NPDES and/or other Disposal System Permits. This shall include any substance that shall interfere, pass through and/or contaminate sludge at the wastewater treatment plant to include discharges of petroleum oil, nonbiodegradable cutting oil or products of mineral oil origin are now prohibited if discharged in amounts that can pass through or cause interference.

(8) Any substance with objectionable color not removed in the treatment process, such as, but not limited to, dye wastes and vegetable tanning solutions. This includes discharges that alter the normal color of sanitary wastes, gray or the natural color of the receiving stream.

(9) Heats in the amounts which will inhibit biological activity in the WWTP resulting in interference; but in no case, wastewater with a temperature at the introduction into the POTW Treatment Plant which exceeds 40° C (104° F). Wastewater discharged to the Sewage Disposal System shall not exceed 65° C (150° F).

(10) Any slug as defined in Section 149.

(11) Any unpolluted water including, but not limited to non-contact cooling water.

(12) Any wastewater containing any radioisotopes of such half life or concentration as exceed limits established by the County in compliance with applicable State or Federal regulations.

(13) Any wastewater which causes a hazard to human life or creates a public nuisance.

(14) No person shall access the sewer system or POTW for any activity including discharge of hauled septic or industrial wastes except at locations and at times as designated by the Sanitary Engineer. Any removal of manhole lids, or

other access to the sewer system for the purpose of discharging wastes at times and/or locations other than those designated by the Sanitary Engineer, or without the expressed permission of the Sanitary Engineer, shall be considered a violation and shall be subject to enforcement action including fines and penalties allowed under this Chapter.

SECTION 403. LIMITATIONS ON WASTEWATER STRENGTH

(1) The National Categorical Pretreatment Standards as promulgated by the USEPA pursuant to the Act which are hereby adopted and incorporated herein by reference shall be met by all users of the County's Sewage Disposal System (Copies of Standards shall be available at the office of the Sanitary Engineer and at the WWTP). The only exception to this requirement is when the County, upon application for removal credits, receives a modification to the Categorical Pretreatment Standards as provided for under the Act.

(2) **Local limits** requirements and limitations on discharges to the Sewage Disposal System shall be met by all users which are subject to such standards in any instance in which they are more stringent than Federal requirements and limitations or those in this or any other applicable ordinance.

(3) The County reserves the right to amend these rules and regulations to provide for more stringent limitations or requirements on discharges to the Sewage Disposal System where deemed necessary to comply with the objectives set forth in Section 401 of this Article.

(4) No user shall increase the use of potable or process water in any way, for the purpose of diluting a discharge as a partial or complete substitute for adequate treatment to achieve compliance with the standards set forth in these rules and regulations.

(5) No industrial user shall discharge wastewater containing concentrations of the following materials in excess of the limits listed in the Industrial Waste Discharge Permit issued in accordance with Section 405: arsenic, cadmium, copper, total chromium, hexavalent chromium, total cyanide, lead, mercury, nickel, silver, and zinc. No user shall discharge wastewater containing the following pollutants exceeding the concentrations listed below.

Pollutant	Brookfield District	Mosquito Creek District
cadmium	2.1	0.56
copper	8.8	6.7
cyanide - total as CN	1.3	0.66
lead	20	17
mercury	0.05	0.13
nickel	91	16
silver	No Specific Limit	0.12
chromium (hex)	5.8	1.7
zinc	No Specific Limit	17

(6) The County may impose mass limitations on users which are using dilution to meet the Pretreatment Standards or Requirements of this Ordinance, or in other cases where the imposition of mass limitations is deemed appropriate by the County.

(7) If sampling performed by an Industrial User indicates a violation, the user shall notify the County Sanitary Engineer within 24 hours of becoming aware of the violation. The user shall also repeat the sampling and analysis and submit the results of the repeat analysis to the County within 30 days after becoming aware of the violation.

#### SECTION 404. ACCIDENTAL DISCHARGES

Each user shall provide protection from accidental discharge of prohibited or regulated materials or substances established by this Ordinance. Where necessary, facilities to prevent accidental discharge of prohibited materials shall be provided and maintained at the User's cost and expense. Detailed plans showing facilities and operating procedures to provide this protection shall be submitted to the Sanitary Engineer for review, and shall be approved by the Sanitary Engineer before construction of the facility.

Users shall notify the Superintendent immediately upon accidentally discharging wastes in violation of these rules and regulations to enable counter-measures to be taken to minimize damage to the Sewage Disposal System, treatment processes and the receiving waters. The notification shall include location of discharge, date and time thereof, type of waste, concentration and volume, and corrective action. This notification shall be followed, within 15 days of the date of occurrence, by a detailed written statement describing the causes of the accidental discharge and the measures being taken to prevent future occurrence. Such notification will not relieve users of liability for any fines provided for in Section 704 of these rules and regulations, or for any expense, loss or damage to the sewer system, treatment plant, or treatment process, or for any fines imposed on the County on account thereof. This shall include slug loads as defined in Section 149.

In order that employees of users be informed of County requirements, users shall make available to their employees copies of these rules and regulations together with such other wastewater information and notices which may be furnished by the County from time to time directed toward more effective water pollution control. A notice shall be furnished and permanently posted on the user's bulletin board advising employees whom to call in case of an accidental discharge in violation of these rules and regulations.

#### SECTION 405. INDUSTRIAL WASTE DISCHARGE PERMIT REQUIRED

No person shall discharge industrial waste, either directly or indirectly, into the County sanitary sewer system without first applying for and obtaining a written permit from the Trumbull County Sanitary Engineer.

All Industrial Users discharging or proposing to connect to or discharge industrial wastes and other wastes to the County Sewage Disposal System shall comply with all terms of these rules and regulations within 90 days after the effective date of said rules and regulations.

Industrial Users shall complete and file with the County an Industrial Waste Discharge Permit Application. Existing and proposed new Industrial Users

shall file said application at least 90 days prior to connecting to and/or discharging industrial wastes to the County Sewage Disposal System. The application shall be made on forms provided by the County and no Industrial Waste Discharge Permit shall be issued unless and until the User has submitted to the County the following required information:

(1) The name, address, and location of the User;

(2) The User's Standard Industrial Classification (SIC) number according to the Standard Industrial Classification Manual, Bureau of the Budget, 1972, as amended;

(3) The wastewater constituents and characteristics of the User's wastes including but not limited to those mentioned in this Ordinance, as determined by bonafide chemical and biological analyses. Sampling and analysis shall be performed in accordance with procedures established by the U.S. EPA contained in 40 CFR, Part 136, as amended;

(4) The time and duration of discharges;

(5) The average daily and instantaneous peak wastewater flow rates, in gallons per day, including daily, monthly and seasonal variations, if any. All flows shall be measured unless other verifiable techniques are approved by the County due to cost or nonfeasibility;

(6) Site plans, floor plans, mechanical and plumbing plans and details to show all sewers, sewer connections, inspection manholes, sampling chambers and appurtenances by size, location and elevation;

(7) The activities, facilities and plant processes on the premises including all materials which are or may be discharged to the sewers or works of the County;

(8) The nature and concentration of any pollutants or materials prohibited by these rules and regulations in the discharge, together with a statement regarding whether or not compliance is being achieved with these rules and regulations on a consistent basis and if not, whether additional operation and maintenance activities and/or additional pretreatment is required for the User to comply with these rules and regulations;

(9) Where additional pretreatment and/or operations and maintenance activities will be required to comply with these rules and regulations, the User shall provide a declaration of the shortest schedule by which the User will provide such additional pretreatment and/or implementation of additional operational and maintenance activities.

(a) The schedule shall contain dates for the commencement and completion of major events leading to the construction and operation of additional pretreatment required for the User to comply with the requirements of these rules and regulations including, but not limited to dates relating to hiring an engineer, completing preliminary plans, completing final plans, executing contract for major components, commencing construction, completing construction, and all other acts to achieve compliance with these rules and regulations.

(b) Under no circumstances shall the County permit a time increment for any single step directed toward compliance which exceeds 9 months.

(c) Not later than 14 days following each completion date in the schedule and the final date for compliance, the User shall submit a progress report to the County, including no less than a statement as to whether or not it complied with the increment of progress represented by that date and, if not, the date on which it expects to comply with this increment of progress, the reason for delay, and the steps being taken by the User to return the construction to the approved schedule. In no event shall more than 9 months elapse between such progress reports to the County

(10) A listing of each product produced by type, amount, process or processes and rate of production;

(11) The type and amount of raw materials utilized average and maximum per day;

(12) All application forms shall be signed by a responsible corporate officer or an authorized representative of that individual;

(13) All industrial users, including new sources, that are subject to categorical pretreatment standards shall be required to submit baseline monitoring reports ("BMRS") to the County;

(14) Spill control practices.

The County will evaluate the complete application form and date furnished by the user. Within 30 days and after full evaluation, the County will notify the user of the County's acceptance by issuing an Industrial Waste Discharge Permit subject to terms, conditions and/or limitations provided for herein, or rejection thereof and the basis therefore. Failure to comply with the provisions of an approved compliance schedule or other terms and conditions as set forth in such Industrial Waste Discharge Permit shall be cause for revocation of said permit and will subject said user to enforcement actions and penalties as hereinafter provided

#### SECTION 406. COUNTY INDUSTRIAL WASTE DISCHARGE PERMIT EXEMPTION

Industrial users situated in the County will be exempt from the Industrial Waste limitations and permit requirements as set forth in these rules and regulations provided they comply with the following requirements:

1. Wastes or sewage discharged by the industrial user is conveyed to and treated by an Authority other than the County.

2. There is a valid agreement in effect between the County and the Authority for treatment of sewage.

3. The user complies with all rules and regulations of the treating authority with respect to its approved Industrial Wastes Pretreatment Program

The County retains the right to enforce more stringent limitations in the event it is necessary to protect the County's sewer collection system by which industrial wastes are conveyed.

#### SECTION 408. PERMIT MODIFICATIONS

The County reserves the right to amend any Wastewater Discharge Permit issued hereunder in order to assure compliance by the County with applicable laws and regulations. Within 9 months of the promulgation of a National Categorical Pretreatment Standard, the Wastewater Discharge Permit of each User subject to such standards shall be revised to require compliance with such standards within the time frame prescribed by such standards. All National Categorical Pretreatment Standards adopted after the enactment of these rules and regulations shall be adopted by the County as part of these rules and regulations. A user subject to a National Categorical Pretreatment Standard operating under the terms of a valid Industrial Waste Discharge Permit, shall submit to the County within 180 days after the promulgation of an applicable National Categorical Pretreatment Standard, the additional information required by paragraphs (8) and (9) of Section 405, the User shall be informed of any proposed changes in the rules and regulations at least 30 days prior to the effective date of change. Any changes or new conditions in the rules and regulations shall include a reasonable time schedule for compliance.

Wastewater Discharge Permits shall specify no less than the following;

- 1) Fees and charges to be paid upon initial permit issuance;
- 2) Limits on the average and maximum wastewater constituents and characteristics regulated thereby;
- 3) Limits on average and maximum rate and time of discharge and/or requirements for flow regulations and equalization;
- 4) Requirements for installation and maintenance of inspection and sampling facilities;
- 5) Special conditions as the County may reasonably require under particular circumstances of a given discharge including sampling locations, frequency of sampling, number, types, and standards for tests and reporting schedule;
- 6) Compliance schedules;
- 7) Requirements for submission of special technical reports or discharge reports where same differ from those prescribed by these rules and regulations.

All Industrial User Permits shall be issued for a period of not more than five (5) years, subject to an amendment of revocation as provided in these rules and regulations. Under extraordinary circumstances, a permit may be issued for a stated period or may be stated to expire on a specific date.

Wastewater Discharge Permits are issued to a specific User for a specific operation and are not assignable to another User without the prior written approval of the County, or transferable to any other location.

#### SECTION 409. REPORTING REQUIREMENTS FOR INDUSTRIAL USERS

##### Periodic Compliance Reports

- 1) Any User subject to a Pretreatment Standard set forth in these rules and regulations shall submit to the County within 90 days following the final compliance date of such Pretreatment Standard, or, in the case of a New User, within 90 days after commencement of the discharge to the County's Sewage

Disposal System and thereafter during the months of June and December, unless required more frequently by the County, a report indicating the nature and concentration, of prohibited or regulated substances in the effluent which are limited by the Pretreatment Standards hereof. In addition, this report shall include a record of all measured or estimated average and maximum daily flows during the reporting period. Flows shall be reported on the basis of actual measurement, provided however, where cost or feasibility considerations justify, the County may accept reports of average and maximum flows estimated by verifiable techniques. The County, for good cause shown considering such factors as local high or low flow rates, holidays, budget cycles, or other extenuating factors may authorize the submission of said reports on months other than those specified above.

(2) Reports of Users shall contain all results of sampling and analysis of the discharge, including the flow and the nature and concentration, or production and mass where required by the County. The frequency of monitoring by the User shall be as prescribed in the applicable Pretreatment Standard of these rules and regulations. All analyses shall be performed in accordance with 40 CFR, Part 136 and amendments thereto. Where 40 CFR, Part 136 does not include a sampling or analytical technique for the pollutant in question, sampling and analysis shall be performed in accordance with the procedures set forth in the EPA publication, Sampling and Analysis Procedures for Screening of Industrial Effluents for Priority Pollutants, April 1977, and amendments thereto, or with any other sampling and analytical procedures approved by the Administrator of the USEPA.

(3) Reports shall state whether the applicable Pretreatment Standards or Requirements are being met on a consistent basis and, if not, what additional facilities and/or pretreatment is necessary to gain compliance with applicable Pretreatment Standards or Requirements.

#### SECTION 410. MONITORING FACILITIES

The County shall require any industrial user discharging industrial wastes to provide and operate at the User's own expense, a monitoring facility to allow inspection, sampling, and flow measurement of each sewer discharge to the County. Each monitoring facility shall be situated on the User's premises, except where such a location would be impractical or cause undue hardship on the User, the County may permit the facility to be constructed in the public street or sidewalk area providing that the facility is located so that it will not be obstructed by landscaping or parked vehicles. There shall be ample room in or near such sampling facility to allow accurate sampling and preparation of samples for analysis. The facility, sampling, and measuring equipment as may be required shall be maintained at all times in a safe and proper operating condition at the expense of the User. Construction shall be completed within 120 days of receipt of permit by the User.

#### SECTION 411. INSPECTION AND SAMPLING

The County may inspect the monitoring facilities of any User to determine compliance with the requirements of these rules and regulations. The User shall allow the County or its representatives to enter upon the premises of the User at all reasonable hours, for the purposes of inspection, sampling, or records examination. The County shall have the right to set up on the User's property such devices as are necessary to conduct sampling, inspection, compliance monitoring and/or metering operations, and to make copies of such records as deemed necessary.

#### SECTION 412. CONFIDENTIAL INFORMATION

Information and data furnished to the County with respect to the nature and frequency of discharge shall be available to the public or other governmental agency without restriction unless the User specifically requests and is able to demonstrate to the satisfaction of the County that the release of such information would divulge information, processes or methods of production entitled to protection as trade secrets or proprietary information of the User. When requested by a User furnishing a report, the portions of a report which may disclose trade secrets or secret processes shall not be made available for inspection by the public but shall be made available upon written request to governmental agencies for uses related to this Ordinance, the National Pollutant Discharge Elimination System (NPDES) Permit, State Disposal System Permit and/or the Pretreatment Programs; provided however, that such portions of a report shall be available for use by the State or any State agency in judicial review or enforcement involving the User furnishing the report. Wastewater constituents and characteristics will not be recognized as confidential information. Information accepted by the County as confidential, shall not be transmitted to any governmental agency or to the general public by the County until and unless a ten-day notification is given to the User.

#### SECTION 413. EMERGENCY SUSPENSION OF SERVICE

The County may for good cause shown suspend the wastewater treatment service to a User when it appears to the County that an actual or threatened discharge presents or may present an imminent or substantial danger to the health or welfare of persons or to the environment, interferes with the operation of the Sewage Disposal System, or violates any pretreatment limits imposed by these rules and regulations. Any User notified of the suspension of the County's wastewater treatment service shall within a reasonable period of time, as determined by the County, cease all discharges. In the event of failure of the User to comply voluntarily with the suspension order within the specified time, the County may commence judicial proceedings to compel compliance with such order. The County shall reinstate the wastewater treatment service and terminate judicial proceedings upon proof by the User of the elimination of the non-complying discharge or conditions creating the threat of imminent or substantial danger as set forth above.

#### SECTION 414. REVOCATION OF TREATMENT SERVICES

The County may seek to terminate the wastewater treatment services to any User which fails to (a) factually report the wastewater constituents and characters of its discharge; (b) report significant changes in wastewater constituents or characteristics; (c) provide reasonable access to the User's premises by a representative of the County for the purpose of inspection or monitoring; or (d) violates the conditions of this Ordinance, or any final judicial order entered with respect thereto.

#### SECTION 415. NOTIFICATION OF VIOLATION-ADMINISTRATIVE ADJUSTMENT-ADMINISTRATIVE ORDER

Whenever the County finds that any User has engaged in conduct which justifies termination of a wastewater treatment service, pursuant to Section 414 hereof, the County may serve or cause to be served upon such User, a written notice either personally or by certified or registered mail, return receipt requested, stating the nature of the alleged violation.

Within 30 days of the date of receipt of the notice, the User shall respond personally or in writing to the County, advising of its position with respect to the allegations. Thereafter the parties shall meet to ascertain the veracity of the allegations and where necessary, establish a plan for the satisfactory correction thereof.

Under Section 309(a) of the Clean Water Act authorizes EPA to issue orders without notice or opportunity for prior hearing, known as Administrative Orders (AO), requiring compliance with standards and other requirements. The County shall issue similar orders under Section 403.8(f)(i)(iii) of the General Pretreatment Standards. These orders shall be used to place an industrial user on an enforceable schedule to comply with pretreatment standards (e.g. install pretreatment, operate and maintain facilities) including appropriate interim limits and assessing administrative penalties.

Any discharger who is found to have violated a permit and/or administrative order of the County or has failed to comply with any provision of Pretreatment requirements shall be subject to the imposition of an administrative penalty not to exceed one thousand dollars (\$1,000.00) for each violation. Each day in which any such violation continues shall constitute a separate offense.

#### SECTION 416. SHOW CAUSE HEARING

Where the violation of Section 414 hereof is not corrected by timely compliance by means of Administrative Adjustment, the County may order any User which causes or allows conduct prohibited by Section 413 hereof, to show cause before the County or its duly authorized representative, why the proposed service termination action should not be taken. A written notice shall be served on the User either personally or by, certified or registered mail, return receipt requested, specifying the time and place of a hearing to be held by the County or its designee regarding the violation, the reasons why the enforcement action is to be taken, the proposed enforcement action, and directing the User to show cause before the County or its designee why the proposed enforcement action should not be taken. The notice of the hearing shall be served no less than ten days before the hearing. Service may be made on any agent, officer, or authorized representative of a User. The proceedings at the hearing shall be considered by the County which shall then enter appropriate orders with respect to the alleged improper activities of the User. Appeal of such orders may be taken by the User in accordance with applicable local or State law.

#### SECTION 417. JUDICIAL PROCEEDINGS

Following the entry of any order by the County with respect to the conduct of a User contrary to the provisions of Section 414 hereof, the County Prosecuting Attorney, following the authorization of such action by the County, commence an action for appropriate legal and/or equitable relief in the appropriate local court.

#### SECTION 418. ENFORCEMENT ACTIONS - ANNUAL PUBLICATION

At least annually, the Director shall publish a list of all industrial users which at any time during the previous twelve months were in significant noncompliance with applicable pretreatment requirements. For the purposes of this provision, an industrial user is in significant noncompliance if its violations meet one or more of the following criteria:

(a) Chronic violations of wastewater discharge limits, defined here as those in which sixty-six percent or more of all of the measurements taken during a six-month period exceed (by any magnitude) the daily maximum limit or the average limit for the same pollutant parameter;

(b) Technical Review Criteria (TRC) violations, defined here as those in which thirty-three percent or more of all of the measurements for each pollutant parameter taken during a six-month period equal or exceed the product of the daily maximum limit or the average limit multiplied by the applicable TRC (TRC=1.4 for BOD, TSS, fats, oil and grease, and 1.2 for all other pollutants except pH);

(c) Any other violation of a pretreatment effluent limit(daily maximum or longer term average)that the Director determines has caused, alone or in combination with other discharges, interference or pass through (including endangering the health of POTW personnel or the general public);

(d) Any discharge of a pollutant that has caused imminent endangerment of human health, welfare or to the environment or has resulted in the POTW's exercise of emergency authority to halt or prevent such a discharge;

(e) Failure to meet, within 90 days after the schedule date, a compliance schedule milestone contained in a Wastewater Discharge Permit or enforcement order for starting construction, completing construction, or attaining final compliance;

(f) Failure to provide, within 30 days after the due date, required reports such as baseline monitoring reports, 90 day compliance reports, periodic self-monitoring reports, and reports on compliance with compliance schedules;

(g) Failure to accurately report noncompliance;

(h) Any other violation or group of violations which the Director determines will or has adversely affected the operation or implementation of the City's pretreatment program.

#### SECTION 419. RIGHT OF APPEAL

Any User or any interested party shall have the right to request in writing an interpretation or ruling by the County on any matter covered by these rules and regulations and shall be entitled to a prompt written reply. In the event that such inquiry is by a User and deals with matters of performance or compliance with these rules and regulations for which enforcement activity relating to an alleged violation is the subject, receipt of a User's request, shall stay all enforcement proceedings pending receipt of the aforesaid written reply. Appeal of any financial judicial order entered pursuant to these rules and regulations may be taken in accordance with local and State law.

#### SECTION 420. OPERATING UPSETS

Any User which experiences an upset in operations which places the User in a temporary state of non-compliance with these rules and regulations shall inform the County thereof within 24 hours of first awareness of the commencement of the upset. Where such information is given orally, a written

follow-up report thereof shall be filed by the User with the County within five days. The report shall specify:

(1) Description of the upset, the cause thereof and the upset's impact on a User's compliance status.

(2) Duration of non-compliance, including exact dates and times of non-compliance, and if the non-compliance continues, the time by which compliance is reasonably expected to occur.

(3) All steps taken or to be taken to reduce, eliminate and prevent recurrence of such an upset or other conditions of non-compliance.

A documented and verified bonafide operating upset shall be an affirmative defense to any enforcement action brought by the County against a User for any non-compliance with the rules and regulations which arises out of violations alleged to have occurred during the period of the upset.

#### SECTION 421. RECORD RETENTION

All Users subject to these rules and regulations shall retain and preserve for no less than three (3) years, any records, books, documents, memoranda, reports, correspondence and any and all summaries thereof, relating to monitoring, sampling, and chemical analyses made by or in behalf of a User in connection with its discharge. All records which pertain to matter which are the subject of Administrative Adjustment or any other enforcement or litigation activities brought by the County pursuant hereto shall be retained and preserved by the User until all enforcement activities have concluded and all periods of limitation with respect to any and all appeals have expired.

#### SECTION 422. REMOVAL CREDITS

Where applicable, the County may elect to initiate a program of removal credits as part of these rules and regulations to reflect the WWTP's ability to remove pollutants in accordance with 40 CFR Part 403.7.

The County may elect to adjust Categorical Pretreatment Standards to reflect the presence of pollutants in the User's intake water, in accordance with 40 CFR Part 403.13.

ARTICLE V

PROTECTION FROM DAMAGE

SECTION 501. No unauthorized person shall maliciously, willfully, or negligently break, damage, destroy, uncover, deface or tamper with any structure, appurtenance, or equipment which is a part of the County sewage system. Any person violating this provision shall be subject to immediate arrest under charge of disorderly conduct.

ARTICLE VI

USER CHARGE REQUIREMENTS, RATES AND TAP-IN FEES

SECTION 601. It is hereby determined and declared to be necessary for the protection of the public safety, health, welfare and convenience of the County to establish and collect user charges from all lots, lands and premises served by or having connections, either directly or indirectly with the sewage works of the County in the County's three different sewer districts of Howland Sewer #9, the Metropolitan Sewer District and the Mosquito Creek Sewer District. It is further determined and declared to be necessary that the establishment and collection of said user charges must be in compliance with the United States Environmental Protection Agency Rules and Regulations as provided for in the Code of Federal Regulations, Title 40, Part 35.2140.

SECTION 602. The Sanitary Engineer shall submit to the Board of County Commissioners a recommended system of User Charges by way of Resolution for approval for each Sewer District on an as needed basis. If approved by the Board of County Commissioners, the User Charge schedule shall become effective based on the authorizing resolution. The system shall be in accordance with the following requirements:

(a) The system shall result in the distribution of the costs of operation and maintenance of the treatment works within the County's jurisdiction to each user class in proportion to such user's contribution to the total wastewater loading of the treatment works. Factors such as strength, volume, and delivery flow rate characteristics shall be considered and included as the basis for the user's contribution to ensure a proportional distribution of operation and maintenance (including replacement) costs to each user's class.

(b) The system of charges shall be reviewed annually and revised periodically to reflect actual treatment works debt and operation and maintenance costs.

(c) The system of charges shall generate sufficient revenue to offset the costs of all treatment works operation and maintenance provided by the County.

(d) A connection charge shall be implemented as a tap-in fee based on methods and procedures established by the Trumbull County Sanitary Engineer's Department and shall be subject for revision periodically.

SECTION 603. Where waters or wastes are discharged to the County sewerage works containing pollutant concentrations in excess of those determined to be normal strength according to County Rules and Regulations, and where it has been determined that such discharges will not adversely affect the operation of the sewage works, a surcharge shall be levied to recover the added cost of operation, maintenance and replacement incurred by reason of such discharges. This surcharge shall be in addition to the use charges levied on all users and waste discharges.

SECTION 604. The rate of charge including extra strength surcharges for treatment operation, maintenance and replacement for any user whose wastes are treated or otherwise disposed of in facilities not owned or controlled by the County shall not be less than the respective rate of charge levied by the entity in control of facilities where such treatment and/or disposal is affected.

SECTION 605. For the purpose of levying user charges to all users connected to a public water supply, the volume of usage shall be the metered volume of water purchased. A minimum sewer charge shall be established and applied to all customers based on a minimum volume imposed by the Trumbull County Board of Commissioners.

Any residential user having a connection with the County's sewage works, or otherwise discharging sanitary sewage directly or indirectly into such works, but which are not supplied by a metered public water supply shall be charged at a rate as a well water customer.

Non-residential users having a connection with the County's sewage works, or otherwise discharging sanitary sewage directly or indirectly into such works, but which are not supplied by a metered public water supply shall be charged according to the equivalent number of single residential equivalences as determined by the Sanitary Engineer's Office times the well water rate.

SECTION 606. In the event that the Sanitary Engineer shall be satisfied that a portion of the water from any source consumed upon any non-residential premises does not and cannot enter the sewage works, then in such case the owner or other interested party may, at the owner's or other party's expense, install and maintain such separate metering devices as shall demonstrate to the satisfaction of the Sanitary Engineer that portion of the water so consumed which is discharged into the sewage works and such portion shall be the basis for measuring the flows and loads under this regulation.

SECTION 607. The charges herein shall constitute the net charges for sewage service if paid within a period of fifteen days next following the date of billing. If paid after the fifteen-day period has elapsed, the applicable user charges may be at the gross rate, which shall be ten percent greater than the net charge, but in no case shall the additional charge be less than ten cents (\$0.10).

SECTION 608. Each user charge established and made pursuant to these regulations is hereby made a lien upon the premises charged therewith, and if the same is not paid within ninety days after it is due and payable it shall be certified to the County Auditor who shall place the same on the tax duplicate. With the interest and penalties allowed by law, it shall be collected as other taxes are collected.

ARTICLE VII

GENERAL PROVISIONS - PENALTIES

SECTION 701. RIGHT TO CONTRACT

The County reserves the right to enter into contracts to provide sewage treatment services with other entities and/or other users regardless of the nature of wastes to be discharged. Provided, however that such contracts shall be in compliance with the provisions of these rules and regulations and the rules and regulations of other governmental agencies with authority.

SECTION 702. PROHIBITIONS

No person shall violate any section or provision of this chapter or any other made in pursuance thereof, nor shall any person obstruct or interfere with the execution of any order or willfully or illegally fail to obey such order

SECTION 703. RECOVERY OF COSTS INCURRED BY THE COUNTY

Any User violating any of the provisions of this Ordinance, or who discharges or causes a discharge producing a deposit or obstruction, or causes damage to or impairs the County's wastewater disposal system shall be liable to the County for any expense, loss, or damage caused by such violation or discharge. The County shall bill the User for the costs incurred by the County for any cleaning, repair, or replacement work caused by the violation or discharge. Refusal to pay the assessed costs shall constitute a violation of these rules and regulations enforceable under the provisions of Section 414 of these rules and regulations.

SECTION 704. PENALTIES

(1)Any person, firm, or corporation who violates 6117.01 et. seq. of the Ohio Revised Code or the rules and regulations contained herein will be subject to the penalties stipulated in Section 6117.45 of the Revised Code which reads in part as follows: "No person shall tamper with or damage any sewer or sewage disposal plant constructed under Section 6117.01 to 6117.45 inclusive, of the Revised Code, or any apparatus or accessory connected therewith or pertaining thereto, or make any connection into such sewer or sewage disposal plant without the permission of the Board of County Commissioners or in a manner or for a use other than as prescribed by such Board. No person shall refuse to permit the inspection by the County Sanitary Engineer of any such connection. Whoever violates 6117.45 of the Revised Code shall be fined not more than \$100.00 nor less than \$10.00.

(2)Any person, firm or corporation who violates or assists in the violation of these rules and regulations or Section 3787 of the Ohio Revised Code shall be subject to the penalty stipulated in Section 701, Article VII of the "Rules and Regulations Governing Sanitary Sewer Connections and Use in Trumbull County, Ohio" or to the penalty stipulated in Section 3791.03 which reads as follows: "No architect, civil engineer, builder, plumber, carpenter, mason, contractor, subcontractor, foreman, or employee shall violate or assist in the violation of Chapters 3781, 3783, 3785, 3787, 3789, and 3791 of the Revised Code or any order issued hereunder. Whoever violates this section shall be fined not more than one thousand dollars. Any drain or sewer builder who

violates these Rules and Regulations shall further be suspended as a licensed drain or sewer builder in Trumbull County, Ohio.

(3) Falsifying Information. Any person who knowingly makes any false statement, representation or certification in any application record, report, plan or other document filed or required to be maintained pursuant to these rules and regulations, or who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required or authorized under these rules and regulations, shall, upon conviction be punished by the imposition of a civil penalty of not more than \$1,000 or by imprisonment for not more than six (6) months, or by both.

(4) Civil Penalties. Any User who is found to have violated an Order of the County or who has failed to comply with any provision of these rules and regulations and the regulations or rules of the County or orders of any court of competent jurisdiction, may be subjected to the imposition of a civil penalty. Except as otherwise provided, any person, firm or corporation violating any provision of this chapter shall be fined not more than one thousand dollars (\$1,000) per violation. A separate offense shall be deemed committed each day during or on which offense occurs or continues. After the second conviction, the County shall discontinue the services of the sewerage and disposal system to the violator.

ARTICLE VIII

VALIDITY

SECTION 801. All rules or regulations in conflict herewith are hereby repealed.

SECTION 802. Each Section or part of a Section in this Resolution is hereby declared to be a separate and distinct enactment, and should any Section or part of a Section be held inoperative or void, it shall not affect the validity of any other Section or part of a Section.

ARTICLE IX

EFFECTIVE DATE

SECTION 901. The rules and regulations contained herein shall be in full force and effect from and after its approval, recording, and publication.

ARTICLE X

EXTRAORDINARY SERVICES

SECTION 1001. Requests for extraordinary services shall be submitted to the Board or its authorized agent.

SECTION 1002. The Board or its authorized agents will either provide for such extraordinary services by special agreement with those requesting such services, or will, in case the demand is sufficient, for such extraordinary use.

ARTICLE XI

GENERAL

SECTION 1101. In any instance where the service for the aforesaid sewer improvements is another political subdivision, and the contract for such service provides that certain rules and regulations applicable to that political subdivision's sewer utility must be followed in connection with the County's collection system connected to such system, then such rules and regulation shall be deemed adopted by the Board and shall be applicable to so much of the aforesaid sewer improvements as are connected to such source of water.

SECTION 1102. These regulations, including the charges heretofore set forth, may be from time to time amended, changed or repealed as the Board may find advisable.

SECTION 1103. The County does not guarantee service; these being subject to the varying conditions which may arise in the operation and maintenance of the collection system.

ARTICLE XII

SEVERABILITY

In the event that any Section or Sub-section(s) of these Rules or Regulation amendment or revision thereto is held to be unenforceable, invalid, contrary to law or otherwise restrained from its full force and effect by a court or other tribunal of competent jurisdiction, the remaining Section(s) or Sub-section(s) of the Manual, to the extent that they remain unaffected by such declaration of restraint, shall continue in full force and effect. The County Commissioners reserve the right to effectuate a lawful alternative to any Section or part thereof declared unenforceable, invalid, or contrary to law.

**Appendix A**

**Private Extension Agreements**

**Reimbursable**

**And**

**Non - Reimbursable**

PRIVATE AGREEMENT  
FOR  
EXTENSION OF SANITARY SEWER

REIMBURSABLE

THESE ARTICLES OF AGREEMENT, made and entered into at Warren, Ohio,  
this \_\_\_\_\_ day of \_\_\_\_\_, 200\_\_ , by and between the BOARD OF  
COUNTY COMMISSIONERS OF TRUMBULL COUNTY, OHIO, hereinafter referred to as the  
“COMMISSIONERS”, and \_\_\_\_\_, hereinafter referred to as the  
“\_\_\_\_\_”; WITNESSETH THAT:

WHEREAS, it is the desire of the parties hereto to provide for an extension of a sanitary  
sewer to be located in \_\_\_\_\_ Sewer District, on \_\_\_\_\_  
,Street/Plat, within \_\_\_\_\_ Township, in accordance with the detailed plans  
and specifications as prepared by \_\_\_\_\_, subject to all the  
current rules, regulations and specifications of the Trumbull County Sanitary Engineering  
Department.

NOW, THEREFORE, for good, valuable and adequate consideration, the receipt of which  
is hereby acknowledged by each party, and of the mutual covenants hereinafter contained, it is  
agreed by and between the parties hereto:

1. \_\_\_\_\_ agrees to pay the total cost of preparing a set of construction drawings and specifications for the proposed sanitary sewer satisfactory to the Trumbull County Sanitary Engineers, including all necessary surveys, engineering and other costs incidental thereto, and that said plans shall be approved by the Trumbull County Sanitary Engineers, the Commissioners, and the Ohio Environmental Protection Agency prior to the construction of the system.

\_\_\_\_\_ shall pay costs associated with the Trumbull County Sanitary Engineers and the Ohio Environmental Protection Agency's plan, review, and approval. Construction of said project cannot start until the shop drawings showing all materials and appurtenances to be used in the construction of said project have been approved and stamped by the Trumbull County Sanitary Engineer. Also, an electronic copy of the Engineer's drawings is to be submitted to the Trumbull County Sanitary Engineer's Office. This copy is to be saved in AutoCAD R14 or in the DXF (Drawing Interchange File) format. The drawing should be saved on an IBM Format Zip Disk, a Writable CD, or on 3-1/2" Diskettes. Furthermore, within a reasonable time after completion of the construction work, an electronic copy of a complete set of the "as built" drawings in Auto CAD or a compatible system shall be furnished to the Trumbull County Sanitary Engineer.

2. The total cost of construction for the sanitary sewer, including the wages of an inspector to be furnished by the Trumbull County Sanitary Engineer's Department, shall be borne by \_\_\_\_\_. The inspector shall inspect said construction work. \_\_\_\_\_ shall be responsible for televising the newly constructed sanitary sewer line at their own expense and shall submit a video tape to the Trumbull County Sanitary Engineer's Office for review. The televising of the sanitary sewer must be completed before the sanitary sewer will be accepted for connections or the issuance of the Certificate of Completion pursuant to paragraph 11 below. Testing shall be performed in accordance with the Sanitary Engineer's Department requirements. Deflection and air pressure testings shall not occur until a minimum of a thirty (30) day period has elapsed from construction.

Any construction occurring prior to said formal approval of the detailed plans by all jurisdictional entities and the expiration of any appeal periods applicable will be done at the sole risk of \_\_\_\_\_, and Trumbull County and its agents shall be held safe and harmless from any claims, costs, damages, obligation or liability whatsoever arising from any construction that does occur. Trumbull County's obligation is subject to the final approval of the plans and specifications by the Trumbull County Sanitary Engineer's Department and the Ohio Environmental Protection Agency.

3. \_\_\_\_\_ shall submit a detailed certified notarized cost statement within ninety (90) days after completion to the Trumbull County Sanitary Engineer for approval.

4. \_\_\_\_\_ agrees to obtain and provide all necessary easements and right-of-way in accordance with the requirements of the Trumbull County Sanitary Engineer and the Ohio Environmental Protection Agency without cost to the Commissioners. \_\_\_\_\_ shall also be responsible for obtaining any required permits to open cut any street, road or alley from the appropriate political body or official having authority or jurisdiction over such work. Proper notification shall be given to the appropriate authority prior to commencing any construction provided for within this agreement.

5. Upon the issuance of the Certificate of Completion as provided in paragraph 11 hereof, the sanitary sewer and other appurtenances shall thereupon become the property of, and title shall immediately vest in the Commissioners or their assigns. If and when any abutting property, as determined by the Trumbull County Sanitary Engineer, desires to tap into or connect to said improvements, a connection charge will be charged the owner of said abutting property based on the pro rata costs as computed from the above mentioned cost statement, which shall be reimbursed to \_\_\_\_\_ for a total period of twenty (20) years after filing said statement, after which all rights to collect a fee are hereby waived by \_\_\_\_\_. The Trumbull County Sanitary Engineer expressly reserves the right to collect any charges or tap-in fees after the expiration period herein agreed upon expires. In the event \_\_\_\_\_ cannot be located after reasonable effort and within a reasonable time, the amount as determined by the Trumbull County Sanitary Engineer to be due in accordance with the above, shall be collected and deposited in the proper fund and held for a period not to exceed one (1) year subject to the demand of \_\_\_\_\_. If said sum has not been claimed by \_\_\_\_\_ or their/its legal heirs, successors or assigns within the time stated above, then said sum shall be credited to and become the property of the Trumbull County Sanitary Engineer.

Also, in accordance with Section 307.73 of the Ohio Revised Code, a copy of this Agreement granting permission to construct sanitary sewer and authorizing the collection of the prorated share must be filed by \_\_\_\_\_ with the Trumbull County Auditor. The filing of this Agreement constitutes constructive notice thereof. The Trumbull County Auditor shall charge a fee of \$1.00 for the filing of this Agreement and no nonparticipant shall be required to pay the prorated share of the cost of such improvement without such notice.

6. \_\_\_\_\_ agrees to pay the total cost of all maintenance and repair on the sanitary sewer during the first two (2) years, said year to begin on the date the Certificate of Completion referred to in paragraph 11 is issued.

7. \_\_\_\_\_ agrees that all connections made to the sanitary sewer will be charged a tap-in fee in accordance with the fee in effect at the time the permit is issued. Apartments and commercial buildings shall pay a connection charge based upon the sewage treatment plant capacity required as compared to a single dwelling.

8. Upon the issuance of the Certificate of Completion as provided in paragraph 11 hereof, the sanitary sewer, including the sewers, manholes and other appurtenances, shall thereupon become the property of, and title shall immediately vest in the Commissioners or their assigns.

9. The Commissioners shall service and maintain the sanitary sewer to be constructed by \_\_\_\_\_.

10. A sewer rental will be charged each property to be connected to the sanitary sewer in accordance with a rate schedule established by a Commissioners' Resolution.

11. After the project referred to herein has been completed and tested to the satisfaction of the Trumbull County Sanitary Engineer, and after \_\_\_\_\_ has conformed to all the provisions of this agreement, the Trumbull County Sanitary Engineer will issue a Certificate of Completion to \_\_\_\_\_.

12. \_\_\_\_\_ hereby agrees to assume at its own expense the defense of, and to indemnify and save harmless the Commissioners and their officers, agents and assigns, against any and all liability, judgments, suits, costs, damages, claims or expenses which may accrue against the Commissioners, their officers, agents and assigns in consequence of injuries or damages occurring to any persons or property occasioned by or growing out of the construction of the work herein authorized, together with Certification of Workmen's Compensation coverage.

To the extent that \_\_\_\_\_ has actual knowledge, reasonable written notice of any such aforementioned claim, cost, loss or damage shall be promptly given to the Commissioners.

13. \_\_\_\_\_ shall comply with all applicable terms of the Occupational Safety Health Act, 29 CFR 1910, 29 CFR 1926 and Ohio Revised Code Chapter 4167. This compliance shall include at a minimum providing all employees working on the project with the necessary training before work is performed, and all safeguards, safety devices, and protective equipment. \_\_\_\_\_ shall take any other actions reasonably necessary to protect the life and health of employees of \_\_\_\_\_ and to protect property in connection with performance of the work covered by this agreement. \_\_\_\_\_ and/or any other party (contractor (s) and subcontractor (s) ) acting on behalf of \_\_\_\_\_ shall comply with the terms of the Occupational Safety and Health Act, 29 CFR 1910, 29 CFR 1926 and Ohio Revised Code Chapter 4167.

14. \_\_\_\_\_ shall not begin performance under this Agreement until such time as the contractor hired to construct the improvement described herein has filed with Trumbull County a copy of a current insurance policy which provides public liability and property damage insurance and which shall protect the contractor, \_\_\_\_\_, Trumbull County and any subcontractor performing work covered by this agreement from claims for personal injury damage including accidental death, as well as from claims for property damage. The amount of such bodily injury insurance shall be not less than \$1,000,000.00 for injuries, including accidental death, to any one person and not less than \$1,000,000.00 for each accident involving injury to more than one person. The amount of such property damage insurance shall be not less than \$1,000,000.00 for each accident and not less than \$1,000,000.00 aggregate property damage liability.

15. \_\_\_\_\_ hereby agrees to file a Maintenance Bond in the amount of \_\_\_  
\_\_\_\_\_ (\$\_\_\_\_\_) with the  
Commissioners, to be in effect for two (2) years after the issuance of the Certificate of Completion  
referred to in paragraph 11 above.

16. The provisions of this agreement shall be in full force and effect from and after the  
signatures of both parties have been affixed hereto; however, if construction is not begun within  
one (1) year of the date of execution of this agreement, it will become null and void.

17. This agreement contains the entire agreement and understanding by and between  
Trumbull County and \_\_\_\_\_. No change or modification of this  
agreement shall be valid or binding unless it is in writing and signed by the party intended to be  
bound.

Signed this \_\_\_\_\_ day of \_\_\_\_\_, 200\_\_.

Witnesses:

\_\_\_\_\_

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

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

Telephone No: \_\_\_\_\_

Witnesses:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_  
BOARD OF COUNTY COMMISSIONERS  
TRUMBULL COUNTY, OHIO

RECOMMENDED:

\_\_\_\_\_  
TRUMBULL COUNTY SANITARY ENGINEER

APPROVED AS TO FORM:

\_\_\_\_\_  
ASSISTANT PROSECUTING ATTORNEY

REV-S-R

PRIVATE AGREEMENT  
FOR  
EXTENSION OF SANITARY SEWER

NON-REIMBURSABLE

THESE ARTICLES OF AGREEMENT, made and entered into at Warren, Ohio, this \_\_\_\_\_ day of \_\_\_\_\_, 200\_\_ , by and between the BOARD OF COUNTY COMMISSIONERS OF TRUMBULL COUNTY, OHIO, hereinafter referred to as the “COMMISSIONERS”, and \_\_\_\_\_, hereinafter referred to as the “\_\_\_\_\_”; WITNESSETH THAT:

WHEREAS, it is the desire of the parties hereto to provide for an extension of a sanitary sewer to be located in \_\_\_\_\_ Sewer District, on \_\_\_\_\_ Street/Plat, within \_\_\_\_\_ Township, in accordance with the detailed plans and specifications as prepared by \_\_\_\_\_, subject to all the current rules, regulations and specifications of the Trumbull County Sanitary Engineering Department.

NOW, THEREFORE, for good, valuable and adequate consideration, the receipt of which is hereby acknowledged by each party, and of the mutual covenants hereinafter contained, it is agreed by and between the parties hereto:

1. \_\_\_\_\_ agrees to pay the total cost of preparing a set of construction drawings and specifications for the proposed sanitary sewer satisfactory to the Trumbull County Sanitary Engineer, including all necessary surveys, engineering and other costs incidental thereto, and that said plans shall be approved by the Trumbull County Sanitary Engineer, the Commissioners, and the Ohio Environmental Protection Agency prior to the construction of the system.

\_\_\_\_\_ shall pay all costs associated with the Trumbull County Sanitary Engineers and the Ohio Environmental Protection Agency's plan, review, and approval. Construction of said project cannot start until the shop drawings showing all materials and appurtenances to be used in the construction of said project have been approved and stamped by the Trumbull County Sanitary Engineer. Also, an electronic copy of the Engineer's drawings is to be submitted to the Trumbull County Sanitary Engineer's Office. This copy is to be saved in AutoCAD R14 or in the DXF (Drawing Interchange File) format. The drawing should be saved on an IBM Format Zip Disk, a Writable CD, or on 3-1/2" Diskettes. Furthermore, within a reasonable time after completion of the construction work, an electronic copy of a complete set of the "as built" drawings in Auto CAD or a compatible system shall be furnished to the Trumbull County Sanitary Engineer.

2. The total cost of construction for the sanitary sewer, including the wages of an inspector to be furnished by the Trumbull County Sanitary Engineer's Department, shall be borne by \_\_\_\_\_. The inspector shall inspect said construction work.

\_\_\_\_\_ shall be responsible, for televising the newly constructed sanitary sewer line at their own expense and shall submit a video tape to the Trumbull County Sanitary Engineer's Office for review. The televising of the sanitary sewer must be completed before the sanitary sewer will be accepted for connections or the issuance of the Certificate of Completion pursuant to paragraph 9 below. Testing shall be performed in accordance with the Sanitary Engineer's Department requirements. Deflection and air pressure testings shall not occur until a minimum of a thirty (30) days period has elapsed from construction.

\_\_\_\_\_ agrees to be solely responsible for the operation and maintenance of all the pressure sanitary sewer laterals in the road right-of-way; and \_\_\_\_\_ further agrees to notify the subsequent property owners that upon transfer of the property that said purchasers assume the sole responsibility to operate and maintain said pressure sanitary sewer lateral and to hold harmless Trumbull County from all claims and demands related thereto.

Any construction occurring prior to said formal approval of the detailed plans by all jurisdictional entities and the expiration of any appeal periods applicable will be done at the sole risk of \_\_\_\_\_, and Trumbull County and its agents shall be held safe and harmless from any claims, costs, damages, obligation or liability whatsoever arising from any construction that does occur. Trumbull County's obligation is subject to the final approval of the plans and specifications by the Trumbull County Sanitary Engineer's Department and the Ohio Environmental Protection Agency.

3. \_\_\_\_\_ agrees to obtain and provide all necessary easements and right-of-way in accordance with the requirements of the Trumbull County Sanitary Engineer and the Ohio Environmental Protection Agency without cost to the Commissioners.

\_\_\_\_\_ shall also be responsible for obtaining any required permits to open cut any street, road or alley from the appropriate political body or official having authority or jurisdiction over such work. Proper notification shall be given to the appropriate authority prior to commencing any construction provided for within this agreement.

4. \_\_\_\_\_ agrees to pay the total cost of all maintenance and repair on the sanitary sewer during the first two (2) years, said year to begin on the date the Certificate of Completion referred to in paragraph 9 is issued.

5. \_\_\_\_\_ agrees that all connections made to the sanitary sewer will be charged a tap-in fee in accordance with the fee in effect at the time the permit is issued. Apartments and commercial buildings shall pay a connection charge based upon the sewage treatment plant capacity required as compared to a single dwelling.

6. Upon the issuance of the Certificate of Completion as provided in paragraph 9 hereof, the sanitary sewer, including the sewers, manholes and other appurtenances, shall thereupon become the property of, and title shall immediately vest in the Commissioners or their assigns.

7. The Commissioners shall service and maintain the sanitary sewer to be constructed by \_\_\_\_\_.

8. A sewer rental will be charged each property to be connected to the sanitary sewer in accordance with a rate schedule established by a Commissioners' resolution.

9. After the project referred to herein has been completed and tested to the satisfaction of the Trumbull County Sanitary Engineer, and after \_\_\_\_\_ has conformed to all the provisions of this agreement, the Trumbull County Sanitary Engineer will issue a Certificate of Completion to \_\_\_\_\_.

10. \_\_\_\_\_ hereby agrees to assume at its own expense the defense of, and to indemnify and save harmless the Commissioners and their officers, agents and assigns, against any and all liability, judgments, suits, costs, damages, claims or expenses which may accrue against the Commissioners, their officers, agents and assigns in consequence of injuries or damages occurring to any persons or property occasioned by or growing out of the construction of the work herein authorized, together with Certification of Workmen's Compensation coverage.

To the extent that \_\_\_\_\_ has actual knowledge, reasonable written notice of any such aforementioned claim, cost, loss or damage shall be promptly given to the Commissioners.

11. \_\_\_\_\_ shall comply with all applicable terms of the Occupational Safety Health Act, 29 CFR 1910, 29 CFR 1926 and Ohio Revised Code Chapter 4167. This compliance shall include at a minimum providing all employees working on the project with the necessary training before work is performed, and all safeguards, safety devices, and protective equipment. \_\_\_\_\_ shall take any other actions reasonably necessary to protect the life and health of employees of \_\_\_\_\_ and to protect property in connection with performance of the work covered by this agreement. \_\_\_\_\_ and/or any other party (contractor (s) and subcontractor (s) ) acting on behalf of \_\_\_\_\_ shall comply with the terms of the Occupational Safety and Health Act, 29 CFR 1910, 29 CFR 1926 and Ohio Revised Code Chapter 4167.

12. \_\_\_\_\_ shall not begin performance under this Agreement until such time as the contractor hired to construct the improvement described herein has filed with Trumbull County a copy of a current insurance policy which provides public liability and property damage insurance and which shall protect the contractor, \_\_\_\_\_, Trumbull County and any subcontractor performing work covered by this agreement from claims for personal injury damage including accidental death, as well as from claims for property damage. The amount of such bodily injury insurance shall be not less than \$1,000,000.00 for injuries, including accidental death, to any one person and not less than \$1,000,000.00 for each accident involving injury to more than one person. The amount of such property damage insurance shall be not less than \$1,000,000.00 for each accident and not less than \$1,000,000.00 aggregate property damage liability.

13. \_\_\_\_\_ hereby agrees to file a Maintenance Bond in the amount of \_\_\_\_\_ (\$ \_\_\_\_\_) with the Commissioners, to be in effect for two (2) years after the issuance of the Certificate of Completion referred to in paragraph 9 above.

14. The provisions of this agreement shall be in full force and effect from and after the signatures of both parties have been affixed hereto; however, if construction is not begun within one (1) year of the date of execution of this agreement, it will become null and void.

15. This agreement contains the entire agreement and understanding by and between Trumbull County and \_\_\_\_\_. No change or modification of this agreement shall be valid or binding unless it is in writing and signed by the party intended to be bound.

Signed this \_\_\_\_\_ day of \_\_\_\_\_, 200\_\_.

Witnesses for \_\_\_\_\_:

\_\_\_\_\_  
Signature of Witness

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

\_\_\_\_\_  
Signature of Witness

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

Telephone No: \_\_\_\_\_

Witnesses for Trumbull County Board of Commissioners:

\_\_\_\_\_  
Signature of Witness

\_\_\_\_\_  
Signature of Witness

\_\_\_\_\_  
BOARD OF COUNTY COMMISSIONERS  
TRUMBULL COUNTY, OHIO

RECOMMENDED:

\_\_\_\_\_  
TRUMBULL COUNTY SANITARY ENGINEER

APPROVED AS TO FORM:

\_\_\_\_\_  
ASSISTANT PROSECUTING ATTORNEY

REV-S-NR

## Appendix B

# Standard Sanitary Sewer Specifications



# TRUMBULL COUNTY COMMISSIONERS

160 HIGH STREET, N.W.  
WARREN, OH 44481-109  
330-675-2451  
Fax: 330-675-2462

**RECEIVED**

DEC 18 2009

Commissioners  
Frank S. Fuda  
Paul E. Heltzel  
Daniel E. Polivka

TR. CO. SANITARY ENGINEER  
Clerk  
Paulette A. Godfrey

December 16, 2009

The following action was taken by the Board of Trumbull County Commissioners on December 16, 2009, and duly recorded in their Journal Volume 133, page 14792.

\*\*\*\*\*

**RE: APPROVE 'RULES AND REGULATIONS'  
TRUMBULL COUNTY'S SANITARY  
SEWER SYSTEMS**

**MOTION:** Made by Mr. Heltzel, seconded by Mr. Polivka, to approve the 'RULES AND REGULATIONS' for TRUMBULL COUNTY'S SANITARY SEWER SYSTEMS, effective January 1, 2010. *Rules and Regulations shall be recorded on the Journal for record purposes; this action per the recommendation of the Trumbull County Sanitary Engineer.*

**NOTE:** The Trumbull County Sanitary Engineer's Department observed a 90-day public written comment period regarding the Rules and Regulations for Trumbull County's Sanitary Sewer Systems.

Yeas: Heltzel, Polivka, Fuda  
Nays: None

### CERTIFICATION

I, Paulette A. Godfrey, Clerk of the Board of County Commissioners, Trumbull County, Ohio, do hereby certify that the foregoing is a true and correct copy of a Resolution adopted by the Board of Trumbull County Commissioners on December 16, 2009, and is duly recorded in Journal Volume 133, page 14792.

Paulette A. Godfrey, Clerk/Interim Administrator  
Board of County Commissioners

/kat

cc: Sanitary Engineer

# TRUMBULL COUNTY COMMISSIONERS

160 HIGH STREET, N.W.  
WARREN, OH 44481-109  
330-675-2451  
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**RECEIVED**

DEC 18 2009



Commissioners  
Frank S. Fuda  
Paul E. Heltzel  
Daniel E. Polivka

TR. CO. SANITARY ENGINEER  
Clerk  
Paulette A. Godfrey

December 16, 2009

The following action was taken by the Board of Trumbull County Commissioners on December 16, 2009, and duly recorded in their Journal Volume 133, page 14792.

\*\*\*\*\*

**RE: APPROVE 'RULES AND REGULATIONS'  
TRUMBULL COUNTY'S SANITARY  
SEWER SYSTEMS**

**MOTION:** Made by Mr. Heltzel, seconded by Mr. Polivka, to approve the 'RULES AND REGULATIONS' for TRUMBULL COUNTY'S SANITARY SEWER SYSTEMS, effective January 1, 2010. *Rules and Regulations shall be recorded on the Journal for record purposes; this action per the recommendation of the Trumbull County Sanitary Engineer.*

**NOTE:** The Trumbull County Sanitary Engineer's Department observed a 90-day public written comment period regarding the Rules and Regulations for Trumbull County's Sanitary Sewer Systems.

Yeas: Heltzel, Polivka, Fuda  
Nays: None

### CERTIFICATION

I, Paulette A. Godfrey, Clerk of the Board of County Commissioners, Trumbull County, Ohio, do hereby certify that the foregoing is a true and correct copy of a Resolution adopted by the Board of Trumbull County Commissioners on December 16, 2009, and is duly recorded in Journal Volume 133, page 14792.

Paulette A. Godfrey, Clerk/Interim Administrator  
Board of County Commissioners

/kat

cc: Sanitary Engineer

STANDARD SANITARY SEWER  
SPECIFICATIONS  
FOR  
TRUMBULL COUNTY  
SANITARY ENGINEERS  
OFFICE

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## General Notes

- 1.) Permission to construct sanitary sewers shall be granted by the Ohio E.P.A., the Trumbull County Sanitary Engineer, and the Board of County Commissioners. The Trumbull County Sanitary Engineer is authorized to stop any construction not in compliance with the current regulations and standards.
- 2.) All construction must be inspected by the Trumbull County Sanitary Engineer or his representative. The cost of such inspection must be borne by the project.
- 3.) No construction is to begin until the plans and specifications are approved by the Ohio E.P.A., the Trumbull County Sanitary Engineers, the Board of County Commissioners, and the local regulatory agencies as applicable.
- 4.) Any changes to approved drawings must be resubmitted for approval by the Trumbull County Sanitary Engineer prior to construction.
- 5.) All work must conform to the requirements and directions of the Trumbull County Sanitary Engineering Department. The contractor must conform to all Federal, State, and local requirements, laws, resolutions, or ordinances relating to permits, safety insurance, work conditions, hiring, Workmen's Compensation, taxes, use of highway or streets, and shall save harmless the County of Trumbull from damages, suits, liability or claims.
- 6.) No permits to connect into the sanitary sewer will be issued until the plat has been recorded and approved by the Trumbull County Planning Commission, as applicable. In addition, connection is also dependent upon the successful testing prescribed by the Trumbull County Sanitary Engineer, or his representative.
- 7.) The connection of footer drains, down spouts, sump pumps, or other clean water sources shall not be connected to the sanitary sewers.
- 8.) The contractor must contact the Ohio Utilities Protection Service (OUPS) at 1-800-362-2764, 48 hours before any underground work is started.
- 9.) Main line sewer grades shall be established and maintained by the use of a Laser only. (See Table A)

# TABLE A

## MINIMUM GRADE FOR SANITARY SEWER PIPE

PIPE SIZE (INCHES)	MINIMUM GRADE
8	0.4%
10	0.28%
12	0.22%
15	0.15%
18	0.12%
21	0.1%
24	0.08%
27	0.067%
30	0.058%
36	0.046%

## PROCEDURE FOR PERMIT AND LATERAL CONSTRUCTION

1. No permit will be written unless all of the following information is obtained:
  - A) Complete address of proposed or existing building.
  - B) Lot/Building number if applicable.
  - C) Owner's name.
  - D) Water source.
  - E) Actual signature of licensed drain layer or employee thereof.  
No builders, homeowners, etc. can sign the permit unless proper authorization is provided in writing.
  - F) Real Estate (Parcel ID) Number.
  - G) Permits will not be issued until all fees are paid.
  
2. Inspection must be scheduled through the Sanitary Engineers Office and require 24 hour advance notice. Work is not to be done if inspection can not be provided. Work hours are Monday thru Friday 8:30 am to 4:30 pm. Any inspection occurring outside of these hours or on Saturday, Sunday, or any Holiday will be charged the rate of \$30.00 per hour and will be the responsibility of the licensed drain layer who signed the permit.
  
3. All permits (including repair) will expire sixty days (60) after issuance. Permit fees are the following:  
  

Residential (1-3 Family Unit)	= \$50.00
Commercial	= \$100.00
Industrial	= \$150.00
  
4. Tap-In Fees for single resident equivalent (SRE) are currently \$1,800.00 and are subject to change by Resolution of the Trumbull County Commissioners. Tap-in fees for multiple family units, commercial and industrial property shall be based on a hydraulic calculation by this office in accordance with accepted practices and procedures established by the United State Environmental Protection Agency's User Charge System and the Ohio Environmental Protection Agency's Sewage Flow Guide. Additional fees such as surcharges, assessments or reimbursements may also apply.
  
5. No sewer permit will be issued until a plumbing inspection has been done by the Trumbull County Board of Health.

## Material Acceptable to Trumbull County for Gravity Sanitary Sewer Construction

### General:

Gravity sanitary sewers shall be constructed in conformance with these specifications and the requirements shown on the engineering drawings. Within the depths specified, and unless otherwise shown on the plans, sanitary sewers up to and including fifteen inches (15") in diameter shall be constructed using a poly-vinyl-chloride (PVC) sewer pipe and fittings or ductile iron sewer pipe and fittings meeting the material and installation requirements specified herein or shown on the plans. Sewer eighteen inches (18") and over shall be constructed using a reinforced concrete sewer pipe and fittings, poly-vinyl-chloride (PVC) sewer pipe and fittings or ductile iron sewer pipe and fittings meeting the material and installation requirements specified herein or shown on the plans. All pipe including laterals shall be laid in a bed of six inches (6") above and below the pipe with #57 crushed stone. Lateral bedding shall be a minimum of ten feet (10') away from the foundation to avoid a French drain situation.

### Materials:

Sanitary sewer materials shall conform with the respective specifications and requirements specified hereinafter.

### Poly-Vinyl-Chloride (PVC) Sewer Pipe:

All P.V.C. sewer pipe shall meet the requirements of the ASTM's last revision of Standard Specifications for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings D3034 (SDR-35, SDR-26), Standard Specification for Poly (Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings F679 or Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter F794. All joints shall be an approved elastomeric gasket joint as defined ASTM D3212 or UNI-B-1. Pipe shall be marked with manufacturers name, nominal pipe diameter, PVC cell classifications, SDR, ASTM number and date of manufacture.

## Material Acceptable to Trumbull County for Gravity Sanitary Sewer Construction

(continued)

For sewers up to and including fifteen inches (15") in diameter and depth of fifteen feet (15') or less PVC sewer pipe and fittings shall conform to ASTM D3034 with a minimum wall thickness equal to SDR-35 and a cell classification 12454-B as defined in ASTM D1784. SDR-26 sewer pipe and fittings should be used in areas with excessively high water tables even if it is less than fifteen feet (15') deep. The higher water table will be determined by the Trumbull County Sanitary Engineer.

For sewers up to and including fifteen inches (15") in diameter and depths over fifteen feet (15') PVC sewer and fittings shall conform to ASTM F679 or F794 with a minimum wall thickness equal to SDR-26 and a cell classification of 12454-B as defined in ASTM D1784.

### Ductile Iron Sewer Pipe:

Ductile iron pipe shall be equal to ASTM A746-99 Standard Specification for Ductile Iron Gravity Sewer Pipe (AWWA C151 and ANSI A21.51 thickness class 52). Ductile iron pipe joints shall be rubber gasket joints equal to the mechanical joint or push on joint as specified by ASTM A746-99 (AWWA C151 and ANSI A21.51 thickness class 52).

Ductile iron pipe shall have a single coat of cement lining in accordance with ASTM A746-99 (AWWA C104 and ANSI A21.4). Cement lining shall be given a coat of approved asphalted material.

Mechanical joint pipe shall be jointed using rubber gasket and cast iron follower rings meeting ANSI A21.11. All nuts and bolts shall be cadmium plated and shall be painted with two coats of Koppers No. 50 Coal Tar Pitch Paint or an approved equal after installation. Alternate methods of protecting the nuts and bolts used with mechanical pipe joints maybe submitted for approval by the Trumbull County Sanitary **Engineer.**

The slip on joints of "Tyton Joint" (pipe size 3"-24") or "Fastitle Joint" (pipe size 30"-36") shall be jointed using a rubber ring gasket. All rubber gaskets shall bear the identifying mark of the pipe manufacturer, the gasket size and the year cleaned by wire brushing and an

## Material Acceptable to Trumbull County for Gravity Sanitary Sewer Construction

(continued)

approved lubricant applied to the spigot end of the pipe. The gasket shall then be placed in the bell and the pipe shall be pushed home.

The Ductile iron pipe shall be encased in a polyethylene wrapper prior to installation in accordance with the provisions of ASTM 674-00 (AWWA C105). Polyethylene film shall not be less than 0.008 inches in thickness and shall be installed in accordance with method ASTM 674-00 (AWWA C105).

### Reinforced Concrete Sewer Pipe:

Reinforced concrete sewer pipe shall be constructed in accordance with ASTM Spec. C-76-79 Class II, III, IV Wall "B" or "C" as called for on the contract drawing.

All reinforced concrete pipe shall be joined by a compression type O-Ring gasket joint, equal to ASTM Designation C433-79, joints for circular concrete pipe using rubber gaskets. The bell and spigot, or tongue and groove ends of the pipe shall be especially prepared for the use of the O-Ring joint during manufacture, by the use of steel or iron forms, to produce a smooth, accurately dimensioned, and truly concentric joint.

Gaskets for the joints shall be of sufficient cross sectional area and length to fill the space provided in the joint when the pipe is laid and of a shape that when the joint is assembled, the gasket would be compressed to form a watertight seal. All rubber gaskets shall be a continuous ring extruded or molded and cured in such a manner that any cross section will be dense, homogeneous and free of porosity, blisters, pitting and other imperfections.

Acid resistant protection coating shall be applied to the interior of all concrete pipes. The coating shall consist of two (2) coats tar epoxy paint or other approved acid proof coating to be applied at the point of manufacture or the pipe, under the supervision of the coating manufacturer and strictly in the conformance with the manufacturer's specifications.

## Procedure for Low-Pressure Air Test for Sanitary Sewer

### Summary of Method:

The sewer line to be tested is plugged, low-pressure air is introduced into the plugged line and the amount and rate of air loss is used to determine the acceptability of the section being tested.

### Preparation of the Sewer Line:

Flush and clean the sewer line prior to testing, thus serving to set the pipe surface as well as clean out any debris. A wetted interior pipe surface will produce more consistent results. Plug all pipe outlets to resist the test pressure. Give special attention to stoppers and laterals.

### Safety:

The air test may be dangerous if, because a lack of understanding or carelessness, a line is improperly prepared.

It is extremely important that the various plugs be installed and braced in such a way as to prevent blowout. Inasmuch as a force of 25lbf (112N) is exerted on an 8 inch (203mm) plug by an internal pipe pressure of 5 psi (34kPa), it should be realized that sudden expulsion of a poorly installed plug or of a plug that is partially deflated before the pipe pressure is released can be dangerous.

As a safety precaution, pressurizing equipment may include a regulator or relief valve set at perhaps 10 psi (69kPa) to avoid over-pressurizing and damaging an otherwise acceptable line. No one shall be allowed in the manholes during testing.

## Procedure for Low-Pressure Air Test for Sanitary Sewer

(continued)

### Procedures:

Determine the type of pipe to be tested and the corresponding ASTM specification to be used. Become familiar with the testing procedures and all related issues especially safety before conducting the test.

Follow the ASTM or AWWA specification instruction for testing. The following table lists the type of pipe and corresponding ASTM or AWWA specification for the test.

Type of Pipe Material	Specification
Poly-Vinyl Chloride (Gravity Pipe)	ASTM F-1417-92
Poly-Vinyl Chloride (Pressure Pipe)	AWWA 605-94
*Reinforced Concrete	ASTM C924-89
Ductile Iron (Gravity Pipe)	ASTM F-1417-92
Ductile Iron (Pressure Pipe)	AWWA 600-99

\*Reinforced concrete pipe 24 inch diameter and larger may be accepted using ASTM C969-94, Standard Practice for Infiltration and Ex-filtration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines or by visual inspection and ASTM C1103-94, Standard Practice for Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines.

Copies of the appropriate ASTM or AWWA Specification can be obtained from the Trumbull County Sanitary Engineers Office.

# DEFLECTION TEST for PVC SEWER PIPE

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After a minimum of thirty (30) days have elapsed from the date when a section of pipe has been installed and back filled, the contractor shall measure the vertical deflection of the installed pipe by use of an approved rigid "Go-No-Go" nine (9) bar mandrel, or approved spheroidal or elliptical ball, cylinder or circular section. The vertical deflection shall not exceed 5% of the internal diameter of the pipe as follows in Table B.

Mandrel, ball, cylinder, or circular section diameters shall not be less than those specified, and shall be verified by the Trumbull County Sanitary Engineer or his representative. Testing device shall be hand pulled through the pipe. Any section of the pipe not meeting the 5% deflection specification shall be uncovered and the haunches re-compacted, and the contractor shall take such other remedial steps to meet the deflection test. No section of flexible pipe will be accepted by the County until the section passes the specified deflection test.

# TABLE B

All dimensions are given in inches.

Mandrel Circumference @ 5% (diameter)

PIPE SIZE  (INCHES)	PIPE TYPE					
	SDR-35		SDR-26		Profile Wall	
	CIRCUMFERENCE	DIAMETER	CIRCUMFERENCE	DIAMETER	CIRCUMFERENCE	DIAMETER
8	41.60	7.28	39.68	7.11	41.38	7.26
10	64.72	9.08	61.76	8.87	64.29	9.05
12	91.39	10.79	87.37	10.55	90.89	10.76
15	136.78	13.2	130.63	12.9	135.95	13.16
18	203.99	16.12	204.24	16.13	204.75	16.15
21	283.39	19	283.39	19	283.09	18.99
24	358.16	21.36	358.16	21.36	362.19	21.48
27	454.80	24.07			460.49	24.22
30					570.15	26.95
33					691.97	29.69
36					825.08	32.42
39					969.89	35.15
42					1126.99	37.89
45					1295.24	40.62
48					1475.87	43.36

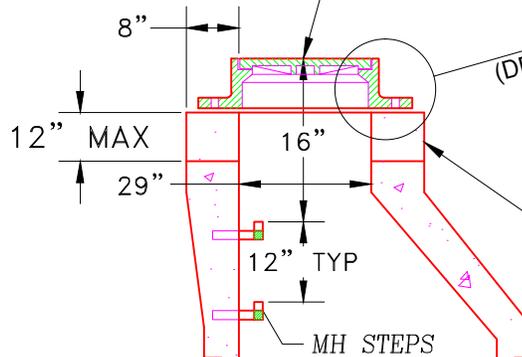
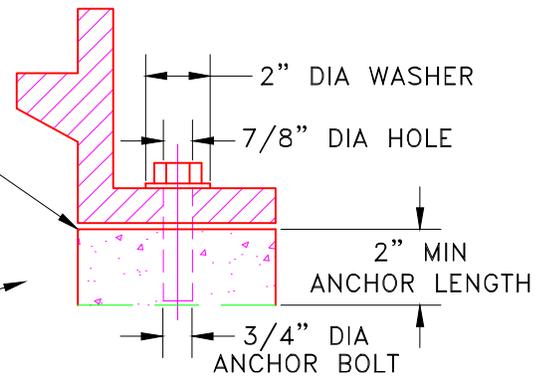
## Internal Visual Inspection of Sanitary Sewers

An internal visual inspection of all sanitary sewer pipe and manholes shall be conducted. This inspection will be done using a color audio-video recording system. The Trumbull County Sanitary Engineers Office or Their designated representative will review the inspection and all discrepancies must be corrected prior to final acceptance. The internal visual inspection shall include the following information both audio and video:

- Name of Project
- Project Number
- Date of Inspection
- Person or Company Performing Inspection
- Street Name
- Manhole Numbers
- Pipe Size and Type (SDR-35, RCP, etc.)
- Continuous Footage Measurement
- Location of Service Connections
- Direction of Travel (Upstream or Downstream)

NEENAH #R-1753-A, OR EAST JORDAN #1890 OR EQUAL CAST IRON FRAME AND COVER. FRAME TO BE BOLTED TO THE CONE OF THE MANHOLE. ALL COVER SHALL BEAR THE WORDS "SANITARY SEWER" IN RAISED LETTERS.

MASTIC STRIPS TO BE PLACED ON BOTH SIDES OF THE LUGS.



ADJUST CASTING TO GRADE WITH PRECAST CONCRETE RISER RING AND SEAL WITH MASTIC. CONCRETE AND BRICK ARE NOT TO BE USED. FINISHED GRADE TO SLOPE AWAY FROM MANHOLE. ALLOW NO WATER TO STAND ON OR AROUND MANHOLE COVER.

A.S.T.M. C443-79 RUBBER GASKET JOINT OR MASTIC STRIPS IN JOINTS. EXTERIOR OF JOINTS TO BE SEALED WITH BITUMINOUS MATERIAL.

ASPHALTIC FOUNDATION COATING-ALL MANHOLE TYPES

WATERTIGHT GASKETED FLEXIBLE CONNECTION (ALL INLETS & OUTLETS)

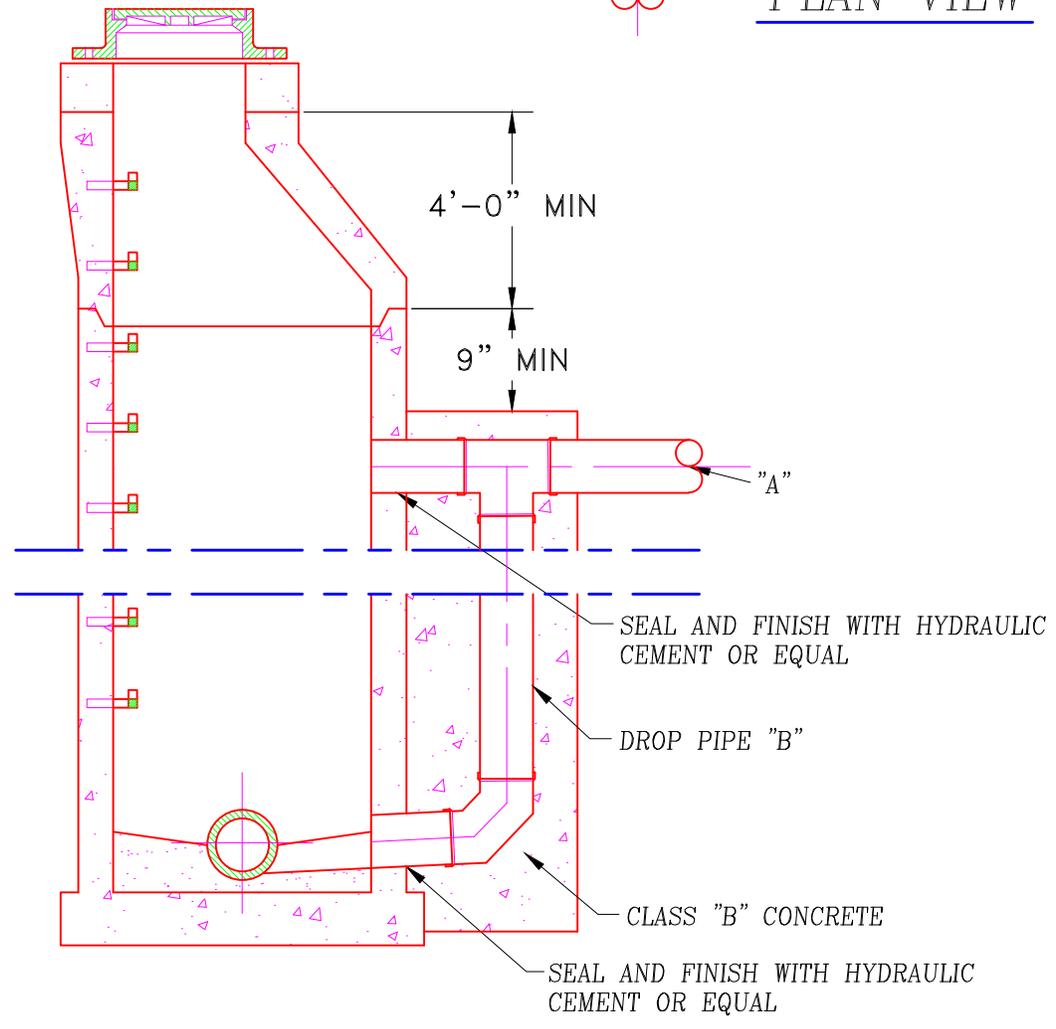
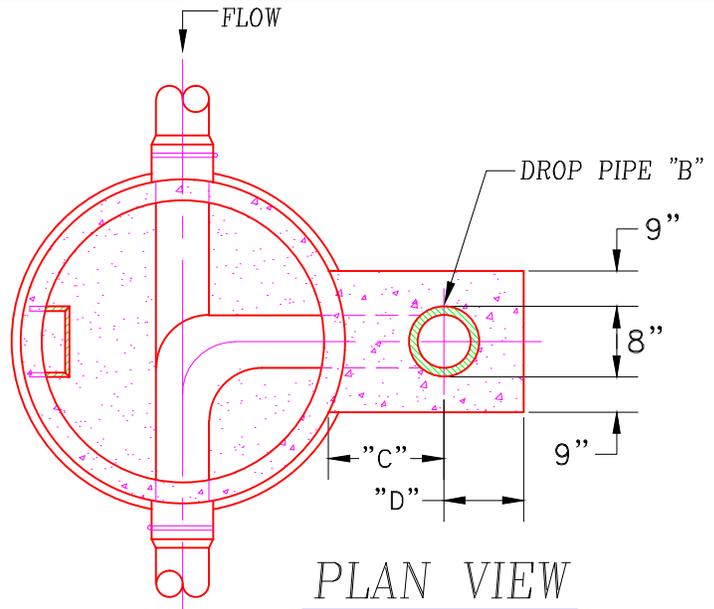
CLASS "B" CONCRETE

SHALL BE LAID IN A BED OF SIX INCHES (6") ABOVE AND BELOW THE PIPE WITH #57 CRUSHED STONE.

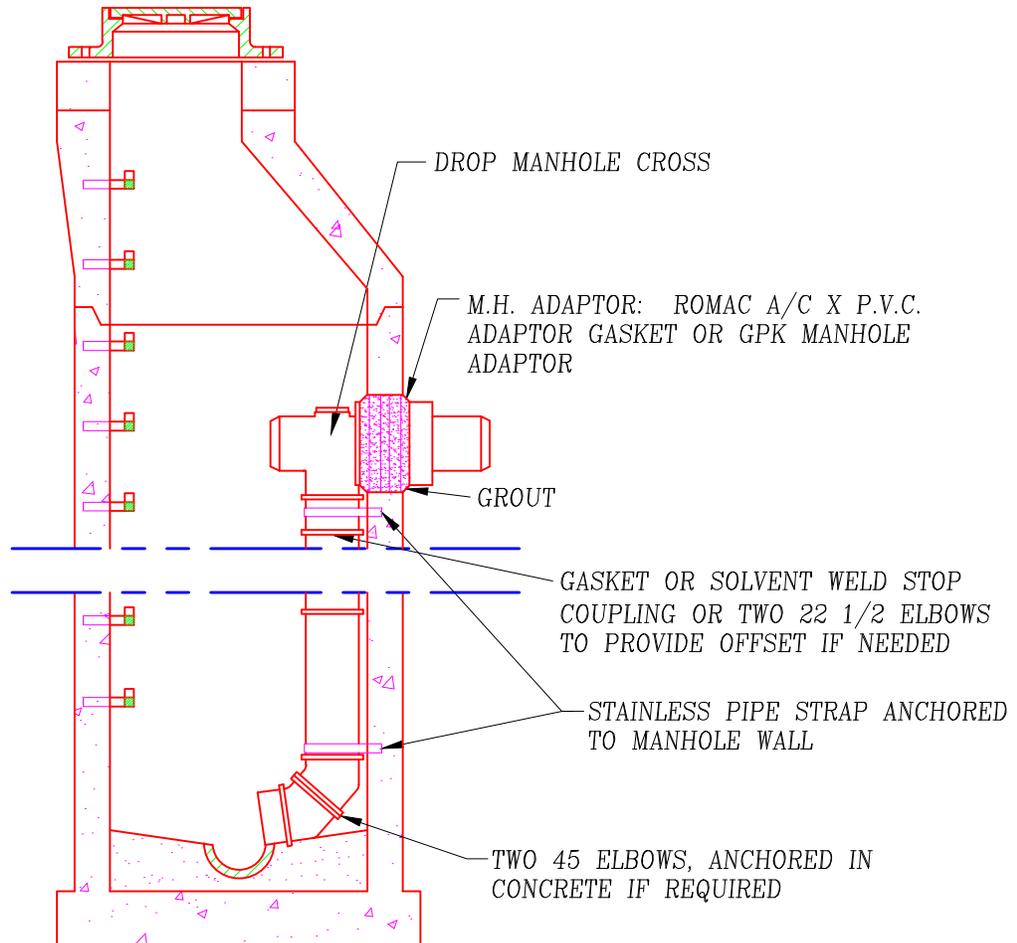
## STANDARD MANHOLE DETAIL

**NOTE:** Manholes shall be vacuum tested in accordance with ASTM C1244-93 Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test.

DROP PIPE DIMENSIONS			
A	B	C	D
8"	8"	11 1/4"	13 1/4"
10"	8"	11 1/4"	13 3/8"
12"	8"	11"	13 3/4"
15"	10"	9 1/2"	15 3/8"
18"	12"	8 1/2"	16 1/2"

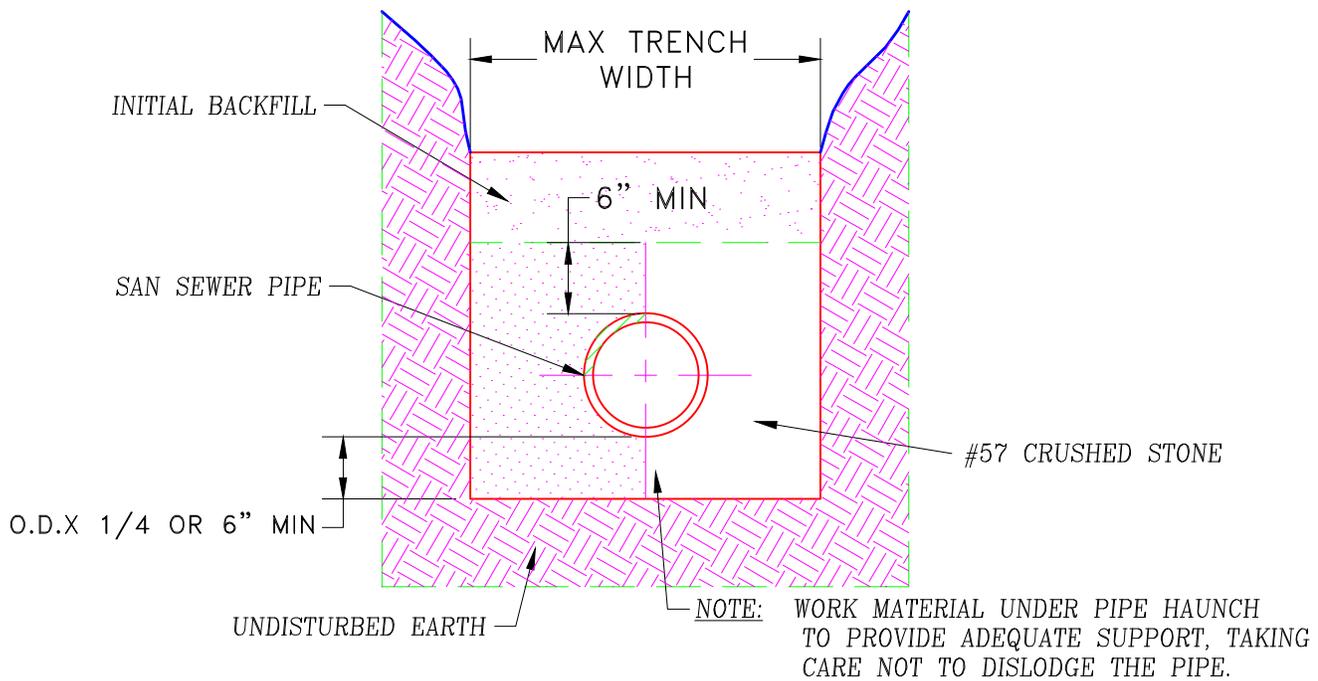


## OUTSIDE DROP MANHOLE DETAIL



## INSIDE DROP MANHOLE

NOTE: THE INSIDE DROP MAY REQUIRE A LARGER MANHOLE DIA PER T.C.S.E.



## BEDDING DETAIL P.V.C.

NOTES: MAXIMUM ALLOWABLE TRENCH WIDTHS SHALL BE AS FOLLOWS:

6"-24" : NOMINAL PIPE DIA + 2'-0"  
 27"-30" : NOMINAL PIPE DIA + 2'-6"  
 36" AND OVER : NOMINAL PIPE DIA + 3'0"

WHEN PROTECTIVE SAFETY TRENCH BOX IS WIDER THAN THE MAX ALLOWABLE TRENCH WIDTH, EXCAVATION SHALL BE SHELVED AS SHOWN AND BOX SHALL RIDE ON THE SHOULDER.

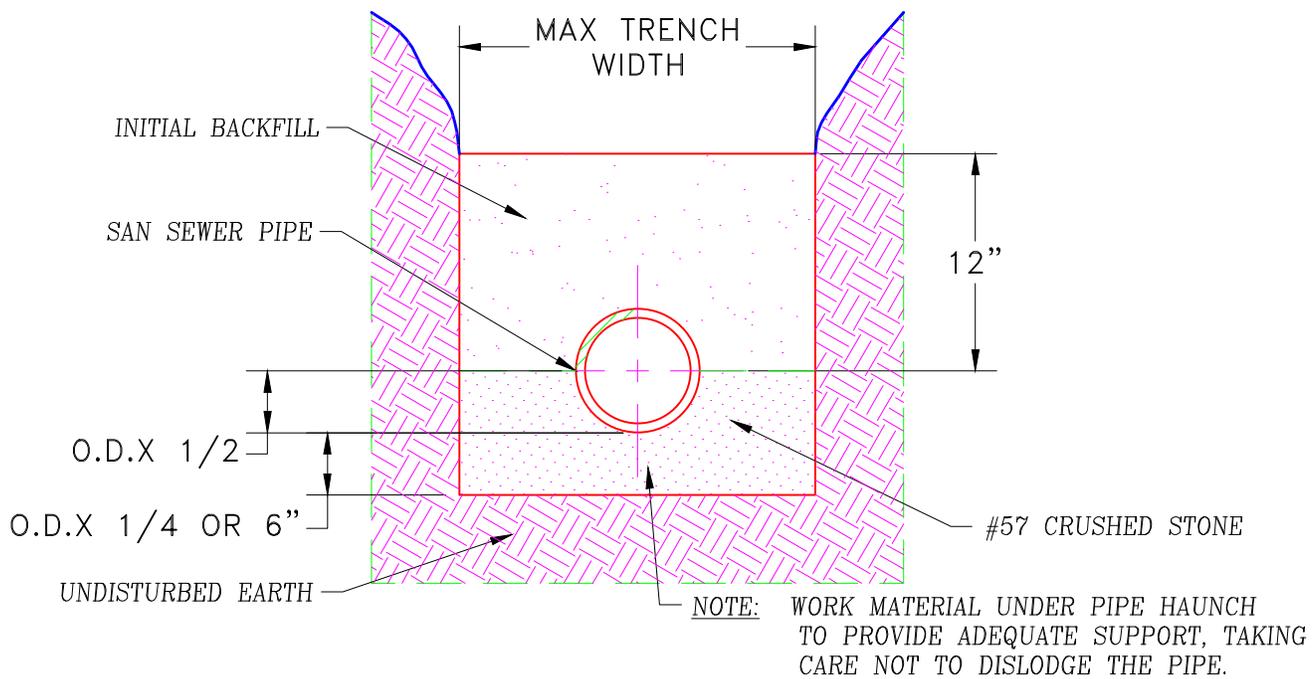
MAIN LINE SEWER IS TO BE AIR AND MANDREL TESTED 30 DAYS AFTER INSTALLATION.

PROPER FITTINGS, ADAPTORS, SADDLES, ETC, SHALL BE USED WHEN JOINING P.V.C. PIPE WITH PIPE OF OTHER MATERIALS.

BEDDING REQUIREMENTS APPLY TO BOTH MAIN LINE AND LATERAL SEWERS.

GRADE FOR MAIN LINE SEWER CONSTRUCTION SHALL BE MAINTAINED THROUGH THE USE OF A LASER ONLY.

IF SUFFICIENT GROUND WATER IS FLOWING THROUGH THE BEDDING OR THE SLOPE OF THE SEWER IS STEEP, CLAY DIKES SHOULD BE INSTALLED AT VARIOUS LOCATIONS WITHIN THE TRENCH.



## BEDDING DETAIL R.C.P. & D.I.P.

NOTES: MAXIMUM ALLOWABLE TRENCH WIDTHS SHALL BE AS FOLLOWS:

6"-24" : NOMINAL PIPE DIA + 2'-0"  
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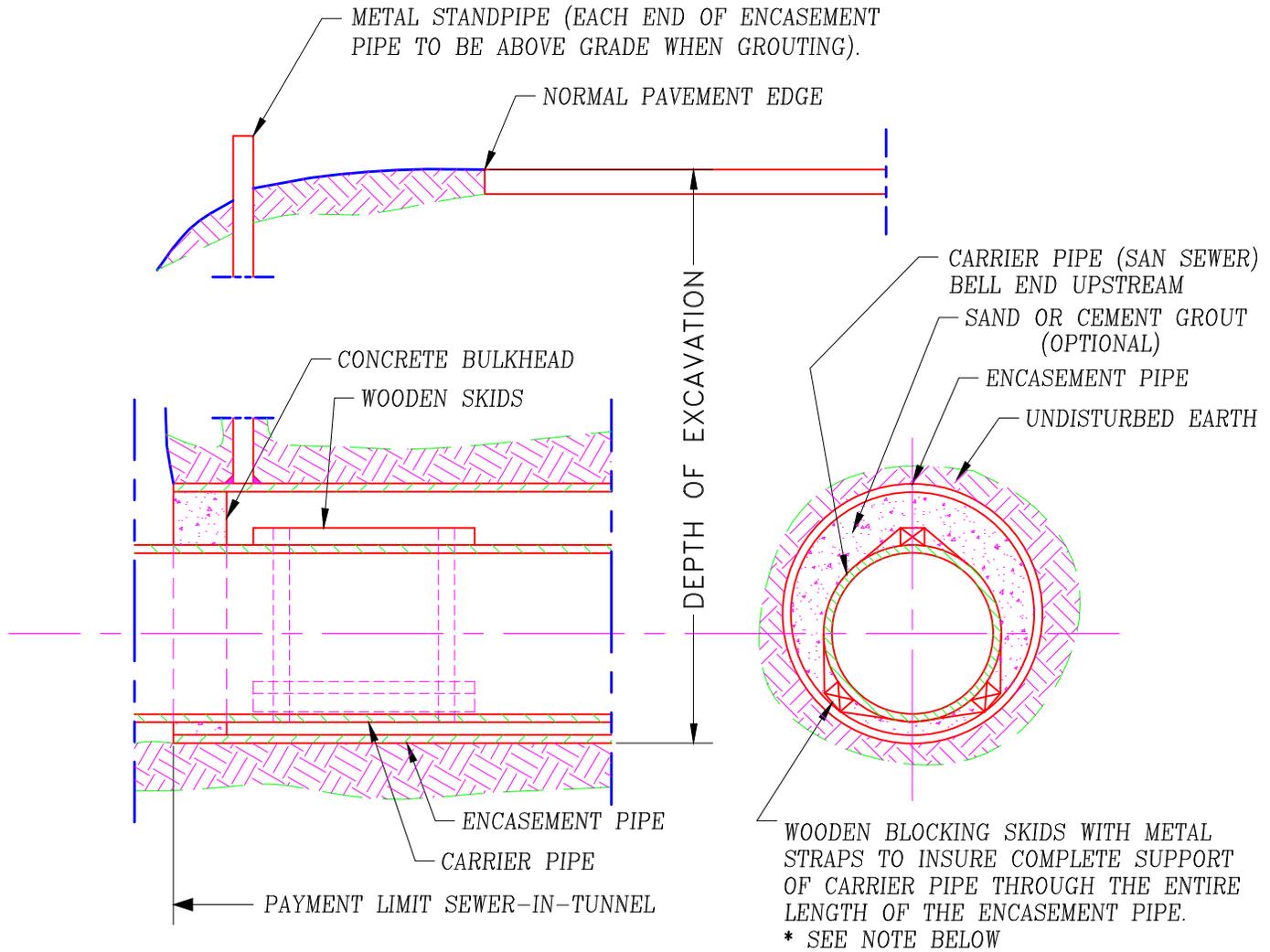
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## SEWER-IN-TUNNEL DETAIL

### CARRIER PIPE

### ENCASEMENT PIPE

	<u>MIN DIAMETER</u>
6"	8" (Laterals ONLY)
8"	16"
10"	18"
12"	24"
15"	30"
18"	36"
21"	40"
24"	42"

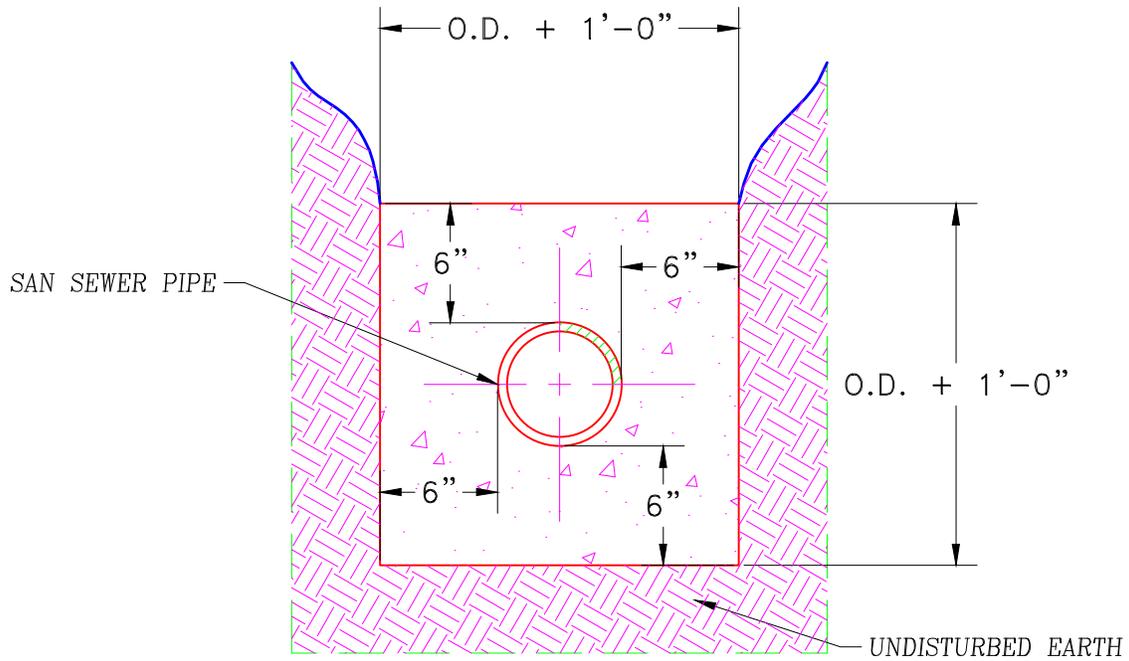
**\*NOTE:**

ACCEPTABLE ENCASEMENT PIPE: CAST IRON, DUCTILE IRON OR C-900 (WATERLINE SPEC) PLASTIC. S.D.R. 35 (P.V.C.) IS NOT ACCEPTABLE.

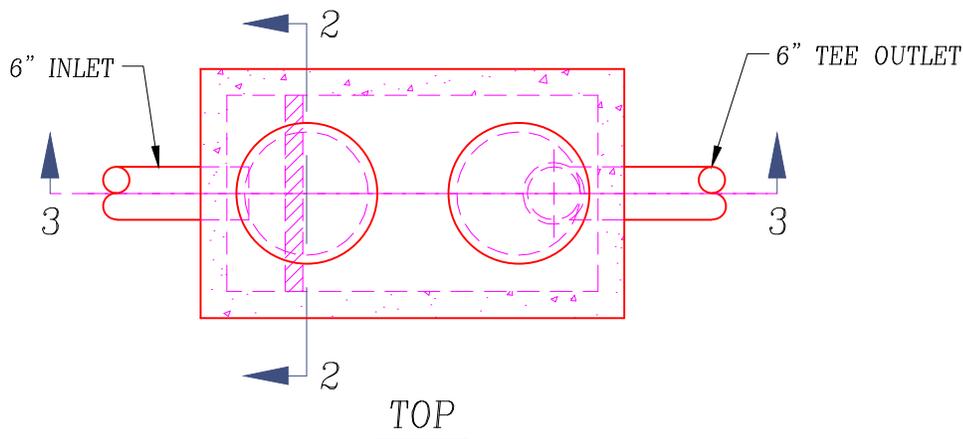
FOR SEWER-IN-TUNNEL GREATER THAN 6' IN DEPTH THE ENCASEMENT PIPE SHALL EXTEND FROM THE EDGE OF THE PAVEMENT A DISTANCE EQUAL TO THE DEPTH OF THE EXCAVATION.

"CASCADE" STAINLESS PIPELINE CASING SPACERS OR EQUIVALENT MAY BE USED IN PLACE OF THE WOOD BLOCKING METHOD.

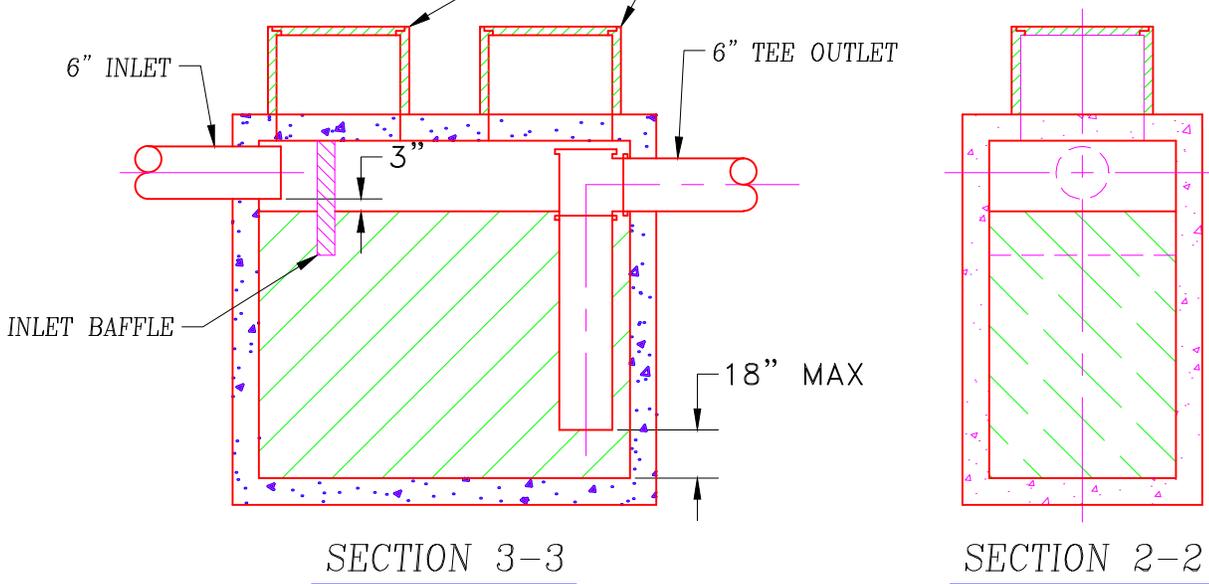
BLOCKING SHALL BE PLACED NO FURTHER APART THAN HALF (1/2) PIPE LENGTH. FOR PIPE TWELVE (12) INCH IN DIAMETER AND SMALLER, FOUR (4) SPACERS SHALL BE PLACED AT EACH LOCATION 90° APART.



## CONCRETE ENCASEMENT

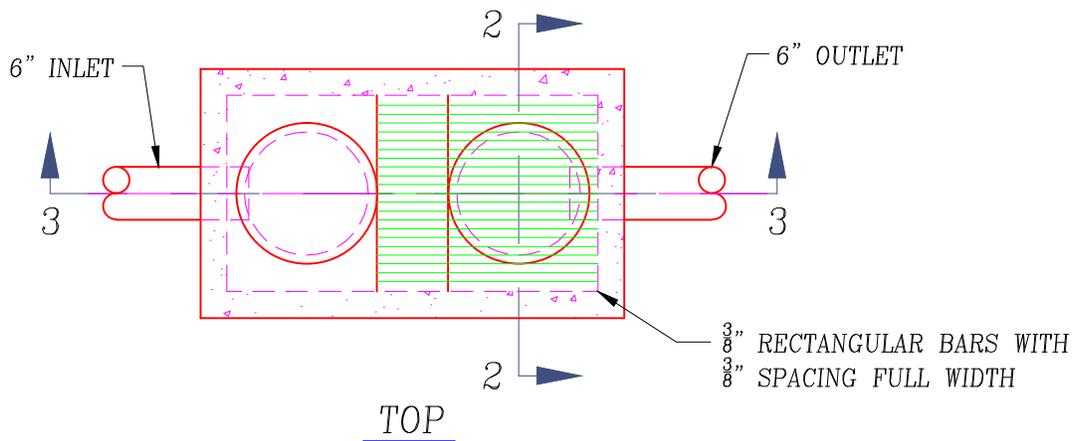


MH RISER WITH VESTAL LID. PRECAST RISER RINGS ARE TO BE USED TO RAISE COVERS TO GRADE—BRICKS AND MORTAR ARE NOT TO BE USED.

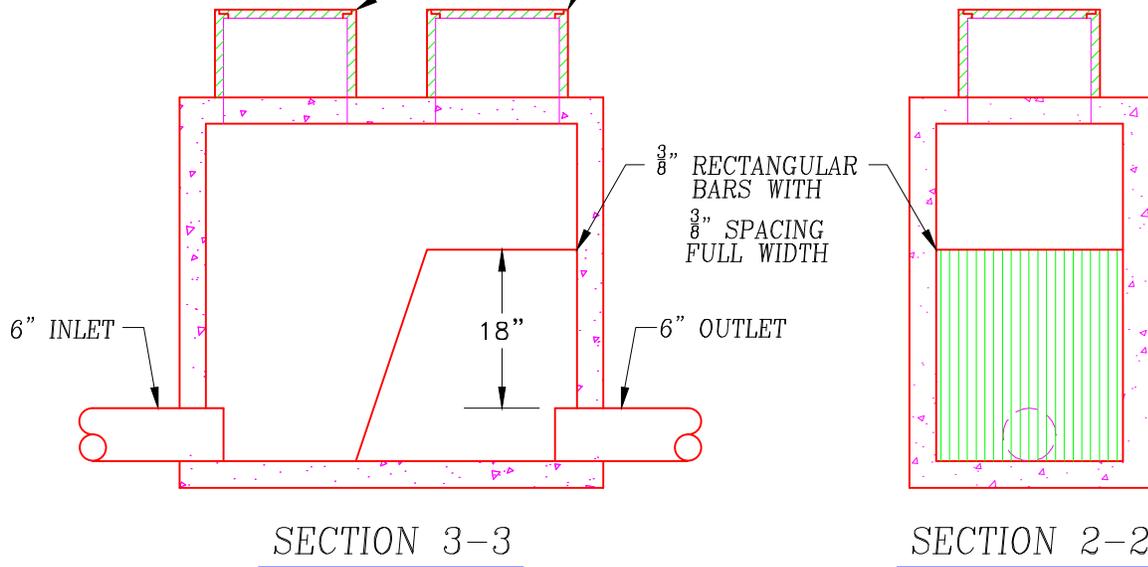


## STANDARD GREASE TRAP

NOTE: GREASE INTERCEPTORS SHALL BE INSTALLED SO THAT THEY WILL RECEIVE ALL KITCHEN WASTES, BUT NONE OF THE RESTROOM WASTES  
MINIMUM OF 1,000 GALLON CAPACITY

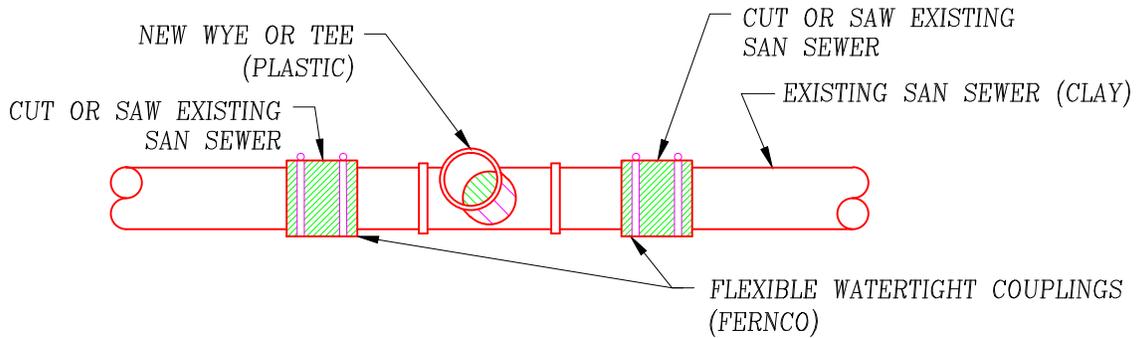


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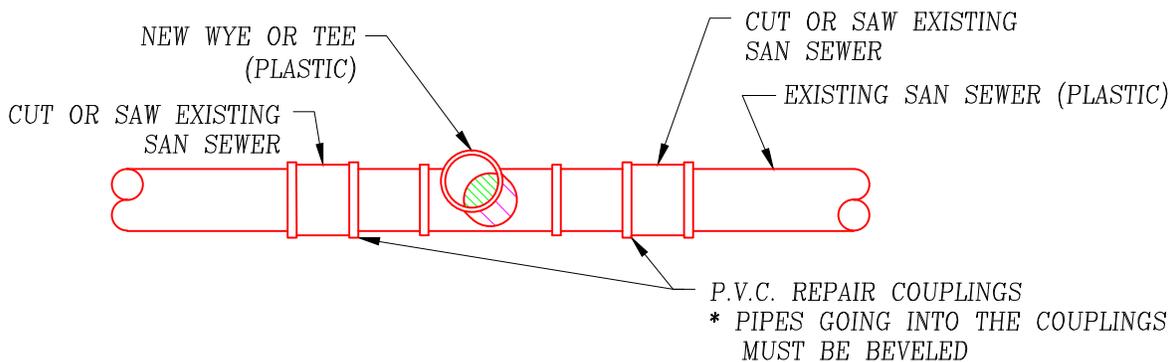
## STANDARD TRASH TRAP

NOTE: MINIMUM OF 1,000 GALLON CAPACITY



## WYE OR TEE INSTALLED IN EXISTING SEWER

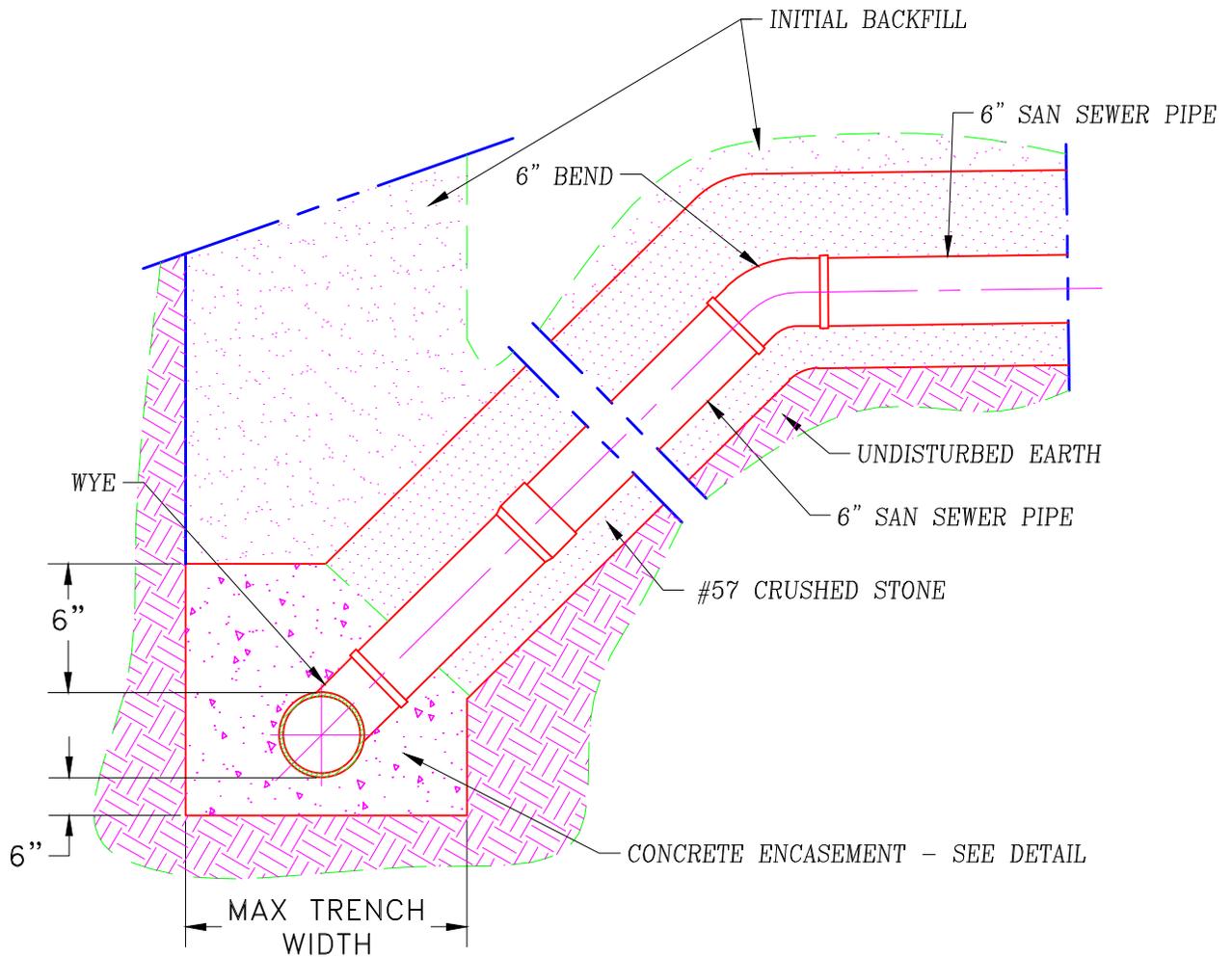
\* FOR PLASTIC WYE TO CLAY MAIN ONLY \*  
 \* AN APPROVED CAST IRON TAPPING SADDLE OR AN INSERTA-TEE MAY ALSO BE USED \*



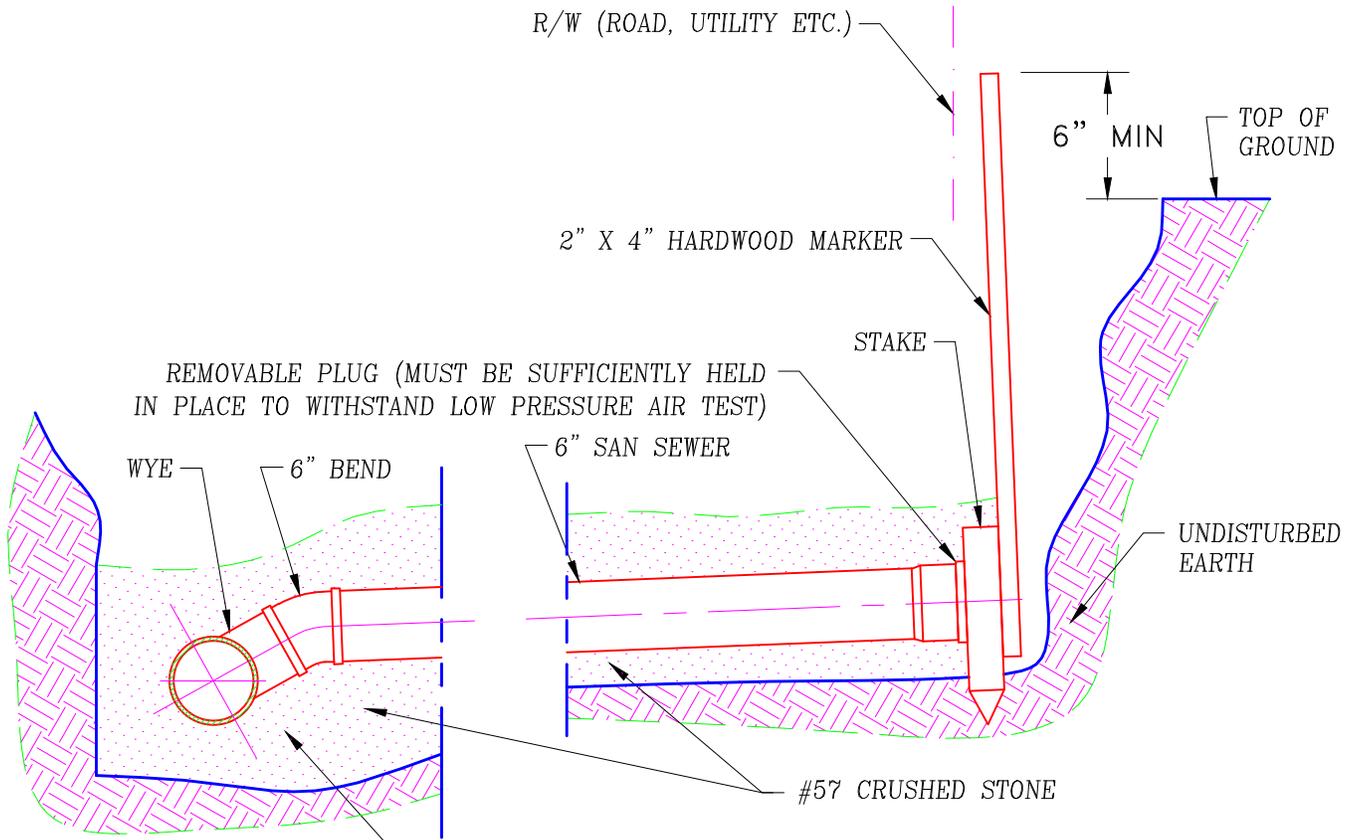
## WYE OR TEE INSTALLED IN EXISTING SEWER

\* FOR PLASTIC WYE TO PLASTIC MAIN ONLY \*  
 \* AN APPROVED CAST IRON TAPPING SADDLE OR AN INSERTA-TEE MAY ALSO BE USED \*

NOTE: ALL REINFORCED CONCRETE PIPE WILL BE CORE BORED.

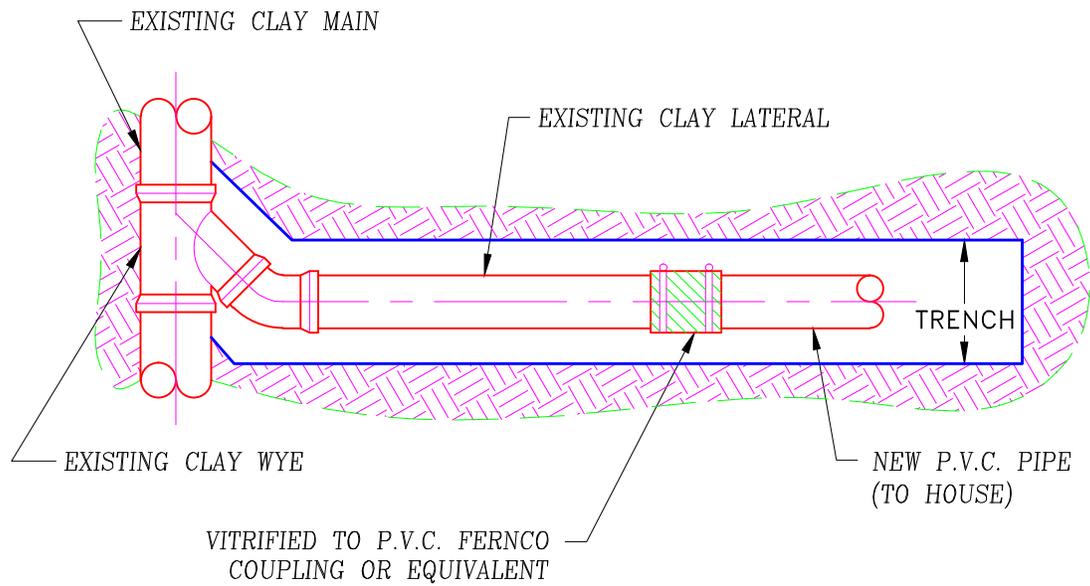


RISER CONNECTION  
FOR SEWERS EXCEEDING 12' TO INVERT

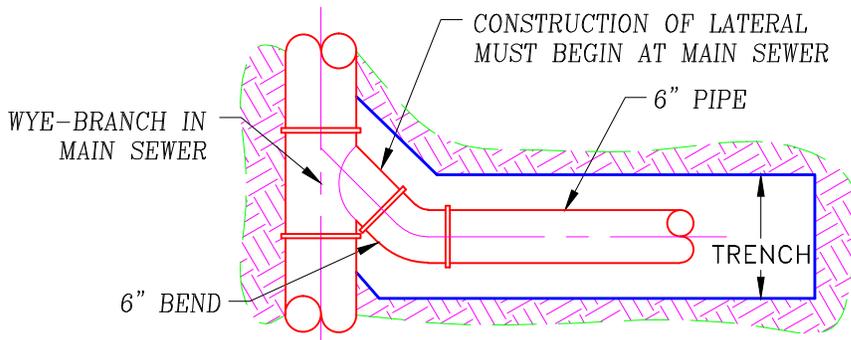


NOTE: WORK MATERIAL UNDER PIPE HAUNCH TO PROVIDE ADEQUATE SUPPORT, TAKING CARE NOT TO DISLodge THE PIPE

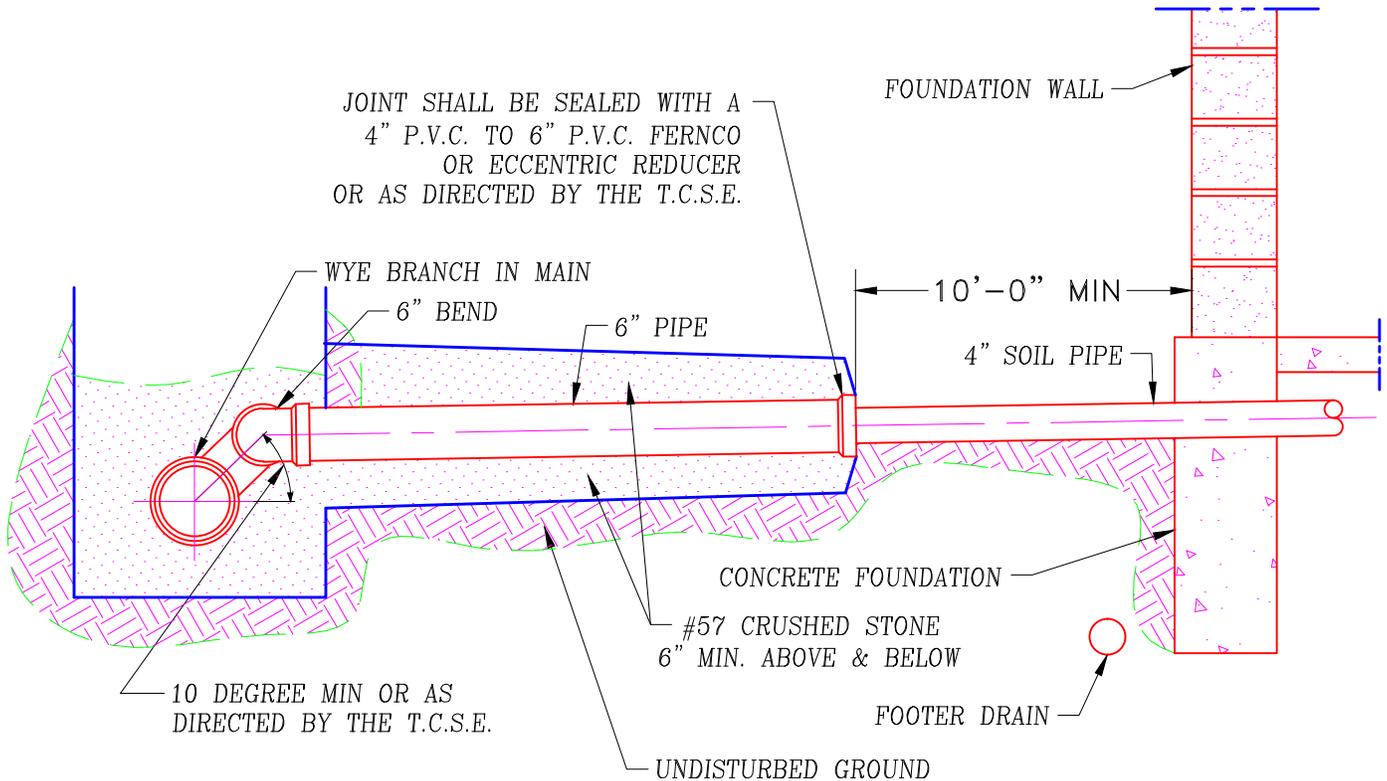
# STANDARD HOUSE CONNECTION



## P.V.C. INSTALLED TO EXISTING CLAY LATERAL

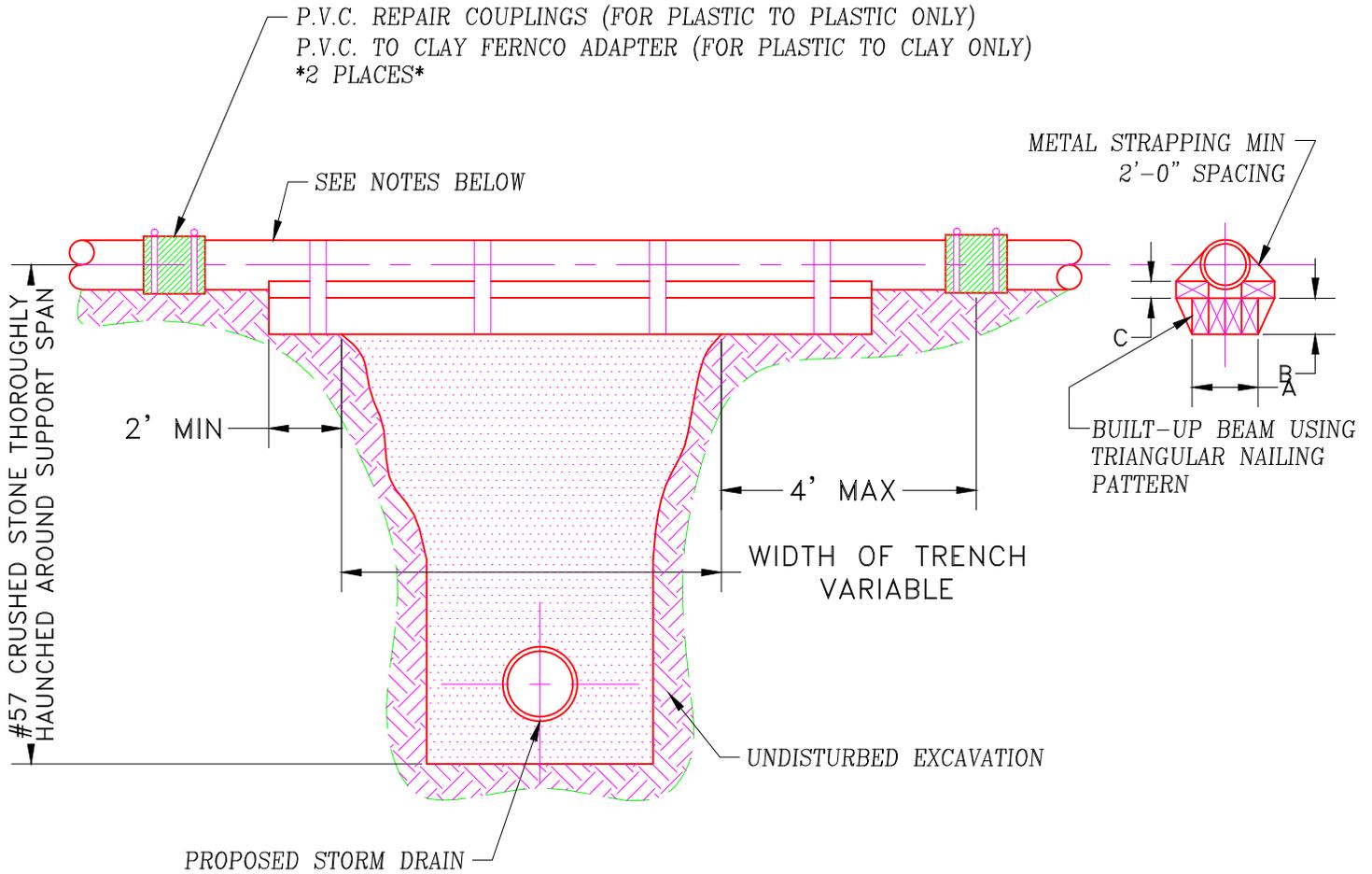


TYPICAL PLAN



TYPICAL SECTION OF LATERAL TRENCH

- NOTES: FOOTER DRAINS SHALL NOT BE CONNECTED TO THE SANITARY SEWER.  
 LATERAL BEDDING SHALL BE A MINIMUM OF 10' AWAY FROM THE FOUNDATION TO AVOID A FRENCH DRAIN SITUATION.  
 FOR P.V.C. AND VITRIFIED CLAY SEWER PIPE SEE BEDDING REQUIREMENTS.  
 THE COST OF RE-CONNECTING DOWNSPOUTS, FIELD DRAINS AND SUMP DRAINS DAMAGED DURING CONSTRUCTION SHALL BE CONSIDERED AS HAVING BEEN INCLUDED IN THE UNIT PRICE BID FOR THE VARIOUS ITEMS OF THE CONTRACT.  
 IF SUFFICIENT GROUND WATER IS FLOWING THROUGH THE BEDDING OR THE SLOPE OF THE SEWER IS STEEP, CLAY DIKES SHOULD BE INSTALLED AT VARIOUS LOCATIONS WITHIN THE TRENCH.  
 MINIMUM GRADE FOR HOUSE CONNECTIONS SHOULD BE 1/4" PER ONE (1) FOOT, WHICH IS 2.08% OR AS DIRECTED BY THE T.C.S.E.

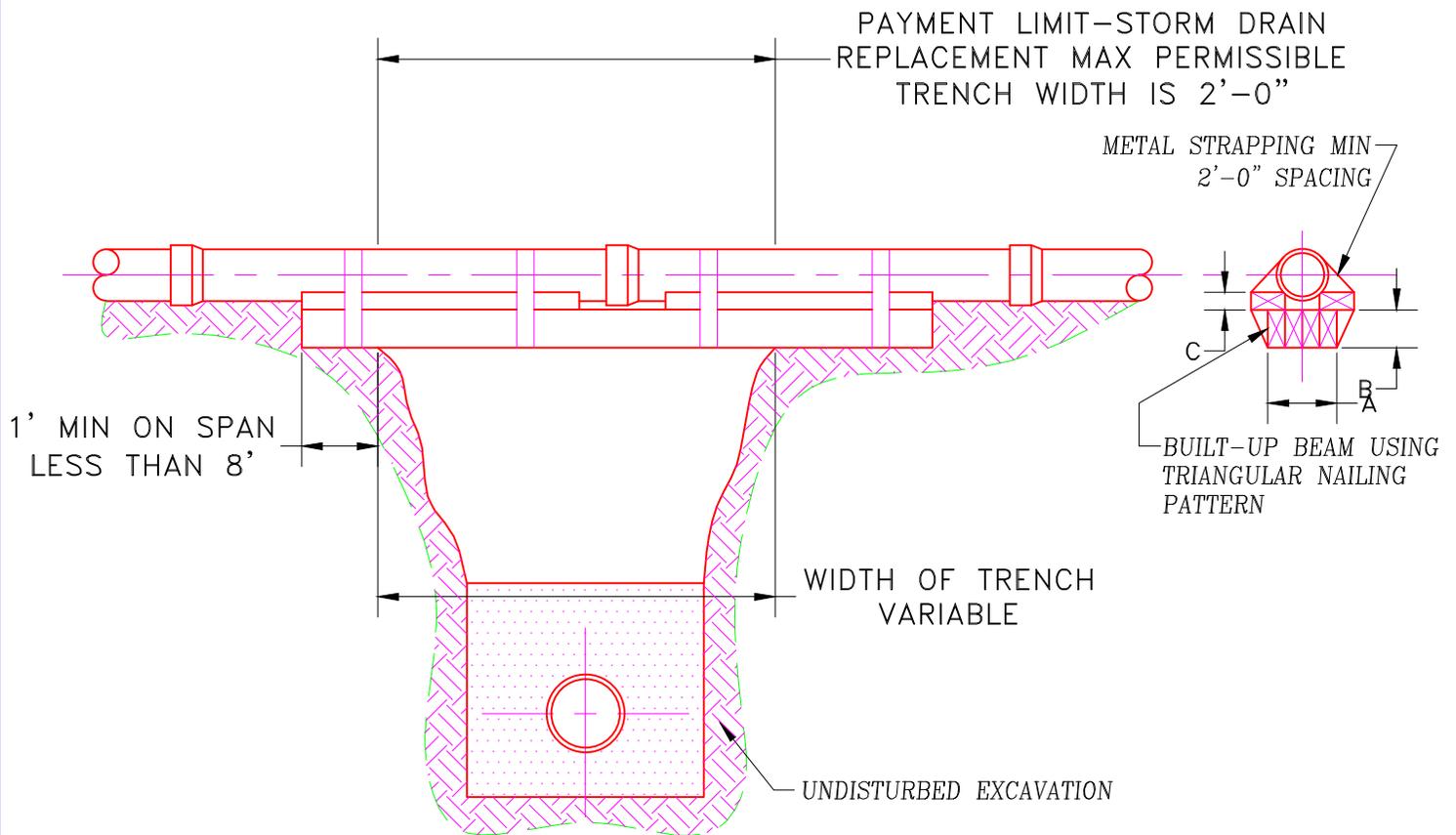


PIPE SIZE D	A	B	EACH SIDE C
4"	6"	6"	2" X 4"
6"	8"	6"	2" X 6"
8"	10"	6"	2" X 6"
10"	12"	6"	2" X 6"
12"	14"	6"	2" X 6"
15"	18"	6"	2" X 6"

## SUPPORT DETAIL FOR RESTORING EXISTING SANITARY SEWER

NOTES: SEWER TO BE REPLACED WITH SDR-35 P.V.C. PIPE WHICH IS THE SAME DIAMETER AS THE EXISTING PIPE. BELLS ARE NOT TO FALL WITHIN THE TRENCH WIDTH.

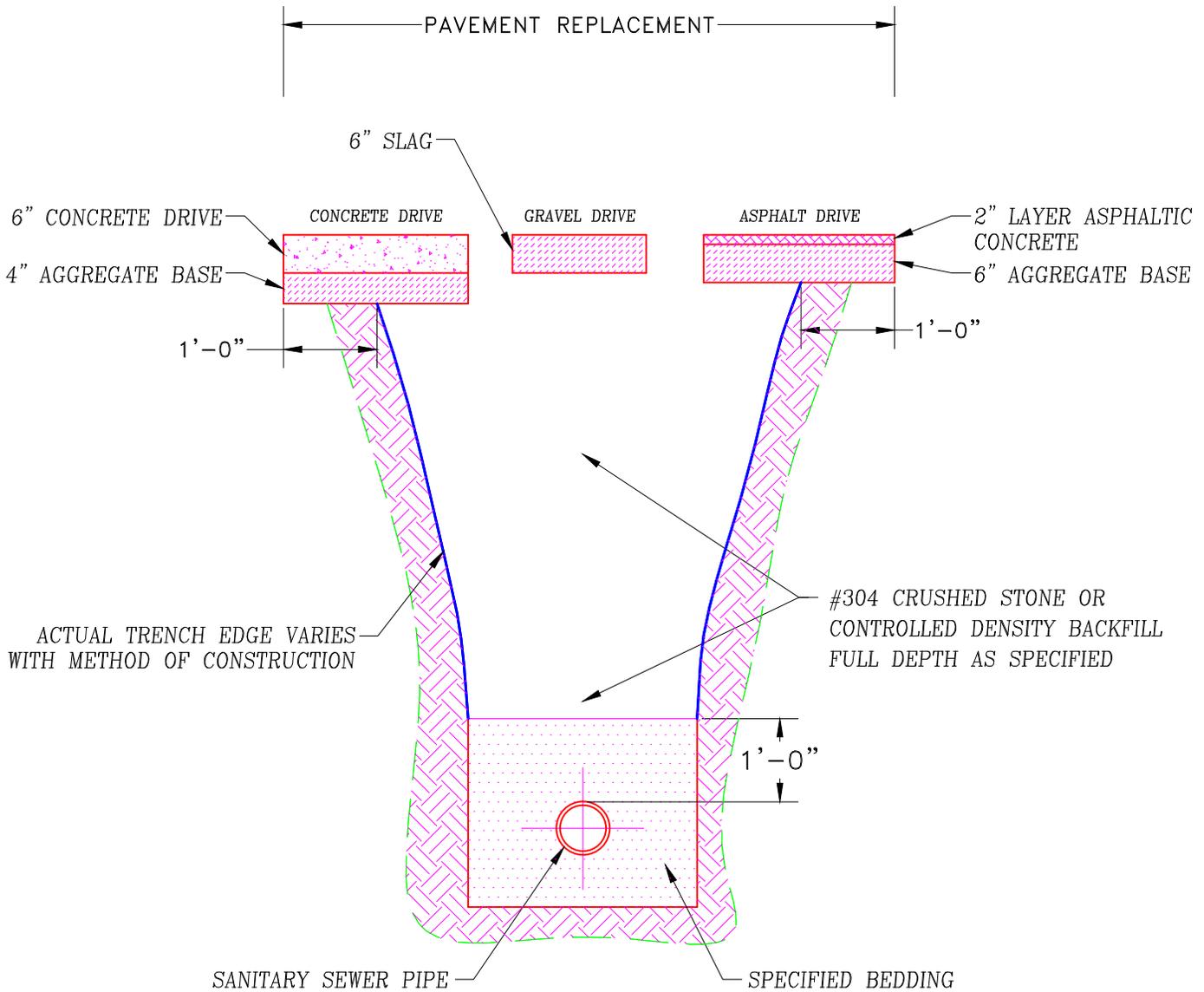
SHOULD THE PROPOSED CONDUIT SPAN THE EXISTING SANITARY SEWER AND LIE WITHIN 0" - 12" VERTICALLY: THE SPANNED SEWER SHALL BE EXPOSED A DISTANCE OF 3' + I.D. FROM CENTER LINE OF PROPOSED CONDUIT AND ENCASED WITH CONCRETE.



PIPE SIZE D	A	B	EACH SIDE C
4"	6"	6"	2" X 4"
6"	8"	6"	2" X 6"
8"	10"	6"	2" X 6"
10"	12"	6"	2" X 6"
12"	14"	6"	2" X 6"
15"	18"	6"	2" X 6"

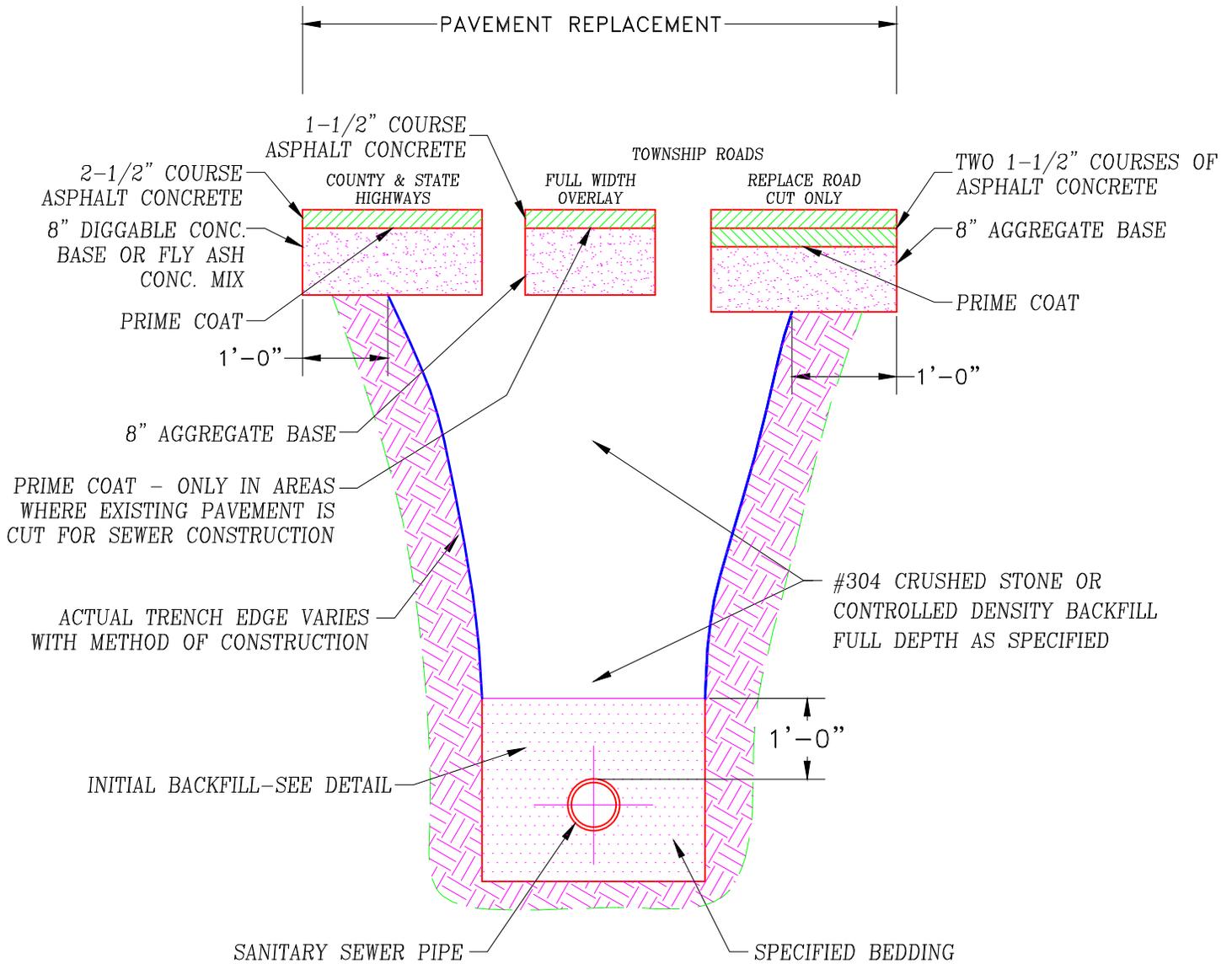
## SUPPORT DETAIL FOR RESTORING EXISTING DRAINAGE

**NOTE:** THE COST OF RE-CONNECTING DOWNSPOUTS, FIELD DRAINS, SUMP DRAINS AND SEPTIC DRAINS DAMAGED DURING CONSTRUCTION SHALL BE CONSIDERED AS HAVING BEEN INCLUDED IN THE UNIT PRICE BID FOR THE VARIOUS ITEMS OF THE CONTRACT.



## DRIVEWAY & PRIVATE DRIVE REPLACEMENT

NOTE: THE CONTRACTOR SHALL MAINTAIN ALL DRIVEWAYS PRIOR TO DRIVEWAY REPLACEMENT.



## PAVEMENT REPLACEMENT

NOTE: THE CONTRACTOR SHALL MAINTAIN ALL ROADS PRIOR TO SURFACE COURSE REPLACEMENT.

# AIR TEST TABLE

BASED ON EQUATIONS FROM A.S.T.M. #C-828

SPECIFICATION TIME (min:sec) REQUIRED FOR PRESSURE DROP FROM  
3-1/2 TO 2-1/2 P.S.I. WHEN TESTING ONE PIPE DIAMETER ONLY

PIPE DIAMETER, INCHES

LENGTH OF LINE, FEET

	4	6	8	10	12	15	18	21	24
25	0:04	0:10	0:18	0:28	0:40	1:02	1:29	2:01	2:38
50	0:09	0:20	0:35	0:55	1:19	2:04	2:58	4:03	5:17
75	0:13	0:30	0:53	1:23	1:59	3:06	4:27	6:04	7:55
100	0:18	0:40	1:10	1:50	2:38	4:08	5:56	8:05	10:34
125	0:22	0:50	1:28	2:18	3:18	5:09	7:26	9:55	11:20
150	0:26	0:59	1:46	2:45	3:58	6:11	8:30		
175	0:31	1:09	2:03	3:13	4:37	7:05			
200	0:35	1:19	2:21	3:40	5:17				12:06
225	0:40	1:29	2:38	4:08	5:40			10:25	13:36
250	0:44	1:39	2:56	4:35			8:31	11:35	15:07
275	0:48	1:49	3:14	4:43			9:21	12:44	16:38
300	0:53	1:59	3:31				10:21	13:53	18:09
350	1:02	2:19	3:47			8:16	11:54	16:12	21:10
400	1:10	2:38			6:03	9:27	13:36	18:31	24:12
450	1:19	2:50			6:48	10:38	15:19	20:50	27:13
500	1:28			5:14	7:34	11:49	17:01	23:09	30:14



# Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air<sup>1</sup>

This standard is issued under the fixed designation F 1417; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This test method provides procedures for testing plastic pipe sewer lines, using low-pressure air to prove the integrity of the installed material and the construction procedures. Two procedures are included to find the rate of air leakage—the constant-pressure method and the time-pressure drop method.

1.2 This test method shall be performed on lines after all connections and service laterals have been plugged and braced adequately to withstand the test pressure. The time between completion of the backfill operation and low-pressure air testing may be specified by the approving authority.

1.3 This test method also may be used as a preliminary test, which enables the installer to show the condition of a buried line prior to final backfill, paving, and other construction activities.

1.4 This test method is applicable to all gravity sewer lines made of thermoplastic pipe, reinforced thermosetting resin (RTRP) pipe, and reinforced plastic mortar (RPM) pipe, defined in Terminology D 883, D 1600, and F 412.

1.5 *This standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* For specific precautionary statements, see Section 5.

## 2. Referenced Documents

### 2.1 ASTM Standards:

- C 828 Practice for Low-Pressure Air Test of Vitrified Clay Pipe Lines (4 to 12-in.)<sup>2</sup>
- C 924 Practice for Testing Concrete Pipe Sewer Lines by Low-Pressure Air Test Method<sup>2</sup>
- D 883 Terminology Relating to Plastics<sup>3</sup>
- D 1600 Terminology for Abbreviated Terms Relating to Plastics<sup>3</sup>
- D 2122 Method for Determining Dimensions of Thermoplastic Pipe and Fittings<sup>4</sup>
- D 3567 Practice for Determining Dimensions of Reinforced

Thermosetting Resin Pipe (RTRP) and Fittings<sup>4</sup>

F 412 Terminology Relating to Plastic Piping Systems<sup>4</sup>

2.2 *Uni-Bell PVC Pipe Association Standard:*

UNI-B-6-90 Recommended Practice for Low-Pressure Air Testing of Installed Sewer Pipe<sup>5</sup>

## 3. Summary of Test Method

3.1 The section of the line to be tested is plugged. Air, at low pressure, is introduced into the plugged line. The line passes the test if the rate of air loss, as measured by pressure drop, does not exceed a specified amount in a specified time. Pressure drop may be determined by using Table 1 or Table 2, or calculated by use of the formulas in 9.1.

## 4. Significance and Use

4.1 This low-pressure air test detects damaged piping or improper jointing by measuring the rate at which air under pressure escapes from an isolated section of sewer.

4.2 The rate of air loss will indicate the presence or absence of damaged piping or leaking joints. This test method is not intended to show total system water leakage limits and cannot be used as a quantitative measure of leakage under service conditions for infiltration or exfiltration.

NOTE 1—A finding of acceptable air loss specified in this test method can be interpreted as an installation acceptance test in lieu of infiltration or exfiltration test.

4.3 This test method will ensure the best possible initial condition and quality workmanship of all property-installed sewer pipe.

## 5. Apparatus

5.1 *Plugs*—Mechanical or pneumatic type.

5.2 *Air Compressor*—A properly calibrated portable, oil-free air source with a singular control panel containing a main shut-off valve, pressure-regulating valve, 9 psig pressure-relief valve, input pressure gage, and a continuous monitoring pressure gage having a pressure range from 0 psi to at least 10 psi with minimum divisions of 0.10 psi and an accuracy of  $\pm 0.04$  psi.

5.3 *Rotameter*, standard CFM reading with an accuracy of  $\pm 2\%$ .

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee F-17 on Plastic Piping Systems and is the direct responsibility of Subcommittee F17.62 on Sewer. Current edition approved July 15, 1992. Published September 1992.

<sup>2</sup> *Annual Book of ASTM Standards*, Vol 04.05.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 08.01.

<sup>4</sup> *Annual Book of ASTM Standards*, Vol 08.04.

<sup>5</sup> Available from Uni-Bell PVC Pipe Association, Suite 155, 2655 Villa Creek Drive, Dallas, TX 75234.

TABLE 1 Minimum Specified Time Required for a 1.0 psig Pressure Drop for Size and Length of Pipe Indicated for Q = 0.0015

NOTE 1—See Practice UNI-B-6-90.

NOTE 2—Consult with pipe and appurtenance manufacturer for maximum test pressure for pipe size greater than 30 in. in diameter.

Pipe Diameter, in.	Minimum Time, mins	Length for Minimum Time, ft	Time for Longer Length, s	Specification Time for Length (L) Shown, mins							
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft
4	3:46	597	0.380 L	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	0.854 L	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	298	1.520 L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24
10	9:26	239	2.374 L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48
12	11:20	199	3.418 L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38
15	14:10	159	5.342 L	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04
18	17:00	133	7.692 L	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41
21	19:50	114	10.470 L	19:50	26:10	34:54	43:37	52:21	61:00	69:48	78:31
24	22:40	99	13.674 L	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:33
27	25:30	88	17.306 L	28:51	43:16	57:41	72:07	86:32	100:57	115:22	129:48
30	28:20	80	21.366 L	35:37	53:25	71:13	89:02	106:50	124:38	142:26	160:15
33	31:10	72	25.852 L	43:05	64:38	86:10	107:43	129:16	150:43	172:21	193:53
36	34:00	66	30.768 L	51:17	76:55	102:34	128:12	153:50	179:29	205:07	230:46

TABLE 2 Minimum Specified Time Required for a 0.5 psig Pressure Drop for Size and Length of Pipe Indicated for Q = 0.0015

NOTE 1—Consult with pipe and appurtenance manufacturer for maximum test pressure for pipe size greater than 30 in. in diameter.

Pipe Diameter, in.	Minimum Time, mins	Length for Minimum Time, ft	Time for Longer Length, s	Specification Time for Length (L) Shown, mins							
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft
4	1:53	597	0.190 L	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	398	0.427 L	2:50	2:50	2:50	2:50	2:50	2:50	2:51	3:12
8	3:47	298	0.760 L	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42
10	4:43	239	1.187 L	4:43	4:43	4:43	4:57	5:56	6:55	7:54	8:54
12	5:40	199	1.709 L	5:40	5:40	5:42	7:08	8:33	9:58	11:24	12:50
15	7:05	159	2.671 L	7:05	7:05	8:54	11:08	13:21	15:35	17:48	20:02
18	8:30	133	3.846 L	8:30	9:37	12:49	16:01	19:14	22:26	25:38	28:51
21	9:55	114	5.235 L	9:55	13:05	17:27	21:49	26:11	30:32	34:54	39:16
24	11:20	99	6.837 L	11:24	17:57	22:48	28:30	34:11	39:53	45:35	51:17
27	12:45	88	8.653 L	14:25	21:38	28:51	36:04	43:16	50:30	57:42	64:54
30	14:10	80	10.683 L	17:48	26:43	35:37	44:31	53:25	62:19	71:13	80:07
33	15:35	72	12.926 L	21:33	32:19	43:56	53:52	64:38	75:24	86:10	96:57
36	17:00	66	15.384 L	25:39	38:28	51:17	64:06	76:55	89:44	102:34	115:23

6. Safety Precautions

6.1 This low-pressure air test may be dangerous to personnel if, through lack of understanding or carelessness, a line is overpressurized or plugs/caps are installed or restrained improperly. It is extremely important that the various plugs be properly installed to prevent the sudden expulsion of a poorly installed or partially inflated plug. Observe the following minimum safety precautions:

6.1.1 No one shall be allowed in the manholes during testing.

6.1.2 Install and restrain all caps and plugs securely.

6.1.3 When lines are tested, it is mandatory that all the caps and plugs be braced as an added safety factor.

6.1.4 Do not overpressurize the lines. Do not exceed 9.0 psig.

NOTE 2—The axial force on a plug at 4 psig internal pressure is  $F = P \pi D^2/4$  lb, where  $D$  is the inside diameter in inches. Thus, the axial force on an 8-in. plug at the start of a properly-conducted test is over 200 lb. Restraint systems must be designed to handle these forces with adequate safety factors. Every effort should be made to maintain backfill over the pipe during air testing.

6.1.5 A regulator or relief valve set no higher than 9 psi shall

be included on all pressurizing equipment.

7. Preparation of the Line

7.1 Clean the section of sewer line to be tested by flushing or other means prior to conducting the low-pressure air test. This cleaning serves to eliminate debris and produce the most consistent results.

8. Procedures

8.1 Isolate the section of sewer line to be tested by inflatable stoppers or other suitable test plugs.

8.1.1 Plug or cap the ends of all branches, laterals, tees, wyes, and stubs to be included in the test to prevent air leakage. All plugs and caps shall be securely braced to prevent blow-out. One of the plugs or caps should have an inlet tap, or other provision for connecting a hose to a portable air control source.

8.1.2 Connect the air hose to the inlet tap and portable air control source. The air equipment shall consist of necessary valves and pressure gages to control an oil-free air source and the rate at which air flows into the test section to enable monitoring of the air pressure within the test section.

8.1.3 Add air slowly to the test section until the pressure

inside the pipe reaches 4.0 psig.

8.1.4 After the pressure of 4.0 psig is obtained, regulate the air supply so that the pressure is maintained between 3.5 to 4.0 psig for at least 2 min depending on air/ground temperature conditions. The air temperature should stabilize in equilibrium with the temperature of the pipe walls. The pressure will normally drop slightly until equilibrium is obtained; however, a minimum of 3.5 psig is required.

8.2 Determine the rate of air loss by either the constant pressure method or the time-pressure drop method.

NOTE 3—All test pressures are measured as gage pressure, which is any pressure greater than atmospheric pressure. Since water produces a pressure of 0.43 psi for every foot of depth, air test pressures must be increased to offset the depth of ground water over the sewer line. If the ground water level is 2 ft or more above the top of the pipe at the upstream end, or if the air pressure required for the test is greater than 9-psi gage, the air test method should not be used. Before the air test method is used, the ground water level should be lowered by pumping or dewatering.

8.2.1 *Constant Pressure Method*—Add air until the internal air pressure of the sewer line is raised to 4.0 psig and the test pipe section is stabilized as in 8.1. Release the pressure to 3.5 psig to run the constant pressure test. The air-flow rate in standard cubic feet per minute is read directly by a rotameter. Convert this air-flow rate to actual cubic feet per minute of air leaking from the test section by using the absolute pressure and temperature in the test section. The requirements for air loss under the constant pressure method shall be considered satisfied if the air loss does not exceed the specified leakage rate in cubic feet per minute per square foot of internal pipe surface area.

8.2.2 *Time-Pressure Drop Method*—Air is slowly introduced into the section of pipe to be tested, until the air pressure is raised to approximately 4.0 psi and the test pipe section is stabilized as in 8.1. Disconnect the air supply and decrease the pressure to 3.5 psi before starting the test. Determine the time required for the pressure to drop from 3.5 psi to 2.5 psi, and compare this interval to the required time to decide if the rate of air loss is within the allowable. Minimum holding times required by pipe diameter are shown in Table 1 and Table 2.

NOTE 4—The time-pressure drop method assumes an atmospheric pressure of 14.7 psia. Locations of high altitude need compensation for variation in atmospheric pressure to maintain the same air leakage test criteria.

8.3 Upon completion of the test, open the bleeder valve and allow all air to escape. Plugs should not be removed until all air pressure in the test section has been reduced to atmospheric pressure.

## 9. Test Time Calculations

9.1 *Test Time Criteria*—No test section shall be accepted if air loss is more than a specified leakage rate (in cubic feet per minute per square foot) determined by the approving authority.

9.2 Calculate all test times by the following formula:

$$T = 0.085 DK/Q$$

where:

$T$  = shortest time allowed for the air pressure to drop 1.0 psig, s,

$K$  = 0.000419 DL but not less than 1.0,  
 $Q$  = leak rate in cubic feet/minute/square feet of internal surface = 0.0015 CFM/SF,  
 $D$  = measured average inside diameter of sewer pipe (see Method D 2122 and Practice D 3567), in., and  
 $L$  = length of test section, ft.

Table 1 contains the specified minimum times required for a 1.00 psig pressure drop from a starting pressure of 3.5 psig to a final pressure of 2.5 psig using a leakage rate of 0.0015 ft<sup>3</sup>/min/ft<sup>2</sup> of internal surface.

9.3 The total leakage from any test section shall not exceed 625 $Q$ .

9.4 If the pressure drops 1.0 psig before the appropriate time shown in Table 1 has elapsed, the air loss rate shall be considered excessive and the section of pipe has failed the test. If the line fails the test, segmented testing may be utilized solely to find the location of leaks. Once leaks are located and repaired, retest the completed pipe installation to requirements of this test method.

9.5 For testing of long sections or sections of larger diameter pipes, or both, a timed-pressure drop of 0.5 psig shall be used in lieu of a 1.0 psig timed-pressure drop. If a 0.5 psig pressure drop is used, the appropriate required test time shall be exactly one-half the values shown in Table 1. (See Table 2.)

NOTE 5—It is not necessary to hold the test for the entire period of time in Table 1 or Table 2 when it is evident that the rate of air loss is zero or less than the allowable, and is authorized by the approving authority.

9.6 If lateral or service lines are included in the test, their length may be ignored for computing required test time if the test time requirements are met. The maximum permissible air loss should not exceed 625 $Q$ . If the test section fails, time shall be recomputed to include all the lateral lengths using the following formula:

$$T = 0.085 \left[ \frac{D_1^2 L_1 + D_2^2 L_2 + \dots + D_n^2 L_n}{D_1 L_1 + D_2 L_2 + \dots + D_n L_n} \right] \frac{K}{Q}$$

where:

$T$  = shortest time allowed for the air pressure to drop 1.0 psig, s,  
 $K$  = 0.000419 ( $D_1 L_1 + D_2 L_2 + \dots + D_n L_n$ ), but not less than 1.0,  
 $Q$  = 0.0015 CFM/SF,  
 $D_1, D_2, \text{ etc.}$  = nominal diameter of different size of pipe being tested, and  
 $L_1, L_2, \text{ etc.}$  = respective lengths of the different size pipes being tested.

If the recomputed test time is short enough to allow the section tested to pass, then the test section meets the requirements of this test method.

## 10. Precision and Bias

10.1 This test method provides qualitative data only; therefore, a precision and bias statement is nonapplicable.

## 11. Keywords

11.1 air test; plastic; sewer

APPENDIXES

(Nonmandatory Information)

X1. EXAMPLES

X1.1 In order to show the technique of applying this test method, the following examples have been prepared. The examples have been designed to illustrate the use of Table 1 and Table 2 and the formula in 9.1 that uses a leakage rate of 0.0015 CFM/ft<sup>2</sup>.

X1.2 A manhole-to-manhole reach of nominal 12 in. pipe is 350 ft long. No lateral connections exist in the reach. What is the required test time for a 1.0 psig pressure drop?

X1.2.1 *Solution*—The required test time can be read directly from Table 1. For 350 ft of 12 in. pipe, the required test time is 19:56 (19 min and 56 s).

X1.3 A 350 ft section of nominal 12 in. pipe is ready for testing. A total of 128 ft of 4 in. lateral sewer pipe is connected to the 350 ft section and will be included in the test. What will be the required test time for a 0.5 psig pressure drop?

X1.3.1 *Solution*—Lateral sewers may be disregarded when selecting test times (see 9.1). Therefore, the required test time will be 9 min and 58 s as shown in Table 2.

NOTE X1.1—If the lateral sewers had not been disregarded, the required test time would be 10 min and 22 s, that is, only 24 s longer.

X1.4 What should the required test time be for a 1.0 psig pressure drop in 327 ft of nominal 8 in. diameter pipe between two manholes?

X1.4.1 *Solution*—The exact test time is easily calculated by using Table 1. Table 1 is used because a 1.0 psig pressure drop is specified. Since 327 ft exceed the 298 ft length associated with the minimum test time for an 8 in. pipeline, the fourth column in Table 1 is used to calculate the required test time as follows:

$$T = 1.520 \times L = 1.52 \times 327 = 497 \text{ s}$$

Therefore, the required test time for a 1.0 psig pressure drop is 497 s or 8 min and 17 s.

X1.5 A manhole-to-manhole reach of nominal 24 in. pipe is 82 ft long. What is the required test time for a 0.5 psig pressure drop?

X1.5.1 *Solution*—Table 2 is used because a 0.5 psig pressure drop is specified. Since 82 ft is less than the 99 ft length associated with the minimum test time for a 24 in. pipeline, the minimum test time shall apply. Thus, the required test time for a 0.5 psig pressure drop is 11:24 (11 min and 24 s).

X1.6 A 412 ft section of nominal 15 in. sewer pipe has been readied for air testing. A total of 374 ft of nominal 6 in. lateral

piping and 148 ft of nominal 4 in. lateral piping branch off the 15 in.-sewer line. All laterals have been capped or plugged, or both, and will be tested together with the 15 in. main line. The specified pressure drop, which will be timed, is 0.5 psig. What is the appropriate test time for this pipe network?

X1.6.1 *Solution*—All lateral sewer sizes and lengths may be disregarded since their influence is generally not significant enough to warrant computation. Table 2 is used for a 0.5 psig pressure drop. The fourth column in the table gives the appropriate formula for calculating the required test time because 412 ft is longer than the third column value of 159 ft.

$$T = 2.671L = 2.671 \times 412 = 1100 \text{ s}$$

The required test time is 1100 s or 18 min and 20 s.

X1.7 A manhole-to-manhole reach of nominal 8 in. pipe is only 100 ft long. A total of 300 ft of nominal 4 in. lateral piping is connected to the 100 ft section and will be included in air testing the section. What will be the required test time for a 1.0 psig pressure drop?

X1.7.1 *Solution*—The required test time can be read directly from Table 1. Thus, for 100 ft of 8 in. pipe, the required holding time is 7:34 (7 min and 34 s). However, should the section fail to meet this test, recalculate the required holding time, taking into account the connected laterals. This recalculation is required because the total internal pipe surface area is less than 625 ft<sup>2</sup>.

$$\begin{aligned} \text{Total area} &= \pi \left[ \frac{D L_1 + D L_2 + \dots + D_n L_n}{12} \right] \\ &= \pi \left[ \frac{(8 \times 100) + (4 \times 300)}{12} \right] = 524 \text{ ft}^2 \end{aligned}$$

Using the equation provided in 9.1, the required test time should be recomputed as follows:

$$\begin{aligned} K &= 0.000419 [(8 \times 100) + (4 \times 300)] \\ &= 0.838 \\ 0.838 &= 1.0 \rightarrow K = 1.0 \end{aligned}$$

NOTE X1.2—K will always be 1.0 when the total area is less than 625 ft<sup>2</sup>.

$$T = 0.085 \left[ \frac{(8^2 \times 100) + (4^2 \times 300)}{(8 \times 100) + (4 \times 300)} \right] \frac{1.0}{0.0015}$$

$$T = 317$$

The required test time is actually only 317 s or 5 min and 17 s for a 1.0 psig pressure drop. Therefore, if the section can meet this test time, it shall be accepted.

NOTE X1.3—For a specified 0.5 psig pressure drop, the test holding time would be only half as long, that is 2 min and 38 s.

## X2. RATIONALE

X2.1 Low-pressure air testing is a fully accepted means of testing sewer lines. (Refs 1, 2, and 3)<sup>6</sup>

X2.2 It is true that due to the differing physical properties of water and air, no direct numerical correlation exists between

air loss and water leakage. This does not mean that the two are unrelated. It has been established that lower air loss rates are associated with lower leakage rates.

X2.3 The data in these studies are based on installed sewer of concrete, clay, and asbestos cement sanitary sewers and were useful in deriving Practices C 828 and C 924.

<sup>6</sup> The boldface numbers in parentheses refer to the references listed at the end of this test method.

## REFERENCES

- (1) Hobbs, S. H., and Cherne, L. G., "Air Testing Sanitary Sewers," *WPCF Journal*, April 1968.
- (2) Ramseier, R. E., "Low Pressure Air Test for Sanitary Sewers," *Journal of the Sanitary Engineering Division, ASCE*, April 1964.
- (3) Ramseier, R. E., "Testing New Sewer Pipe Installation," *Water Pollution Central Federation Journal*, April 1972.

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American Water Works Association  
ANSI/AWWA C605-94  
(First Edition)



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**AWWA STANDARD**  
FOR  
UNDERGROUND INSTALLATION  
OF POLYVINYL CHLORIDE (PVC) PRESSURE  
PIPE AND FITTINGS FOR WATER



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*Approved by American National Standards Institute Mar. 15, 1995.*

AMERICAN WATER WORKS ASSOCIATION

6666 West Quincy Avenue, Denver, Colorado 80235

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## SECTION 7: PREPARATION FOR USE

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### Sec. 7.1 Cleaning

Prior to filling, testing, and disinfecting the installed line, the constructor shall ensure that the line is clean in conformance with ANSI/AWWA C651. To facilitate effective disinfection and minimize the chlorine dosage needed, when practicable, predisinfection flushing should continue until the discharge turbidity drops below 5 ntu using measurement procedures described in AWWA Manual M12.

### Sec. 7.2 Filling and Flushing

Lines shall be filled slowly with potable water at a maximum velocity of 1 ft/s (0.3 m/s) while venting all air. Precautions shall be taken to prevent entrapping air in the lines. After filling, lines shall be flushed at blowoffs and dead ends at a minimum velocity of 3 ft/s (0.9 m/s). A minimum of three changes of treated water shall be used in flushing operations. Valves shall be closed slowly to prevent excessive surges while maintaining positive pressure at all times throughout the new line. Flushing water shall be discharged without causing erosion damage, nuisance, or interruption of traffic. Disposal of flushing water shall be in accordance with Sec. 4.1.1.2. A special pipeline pig may be required when the required flushing velocity cannot be achieved or when needed to conserve water. The constructor shall make provisions for launching and retrieving the pig.

### Sec. 7.3 Hydrostatic Testing

*7.3.1 General.* To prevent pipe movement, sufficient backfill shall be placed prior to filling the pipe with water and field testing. When local conditions require that the trenches be backfilled immediately after the pipe has been laid, the testing may be carried out after backfilling has been completed but before placement of permanent surfacing. The constructor shall ensure that thrust blocking or other types of restraining systems will provide adequate restraint prior to pressurizing the pipeline. Refer to Sec. 5.8.4 for backfilling requirements.

*7.3.2 Cross-connection control.* When existing water mains are used to supply test water, they should be protected from backflow contamination by temporarily installing a double check-valve assembly between the test and supply main or by other means approved by the purchaser. Prior to pressure and leakage testing, the temporary backflow protection should be removed and the main under test isolated from the supply main.

*7.3.3 Procedure.* The following procedure is based on the assumption that the pressure and leakage tests will be performed at the same time. Separate tests may be made if desired. If separate tests are made, the pressure test shall be performed first. Tests shall be performed only after the pipeline has been properly filled, flushed, and purged of all air. The specified test pressure shall be applied by means of an approved pumping assembly connected to the pipe in a manner satisfactory to the purchaser. The test pressure shall not exceed pipe or thrust-restraint design pressures. If necessary, the test pressure shall be maintained by additional pumping for the specified time during which the system and all exposed pipe, fittings, valves, and hydrants shall be carefully examined for leakage. All visible leaks shall be stopped. All defective elements shall be repaired or removed and replaced and the test repeated until the allowable leakage requirements have been met.

7.3.4 *Test method.* The constructor may perform simultaneous pressure and leakage tests or perform separate pressure and leakage tests on the installed system at test durations and pressures specified in Table 2. Tests shall be witnessed by the purchaser or the purchaser's agent, and the equipment used for the test shall be subject to the approval of the purchaser or the purchaser's agent.

7.3.5 *Allowable leakage.* The constructor shall furnish the gauges and measuring device for the leakage test, pump, pipe, connections, and all other necessary apparatus, unless otherwise specified, and shall furnish the necessary assistance to conduct the test. The duration of each leakage test shall be 2 h, unless otherwise specified. During the test, the pipeline shall be subjected to the pressure listed in Table 2. Leakage shall be defined as the quantity of water that must be supplied into the pipe section being tested to maintain a pressure within 5 psi (34 kPa) of the specified leakage-test pressure after the pipe has been filled with water and the air in the pipeline has been expelled. No installation will be accepted if the leakage is greater than that determined by the formula:

$$L = \frac{ND\sqrt{P}}{7,400} \quad (\text{Eq 1})$$

Where:

- $L$  = allowable leakage, in gallons per hour
- $N$  = number of joints in the length of pipeline tested
- $D$  = nominal diameter of the pipe, in inches
- $P$  = average test pressure during the leakage test, in pounds per square inch (gauge)

In metric units,

$$L_m = \frac{ND\sqrt{P}}{130,400} \quad (\text{Eq 2})$$

Where:

- $L_m$  = allowable leakage, in litres per hour
- $N$  = number of joints in the length of pipeline tested
- $D$  = nominal diameter of the pipe, in millimetres
- $P$  = average test pressure during the leakage test, in kilovolts per ampere

Table 2 System test methods

Procedure	Pressure	Duration of Test
Simultaneous Pressure and Leakage Tests	150% of working pressure* at point of test, but not less than 125% of normal working pressure at highest elevation.†	2 h
Separate Pressure Test	150% of working pressure* at point of test, but not less than 125% of normal working pressure at highest elevation.†	1 h
Separate Leakage Test	150% of working pressure* of segment tested.†	2 h

\*Working pressure is defined as maximum anticipated sustained operating pressure.

†In no case shall the test pressure be allowed to exceed the design pressure for pipe, appurtenances, or thrust restraints.

Table 3 Allowable leakage per 50 joints of PVC pipe\* — *gph*<sup>†</sup>

Avg. Test Pressure, <i>psi</i> ( <i>kPa</i> )	Nominal Pipe Diameter, <i>in.</i> ( <i>mm</i> )											
	4 (100)	6 (150)	8 (200)	10 (250)	12 (300)	14 (350)	16 (400)	18 (450)	20 (500)	24 (610)	30 (760)	36 (915)
300 (2,070)	0.47	0.70	0.94	1.17	1.40	1.64	1.87	2.11	2.34	2.81	3.51	4.21
275 (1,900)	0.45	0.67	0.90	1.12	1.34	1.57	1.79	2.02	2.24	2.69	3.36	4.08
250 (1,720)	0.43	0.64	0.85	1.07	1.28	1.50	1.71	1.92	2.14	2.56	3.21	3.85
225 (1,550)	0.41	0.61	0.81	1.01	1.22	1.42	1.62	1.82	2.03	2.43	3.04	3.65
200 (1,380)	0.38	0.57	0.76	0.96	1.15	1.34	1.53	1.72	1.91	2.29	2.87	3.44
175 (1,210)	0.36	0.54	0.72	0.89	1.07	1.25	1.43	1.61	1.79	2.15	2.68	3.22
150 (1,030)	0.33	0.50	0.66	0.83	0.99	1.16	1.32	1.49	1.66	1.99	2.48	2.98
125 (860)	0.30	0.45	0.60	0.76	0.91	1.06	1.21	1.36	1.51	1.81	2.27	2.72
100 (690)	0.27	0.41	0.54	0.68	0.81	0.95	1.08	1.22	1.35	1.62	2.03	2.43
75 (520)	0.23	0.35	0.47	0.59	0.70	0.82	0.94	1.05	1.17	1.40	1.76	2.11
50 (340)	0.19	0.29	0.38	0.48	0.57	0.67	0.76	0.86	0.96	1.15	1.43	1.72

\*If the pipeline under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size.

†To obtain leakage in litres per hour, multiply the values in the table by 3.72.

These formulas are based on an allowable leakage of 10.5 gpd/mi/in. (0.978 L/day/km/mm) of nominal diameter at a pressure of 150 psi (1,030 kPa).

7.3.5.1 Leakage values determined by the above formulas are presented in Table 3.

7.3.5.2 When testing against closed metal-seated valves, an additional leakage per closed valve of 0.078 gph/in. (0.0012 L/h/mm) of nominal valve size shall be allowed.

7.3.5.3 When hydrants are in the test section, the test shall be made against closed hydrant valves.

7.3.5.4 All visible leaks shall be repaired, regardless of the amount of leakage.

7.3.5.5 Alternative allowable-leakage criteria may be used if specified by the purchaser.

## Sec. 7.4 Disinfecting

Prior to placing the installed water line in service, the new pipe and all exposed sections and appurtenances of existing pipelines shall be cleaned and disinfected in accordance with ANSI/AWWA C651, unless otherwise specified. Pipelines shall be flushed following completion of disinfection procedures. Disposal or neutralization of disinfection water shall comply with applicable regulations. (Refer to Appendix B of ANSI/AWWA C651.)



# Standard Practice for Testing Concrete Pipe Sewer Lines by Low-Pressure Air Test Method<sup>1</sup>

This standard is issued under the fixed designation C 924; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

*This standard has been approved for use by agencies of the Department of Defense.*

## 1. Scope

1.1 This practice covers procedures for testing concrete pipe sewer lines, when using the low-pressure air test method to demonstrate the integrity of the installed material and the construction procedures. This practice is used for testing 4 to 24-in. circular concrete pipe sewer lines utilizing gasketed joints.

1.2 This practice may also be used as a preliminary test to enable the installer to demonstrate the condition of the line prior to backfill.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use (see Section 6, Safety Precautions).*

1.4 A complete metric companion to Practice C 924 has been developed—C 924 M; therefore, no metric equivalents are presented in this practice.

NOTE 1—Air test criteria presented in this practice are similar to those in general use. The test and criteria have been used widely and successfully in testing smaller diameter pipe, but additional data are required to confirm the safety and applicability or develop criteria for pipe larger than 24 in. in diameter. Larger pipe may be accepted more conveniently by visual inspection and individual joint testing.

NOTE 2—It should be understood that no correlation has been found between air loss and water leakage.

## 2. Referenced Documents

### 2.1 ASTM Standards:

C 822 Terminology Relating to Concrete Pipe and Related Products<sup>2</sup>

C 969 Practice for Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines<sup>2</sup>

## 3. Terminology

3.1 Definitions—For definitions of terms relating to concrete pipe, see Terminology C 822.

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee C-13 on Concrete Pipe and is the direct responsibility of Subcommittee C13.09 on Methods of Test. Current edition approved Jan. 27, 1989. Published March 1989. Originally published as C 924 – 84. Last previous edition C 924 – 86.

<sup>2</sup> *Annual Book of ASTM Standards*, Vol 04.05.

## 4. Summary of Practice

4.1 The sewer line to be tested is plugged. Air is introduced at low pressures into the plugged line. The amount of air loss is used to determine the acceptability of the sewer line.

## 5. Significance and Use

5.1 This is not a routine test. The values recorded are applicable only to the sewer being tested and at the time of testing.

## 6. Safety Precautions

6.1 The air test may be dangerous if a line is not prepared properly and proper procedures are not followed.

6.2 It is extremely important that plugs be installed and braced in such a way as to prevent blowouts. It is also imperative that the pressure in the pipe be relieved completely before any plug is loosened for removal.

NOTE 3—As an example, 4-psi air pressure acting on one side of a 15-in. plug results in a total force of approximately 700 lbf on the plug. Such a force could cause the expulsion of an improperly installed plug.

6.3 Pressurizing equipment should include a 6-psi pressure relief device to reduce hazards and avoid over-pressurization with possible damage to the line.

6.4 No one should be allowed in or near the manholes during pressurization, testing, or depressurization.

## 7. Capacity of Air Compressor

7.1 To provide satisfactory test results, the air compressor should be capable of pressurizing the sewer test section in the required test time, or less, as determined by 9.1. The compressor capacity required to accomplish the pressurization is equal to the rate necessary to fill the sewer to the desired pressure plus the allowable air loss rate:

$$C = \frac{0.17D^2L}{T} + Q \quad (1)$$

where:

$C$  = compressor capacity, cfm,  
 $T$  = required test time, or less, min,  
 $D$  = pipe internal diameter, ft,  
 $L$  = length of test section, ft, and  
 $Q$  = allowable air loss, rate, cfm.

### 8. Preparation of the Sewer Line

8.1 Where practical, clean the sewer line prior to testing to wet the pipe surface and eliminate debris.

NOTE 4—A wetted interior pipe surface is desirable and will produce more consistent test results. Air may pass through the walls of dry pipe. This can be overcome by wetting the pipe. If the problem persists, segmental testing of the line will establish if there is a significant leak.

8.2 Plug all pipe outlets including laterals, which should be given special attention. Review safety precautions in Section 6.

### 9. Procedure

9.1 Determine the test time for the sewer line to be tested by using Table 1. Table 1 has been established using the criteria specified in Table 2, and the formulas contained in the Appendix. The test time is the time required for the pressure to drop from 3.5 psi to 2.5 psi.

NOTE 5—All test pressures are measured as gage pressure, which is defined as any pressure greater than atmospheric pressure. Since water produces a pressure of 0.43 psi for every foot of depth, air test pressures must be increased to offset the depth of ground water over the sewer line. If the ground water level is 2 ft or more above the top of the pipe at the upstream end or if the air pressure required for the test is greater than 5-psi gage, the air test method should not be used. In that event, the infiltration test, (see Practice C 969), shall be used.

9.2 Add air until the internal air pressure of the sewer line is raised to approximately 4 psi. Allow the air pressure to stabilize. The pressure will normally drop until the temperature of the air in the line stabilizes.

9.3 When the pressure has stabilized and is at or above the starting test pressure of 3.5 psi, commence the test by allowing

**TABLE 1 Minimum Test Time for Various Pipe Sizes**

Nominal Pipe Size, in.	T (time), min/100 ft	Nominal Pipe Size, in.	T (time), min/100 ft
4	0.3	15	2.1
6	0.7	18	2.4
8	1.2	21	3.0
10	1.5	24	3.6
12	1.8		

**TABLE 2 Allowable Air Loss for Various Pipe Sizes**

D, Nominal Pipe Size, in.	Q ft <sup>3</sup> /min	D, Nominal Pipe Size, in.,	Q ft <sup>3</sup> /min
4	2	15	4
6	2	18	5
8	2	21	5.5
10	2.5	24	6
12	3		

the gage pressure to drop to 3.5 psi at which point the time recording is initiated. Record the drop in pressure for the test period.

9.4 If the drop in pressure is 1 psi or less during the test period, accept the line. If the drop in pressure is more than 1 psi during the test period, inspect, evaluate, and retest the line to determine the cause of excessive air loss.

9.5 Use or failure of this air test shall not preclude acceptance by appropriate water infiltration or exfiltration testing, (see Practice C 969), or other means.

### 10. Air Test Criteria

10.1 An appropriate allowable air loss, *Q*, in cubic feet per minute has been established for each nominal pipe size. Based on field experience the *Q*'s that have been selected will enable detection of any significant leak. Table 2 lists the *Q* established for each pipe size.

10.2 When a main line with connected laterals is to be tested as a unit, the total volume of the main and laterals shall be considered, and the allowable air loss rate shall be that listed for the main.

### 11. Precision and Bias

11.1 No justifiable statement can be made either on precision or bias of this procedure since the test result merely states whether there is conformance to the criteria for success specified. Due to the sealing effects of ground water and internal flow on sewer line, the test conditions and results are not reproducible.

## APPENDIXES

(Nonmandatory Information)

### XI. EQUATIONS USED IN PRACTICE C924

X1.1 The required test time per 100 ft of pipe for a single diameter pipe using Table 2:

$$T_T = (0.00037) \left( \frac{D^2 L}{Q} \right) \quad (X1.1)$$

X1.2 The required test time for a single diameter pipe system using Table 1:

$$T_T = (L) \left( \frac{T}{100} \right) \quad (X1.2)$$

X1.3 For testing a sewer system involving different diameter pipe, the allowable air loss rate is equal to that of the main sewer line (using Table 2). For this system the minimum test time per 100 ft of pipe is equal to that of the main sewer line (using Table 1). Each length of lateral pipe is converted into an equivalent length of main sewer line. Then each length is added to the test length of main sewer. The minimum test time for the total system is computed as follows:

$$L_e = \Sigma \left( \frac{d^2 l}{D^2} \right) \quad (X1.3)$$

$$T_T = (L + L_e) \left( \frac{T}{100} \right) \quad (X1.4)$$

X1.4 The symbols used in the equations in this practice are defined as follows;

where:

$T$  = minimum test time per 100 ft of pipe for pressure to drop from 3.5 to 2.5 psi, min,

$T_T$  = minimum test time for total system, min,  
 $D$  = designated inside diameter of test section of main sewer, in.,  
 $d$  = designated inside diameter of lateral, in.,  
 $L$  = length of test section or main sewer, ft,  
 $L_e$  = total volume of all laterals connected to the main sewer expressed as an equivalent length of the main sewer, ft,  
 $l$  = total length of each diameter lateral, ft, and  
 $Q$  = allowable air loss rate, ft<sup>3</sup>/min.

## X2. APPLICATION OF PRACTICE C924

X2.1 The following examples have been prepared to demonstrate the technique of applying this practice.

X2.2 —*Example 1*—A sewer system consists of 600 ft of 18-in. diameter concrete pipe between manholes A and B; 35 ft of 12-in. diameter pipe between manholes B and C.

### X2.2.1 Find

The appropriate test times to demonstrate the integrity of the installed lines.

### X2.2.2 Solution:

X2.2.2.1 For the main sewer between manholes A and B, use equation X1.2 and from Table 1,  $T = 2.4$  min/100 ft, for 18-in. pipe.

$$T_T = (L) \left( \frac{T}{100} \right) \quad (X2.1)$$

$$T_T = (600) \left( \frac{2.4}{100} \right) \quad (X2.2)$$

$$T_T = 14 \text{ min.} \quad (X2.3)$$

X2.2.2.2 Similarly, for the main sewer between manholes B and C:

$$T_T = (35) \left( \frac{1.8}{100} \right) \quad (X2.4)$$

$$T_T = 0.6 \text{ min} \quad (X2.5)$$

X2.3 *Example 2*—The 600 ft. of 18-in. diameter concrete pipe between manholes A and B in Example 1 has connected 6-in. laterals with a total length of 900 ft.

X2.3.1 Find—The appropriate test time to demonstrate the

integrity of the installed lines.

### X2.3.2 Solution:

X2.3.2.1 Use equation X1.3 to convert the total volume of 6-in. laterals to an equivalent length of main sewer:

$$L_e = \Sigma \left( \frac{d^2 l}{D^2} \right) \quad (X2.6)$$

$$L_e = \left( \frac{6^2 \times 900}{18^2} \right) \quad (X2.7)$$

$$L_e = 100 \text{ ft} \quad (X2.8)$$

X2.3.2.2 For the connected system, use Table 1 and from Table 1,  $T = 2.4$  min/100 ft, for 18-in pipe:

$$T_T = (L + L_e) \left( \frac{T}{100} \right) \quad (X2.9)$$

$$T_T = (600 + 100) \left( \frac{2.4}{100} \right) \quad (X2.10)$$

$$T_T = 17 \text{ min.} \quad (X2.11)$$

X2.4 If a line fails the air test, the following courses of action should be considered:

(1) Segmentally test the line and compare the time-air loss values in each segment.

(2) If the values in each segment are comparable, the air-loss problem may be distributed throughout the line, and further analysis should be made.

(3) If the values in each segment are significantly different, each segment may be evaluated and further analysis be made to determine the location of any significant air losses.

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American Water Works Association

**ANSI/AWWA C600-99**

(Revision of ANSI/AWWA C600-93)



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**AWWA STANDARD**  
FOR  
**INSTALLATION OF DUCTILE-IRON WATER  
MAINS AND THEIR APPURTENANCES**



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**AMERICAN WATER WORKS ASSOCIATION**

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## Sec. 5.2 Hydrostatic Testing

*WARNING: The testing methods described in this section are specific for water-pressure testing. These procedures should not be applied for air-pressure testing because of the serious safety hazards involved.*

### 5.2.1 Pressure test.

5.2.1.1 Test restrictions. Test pressure shall not be less than 1.25 times the working pressure at the highest point along the test section.

Test pressure shall not exceed pipe or thrust-restraint design pressures.  
The hydrostatic test shall be of at least a 2-h duration.

Test pressure shall not vary by more than  $\pm 5$  psi (34.5 kPa) for the duration of the test.

Valves shall not be operated in either direction at a differential pressure exceeding the rated valve working pressure. A test pressure greater than the rated valve pressure can result in trapped test pressure between the gates of a double-disc gate valve. For tests at these pressures, the test setup should include a provision, independent of the valve, to reduce the line pressure to the rated valve pressure on completion of the test. The valve can then be opened enough to equalize the trapped pressure with the line pressure, or the valve can be fully opened if desired.

The test pressure shall not exceed the rated pressure of the valves when the pressure boundary of the test section includes closed, resilient-seated gate valves or butterfly valves.

5.2.1.2 Pressurization. After the pipe has been laid, all newly laid pipe or any valved section thereof shall be subjected to a hydrostatic pressure of at least 1.5 times the working pressure at the point of testing. Each valved section of pipe shall be slowly filled with water, and the specified test pressure (based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gauge) shall be applied using a pump connected to the pipe. Valves shall not be operated in either the opened or closed direction at differential pressures above the rated pressure. The system should be allowed to stabilize at the test pressure before conducting the hydrostatic test.

5.2.1.3 Air removal. Before applying the specified test pressure, air shall be expelled completely from the section of piping under test. If permanent air vents are not located at all high points, corporation cocks shall be installed at these points to expel the air as the line is filled with water. After the air has been expelled, the corporation cocks shall be closed and the test pressure applied. At the conclusion of the pressure test, the corporation cocks shall be removed and the pipe plugged or left in place as required by the specifications.

5.2.1.4 Examination. Any exposed pipe, fittings, valves, hydrants, and joints shall be examined carefully during the test. Any damage or defective pipe, fittings, valves, hydrants, or joints that are discovered following the pressure test shall be repaired or replaced with reliable material, and the test shall be repeated until satisfactory results are obtained.

5.2.1.5 Testing allowance defined. Testing allowance shall be defined as the quantity of makeup water that must be supplied into the newly laid pipe or any valved section thereof to maintain pressure within 5 psi (34.5 kPa) of the specified test pressure after the pipe has been filled with water and the air has been expelled. Testing allowance shall not be measured by a drop in pressure in a test section over a period of time.

5.2.1.6 Testing allowance. No pipe installation will be accepted if the amount of makeup water is greater than that determined by the following formula:

In inch-pound units,

$$L = \frac{SD\sqrt{P}}{133,200} \quad (\text{Eq 1})$$

Where:

- $L$  = testing allowance (makeup water), in gallons per hour
- $S$  = length of pipe tested, in feet
- $D$  = nominal diameter of the pipe, in inches
- $P$  = average test pressure during the hydrostatic test, in pounds per square inch (gauge)

In metric units,

$$L_m = \frac{SD\sqrt{P}}{715,317} \quad (\text{Eq 2})$$

Where:

- $L_m$  = testing allowance (makeup water), in liters per hour
- $S$  = length of pipe tested, in meters
- $D$  = nominal diameter of the pipe, in millimeters
- $P$  = average test pressure during the hydrostatic test, in kPa

These formulas are based on a testing allowance of 11.65 gpd/mi/in. (1.079 L/d/km/mm) of nominal diameter at a pressure of 150 psi (1,034 kPa).

5.2.1.6.1 Testing allowance at various pressures is shown in Tables 6A and 6B.

5.2.1.6.2 When testing against closed metal-seated valves, an additional testing allowance per closed valve of 0.0078 gal/h/in. (1.2 mL/h/mm) of nominal valve size shall be allowed.

5.2.1.6.3 When hydrants are in the test section, the test shall be made against the main valve in the hydrant.

5.2.1.7 Acceptance of installation. Acceptance shall be determined on the basis of testing allowance. If any test of laid pipe discloses a testing allowance greater than that specified in Sec. 5.2.1.6, repairs or replacements shall be accomplished in accordance with the specifications.

5.2.1.7.1 All visible leaks are to be repaired regardless of the allowance used for testing.

Table 6A Hydrostatic testing allowance per 1,000 ft of pipeline\*—gph†

Avg. Test Pressure psi	Nominal Pipe Diameter—in.																	
	3	4	6	8	10	12	14	16	18	20	24	30	36	42	48	54	60	64
450	0.48	0.64	0.95	1.27	1.59	1.91	2.23	2.55	2.87	3.18	3.82	4.78	5.73	6.69	7.64	8.60	9.56	10.19
400	0.45	0.60	0.90	1.20	1.50	1.80	2.10	2.40	2.70	3.00	3.60	4.50	5.41	6.31	7.21	8.11	9.01	9.61
350	0.42	0.56	0.84	1.12	1.40	1.69	1.97	2.25	2.53	2.81	3.37	4.21	5.06	5.90	6.74	7.58	8.43	8.99
300	0.39	0.52	0.78	1.04	1.30	1.56	1.82	2.08	2.34	2.60	3.12	3.90	4.68	5.46	6.24	7.02	7.80	8.32
275	0.37	0.50	0.75	1.00	1.24	1.49	1.74	1.99	2.24	2.49	2.99	3.73	4.48	5.23	5.98	6.72	7.47	7.97
250	0.36	0.47	0.71	0.95	1.19	1.42	1.66	1.90	2.14	2.37	2.85	3.56	4.27	4.99	5.70	6.41	7.12	7.60
225	0.34	0.45	0.68	0.90	1.13	1.35	1.58	1.80	2.03	2.25	2.70	3.38	4.05	4.73	5.41	6.03	6.76	7.21
200	0.32	0.43	0.64	0.85	1.06	1.28	1.48	1.70	1.91	2.12	2.55	3.19	3.82	4.46	5.09	5.73	6.37	6.80
175	0.30	0.40	0.59	0.80	0.99	1.19	1.39	1.59	1.79	1.98	2.38	2.98	3.58	4.17	4.77	5.36	5.96	6.36
150	0.28	0.37	0.55	0.74	0.92	1.10	1.29	1.47	1.66	1.84	2.21	2.76	3.31	3.86	4.41	4.97	5.52	5.88
125	0.25	0.34	0.50	0.67	0.84	1.01	1.18	1.34	1.51	1.68	2.01	2.52	3.02	3.53	4.03	4.53	5.04	5.37
100	0.23	0.30	0.45	0.60	0.75	0.90	1.05	1.20	1.35	1.50	1.80	2.25	2.70	3.15	3.60	4.05	4.50	4.80

\*If the pipeline under test contains sections of various diameters, the testing allowance will be the sum of the testing allowance for each size.

†Calculated on the basis of Eq. 1.

Table 6B Hydrostatic testing allowance per 300 m of pipeline —L/h†

Avg. Test Pressure KPa	Nominal Pipe Diameter—mm																			
	76	102	152	203	254	305	356	406	457	508	610	762	914	1,067	1,219	1,400	1,500	1,600		
3,000	1.84	2.30	3.45	4.59	5.74	6.89	8.04	9.19	10.34	11.49	13.78	17.23	20.67	22.97	27.57	32.16	34.46	36.75		
2,800	1.78	2.22	3.33	4.44	5.55	6.66	7.77	8.88	9.99	11.10	13.32	16.64	19.97	22.19	26.63	31.07	33.29	35.51		
2,600	1.71	2.14	3.21	4.28	5.35	6.42	7.48	8.55	9.62	10.69	12.83	16.04	19.25	21.39	25.66	29.94	32.08	34.22		
2,400	1.64	2.05	3.08	4.11	5.14	6.16	7.19	8.22	9.25	10.27	12.33	15.41	18.49	20.55	24.66	28.76	30.82	32.87		
2,200	1.57	1.97	2.95	3.93	4.92	5.90	6.88	7.87	8.85	9.84	11.80	14.75	17.70	19.67	23.61	27.54	29.51	31.47		
2,000	1.50	1.88	2.81	3.75	4.69	5.63	6.56	7.50	8.44	9.38	11.25	14.07	16.88	18.76	22.51	26.26	28.13	30.01		
1,800	1.42	1.78	2.67	3.56	4.45	5.34	6.23	7.12	8.01	8.90	10.68	13.35	16.01	17.79	21.35	24.91	26.69	28.47		
1,600	1.34	1.68	2.52	3.36	4.19	5.03	5.87	6.71	7.55	8.39	10.07	12.58	15.10	16.78	20.13	23.49	25.16	26.84		
1,400	1.26	1.57	2.35	3.14	3.92	4.71	5.49	6.28	7.06	7.85	9.42	11.77	14.12	15.69	18.83	21.97	23.54	25.11		
1,200	1.16	1.45	2.18	2.91	3.63	4.36	5.08	5.81	6.54	7.26	8.72	10.90	13.08	14.53	17.43	20.34	21.79	23.25		
1,000	1.06	1.33	1.99	2.65	3.32	3.98	4.64	5.30	5.97	6.63	7.96	9.95	11.94	13.26	15.91	18.57	19.89	21.22		
800	0.95	1.19	1.78	2.37	2.97	3.56	4.15	4.74	5.34	5.93	7.12	8.90	10.68	11.86	14.23	16.61	17.79	18.98		
600	0.82	1.03	1.54	2.05	2.57	3.08	3.60	4.11	4.62	5.14	6.16	7.70	9.25	10.27	12.33	14.38	15.41	16.44		

\*If the pipeline under test contains sections of various diameters, the testing allowance will be the sum of the testing allowance for each size.

†Calculated on the basis of Eq. 2.



## Standard Practice for Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines<sup>1</sup>

This standard is issued under the fixed designation C 969; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

*This standard has been approved for use by agencies of the Department of Defense.*

### 1. Scope

1.1 This practice covers procedures for testing installed precast concrete pipe sewer lines using either water infiltration or exfiltration acceptance limits to demonstrate the integrity of the installed materials and construction procedure.

1.2 A complete metric companion to this practice has been developed—C 969M; therefore, no metric equivalents are presented in this practice.

NOTE 1—The owner should specify the following: who will conduct, observe, and furnish labor, furnish material and measuring devices, and pay for the tests; who is responsible for determining local groundwater conditions; and which test is to be conducted, that is, an infiltration test or an exfiltration test.

NOTE 2—Test criteria presented in this practice are similar to those in general use. Pipe, 24-in. diameter or larger, may be accepted by visual inspection when testing for infiltration.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

### 2. Referenced Documents

#### 2.1 ASTM Standards:

C 822 Terminology Relating to Concrete Pipe and Related Products<sup>2</sup>

### 3. Terminology

3.1 *Definitions*—For definitions of terms relating to concrete pipe, see Terminology C 822.

### 4. Summary of Practice

4.1 Determine the groundwater conditions surrounding the section of sewer to be tested and select the type of test to be conducted.

4.2 For the infiltration test, the amount of water leaking into the sewer line is measured, and the rate of infiltration is

determined. If the rate is less than or equal to the allowable limit, the section of sewer tested is acceptable.

4.3 For the exfiltration test, the sewer line is filled with water to the recommended test head and the rate of water loss is determined. If the rate is less than or equal to the allowable limit, the section of sewer tested is acceptable.

### 5. Significance and Use

5.1 This is not a routine test. The values recorded are applicable only to the sewer being tested and at the time of testing.

### 6. Preparation of the Sewer Line

6.1 The sewer line should be free of debris prior to testing.

6.2 The manholes, the ends of the branches, laterals, wyes and stubs to be included in the test shall be plugged. All plugs shall be secured to prevent leakage blowout due to testing pressure.

### 7. Procedure

#### 7.1 Infiltration Testing:

7.1.1 Conduct testing from manhole to manhole or between more than two manholes. The length of main tested shall not exceed 700 ft.

7.1.2 Stop all dewatering operations and allow the groundwater to return to its normal level. Infiltration testing should not be used unless the groundwater level is at least 2 ft above the crown of the pipe for the entire length of the test section.

7.1.3 Plug all pipe outlets discharging into the upstream manhole.

7.1.4 Measure the groundwater elevation and determine the average head over the test section.

7.1.5 Measure infiltration leakage at the outlet of the test section. Because leakage allowances are small, measurements are best made by either timing the filling of a small container of known volume, or by directing flow into a container for a specified time and measuring the content, or by using small weirs.

7.1.6 If the measured rate of leakage is less than or equal to the allowable leakage in accordance with 8.1, the section of sewer tested is acceptable.

7.1.7 If the test section fails, it may be repaired and retested

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee C13 on Concrete Pipe and is the direct responsibility of Subcommittee C13.09 on Methods of Test. Current edition approved July 15, 1994. Published September 1994. Originally published as C 969–82. Last previous edition C 969–82 (1990)<sup>1</sup>.

<sup>2</sup> *Annual Book of ASTM Standards*, Vol 04.05.

in accordance with this practice.

7.2 *Exfiltration Testing:*

7.2.1 Conduct testing from manhole to manhole or between more than two manholes. The length of main tested shall not exceed 700 ft.

7.2.2 Determine the groundwater elevation at both ends of the test section. If the groundwater level is less than 2 ft above the crown of the pipe measured from the highest elevation of the sewer, the exfiltration test should be used.

7.2.3 Plug all pipe outlets discharging into the upstream manhole and the test section outlet. Fill the sewer line with water.

7.2.4 At the upstream manhole the test head should be established a minimum of 2 ft above the crown of the pipe, or at least 2 ft above existing groundwater, whichever is higher.

7.2.5 Allow the pipe to remain saturated for a period long enough to allow water absorption in the pipe, a minimum of 4 h and up to a maximum of 72 h. After the absorption period, refill the pipe to the required test head.

7.2.6 Measure the leakage loss over a timed test period. The minimum test period should be 15 min and the maximum should not exceed 24 h.

7.2.7 If the measured rate of leakage is less than or equal to the allowable leakage in accordance with 8.2, the section of sewer tested is acceptable.

7.2.8 If the test section fails, it may be repaired and retested in accordance with this practice. The groundwater elevation shall be redetermined prior to a second test and the test head adjusted, if necessary, in accordance with 7.2.4.

8. Leakage Criteria

8.1 *Infiltration Testing:*

8.1.1 For infiltration testing, the allowable leakage limit including manholes is 200 gal/(in. of internal diameter) (mile of sewer) (24 h) when the average head on the test section is 6 ft or less.

Note 3—The average head on the test section is the head above the crown of the pipe at the upstream manhole plus the head above the crown of the pipe at the downstream manhole divided by two.

8.1.2 When the average groundwater head on the test section is greater than 6 ft, the allowable leakage should be increased in proportion to the ratio of the square root of the average groundwater head to the square root of the base head of 6 ft.

8.1.3 Manholes may be tested separately and independently with the allowance of 0.1 gal/(ft of diameter) (ft of head) (h). If building or house leads are connected to the main line being tested, allowance shall be made for permissible leakage in such leads.

8.2 *Exfiltration Testing:*

8.2.1 For exfiltration testing the allowable leakage limit including manholes is 200 gal/(in. of internal diameter) (mile of sewer) (24 h) when the average head on the test section is 3 ft or less.

8.2.2 When the average head on the test section is greater than 3 ft, the allowable leakage shall be multiplied by the ratio of the square root of the average test head and the square root of the base head of 3 ft.

8.2.3 Manholes may be tested separately and independently with an allowance of 0.1 gal/(ft of diameter) (ft of head) (h).

9. Calculation

9.1 Sample calculations are presented in the Appendix.

10. Precision and Bias

10.1 No justifiable statement can be made either on precision or on bias of these procedures since the test results merely state whether there is conformance to the criteria for the success specified. Due to the sealing effects of groundwater, internal flow in the sewerline, and test water, the test conditions and results are not reproducible.

APPENDIX

(Nonmandatory Information)

XI. APPLICATION OF THE PRACTICE

XI.1 The following examples have been prepared to demonstrate the technique of applying this practice:

XI.1.1 *Example 1:* A sewer line is to be tested for infiltration. The sewer line is a 12-in. diameter pipe with the groundwater head over the upstream manhole of 9 ft and a groundwater head over the downstream manhole of 11 ft. The distance between manholes is 400 ft.

XI.1.1.1 *Find:* The appropriate allowable rate of infiltration leakage per hour of test.

XI.1.1.2 *Solution:* The average test head in feet is:

$$\text{Test head} = [(9 + 11)/2] = 10 \quad (X1.1)$$

Since the test head is greater than the base head (6 ft), the allowable rate of 200 gal/(in. diameter) (mile) (24 h) must be

multiplied by the ratio of the square root of the average groundwater head (10 ft) and the square root of the base head (6 ft) or:

$$\begin{aligned} \text{Allowable leakage} &= 200 \times \frac{\sqrt{10}}{\sqrt{6}} \\ &= 258 \text{ gal/(in. diameter) (mile) (24 h)} \end{aligned} \quad (X1.2)$$

Conversion of this rate to the allowable leakage for the above line in gallons per hour gives:

$$\begin{aligned} \text{Allowable leakage: } &258 [12 \text{ (diameter)} \\ &\times 400 \text{ (ft)/24 (h)} \times 5280 \text{ (ft/mile)}] \\ &= 9.77 \end{aligned} \quad (X1.3)$$

X1.1.1.3 *Answer:* 9.77 gal/h.

X1.1.2 *Example 2:* A sewer line is to be tested for exfiltration as the groundwater level is below the crown of the pipe at the upstream manhole. The sewer line is an 18-in. diameter pipe with a specified test head of 2 ft over the crown of the pipe at the upstream manhole. The sewer line test section is 400 ft long between manholes on a slope of 1.0 %.

X1.1.2.1 *Find:* The appropriate allowable rate of exfiltration leakage per hour of test.

X1.1.2.2 *Solution:* The average test head in feet is:

$$\text{Test head} = \frac{(400 \times 0.01 + 2) + 2}{2} = 4 \quad (\text{X1.4})$$

Since the test head is greater than the base head (3 ft), the allowable rate of 200 gal/(in. diameter) (mile) (24 h) must be

multiplied by the ratio of the square root of the test head and the square root of the base head (3 ft) or:

$$\begin{aligned} \text{Allowable leakage} &= 200 \times \frac{\sqrt{4}}{\sqrt{3}} \\ &= 231 \text{ gal/(in. diameter) (mile) (24 h)} \end{aligned} \quad (\text{X1.5})$$

Conversion of this rate to the allowable leakage for the above line in gallons per hour gives:

$$\begin{aligned} \text{Allowable leakage} &= 231 [18 \text{ (diameter)} \times 400 \text{ (ft)}/24 \text{ (h)} \\ &\quad \times 5280 \text{ (ft/mile)}] \\ &= 13.1 \end{aligned} \quad (\text{X1.6})$$

X1.1.2.3 *Answer:* 13.1 gal/h.

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## Standard Practice for Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines<sup>1</sup>

This standard is issued under the fixed designation C 1103; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This practice covers procedures for testing the joints of installed precast concrete pipe sewer lines, when using either air or water under low pressure to demonstrate the integrity of the joint and the construction procedures. This practice is used for testing 27-in. and larger diameter precast concrete sewer lines utilizing rubber gasket sealed joints.

1.2 A complete metric companion to Practice C 1103 has been developed—C 1103M; therefore, no metric equivalents are presented in this practice.

NOTE 1—The owner shall specify the following: who will conduct, observe, and furnish labor, material, and measuring devices and pay for the tests; who is responsible for determining local ground conditions; and whether an air or water test is to be used.

NOTE 2—Test criteria presented in this practice are similar to those in general use. Pipe 24-in. diameter and smaller may be accepted by infiltration or exfiltration testing utilizing Practice C 969 or by low pressure air testing utilizing Practice C 924. Pipe greater than 24-in. diameter may be accepted by infiltration or exfiltration testing utilizing C 969.

NOTE 3—It should be understood that there is no correlation between air loss and water leakage.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* Specific precautions are given in Section 6.

### 2. Referenced Documents

#### 2.1 ASTM Standards:

C 822 Terminology Relating to Concrete Pipe and Related Products<sup>2</sup>

C 924 Practice for Testing Concrete Pipe Sewer Lines by Low-Pressure Air Test Method<sup>2</sup>

C 969 Practice for Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines<sup>2</sup>

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee C13 on Concrete Pipe and is the direct responsibility of Subcommittee C13.09 on Methods of Test. Current edition approved July 15, 1994. Published September 1994. Originally published as C 1103–89. Last previous edition C 1103–90.

<sup>2</sup> Annual Book of ASTM Standards, Vol 04.05.

### 3. Terminology

3.1 *Definitions*—For definitions of terms relating to concrete pipe, see Terminology C 822.

### 4. Summary of Practice

4.1 The joint in the sewer line to be tested is covered on the inside of the pipe by a ring with two end element sealing tubes. Air or water, at low pressure, is introduced through a connection on the ring into the annular space between the ring and joint. The amount of air, or water, loss is used to determine the acceptability of the installed sewer line.

### 5. Significance and Use

5.1 This is not a routine test. The values recorded are applicable only to the sewer being tested and at the time of testing.

### 6. Safety Precautions

6.1 The use of compressed air may be dangerous if a sewer line is not prepared properly and proper procedures are not followed.

6.2 It is imperative that all pressures be relieved completely before the test apparatus is loosened for removal.

6.3 Pressurizing lines for the two end element sealing tubes shall be separate from the lines for pressurizing the void volume created by the joint test apparatus. The pressures required to seal the end element tubes shall be as specified by the apparatus manufacturer, and are greater than the pressure required to test the joint. The line for pressurizing the void volume should include a 6-psi pressure relief device to reduce hazards and avoid overpressurization, which could cause possible damage to the sewer line.

### 7. Preparation of the Sewer Joint

7.1 Check the size of access openings to ensure that the test apparatus can be placed into the sewer line.

7.2 A wetted interior surface is desirable and will produce more consistent results. Air may pass through the walls of dry pipe. This may be overcome by wetting the pipe. Clean the joint and interior joint surfaces to eliminate debris prior to wetting and testing.

7.3. Review safety precautions in Section 6.

**8. Procedures**

8.1 The following procedures apply to testing with either air or water.

8.1.1 Determine groundwater conditions surrounding the sewer line to be tested, and select the type of test to be conducted.

8.1.2 If the groundwater pressure is equal to or greater than the test pressure, and the sewer line or joint is not leaking, the sewer line or joint is acceptable in accordance with Practice C 969 and no additional testing is required. If one or more joints are leaking, but the total amount of leakage in the sewer line being tested is equal to, or less than, the allowable leakage rate established in accordance with Practice C 969, the line is acceptable and no additional testing is required provided visible leaks are repaired. Moisture or beads of water appearing on the surface of the joint will not be considered as visible leakage.

8.1.3 Review proper operation, safety, and maintenance procedures as provided by the manufacturer of the joint test apparatus.

8.1.4 Move the joint test apparatus into the sewer line to the joint to be tested and position it over the joint. Make sure the end element sealing tubes straddle both sides of the joint and the hoses are attached. For the water test, the bleed-off petcock must be located at top dead center.

8.1.5 Inflate end element sealing tubes with air in accordance with equipment and manufacturer's instructions.

*NOTE 4*—All test pressures are measured as gage pressure, which is defined as any pressure greater than atmospheric pressure. Since water produces a pressure of 0.43 psi for every foot of depth, test pressures must be increased to offset the depth of groundwater over the sewer line. If the groundwater level is 2 ft or more above the top of the pipe at the upstream end or if the pressure required for the test is greater than 6-psi gage, the joint test method should not be used and the infiltration test may be used (see Practice C 969).

*NOTE 5*—An air or water reservoir should be included in the joint test system. By maintaining a constant supply of air or water in a reservoir, continuous pumping of air or water is not required, and any variances in test equipment and joint space will be negated. The reservoir should have a minimum volume of 2.5 ft<sup>3</sup>.

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8.2 *Joint Air Test:*

8.2.1 Review procedures in 8.1.

8.2.2 ~~Pressurize the void volume with air to 3.5 psi greater than the pressure exerted by groundwater above the pipe. Allow the air pressure and temperature to stabilize before shutting off the air supply, and start of test timing.~~

8.2.3 If pressure holds, or drops less than 1 psi in 5 s, the joint is acceptable. Practically, the test is a go/no go test.

8.2.4 If the joint being tested fails, it may be retested, or repaired if necessary, and retested, in accordance with this practice.

8.2.5 After the joint test is completed, exhaust void volume, then exhaust end element tubes prior to removal of apparatus.

8.2.6 Use or failure of the joint air test shall not preclude acceptance by appropriate water infiltration and exfiltration testing (see Practice C 969), or other means.

8.3 *Joint Water Test:*

8.3.1 Review procedures in 8.1.

8.3.2 Introduce water into void volume until water flows evenly from open petcock. Close the petcock and pressurize with water to 3.5 psi above the pressure exerted by groundwater above the pipe. Shut off the water supply.

8.3.3 If the pressure holds, or drops less than 1 psi in 5 s, the joint is acceptable. Practically, the test is a go/no go test.

8.3.4 If the joint being tested fails, it may be retested, or repaired if necessary, and retested, in accordance with this practice.

8.3.5 After the joint test is completed, exhaust end element tubes which will automatically release the water from the void volume, prior to removal of apparatus.

8.3.6 Use or failure of this joint water test shall not preclude acceptance by appropriate water infiltration or exfiltration testing (see Practice C 969), or other means.

**9. Precision and Bias**

9.1 No justifiable statement can be made either on precision or bias of these procedures since the test results merely state whether this is in conformance to the criteria for success specified. Due to the sealing effects of groundwater and internal flow on concrete sewer lines, the test conditions and results are not reproducible.



# Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test<sup>1</sup>

This standard is issued under the fixed designation C 1244; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This test method covers procedures for testing precast concrete manhole sections when using the vacuum test method to demonstrate the integrity of the installed materials and the construction procedures. This test method is used for testing concrete manhole sections utilizing mortar, mastic, or gasketed joints.

1.2 This test method is intended to be used as a preliminary test to enable the installer to demonstrate the condition of the concrete manholes prior to backfill. It may also be used to test manholes after backfilling; however, testing should be correlated with the connector supplier.

1.3 *This standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

1.4 This test method is the companion to metric Test Method C 1244M; therefore, no SI equivalents are shown in this test method.

NOTE 1—Vacuum test criteria presented in this test method are similar to those in general use. The test and criteria have been widely and successfully used in testing manholes.

NOTE 2—It should be understood that no correlation has been found between vacuum (air) and hydrostatic tests.

## 2. Referenced Documents

### 2.1 ASTM Standards:

C 822 Terminology Relating to Concrete Pipe and Related Products<sup>2</sup>

C 924 Practice for Testing Concrete Pipe Sewer Lines by Low-Pressure Air Test Method<sup>2</sup>

C 969 Practice for Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines<sup>2</sup>

## 3. Terminology

3.1 For definitions of terms relating to manholes, see Terminology C 822.

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee C13 on Concrete Pipe and is the direct responsibility of Subcommittee C13.06 on Manholes and Specials.

Current edition approved Aug. 15, 1993. Published October 1993.

<sup>2</sup> Annual Book of ASTM Standards, Vol. 04.05.

TABLE 1 Minimum Test Times for Various Manhole Diameters in Seconds

Depth (ft)	Diameter, in.								
	30	33	36	42	48	54	60	66	72
	Time, in seconds								
8	11	12	14	17	20	23	26	29	33
10	14	15	18	21	25	29	33	38	41
12	17	18	21	25	30	35	39	43	49
14	20	21	25	30	35	41	46	51	57
16	22	24	30	34	40	46	52	58	67
18	25	27	32	38	45	52	59	65	73
20	28	30	35	42	50	53	65	72	81
22	31	33	39	46	55	64	72	79	89
24	33	36	42	51	59	64	78	87	97
26	36	39	46	55	64	75	85	94	105
28	39	42	49	59	69	81	91	101	113
30	42	45	53	63	74	87	98	108	121

## 4. Summary of Practice

4.1 All lift holes and any pipes entering the manhole are to be plugged. A vacuum will be drawn and the vacuum drop over a specified time period is used to determine the acceptability of the manhole.

## 5. Significance and Use

5.1 This is not a routine test. The values recorded are applicable only to the manhole being tested and at the time of testing.

## 6. Preparation of the Manhole

6.1 All lift holes shall be plugged.

6.2 All pipes entering the manhole shall be temporarily plugged, taking care to securely brace the pipes and plugs to prevent them from being drawn into the manhole.

## 7. Procedure

7.1 The test head shall be placed at the top of the manhole in accordance with the manufacturer's recommendations.

7.2 A vacuum of 10 in. of mercury shall be drawn on the manhole, the valve on the vacuum line of the test head closed, and the vacuum pump shut off. The time shall be measured for the vacuum to drop to 9 in. of mercury.

7.3 The manhole shall pass if the time for the vacuum reading to drop from 10 in. of mercury to 9 in. of mercury meets or exceeds the values indicated in Table 1.

7.4 If the manhole fails the initial test, necessary repairs

shall be made by an approved method. The manhole shall then be retested until a satisfactory test is obtained.

7.5 Use or failure of this vacuum test shall not preclude acceptance by appropriate water infiltration or exfiltration testing, (see Practice C 969), or other means.

**8. Precision and Bias**

8.1 No justifiable statement can be made either on the

precision or bias of this procedure, since the test result merely states whether there is conformance to the criteria for the success specified.

**9. Keywords**

9.1 acceptance criteria; concrete; manhole sections; test method; vacuum test

**APPENDIX**

(Nonmandatory Information)

**X1.**

X1.1 The standard accepted method of air testing, for a single diameter pipe, Practice C 924, allows a drop of 1 psi pressure during the time calculated by the formula:

$$T_{press.} = \frac{KD^2L}{Q} \tag{X1.1}$$

where:

- $T$  = time for 1 psi drop in pressure
- $K$  = 0.00037 for in./lb units
- $D$  = pipe diameter, in.
- $L$  = length of line, ft
- $Q$  = air loss, ft<sup>3</sup>/min

X1.2 A pressure drop of 1 in. Hg for the vacuum test compares to a pressure drop of 0.490 psi for the air test.

$$1 \text{ in. Hg} \times \frac{14.696 \text{ lb/in.}^2}{29.02 \text{ in. Hg}} = 0.490 \text{ psi} \tag{X1.2}$$

Therefore, the time relationship is:

$$T_{vac} = 0.490 T_{press} \tag{X1.3}$$

or

$$T_{vac} = \frac{T_{press}}{2.04} \tag{X1.4}$$

X1.3 The allowable test times cited in Practice C 924, Table 2, for pipe sizes 4 in. to 24 in. diameter are provided in Table X1.1 and Table X1.2. The allowable test times for sizes above 24 in. were obtained by extrapolation. Therefore, using the appropriate  $Q$ , we find that:

$$\text{for 30 in. } (Q = 7 \text{ ft}^3/\text{min}), T_{vac} = 0.00018 \frac{D^2}{Q} L = 0.023 L$$

$$\text{for 36 in. } (Q = 8 \text{ ft}^3/\text{min}), T_{vac} = 0.00018 \frac{D^2}{Q} L = 0.029 L$$

$$\text{for 42 in. } (Q = 9 \text{ ft}^3/\text{min}), T_{vac} = 0.00018 \frac{D^2}{Q} L = 0.035 L$$

$$\text{for 48 in. } (Q = 10 \text{ ft}^3/\text{min}), T_{vac} = 0.00018 \frac{D^2}{Q} L = 0.041 L$$

$$\text{for 54 in. } (Q = 11 \text{ ft}^3/\text{min}), T_{vac} = 0.00018 \frac{D^2}{Q} L = 0.048 L$$

$$\text{for 60 in. } (Q = 12 \text{ ft}^3/\text{min}), T_{vac} = 0.00018 \frac{D^2}{Q} L = 0.054 L$$

$$\text{for 66 in. } (Q = 13 \text{ ft}^3/\text{min}), T_{vac} = 0.00018 \frac{D^2}{Q} L = 0.060 L$$

$$\text{for 72 in. } (Q = 14 \text{ ft}^3/\text{min}), T_{vac} = 0.00018 \frac{D^2}{Q} L = 0.067 L$$

**TABLE X1.1 Minimum Test Times for Various Pipe Diameters  
(Practice C 924)**

Nominal Pipe Size, in.	Time (T), min 100 ft.
4	0.3
6	0.7
8	1.2
10	1.5
12	1.8
15	2.1
18	2.4
21	3.0
24	3.6
27	4.2
30	4.8
33	5.4
36	6.0

**TABLE X1.2 Allowable Air Loss for Various Pipe Diameters  
(Practice C 924)**

Nominal Pipe Size, in.	Air Loss (Q), ft <sup>3</sup> /min
4	2
6	2
8	2
10	2.5
12	3
15	4
18	5
21	5.5
24	6
30	7
36	8
42	9
48	10
54	11
60	12
66	13
72	14

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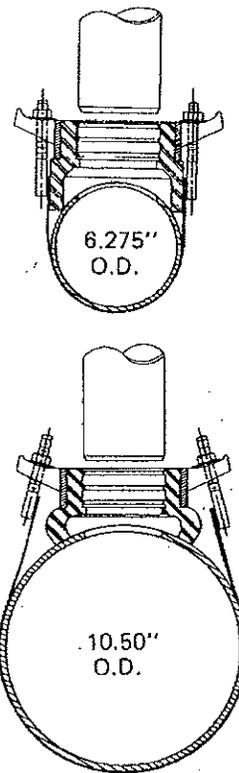
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# ROMAC

## STYLE "CB" SEWER SADDLE

Nom. Branch Size	Nom. Pipe Size	Range	Branch Type	Branch O.D.
4"	6"-12"	6.27-14.40	PVC Sewer	4.215
			Tyseal	4.28
			C.I. Soil-No Hub	4.38
			PVC	4.50
			A/C M.E. Sewer	4.62
			*Universal	4.20-4.63
			Cast Iron-D.I.	4.80
	Clay*	5.00-5.38		
	14"-24"	14.40-25.80	PVC Sewer	4.215
			Tyseal	4.28
			C.I. Soil-No Hub	4.38
			PVC	4.50
			A/C M.E. Sewer	4.62
			Universal*	4.20-4.63
Cast Iron-D.I.			4.80	
Clay	5.00-5.38			
6"	8"-12"	8.00-14.40	PVC Sewer	6.30
			C.I. Soil-No Hub	6.30
			A/C M.E. Sewer	6.66
			Universal*	6.30-6.66
			Cast Iron-D.I.	6.90
			Clay*	7.19-7.56
	14"-24"	14.40-25.80	PVC Sewer	6.30
			C.I. Soil-No Hub	6.30
			A/C M.E. Sewer	6.66
			Universal*	6.30-6.66
			Cast Iron-D.I.	6.90
			Clay*	7.19-7.56

SAME SADDLE CONFORMING TO DIFFERENT OUTSIDE DIAMETERS



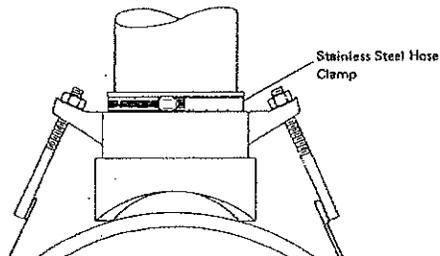
### MATERIAL SPECIFICATIONS

**CASTING:** High tensile ductile (nodular) iron.  
ASTM 536-71, protected with a yellow corrosion resistant paint.

**SHELLS:** 18-8 Stainless Steel

**ADJUSTABLE STRAP:** Bolts, nuts, and washer:  
1/2" N.C. roll thread Teflon coated. The band is 3/2" wide. All the above type 304 (18-8) Stainless Steel.

**GASKET:** Virgin SBR compounded for sewer service.



# ASHLAND MUNICIPAL SUPPLIES

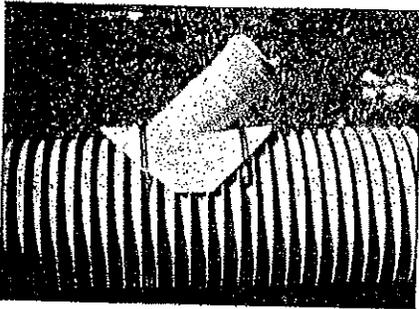
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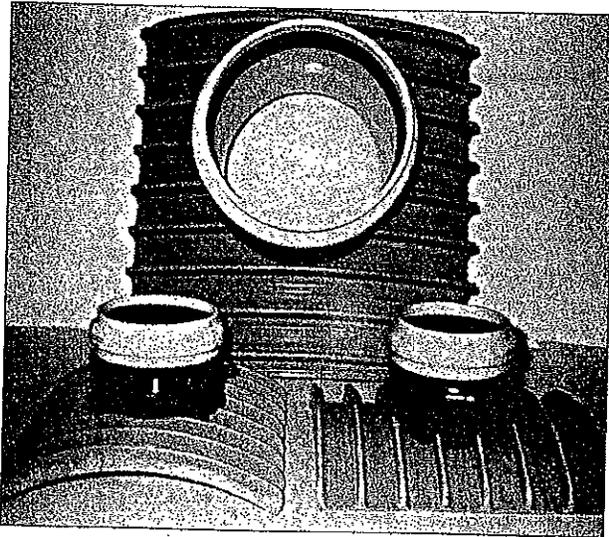
## Tapping Saddles

While in-line fittings for lateral connections are available, future connections may also be made using the same tee or wye tapping saddle as currently used with SDR35. The corrugations act as a locking guide for the stainless steel strap which prevents slipping of the saddle. A saddle gasket, available from Uponor ETI, is all that is required to make your SDR35 saddle work with Ultra-Rib.

Another alternative to the tapping saddle is the Inserta Tee®. This product may be specified for either new construction or future connections.



*Typical SDR35 tapping saddle.*



*Fowler Inserta Tee® connected to Ultra-Rib*

# THE ORIGINAL INSERTA TEE

## INSERTA TEE®

## INSERTA TEE

## INSERTA TEE



## INSERTA TEE® DESCRIPTION

INSERTA TEE is a three piece service connection consisting of a PVC Hub, Rubber Sleeve and Stainless Steel Band. INSERTA TEE is compression fit into the cored wall of a mainline and requires no special tooling. INSERTA TEEs are designed to connect 4" (100mm) through 15" (375mm) services to all known solidwall, profile, closed profile, and corrugated pipe manufactured today.

INSERTA TEE for NEW & REHAB installations allow:

- Easier grading of mainline
- Services are connected where they need to be
- Faster connections

INSERTA TEE for TAPPING EXISTING LINES without disturbing the bedding while eliminating:

- Glues, epoxies and grout
- Tightening and retightening of bands around mainline
- Awkward gaskets

INSERTA TEE for Sliplining, Pipe Bursting, Relining (Fold-and-Formed products and Cured-in-Place Products) allow:

- Compression fitting directly into new liner
- Eliminating banding around new liner
- Eliminating grouting and epoxies

## APPLICATIONS

- Manholes
- Sanitary Sewers
- Storm Sewers
- Wet Wells
- Pipe Bursting
- Drainage
- Irrigation
- Sliplining
- FFP
- CIPP

INSERTA TEE construction varies with pipe type and size. For pipe not listed contact our engineering department.

### INSERTA FITTINGS Co.

Tel 503/357-2110 Fax 503/359-5417

Email [insertat@teleport.com](mailto:insertat@teleport.com)

<http://www.insertatee.com>

## INSERTA TEE® FITTINGS FOR ALL GRAVITY FLOW PIPE AND MANHOLES

- |                |                   |                    |
|----------------|-------------------|--------------------|
| ▪ Ductile Iron | ▪ N12             | ▪ Hi Q/Sure-Lok    |
| ▪ Ultra Rib    | ▪ A2000           | ▪ Polyethylene     |
| ▪ Fiberglass   | ▪ Concrete        | ▪ PW RIB           |
| ▪ Perma Loc    | ▪ Clay            | ▪ Corrugated Metal |
| ▪ PVC          | ▪ Asbestos Cement | ▪ Ultra Corr       |
| ▪ Vylon        | ▪ Spirolite       | ▪ Solflo Max       |

## SPECIFICATIONS

PVC HUB .....	D 3034 SDR 35 & SDR26
Rubber Sleeve .....	ASTM C443
Band .....	301 SS
Screw .....	305 SS
Housing .....	301 SS
Gasket .....	ASTM F477

## TEST RESULTS

- 12 PSI for 50 hours, no leakage

Major Pipe Manufacturer. 1992

- 16.5 PSIG for 10 minutes, no leakage
- 22" Hg for 10 minutes, no leakage
- Back to room pressure
- 22" Hg for 10 minutes, no leakage
- Pipe Deflection 5%
- Pressure at 10.8 PSIG for 10 minutes, no leakage

Reference Document: ASTM 3212.  
Northwest Testing Labs, Portland, Oregon. 1991

- "...FOWLER INSERTA TEE APPROVED."

State of Oregon, Plumbing Advisory Board. 1982

## SOME OF OUR CLIENTS

### Pipe Manufacturers

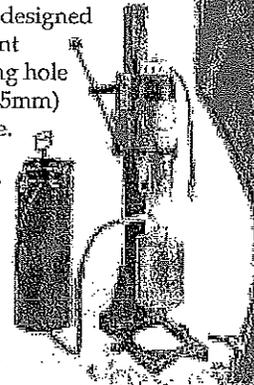
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|-----------------------------|-------------------|--------------------------|
| ▪ Advanced Drainage Systems | ▪ Hancor          | ▪ Philips Drisco         |
| ▪ Contech                   | ▪ Hobas           | ▪ Plexco/Spirolite       |
| ▪ Uponor ETI                | ▪ IPEX, Inc.      | ▪ Rehau Industries, Inc. |
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- Seattle, Washington
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## CORING MACHINE

INSERTA FITTING's electric coring machine is designed for fast and efficient operation for coring hole sizes up to 15" (375mm) in any type of pipe.



Recommended for all Concrete, Clay, Fiberglass, D.I. and 10"-15" INSERTA TEES into PVC and Polyethylene Pipe.

## DIAMOND BITS

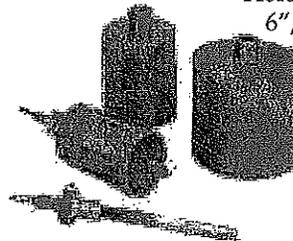
Our diamond bits are of the highest quality to ensure maximum holes per bit.

Diamond bits recommended for concrete, clay, fiberglass and D.I.

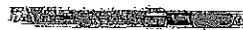
## HOLE SAWS

A unique "twin blade" designed hole saw allows the user to core a fast, smooth and clean hole.

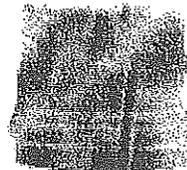
Hole saws recommended for 4", 6", 8", 10", 12" and 15" laterals into PVC and polyethylene pipe. 4", 6" and 8" hole saw can be used with 1/2" handheld drill.



Rubber Sleeve



Stainless Steel Band



Gasketed PVC HUB

## INSERTA TEE®

## Types Available For All Mainlines

- PSM/Sewer Gasketed Bell
- IPS/Sch 40 Gasketed Bell
- C900 Gasketed Bell
- Corrugated Poly non-Gasketed Bell

## INSERTA FITTINGS Co.

\*INSERTA FITTINGS, formerly Fowler Manufacturing, was established in 1969 as an excavating and fabrication shop. By combining new technology with down to earth problem-solving and "in trench" experience, INSERTA FITTINGS brings you a significant improvement and cost effective solution for sideservice connections - INSERTA TEE.

**Easy, Fast & Watertight**