

## Chapter Comm 82

### DESIGN, CONSTRUCTION, INSTALLATION SUPERVISION AND INSPECTION OF PLUMBING

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**Note:** Sections ILHR 82.01 to 82.25, 82.15 and 82.17 to 82.25 as they existed on February 28, 1985 were repealed and new sections ILHR 82.01 to 82.36 and 82.51 and 82.60 were created effective March 1, 1985. Chapter ILHR 82 was renumbered chapter Comm 82 under s. 13.93 (2m) (b) 1., Stats. and corrections made under s. 13.93 (2m) (b) 7., Stats., Register, February, 1997, No. 494.

**Comm 82.01 Scope.** The provisions of this chapter apply to the design, construction and installation of plumbing, including but not limited to sanitary and storm drainage, water supplies, storm water and sewage disposal for buildings.

**Note:** Chapter Comm 83 contains provisions for the siting, design, installation, inspection and maintenance of private sewage systems. Chapter Comm 84 contains provisions and standards for plumbing materials, plumbing fixtures and plumbing appliances.

**History:** Cr. Register, February, 1985, No. 350, eff. 3-1-85.

**Comm 82.03 Application.** The provisions of this chapter are not retroactive, unless specifically stated otherwise in the rule.

**History:** Cr. Register, February, 1985, No. 350, eff. 3-1-85.

#### Subchapter I — Plumbing Principles and Definitions

**Comm 82.10 Basic plumbing principles:** This chapter is founded upon certain basic principles of environmental sanitation and safety through properly designed, installed, and maintained plumbing systems. Some of the details of plumbing construction may vary, but the basic sanitary and safety principles desirable and necessary to protect the health of people are the same everywhere. As interpretations may be required, and as unforeseen situations arise which are not specifically addressed, the following principles shall be used to define the intent of this chapter.

(1) Plumbing in all buildings, public and private, intended for human occupancy, shall be installed and maintained in such a manner so as to protect the health, safety and welfare of the public or occupants.

(2) Every building intended for human occupancy shall be provided with an adequate, safe and potable water supply. A building located adjacent to a street in which there is a public water supply, shall be connected to the public water supply.

(3) Each dwelling unit connected to a private sewage system or public sewer shall have at least one water closet, one wash basin, one kitchen sink and one bathtub or shower to meet the basic requirements of sanitation and personal hygiene. All other structures for human occupancy shall be equipped with sanitary facilities in sufficient numbers as specified in chs. Comm 50 to 64.

(4) Plumbing fixtures, appliances and appurtenances, whether existing or to be installed, shall be supplied with water in sufficient volume and at pressures adequate to enable them to function properly and efficiently at all times and without undue noise under nor-

mal conditions of use. Plumbing systems shall be designed and adjusted to use the minimum quantity of water consistent with proper performance and cleaning.

(5) Hot or tempered water shall be supplied to all plumbing fixtures which normally require hot or tempered water for proper use and function.

(6) Devices for heating water and storing it in pressure vessels or tanks shall be so designed and installed as to prevent dangers of explosion or overheating.

(7) Where plumbing fixtures exist in a building which is not connected to a public sewer system, suitable provision shall be made for disposing of the building sewage by a method of sewage treatment or disposal satisfactory to the department and the governmental unit responsible for the regulation of private sewage systems.

(8) Drain systems shall be designed, constructed, and maintained to conduct the waste water or sewage quickly from the fixture to the place of disposal, with velocities which will prevent clogging, fouling and the depositing of solids, and shall have adequate cleanouts so arranged that the drain pipes may be readily cleaned.

(9) The drain systems shall be designed so that there is an adequate circulation of air in all pipes and no danger of siphonage, aspiration or forcing of trap seals under conditions of ordinary use.

(10) The piping of a plumbing system shall be of durable material, free from defective workmanship, and designed and constructed to give satisfactory service for its reasonable expected life.

(11) Plumbing fixtures shall be made of durable, smooth, non-absorbent and corrosion resistant material, and shall be free from concealed fouling surfaces.

(12) Proper protection shall be provided to prevent contamination of food, water, sterile goods and similar materials by backflow of sewage.

(13) All plumbing fixtures shall be installed to provide adequate spacing and accessibility for the intended use and for cleaning.

(14) All rooms in which water closets, urinals or similar fixtures are installed shall be provided with adequate lighting and proper ventilation.

**Note:** See ss. Comm 52.53 to 52.55 for toilet rooms located in commercial and public buildings.

**History:** Cr. Register, February, 1985, No. 350, eff. 3-1-85; correction in (3) made under s. 13.93 (2m) (b) 7., Stats; am. (2), Register, August, 1991, No. 428, eff. 9-1-91; am. (3), Register, March, 1992, No. 435, eff. 4-1-92; r. (7) and renum. (8) to (15) to be (7) to (14), Register, February, 2000, No. 530, eff. 3-1-00.

**Comm 82.11 Definitions.** In chs. Comm 82 and 84:

(1) "Accepted engineering practice" means a specification, standard, guideline or procedure in the field of construction or related thereto, generally recognized and accepted as authoritative.

(2) "Accessible" when applied to a fixture, appliance, pipe, fitting, valve or equipment, means having access thereto, but which first may require the removal of an access panel or similar obstruction.

(3) "Air-break" means a piping arrangement for a drain system where the wastes from a fixture, appliance, appurtenance or device discharge by means of indirect or local waste piping terminating in a receptor at a point below the flood level rim of the receptor and above the inlet of the trap serving the receptor.

(4) "Air-gap, drain system" means the unobstructed vertical distance through free atmosphere between the outlet of indirect or local waste piping and the flood level rim of the receptor into which it discharges.

(5) "Air-gap", in the water supply system, means the unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe or faucet supplying water to a tank or plumbing fixture and the flood-level rim or spill level of the receptacle.

(6) "Alignment" means installed in a straight line, either horizontal, vertical or at a given angle.

(9) "Approved" means acceptable to the department.

(10) "Area drain" means a receptor designed to collect surface or storm waters from an open area.

(11) "Areawide water quality management plan" means those plans prepared by the department of natural resources, including those plans prepared by agencies designated by the governor under the authority of ch. 281 and s. 283.83, Stats., for the purpose of managing, protecting and enhancing groundwater and surface water of the state.

Note: See Appendix for further explanatory material.

(12) "Aspirator" means a fitting or device supplied with water or other fluid under positive pressure which passes through an integral orifice or constriction causing a vacuum.

(13) "Autopsy table" means a fixture or table used for post-mortem examination.

(14) "Backflow" means the unwanted reverse flow of liquids, solids or gases.

(16) "Back-pressure" means a pressure greater than the supply pressure which may cause backflow.

(17) "Backflow preventer with intermediate atmospheric vent" means a type of cross connection control device which consists of 2 independently acting check valves, internally force loaded to a normally closed position and separated by an intermediate chamber with a means for automatically venting to atmosphere, the venting means is internally force loaded to a normally open position.

(18) "Backsiphonage" means the creation of a backflow as a result of negative pressure.

(18m) "Back siphonage backflow vacuum breaker" means a type of cross connection control device which contains a check valve force-loaded closed and an air inlet vent valve force-loaded open to atmosphere, positioned downstream of the check valve, and located between and including 2 tightly closing shut-off valves and 2 test cocks.

(19) "Backwater valve" means a device designed to prevent the reverse flow of storm water or sewage into the drain system.

Note: Back vent, see "individual vent".

(20) "Ballcock" means a water supply valve opened or closed by means of a float or similar device used to supply water to a tank.

(21) "Bathroom group" means a water closet, lavatory and a bathtub or shower located together on the same floor level.

(22) "Battery of fixtures" means any group of 2 or more fixtures which discharge into the same horizontal branch drain.

(23) "Bedpan sterilizer" means a fixture used for sterilizing bedpans or urinals by direct application of steam, boiling water or chemicals.

(24) "Bedpan washer and sanitizer" means a fixture designed to wash bedpans and to flush the contents into the sanitary drain system and which may also provide for disinfecting utensils by scalding with steam or hot water.

(25) "Bedpan washer hose" means a device supplied with hot or cold water, or both, and located adjacent to a water closet or clinical sink to be used for cleansing bedpans.

(26) "Bell" means the portion of a pipe which is enlarged to receive the end of another pipe of the same diameter for the purpose of making a joint.

(27) "Boiler blow-off basin" means a vessel designed to receive the discharge from a boiler blow-off outlet and to cool the discharge to a temperature which permits safe entry into the drain system.

(28) "Branch" means a part of a piping system other than a riser, main or stack.

(29) "Branch interval" means the vertical distance along a drain stack measured from immediately below a branch drain connection to immediately below the first lower branch drain connection which is 8 feet or more below.

Note: See Appendix for further explanatory material.

(30) "Branch vent" means a vent serving more than one fixture drain.

(31) "B.T.U." means British Thermal Units.

(32) "Building" means a structure for support, shelter or enclosure of persons or property.

(33) "Building, public" means any structure, including exterior parts of such building, such as a porch, exterior platform or steps providing means of ingress or egress, used in whole or in part as a place of resort, assemblage, lodging, trade, traffic, occupancy or use by the public, or by 3 or more tenants.

(34) "Building drain" means horizontal piping within or under a building, installed below the lowest fixture or the lowest floor level from which fixtures can drain by gravity to the building sewer.

(35) "Building drain branch" means a fixture drain which is individually connected to a building drain and is vented by means of a combination drain and vent system.

(35m) "Building subdrain branch" means a fixture drain which is individually connected to a building subdrain and is vented by means of a combination drain and vent system.

(36) "Building drain, sanitary" means a building drain which conveys sewage only.

(37) "Building drain, storm" means a building drain which conveys storm water wastes or clear water wastes, or both.

(38) "Building sewer" means that part of the drain system not within or under a building which conveys its discharge to a public sewer, private interceptor main sewer, private sewage system or other point of disposal.

(39) "Building sewer, sanitary" means a building sewer which conveys sewage only.

(40) "Building sewer, storm" means a building sewer which conveys storm water wastes or clear water wastes, or both.

(41) "Building subdrain" means the horizontal portion of a drain system which does not flow by gravity to the building sewer.

(42) "Burr" means a roughness or metal protruding from the walls of a pipe usually as the result of cutting the pipe.

(44) "Catch basin" means a watertight receptacle built to arrest sediment of surface, subsoil or other waste drainage, and to retain oily or greasy wastes, so as to prevent their entrance into the building drain or building sewer.

**(45)** "Circuit vent" means a branch vent that serves 2 or more fixture traps which discharge to a horizontal branch drain and connects to the horizontal drain at a point between the 2 most upstream, floor outlet fixtures.

**(46)** "Cleanout" means an accessible opening in a drain system used for the removal of obstructions.

**(47)** "Clear water wastes" means liquids other than storm water, having no impurities or where impurities are below a minimum concentration considered harmful by the department, including, but not limited to noncontact cooling water and condensate drainage from refrigeration compressors and air conditioning equipment, drainage of water used for equipment chilling purposes and cooled condensate from steam heating systems or other equipment.

**(47m)** "Cold water" means water at a temperature less than 85°F.

**(48)** "Combination fixture" means a fixture combining one sink and laundry tray or a 2 or 3 compartment sink or laundry tray in one unit.

**(49)** "Combination drain and vent system" means a specially designed system of drain piping embodying the wet venting of one or more fixtures by means of a common drain and vent pipe adequately sized to provide free movement of air in the piping.

**(50)** "Common vent" means a branch vent connecting at or downstream from the junction of 2 fixture drains and serving as a vent for those fixture drains.

**(51)** "Conductor" means a drain pipe inside the building which conveys storm water from a roof to a leader, storm drain or storm sewer.

**(52)** "Control valve" means a device that will stop the flow of water in the water supply system or water-based fire protection system.

**(53)** "Corporation cock" means a valve:

(a) Installed in a private water main or a water service at or near the connection to public water main; or

(b) Installed in the side of a forced main sewer to which a forced building sewer is connected.

**(54)** "Critical level" means the reference point on a vacuum breaker which must be submerged before backflow can occur. When the critical level is not indicated on the vacuum breaker, the bottom of the vacuum breaker shall be considered the critical level.

**(55)** "Cross-connection" means a connection or potential connection between any part of a water supply system and another environment containing substances in a manner that, under any circumstances, would allow the substances to enter the water supply system by means of backsiphonage or back pressure.

**(55m)** "Cross-connection control device" means any mechanical device which automatically prevents backflow from a contaminated source into a potable water supply system.

**(56)** "Curb stop" means a valve placed in a water service or a private water main.

**(57)** "Dead end" means a branch leading from a drain pipe, vent pipe, building drain or building sewer and terminating at a developed length of 2 feet or more by means of a plug, cap or other closed fitting.

**(58)** "Department" means the department of commerce.

**(59)** "Developed length" means the length of pipe line measured along the center line of the pipe and fittings.

**(60)** "Diameter" means in reference to a pipe the nominal inside diameter of the pipe.

Note: Downspout, see "leader".

**(60m)** "Double check backflow prevention assembly" means a type of cross connection control device which is composed of 2 independently acting check valves internally force loaded to a

normally closed position, tightly closing shut-off valves located at each end of the assembly and fitted with test cocks.

**(60n)** "Double check detector assembly backflow preventer" means a type of a double check backflow prevention assembly which includes a parallel flow meter to indicate leakage or unauthorized use of water downstream of the assembly.

**(61)** "Drain" means any pipe which carries waste water or water borne wastes.

**(62)** "Drain system" includes all the piping or any portion of the piping within public or private premises which conveys sewage, storm water or other liquid wastes to a legal point of disposal, but does not include the mains of public sewer systems or a private or public sewage treatment or disposal plant.

**(63)** "Dwelling unit" means a structure, or that part of a structure, which is used or intended to be used as a home, residence or sleeping place by one person or by 2 or more persons maintaining a common household, to the exclusion of all others.

**(64)** "Ejector" means an automatically operated device to elevate liquid wastes and sewage by the use of air under higher than atmospheric pressure.

**(65)** "Faucet" means a valve end of a water pipe by means of which water can be drawn from or held within the pipe.

**(66)** "Ferrule" means a rigid sleeve used to connect dissimilar plumbing materials.

**(67)** "Fixture drain" means the drain from fixture to a junction with another drain pipe.

**(67m)** "Fixture supply" means that portion of a water distribution system serving one plumbing fixture, appliance or piece of equipment.

**(68)** "Fixture supply connector" means that portion of water supply piping which connects a plumbing fixture, appliance or a piece of equipment to the water distribution system.

**(69)** "Fixture unit, drainage, dfu" means a measure of the probable discharge into the drain system by various types of plumbing fixtures. The drainage fixture unit value for a particular fixture depends on its volume rate of drainage discharge, on the time duration of a single drainage operation, and on the average time between successive operations.

**(70)** "Fixture unit, supply, sfu" means a measure of the probable hydraulic demand on the water supply by various types of plumbing fixtures. The supply fixture unit value for a particular fixture depends on its volume rate of supply, on the time duration of a single supply operation, and on the average time between successive operations.

**(72)** "Flood level rim" means the edge of the receptacle from which water overflows.

**(73)** "Floor sink" means a receptor for the discharge from indirect or local waste piping installed with its flood level rim even with the surrounding floor.

**(75)** "Flush valve" means a device located at the bottom of a tank for flushing water closets and similar fixtures.

**(76)** "Flushometer valve" means a device which discharges a predetermined quantity of water to fixtures for flushing purposes and is closed by direct water pressure.

**(77)** "Garage, private" means a building or part of a building used for the storage of vehicles or other purposes, by a family or less than 3 persons not of the same family and which is not available for public use.

**(78)** "Garage, public" means a building or part of a building which accommodates or houses self-propelled land, air or water vehicles for 3 or more persons not of the same family.

**(79)** "Grease interceptor" means a receptacle designed to intercept and retain grease or fatty substances.

**(79m)** "Hand held shower" means a type of plumbing fixture which includes a cross connection control device, a hose and a hand held discharge piece such as a shower head or spray.

**(80)** "Health care facility" means any building or part of a building used for purposes such as hospitals, nursing or rest homes, homes for the aged, infirmaries, residential care facilities, sanitariums, mortuaries, medical laboratories, and offices and clinics with operatories for dentists and doctors.

**(80m)** "High hazard" means a situation where the water supply system could be contaminated with a toxic solution.

**(81)** "Horizontal pipe" means any pipe or fitting which makes an angle of less than 45° with the horizontal.

**(81h)** "Hose connection backflow preventer" means a type of cross connection control device which consists of 2 independent checks, force loaded or biased to a closed position, with an atmospheric vent located between the 2 check valves, which is forced loaded or biased to an open position, and a means for attaching a hose.

**(81m)** "Hose connection vacuum breaker" means a type of cross connection control device which consists of a check valve member force loaded or biased to a closed position and an atmospheric vent valve or means force loaded or biased to an open position when the device is not under pressure.

**(82)** "Hot water" means water at a temperature of 110° F. or more.

**(83)** "Hot water storage tank" means a tank used to store water that is heated indirectly by a circulating water heater or by steam or hot water circulating through coils or by other heat exchange methods internal or external to the tank.

**(84)** "Hydrostatic test" means a test performed on a plumbing system or portion thereof in which the system is filled with a liquid, normally water, and raised to a designated pressure.

**(85)** "Indirect waste piping" means drain piping which does not connect directly with the drain system, but which discharges into the drain system by means of an air break or air gap into a receptor.

**(86)** "Individual vent" means a pipe installed to vent a fixture trap.

**(87)** "Industrial wastes" means the liquid wastes which result from the processes employed in industrial establishments and which are free from fecal matter.

**(88)** "Interceptor" or "separator" means a device designed and installed so as to separate and retain deleterious, hazardous or undesirable matter from wastes flowing through it.

**(89)** "Journeyman plumber" means a person as defined in s. 145.01 (7), Stats.

**(89m)** "Laboratory faucet backflow preventer" means a type of cross connection control device which consists of 2 independently acting check valves force loaded or biased to a closed position and between the check valves a means for automatically venting to atmosphere force loaded or biased to an open position.

**(90)** "Leader" means a pipe or channel outside a building which conveys storm water from the roof or gutter drains to a storm drain, storm sewer or to grade.

**(91)** "Load factor" means the percentage of the total connected fixture unit flow rate which is likely to occur at any point in the drain system.

**(92)** "Local waste piping" means a portion of drain piping which receives the wastes discharged from indirect waste piping and which discharges those wastes by means of an air break or air gap into a receptor.

**(93)** "Local vent" means a pipe connecting to a fixture and extending to outside air through which vapor or foul air is removed from the fixture.

**(93m)** "Low hazard" means a situation where the water supply system could be contaminated with a nontoxic solution.

**(94)** "Main" means the principal pipe artery to which branches may be connected.

**(95)** "Manhole" means an opening constructed to permit access to a sewer or any underground portion of a plumbing system.

**(96)** "Master plumber" means a person as defined in s. 145.01 (8), Stats.

**(97)** "Mechanical joint" means a connection between pipes, fittings or pipes and fittings by means of a device, coupling, fitting or adapter where compression is applied around the center line of the pieces being joined, but which is neither caulked, threaded, soldered, solvent cemented, brazed nor welded.

**(98)** "Mobile home" means a vehicle as defined in s. 101.91 (1), Stats.

**(99)** "Mobile home drain connector" means the pipe which joins the drain piping for a mobile or manufactured home to the building sewer.

**(100)** "Mobile home park" means any plot or plots of ground as defined in s. 66.058 (1) (e), Stats.

**(101)** "Multiple dwelling" means a building containing more than 2 dwelling units.

**(101m)** "Negative pressure" means a pressure less than atmospheric.

**(102)** "Nonpotable water" means water not safe for drinking, personal or culinary use.

**(103)** "Nonpublic" means, in the classification of plumbing fixtures, those fixtures in residences, apartments, living units of hotels and motels, and other places where the fixtures are intended for the use by a family or an individual to the exclusion of all others.

**(103m)** "Nontoxic" means a probable human oral lethal dose of greater than 15 grams of solution per kilogram of body weight.

**(104)** "Nuisance" means any source of filth or probable cause of sickness pursuant to the provisions of s. 146.14, 1991 Stats.

Note: 1993 Wis. Act 27 repealed concept of "nuisance" and replaced it with "human health hazard". See s. 254.01 (2), Stats.

**(105)** "Oil interceptor" means a device designed to intercept and retain oil, lubricating grease or other similar materials.

**(106)** "Offset" means a combination of fittings or bends which brings one section of the pipe out of line but into a line parallel with the other section.

**(107)** "One or 2-family dwelling" means a building containing not more than 2 dwelling units.

**(108)** "Open air" means outside the building.

**(108m)** "Pipe applied atmospheric type vacuum breaker" means a type of cross connection control device where the flow of water into the device causes a float to close an air inlet port and when the flow of water stops the float falls and forms a check valve against backsiphonage and at the same time opens the air inlet port to allow air to enter and satisfy the vacuum.

**(109)** "Pitch" means the gradient or slope of a line of pipe in reference to a horizontal plane.

**(110)** "Place of employment" means a place as defined in s. 101.01 (2) (f), Stats.

**(111)** "Plumbing" means piping, fixtures, appliances, appurtenances, devices and systems as defined in s. 145.01 (10), Stats.

**(112)** "Plumbing appliance" means any one of a special class of plumbing devices which is intended to perform a special function. The operation or control of the appliance may be dependent upon one or more energized components, such as motors, controls, heating elements, or pressure or temperature sensing elements. The devices may be manually adjusted or controlled by the user or operator, or may operate automatically through one or more of the following actions: a time cycle, a temperature range, a pressure range, a measured volume or weight.

**(113)** "Plumbing appurtenance" means a manufactured device or prefabricated assembly of component parts which is an adjunct to the basic piping system and plumbing fixtures. An

appurtenance does not demand additional water supply, nor does it add any discharge load to a fixture or the drain system. It is presumed that the appurtenance performs some useful function in the operation, maintenance, servicing, economy, or safety of the plumbing system.

**(114)** "Plumbing fixture" means a receptacle or device which:

(a) Is either permanently or temporarily connected to the water distribution system of the premises, and demands a supply of water from the system;

(b) Discharges used water, waste materials, or sewage either directly or indirectly to the drain system of the premises; or

(c) Requires both a water supply connection and a discharge to the drain system of the premises.

**(115)** "Plumbing system" includes the water supply system, the drain system, the vent system, plumbing fixtures, plumbing appliances and plumbing appurtenances which serve a building, structure or premises.

**(116)** "Potable water" means water which is:

(a) Safe for drinking, personal or culinary use; and

(b) Free from impurities present in amounts sufficient to cause disease or harmful physiological effects and conforming in its bacteriological and chemical quality to the requirements specified in ch. NR 809.

**(117)** "Pressure relief valve" means a pressure actuated valve held closed by a spring or other means and designed to automatically relieve pressure at a designated pressure.

**(117h)** "Pressure vacuum breaker assembly" means a type of cross connection control device which consists of an independently operating internally loaded check valve and an independently operating loaded air inlet located on the discharge side of the check valve, a tightly closing shut-off valve located at each end of the assembly, and test cocks.

**(117m)** "Pressurized flushing device" means a device which uses the water supply to create a pressurized discharge to flush a fixture exclusive of gravity type flushing systems.

**(118)** "Private interceptor main sewer" means a privately owned sewer serving 2 or more buildings and not directly controlled by a public authority.

**(119)** "Private water main" means a privately owned water main serving 2 or more buildings and not directly controlled by a public authority.

**(121)** "Public" means, in the classification of plumbing fixtures, those fixtures which are available for use by the public or employes.

**(122)** "Public sewer" means a sewer owned and controlled by a public authority.

**(123)** "Public water main" means a water supply pipe for public use owned and controlled by a public authority.

**(124)** "Quick closing valve" means a valve or faucet that closes automatically when released manually or controlled by mechanical means for fast action closing.

**(125)** "Receptor" means a fixture or device which receives the discharge from indirect or local waste piping.

**(125m)** "Reduced pressure detector backflow preventer" means a type of reduced pressure principle type backflow preventer which includes a parallel flow meter to indicate leakage or unauthorized use of water downstream of the assembly.

**(126)** "Reduced pressure principle type backflow preventer" means a type of cross connection control device which contains 2 independently acting check valves, separated by an intermediate chamber or zone in which there is a hydraulically operated means for venting to atmosphere, and includes 2 shut-off valves and 4 test cocks.

**(127)** "Relief vent" means a vent which permits additional circulation of air in or between drain and vent systems.

**(128)** "Riser" means a water supply pipe which extends vertically one full story or more.

**(129)** "Roof drain" means a drain installed to receive water collecting on the surface of a roof and to discharge it into a conductor.

**(130)** "Roughing in" means the installation of all parts of the plumbing system which can be completed prior to the installation of fixtures including drain, water supply and vent piping and the necessary fixture supports.

**(131)** "Row house" means a place of abode not more than 3 stories in height, arranged to accommodate 3 or more attached row living units in which each living unit is separated from the adjoining unit by a vertical occupancy separation of not less than one-hour fire-resistive construction, extending from the basement or lowest floor to the under side of the roof deck.

**(132)** "Safing" means a pan or other collector placed beneath a pipe or fixture to prevent leakage from escaping to the floor, ceiling or walls.

**(133)** "Sand interceptor" means a receptacle designed to intercept and retain sand, grit, earth and other similar solids.

**(134)** "Sanitary sewer" means a pipe which carries sewage excluding storm water, surface water, ground water and clear water wastes.

**(135)** "Sewage" means any liquid waste containing animal or vegetable matter in suspension or solution, and may include liquids containing chemicals in solution.

**(136)** "Sewage grinder pump" means a type of sewage pump which macerates sewage.

**(137)** "Sewage pump" means an automatic pump for the removal of sewage from a sanitary sump.

**(138)** "Slip-joint" means a connection in which one pipe slips into another, the joint of which is made tight with a compression type fitting.

**(139)** "Spigot" means the end of a pipe which fits into a bell or hub.

**(139m)** "Spill level" means the horizontal plane to which water will rise to overflow through channels or connections which are not directly connected to any drainage system, when water is flowing into a fixture, vessel or receptacle at the maximum rate of flow.

**(140)** "Spring line, pipe" means the line or place from which the arch of a pipe or conduit rises.

Note: See Appendix for further explanatory material.

**(141)** "Stack" means a drain or vent pipe which extends vertically one full story or more.

**(142)** "Stack vent" means a vent extending from the top of a drain stack.

**(143)** "Standpipe" means a drain pipe serving as a receptor for the discharge wastes from indirect or local waste piping.

**(144)** "Sterilizer, boiling type" means a device of nonpressure type, used for boiling instruments, utensils, or other equipment for disinfection.

**(145)** "Sterilizer, instrument" means a device for the sterilization of various instruments.

**(146)** "Sterilizer, pressure instrument washer" means a pressure vessel designed to both wash and sterilize instruments during the operating cycle of the device.

**(147)** "Sterilizer, pressure" means a pressure vessel fixture designed to use steam under pressure for sterilizing.

Note: A pressure sterilizer is also referred to as an autoclave.

**(148)** "Sterilizer, utensil" means a device for the sterilization of utensils.

**(149)** "Sterilizer vent" means a separate pipe or stack, indirectly connected to the drain system at the lower terminal, which receives the vapors from nonpressure sterilizers, or the exhaust

vapors from pressure sterilizers, and conducts the vapors directly to the outer air.

**(150)** "Sterilizer, water" means a device for sterilizing water and storing sterile water.

**(151)** "Storm sewer" means a pipe which carries storm water, surface water, ground water and clear water wastes.

**(152)** "Subsoil drain" means that part of a drain system which conveys the ground or seepage water from the footings of walls or below the basement floor under buildings to the storm sewer or other point of disposal.

**(153)** "Sump" means a tank or pit which receives sewage or liquid wastes, usually located below the normal grade of the gravity system and which must be emptied by mechanical means.

**(154)** "Sump pump" means an automatic water pump for the removal of drainage, other than raw sewage, from a sump, pit or low point.

**(155)** "Sump vent" means a vent pipe from a nonpressurized sump.

**(156)** "Supports" means hangers, anchors and other devices for supporting and securing pipes, or fixtures to structural members of a building.

**(157)** "Swimming pool" means a structure, basin, chamber or tank containing an artificial body of water for swimming, diving or recreational bathing having a depth of 2 feet or more at any point.

**(158)** "Temperature and pressure relief valve" means a combination relief valve designed to function as both a temperature relief and pressure relief valve.

**(159)** "Temperature relief valve" means a temperature actuated valve designed to automatically discharge at a designated temperature.

**(159m)** "Tempered water" means water ranging in temperature from 85° F. to less than 110° F.

**(159t)** "Toxic" means a probable human oral lethal dose of 15 or less grams of solution per kilogram of body weight.

**(160)** "Trap" means a fitting, device or arrangement of piping so designed and constructed as to provide, when properly vented, a liquid seal which prevents emission of sewer gases without materially affecting the flow of sewage or waste through it.

**(161)** "Trap seal" means the vertical distance between the top of the trap weir and the top of the dip separating the inlet and outlet of the trap.

**(161m)** "Trap seal primer, water supply fed" means a type of valve designed to supply water to the trap in order to provide and maintain the water seal of the trap.

**(162)** "Trap weir" means that part of a trap which forms a dam over which wastes must flow to enter the drain piping.

**(163)** "Turf sprinkler system" means a system of piping, appurtenances and devices installed underground to distribute water for lawn or other similar irrigation purposes.

**(164)** "Vacuum" means any pressure less than that exerted by the atmosphere.

**(166)** "Vacuum relief valve" means a device which admits air into the water distribution system to prevent excessive vacuum in a water storage tank or heater.

**(167)** "Vent" means a part of the plumbing system used to equalize pressures and ventilate the system.

**(168)** "Vent header" means a branch vent which connects 2 or more stack vents or vent stacks or both and extends to the outside air.

**(169)** "Vent stack" means a vertical vent pipe which extends one or more stories.

**(170)** "Vent system" means a pipe or pipes installed to provide a flow of air to or from a drain system, or to provide a circula-

tion of air within the system to protect trap seals from siphonage and back pressure.

**(171)** "Vertical pipe" means any pipe or fitting which makes an angle of 45° or less with the vertical.

**(171m)** "Wall hydrant, freeze resistant automatic draining type vacuum breaker" means a type of device which is designed and constructed with anti-siphon and back pressure preventive capabilities and with means for automatic post shut-off draining to resist freezing.

**(172)** "Wall mounted water closet" means a water closet attached to a wall in such a way that it does not touch the floor.

**(173)** "Waste" means the discharge from any fixture, appliance, area or appurtenance.

**(174)** "Waste sink" means a receptor for the discharge from indirect or local waste piping installed with its flood level rim above the surrounding floor.

**(175)** "Water closet" means a water flushed plumbing fixture designed to receive human excrement directly from the user of the fixture.

**(176)** "Water conditioner" means an appliance, appurtenance or device used for the purpose of ion exchange, demineralizing water or other methods of water treatment.

**(177)** "Water distribution system" means that portion of a water supply system from the building control valve to the connection of a fixture supply connector, plumbing fixture, plumbing appliance, water using equipment or other piping systems to be served.

**(178)** "Water heater" means any heating device with piping connections to the water supply system which is intended to supply hot water for domestic or commercial purposes other than space heating.

**(179)** "Water service" means that portion of a water supply system from the water main or private water supply to the building control valve.

**(180)** "Water supply system" means the piping of a private water main, water service and water distribution system, fixture supply connectors, fittings, valves, and appurtenances through which water is conveyed to points of usage such as plumbing fixtures, plumbing appliances, water using equipment or other piping systems to be served.

**(181)** "Water treatment device" means a device which:

(a) Renders inactive or removes microbiological, particulate, inorganic, organic or radioactive contaminants from water which passes through the device or the water supply system downstream of the device; or

(b) Injects into the water supply system gaseous, liquid or solid additives other than water, to render inactive microbiological, particulate, inorganic, organic or radioactive contaminants.

**(185)** "Wet vent" means that portion of a vent pipe which receives the discharge of wastes from other than water closets, urinals or other fixtures which discharge like sewage or fecal matter.

**(186)** "Yoke vent" means a vent connected to a drain stack for the purpose of preventing pressure changes in the drain stack.

**History:** Cr. Register, February, 1985, No. 350, eff. 3-1-85; r. (43), (71), (74), (120), (177) to (184), r. and recr. (53), (68) and (115), am. (56) and (163), cr. (55m), (67m), (159m), (177) to (181), Register, May, 1988, No. 389, eff. 6-1-88; cr. (35m), am. (111), Register, August, 1991, No. 428, eff. 9-1-91; am. (14), r. (7), (8), (15) and (52), r. and recr. (5), (16) to (18), (55), (55m), (126) and (165), cr. (47m), (60m), (60m), (79m), (80m), (81m), (89m), (93m), (101m), (103m), (117m), (125m), (139m), (159t), (161m), (165m) and (171m), Register, February, 1994, No. 458, eff. 3-1-94; correction in (89), (96), (98) and (110) made under s. 13.93 (2m) (b) 7., Stats., Register, February, 1994, No. 458; correction in (58) made under s. 13.93 (2m) (b) 6., Stats., Register, October, 1996, No. 490; am. (89m), (125m), (161m), (171m), renum. (165) to be (117h) and am., (165m) to be (108m) and am., cr. (18m), (52), (81h), Register, February, 1997, No. 494, eff. 3-1-97.

## Subchapter II — Administration & Enforcement

**Comm 82.20 Plan review and approval. (1) GENERAL.** Plans and specifications shall be submitted to the department or

to an approved agent municipality for review in accordance with pars. (a) and (b).

**Note:** A plan approval application form (SBD-6154) is available from the Safety and Buildings Division, P. O. Box 7162, Madison, WI 53707.

(a) **Department review.** Plans and specifications for the types of installations listed in Table 82.20-1 shall be submitted to the department for review, regardless of where the installation is to be located. Written approval for the plans shall be obtained prior to installation of the work.

(b) **Department or agent municipality review.** Plumbing plans and specifications for the types of plumbing installations listed in Table 82.20-2 shall be submitted for review to an agent municipality, if the installation is to be located within the agent municipality or to the department, if the installation is not to be located within an agent municipality. A municipality shall be designated as an agent municipality in accordance with sub. (2). Written approval for the plumbing plans shall be obtained prior to installation of the plumbing.

1. Plan review and approval of one- and 2-family dwellings. Review and approval of plumbing plans for one- and 2-family dwellings shall be in accordance with the provisions specified in s. Comm 20.09.

2. Local review. An agent municipality may require by local ordinance the submittal and review of plumbing plans for those installations involving 10 or less plumbing fixtures.

**Table 82.20-1**  
**SUBMITTALS TO DEPARTMENT**

Type of Installation
1. All plumbing, new installations, additions and alterations, regardless of the number of plumbing fixtures involved, to be installed in health care facilities.
2. Plumbing, new installations, additions and alterations involving 11 or more plumbing fixtures, to be installed in buildings owned by a metropolitan or sanitary sewer district. <sup>a</sup>
3. Plumbing, new installations, additions and alterations involving 11 or more plumbing fixtures, to be installed in buildings owned by the state. <sup>a</sup>
4. Engineered plumbing systems.
5. Controlled roof drainage systems.
6. Reduced pressure principle backflow preventers and reduced pressure detector backflow preventers.
7. Pressure vacuum breaker assembly.
8. Back siphonage backflow vacuum breaker.

<sup>a</sup>A water heater is to be counted as a plumbing fixture.

**Table 82.20-2**  
**SUBMITTALS TO DEPARTMENT OR AGENT MUNICIPALITY**

Type of Plumbing Installation
1. New installations, additions and alterations to drain systems, vent systems, water service systems, and water distribution systems involving 11 or more plumbing fixtures to be installed in public buildings. <sup>a,b</sup>
2. Grease interceptors to be installed for public buildings.
3. Garage catch basins and oil interceptors to be installed for public buildings.
4. Automatic car wash facilities.
5. Sanitary dump stations.
6. Private water mains.
7. Water supply systems and drain systems to be installed for mobile home parks and campgrounds. <sup>c</sup>

8. Private interceptor main sewers.

9. Chemical waste systems regardless of the number of plumbing fixtures involved.<sup>c</sup>

<sup>a</sup>A water heater is to be counted as a plumbing fixture.

<sup>b</sup>For the purpose of plan submittal, public buildings do not include zero-lot-line row houses where each living unit is served by an individual water service and an individual building sewer.

<sup>c</sup>Only agent municipalities which are cities of the first class may review these types of installations.

(2) **AGENT MUNICIPALITIES.** The department may designate to an approved municipality the authority to review and approve plumbing plans and specifications for those plumbing installations to be located within the municipality's boundary limits and which require approval under sub. (1) (b).

(a) An agent municipality shall employ at least 2 full time plumbing inspectors who have been qualified by the department.

1. The primary duties of the plumbing inspectors shall include plumbing plan review.

2. The plumbing inspectors shall be Wisconsin licensed master or journeyman plumbers.

**Note:** See Appendix for listing of agent municipalities.

(b) An agent municipality may waive its jurisdiction for plan review and approval for any project, in which case plans shall be submitted to the department for review and approval.

(c) Agent municipalities may set by ordinance the fees for plan review services.

(3) **PRIORITY PLAN REVIEW.** An appointment may be made with the department to facilitate the examination of plans in less than the normal processing time. Complete plans along with the fee specified in s. Comm 2.61 (3), shall be submitted to the department. The plans shall comply with all of the provisions of this section.

(4) **PLANS AND SPECIFICATIONS.** (a) At least 2 sets of plans and one copy of specifications which are clear, legible and permanent copies shall be submitted for examination and approval.

(b) If a submitter wants more than 2 sets of approved plans returned, the fees specified in s. Comm 2.64 shall accompany the plan submittal.

(c) All plans submitted for approval shall be accompanied by sufficient data and information for the department to judge if the installation and its performance will meet the requirements of this chapter and ch. Comm 84.

1. Information to accompany the plans shall include the location or address of the installation and the name of the owner.

2. Plans proposing the installation, creation or extension of a private interceptor main sewer which is to discharge to a municipal treatment facility shall:

a. Be accompanied by a letter from the appropriate designated planning or management agency indicating conformance with an approved areawide water quality management plan under ch. NR 121; and

b. Not be approved, if the municipality is ineligible for sanitary sewer extension approvals under s. NR 110.05.

3. Except as provided in subd. 4., plans proposing the installation of a building sewer for new construction which is to discharge to a municipal treatment facility shall:

a. Be accompanied by a letter from either the appropriate designated management agency or sanitary district indicating conformance with an approved areawide water quality management plan; and

b. Not be approved, if the municipality is ineligible for sanitary sewer extension approvals under s. NR 110.05.

4. Plans proposing the installation of a building sewer for new construction which is to discharge to a municipal treatment facility shall not be required to comply with subd. 3., if:

a. The proposed installation is served by an existing building sewer which extends from the lot line to the public sewer and the

proposed installation does not exceed the capacity of the existing building sewer or sewers; or

b. The plans indicate that a drainage load of not more than 54 drainage fixture units will be discharged through the building sewer.

Note: See Appendix for listing of water quality management agencies.

(d) 1. a. Except as provided in subd. 1. b., plumbing plans and specifications shall be sealed or stamped and shall be signed by a Wisconsin registered architect, engineer or plumbing designer in accordance with ch. A-E 2.

b. A master plumber may design and submit for approval plumbing plans and specifications for a plumbing system which the master plumber is to install. Each sheet of plans and specifications the master plumber submits shall be signed and dated and shall include the Wisconsin license number of the master plumber. Where more than one sheet is bound together into one volume, only the title sheet or index sheet need to be signed and dated by the master plumber responsible for their preparation, if the signed sheet clearly identifies all of the other sheets in the volume.

2. Automatic fire sprinkler plans and specifications for cross connection control shall be:

a. Signed and sealed in accordance with s. A-E 2.02 by an architect, engineer or sprinkler designer who is registered by the department of regulation and licensing; or

b. Signed, including license number, and dated by an automatic fire sprinkler contractor who is responsible for the installation of the sprinklers and who is licensed by the department.

(5) **PLAN REVIEW.** Except as provided in sub. (12), the department shall review and make a determination on an application for plan review within 15 days of receiving the required information and fees.

(a) *Conditional approval.* If, upon review, the department determines that the plans substantially conform to the provisions of chs. Comm 82 to 84, a conditional approval, in writing, shall be granted. All noncode complying conditions stated in the conditional approval shall be corrected before or during installation.

(b) *Denial of approval.* If, upon review, the department determines that the plans do not substantially conform to the provisions of chs. Comm 82 to 84, the request of conditional approval shall be denied in writing.

(6) **EVIDENCE OF APPROVAL.** The plumber responsible for the installation of the plumbing shall keep at the construction site at least one set of plans bearing the department's or the agent municipality's stamp of approval and at least one copy of specifications. The plans and specifications shall be open to inspection by an authorized representative of the department.

(7) **FEES.** Fees for plumbing plan review and petition for variance shall be submitted in accordance with ss. Comm 2.64 and 2.52.

(8) **REVISIONS.** All changes or modifications, which involve the provisions of chs. Comm 82 to 84, made to plumbing plans and specifications, which have been granted approval under sub. (1), shall be submitted to the department or agent municipality for examination. All changes and modifications shall be approved in writing by the department or agent municipality prior to installation of the plumbing.

(9) **REVOCATION OF APPROVAL.** The department may revoke any approval, issued under the provisions of this chapter, for any false statements or misrepresentation of facts on which the approval was based.

(10) **DEPARTMENT LIMITATION AND EXPIRATION OF APPROVAL.**  
 (a) A conditional approval of a plan by the department shall not be construed as an assumption by the department of any responsibility for the design; and the department does not hold itself liable for any defects in construction, nor for any damages that may result from the specific installation.

(b) Plan approval by the department or its authorized representative shall expire 2 years after the date indicated on the approval

letter, if construction has not commenced within that 2 year period.

(11) **PETITION FOR VARIANCE.** (a) *Procedure.* The department will consider and may grant a variance to an administrative rule upon receipt of a fee and a completed petition for variance form from the owner, provided an equivalency is established in the petition for variance which meets the intent of the rule being petitioned. The department may impose specific conditions in granting a variance to promote the protection of the health, safety or welfare of the public. Violation of those conditions under which the variance is granted constitutes a violation of this chapter.

(b) *Petition processing time.* Except for priority petitions, the department shall review and make a determination on a petition for variance within 30 business days of receipt of all calculations, documents and fees required to complete the review. The department shall process priority petitions within 10 business days.

Note: The petition for variance form (SBD-8) is available from the Safety and Buildings Division, P. O. Box 7162, Madison, WI 53707.

(12) **ENGINEERED PLUMBING SYSTEMS.** The provisions of this chapter or ch. Comm 84 are not intended to prevent design and use of engineered plumbing systems if the system has been first approved by the department. The department may approve an engineered plumbing system, if the system complies with the intent of chs. Comm 82 to 84.

(a) *Plans and specifications.* Plans and specifications for all engineered plumbing systems shall be submitted and reviewed in accordance with subs. (4) to (10).

1. The plans, specifications and all pertinent data shall indicate the nature and extent of the proposed system before an approval is granted.

2. Plans, specifications and data for an engineered plumbing system shall show the complete drain system, vent system, and water supply system including:

- The plumbing fixture and appliance arrangements;
- The pipe sizes;
- The direction of flow for drain pipes;
- The grade of horizontal drain pipes;
- The drainage fixture unit values for all drain pipes; and
- The water supply fixture unit values for all water supply pipes.

3. When requested, additional details and data pertaining to the design, installations and materials of an engineered plumbing system shall be submitted to the department.

4. The department shall review and make a determination on an application for plan review of an engineered plumbing system within 3 months of receiving the required information and fees.

(b) *Inspections.* The registered architect, engineer, plumbing designer or master plumber responsible for the design of the engineered plumbing system shall provide on-site supervision of the installation.

1. Upon completion of the installation, the registered architect, engineer, plumbing designer or master plumber shall certify in writing to the department that the installation is in compliance with the approved plans, specifications and data.

2. The department may require periodic inspections of the system by the registered architect, engineer, plumbing designer or master plumber after the installation is completed to monitor the performance of the system.

(13) **PENALTIES.** Penalties for violations of this chapter shall be assessed in accordance with s. 145.12, Stats.

History: Cr. Register, February, 1985, No. 350, eff. 3-1-85; am. (1) (intro.), r. and recr. Tables 82.20-1 and 82.20-2, r. (5), renum. (6) to (12) to be (5) to (11), cr. (5) (intro.) and (12), Register, May, 1988, No. 389, eff. 6-1-88; correction in (1) (b) 1. made under s. 13.93 (2m) (b) 7., Stats., Register, May, 1988, No. 389; am. (4) (c) 2. intro. and 4. a. and b., Register, February, 1991, No. 422, eff. 3-1-91; am. (4) (c) 3.a., Register, August, 1991, No. 428, eff. 9-1-91; am. (1) (intro.), (a), (4) (a) to (c) 1., (5) (a), (b) and Tables 82.20-1 and 82.20-2, renum. (4) (d) and (c) to be (4) (d) 1. a. and b. and am. (4) (d) 1. a., cr. (4) (d) 2., Register, February, 1994, No. 458, eff. 3-1-94; correction in (7) made under s. 13.93 (2m) (b) 7., Stats., Register, February, 1994, No. 458; corrections made under s. 13.93 (2m) (b) 7., Stats., Register, October, 1996, No. 490; am. Tables 82.20-1, 2, (1) (b) 2., Register, February, 1997, No. 494, eff. 3-1-97;



correction in (13) made under s. 13.93 (2m) (b) 7., Stats., Register, February, 2000, No. 530.

**Comm 82.21 Testing and maintenance. (1) TESTING OF PLUMBING SYSTEMS.** Except as provided in par. (a), all new plumbing and all parts of existing systems which have been altered, extended or repaired shall be tested as specified in par. (d) to disclose leaks and defects before the plumbing is put into operation.

(a) *Waiver of testing.* 1. The testing of the plumbing shall not be required where the installation does not include the addition, replacement, alteration or relocation of any water distribution, drain or vent piping.

2. a. Field testing the installation of a storm building sewer and a storm private interceptor main sewer is not required.

b. The joints and connections to be employed for storm building sewer piping shall conform with s. Comm 84.40 (1) (a).

(b) *Local inspection.* Where the plumbing is installed in a municipality having a local inspector, the testing of the plumbing shall be done in the presence of a plumbing inspector, except as provided in subd. 1. b.

1. Notice of inspection. a. The plumber responsible for the installation shall notify the plumbing inspector in person, by telephone or in writing when the work is ready for inspection.

b. If the inspection is not made by the end of the normal business day following the day of notification, not including Saturday, Sunday or legal holidays, the plumber may proceed with the testing and the installation.

2. Preparations for inspection. When the installation is ready for inspection, the plumber shall make such arrangements as will enable the plumbing inspector to inspect all parts of the plumbing system. The plumber shall have present the proper apparatus and appliances for making the tests, and shall furnish such assistance as may be necessary in making the inspection.

3. Rough-in inspection. A rough-in inspection shall be made when the plumbing system is roughed-in and before fixtures are set. Except as provided in subd. 1., plumbing work shall not be closed in, concealed, or covered until it has been inspected and approved by the plumbing inspector and permission is granted to do so.

4. Final inspection. a. Upon completion of the plumbing installation and before final approval is given, the plumbing inspector shall inspect the work.

b. When required by a municipality, the plumbing installation shall be subject to a final test conducted in accordance with par. (d) 7. The final test shall be observed by the plumbing inspector.

5. Reinspections. Whenever the plumbing official finds that the work or installation does not pass any initial test or inspection, the necessary corrections shall be made to comply with this chapter. The work or installation shall then be resubmitted for inspection to the plumbing inspector.

(c) *Inspection of one- and 2-family dwellings.* The inspection of plumbing installations for one- and 2-family dwellings shall be in accordance with ss. Comm 20.08 to 20.11.

(d) *Testing provisions.* 1. General. The testing of plumbing installations shall be conducted in accordance with this paragraph.

a. Equipment, material and labor for tests. All equipment, material and labor required for testing a plumbing system or part thereof shall be furnished by the plumber responsible for the installation.

b. Exposure of work. Except as provided in subds. 2. and 5., all new, altered, extended or replaced plumbing shall be left uncovered and unconcealed until it has been tested. Where the work has been covered or concealed before it is tested, it shall be exposed for testing.

2. Sanitary building sewer and sanitary private interceptor main sewer. A sanitary building sewer and a sanitary private interceptor main sewer shall be tested for leaks and defects with water or air before or after being covered in accordance with either subd.

2. a. or b. The test for leaks and defects may be applied to the entire building sewer or private interceptor main sewer or in sections. For the purposes of this subdivision, the testing of a building sewer or private interceptor main sewer is not required to include the manholes serving the sewer.

a. The building sewer or private interceptor main sewer shall be tested by insertion of a test plug at the point of connection with the public sewer. The sewer shall then be filled with water under a head of not less than 10 feet. The water level at the top of the test head of water shall not drop for at least 15 minutes.

b. The air test shall be made by attaching an air compressor testing apparatus to any suitable opening, and, after closing all other inlets and outlets to the system, forcing air into the system until there is a uniform gauge pressure of 3 pounds per square inch. This pressure shall be held without introduction of additional air for a period of at least 15 minutes.

3. Building drain. The entire building drain with all its branches, receptacles and connections shall be brought so far as practical to the surface or grade of the basement floor and shall be tested with water or air in accordance with subd. 7.

4. Drain and vent systems. The piping of a drain and vent systems, including conductors, shall be tested upon completion of the rough piping installation with water or air in accordance with subd. 7.

5. Private water mains and water services. Private water mains and water services shall be inspected before being covered. The private water mains and water services shall be tested and proven water tight under water pressure not less than the working pressure under which it is to be used. The water used for testing shall be obtained from a potable source of supply.

6. Water distribution system. The piping of a water distribution system shall be tested and proven water tight under a water pressure not less than the working pressure under which it is to be used. The water used for tests shall be obtained from a potable source of supply.

7. Test methods for drain and vent systems. A test for watertightness shall be applied to the entire drain and vent system at one time or to the entire system in sections after the rough piping has been installed in accordance with either subd. 7. a. or b.

a. If applied to the entire system, all openings in the piping shall be tightly closed, except the highest opening, and the system shall be filled with water to the point of overflow. If the system is tested in sections, each opening shall be tightly plugged except the highest opening of the section under test, and each section shall be filled with water, but a section shall not be tested with less than a 10 foot head of water. In testing successive sections, at least the upper 10 feet of the next preceding section shall be tested, so that no joint or pipe in the building, except the uppermost 10 feet of the system, is subjected to a test of less than a 10 foot head of water. The water shall be kept in the system or in the portion under test for at least 15 minutes before inspection starts. The system shall then be tight at all points.

b. The air test shall be made by attaching an air compressor testing apparatus to any suitable opening, and, after closing all other inlets and outlets to the system, forcing air into the system until there is a uniform gauge pressure of 5 pounds per square inch or sufficient to balance a column of mercury 10 inches in height. This pressure shall be held without introduction of additional air for a period of at least 15 minutes.

8. Final test. Where required by the local plumbing inspector, after the plumbing fixtures have been installed and the traps filled with water, the connections shall be tested and proven gas and watertight by either one of the methods specified in subd. 8. a. or b.

a. The smoke test shall be made by introducing a pungent, thick smoke, produced by one or more smoke machines, into the completed system. When the smoke appears at stack openings on the roof, the openings shall be closed and a pressure equivalent to

a one inch water column shall be built and maintained for the period of the inspection.

b. The air test shall be made by attaching an air compressor testing apparatus to any suitable opening, and, after closing all other inlets and outlets to the completed system, forcing air into the system until a pressure equivalent to the gauge pressure of a one inch water column. This shall be accomplished by the use of The pressure shall remain constant for the period of inspection without the introduction of additional air.

**(2) MAINTENANCE AND REPAIRS.** All plumbing systems, both existing and new, and all parts thereof, shall be maintained in a safe and sanitary condition. All devices or safeguards which are required by this chapter shall be maintained in good working order. The owner shall be responsible for the maintenance of plumbing systems.

(a) *Existing systems.* Whenever it appears upon inspection that any part of an existing plumbing system is defective, or fails to conform to the requirements of this chapter and if failure tends to create a health hazard, it shall be repaired, renovated, replaced or removed.

(b) *Fixtures replaced.* When an old or defective fixture is removed, to be replaced by a new fixture, and no other fixture or piping is to be added or remodeled, it is not necessary to reconstruct the drain or vent piping to make it conform to the provisions of this chapter, unless the drain or vent piping is in a defective condition. Where the existing drain or vent piping does not conform to the provisions of this chapter, the department may require the new fixtures to be provided with deep seal traps.

(c) *Reconstruction.* When old or defective plumbing is to be remodeled, additional fixtures installed, or the whole plumbing system moved to another part of the building, the remodeled system shall be made to conform to this chapter.

(d) *Materials reused.* All plumbing fixtures, drain and vent pipes removed from a building, if found to be in good condition, may be reused, if the fixtures and pipes are approved by the department or local plumbing inspector and the owner of the building in which they are to be installed gives written consent.

(e) *Existing building sewers and drains.* Existing building sewers and drains may be used in connection with new buildings only when they are found on examination and test to conform to the requirements of this chapter governing building sewers and drains. If the existing work is found defective, the local or state inspector shall notify the owner of the changes necessary to make it conform to the requirements of this chapter.

(f) *Repairs.* All repairs to fixtures or piping shall be done in conformance with the provisions of this chapter, except repair clamps or bands may be used for emergency situations.

(g) *Demolition of structures.* When a structure is demolished or removed, all sanitary sewer, storm sewer and water supply connections shall be sealed and plugged in a safe manner.

(h) *Dead ends.* If a dead end is created in the removal of any part of a drain system, all openings in the drain system shall be properly sealed.

**(3) MAINTENANCE AND TESTING OF CROSS CONNECTION CONTROL DEVICES.** (a) All cross connection control devices shall be maintained in accordance with the appropriate standard.

(b) 1. A performance test shall be conducted for a reduced pressure principle backflow preventer, a reduced pressure detector backflow preventer, a double check backflow prevention assembly, a double check detector assembly backflow preventer, a pressure vacuum breaker assembly and a back siphonage backflow vacuum breaker:

- a. At the time of installation;
- b. Immediately after repairs or alterations to the device have occurred; and
- c. At least annually.

2. a. The performance test for a reduced pressure principle backflow preventer shall be conducted in accordance with ASSE 5010-1013-1.

b. The performance test for a reduced pressure detector backflow preventer shall be conducted in accordance with ASSE 5010-1047-1.

c. The performance test for a double check backflow prevention assembly shall be conducted in accordance with ASSE 5010-1015-1, 5010-1015-2, 5010-1015-3 or 5010-1015-4.

d. The performance test for a double check detector assembly backflow preventer shall be conducted in accordance with ASSE 5010-1048-1, 5010-1048-2, 5010-1048-3 or 5010-1048-4.

e. The performance test for a pressure vacuum breaker assembly shall be conducted in accordance with ASSE 5010-1020-1.

3. A performance test for a reduced pressure principle backflow preventer, a reduced pressure detector backflow preventer, a double check backflow prevention assembly, a double check detector assembly backflow preventer, a pressure vacuum breaker assembly and a back siphonage backflow vacuum breaker shall be conducted by an individual registered by the department in accordance with s. Comm 5.99.

4. a. The results of a performance test for a reduced pressure principle backflow preventer, a reduced pressure detector backflow preventer, pressure vacuum breaker assembly, and back siphonage backflow vacuum breaker, shall be forwarded to the department within 60 days of completion of the test.

b. The results of performance tests for a reduced pressure principle backflow preventer, a reduced pressure detector backflow preventer, pressure vacuum breaker assembly, and back siphonage backflow vacuum breaker, shall be recorded in a format prescribed by the department.

*Note:* The form for reporting the test results (SBD-9927) is available from, and the test results are to be sent to, the Safety and Buildings Division, P. O. Box 7969, Madison, WI 53707.

5. The results of performance tests for a double check backflow prevention assembly, and a double check detector assembly backflow preventer shall be maintained at the site where the device is installed and shall be made available upon request to the department or government entity exercising jurisdiction.

(c) The maintenance and performance testing requirements of this subsection shall also apply to those cross connection control devices installed prior to the effective date of this subsection.

*History:* Cr. Register, February, 1985, No. 350, eff. 3-1-85; r. and recr. (1) (d) 5., am: (1) (d) 7. intro., Register, May, 1988, No. 389, eff. 6-1-88; correction in (1) (c) made under s. 13.93 (2m) (b) 7., Stats., Register, May, 1988, No. 389; renum. (1) (a) and (2) (b) to (i) to be (1) (a) 1. and (2) (a) to (h), r. (2) (a), cr. (1) (a) 2. and (3), r. and recr. (1) (d) 1. (intro.), am. (1) (d) 2. (intro.), Register, February, 1994, No. 458, eff. 3-1-94; am. (3) (b) 3., Register, October, 1996, No. 490, eff. 11-1-96; am. (3), Register, February, 1997, No. 494, eff. 3-1-97.

### Subchapter III — Drain and Vent Systems

**Comm 82.30 Sanitary drain systems.** (1) **SCOPE.** The provisions of this section set forth the requirements for the design and installation of sanitary drain systems, including building drains and building sewers.

*Note:* The provisions for storm and clear water drain systems are specified in s. Comm 82.36.

(2) **MATERIALS.** All sanitary drain systems shall be constructed of approved materials in accordance with ch. Comm 84.

(3) **LOAD ON DRAIN PIPING.** (a) *Intermittent flow fixtures.* The load factor on drain piping shall be computed in terms of drainage fixture unit values specified in Table 82.30-1 for the corresponding fixture listed. Drainage fixture unit values for intermittent flow fixtures not listed in Table 82.30-1 shall be computed on the basis of one fixture unit equalling 7.5 gallons per minute of flow.

(b) *Continuous flow devices.* Drainage fixture unit values for continuous or semicontinuous flow devices such as pumps, ejectors, air conditioning equipment or similar devices shall be com-

puted on the basis of one fixture unit for each 2 gallons per minute of flow rate of discharge into the drain system.

**TABLE 82.30-1  
DRAINAGE FIXTURE UNIT VALUES**

Type of Fixture	Drainage Fixture Unit Value (dfu)	Trap Size Min. Diam. (in inches)
Automatic clothes washers,		
Commercial, individual	4	2
Commercial, large capacity	a	a
Self Service Laundry	3	1½
Residential	3	1½
Bathroom Group, includes: water closet, lavatory, bathtub or shower	6	
Bathrooms, all types <sup>b</sup>	2	1½
Bedpan Washer	6	2
Beer Tap	½	1¼
Bidet	2	1½
Bottle Cooler	½	1¼
Coffee Maker	½	1¼
Cuspidor, fountain or dental	1	1¼
Dipper Well	1	1¼
Dishwasher, commercial type	c	c
Dishwasher, residential type	2	1½
Drinking Fountain	½	1¼
Exhaust Hood Washer	4	2
Floor Drain,		
2 inch	2	2
3 inch	3	3
4 inch	4	4
Larger than 4 inch	4	d
Glass Filler	½	1¼
Glass Washer	2	1½
Ice Chest	½	1½
Laundry Tray, 1 or 2 compartment	2	1½
Lavatory	1	1¼
Refrigerated Food Display Case	1	1
Shower Stall		
Residential	2	2
Public, individual	2	2
Public, group	2 per shower head	2
Sinks,		
Cup	½	1¼
Factory, wash, per set of faucets	1	1½
Fountain wash up, per station	1	1½
Fountain or Bar, 4 compartments or less	3	1½
Food Waste Grinder, commercial 2 HP or less	2	f
Food Waste Grinder, commercial 3 HP or more	3	f

**TABLE 82.30-1 (Continued)  
DRAINAGE FIXTURE UNIT VALUES**

Type of Fixture	Drainage Fixture Unit Value (dfu)	Trap Size Min. Diam. (in inches)
Laboratory	2	1½
Laboratory, school	2	1½
Classroom	1	1¼
Pack or plaster	3	2
Residential, with or without food waste grinder	2	1½
Restaurant,		
Scullery, pots and pans—4 compartments or less	3	f
Food, rinsing, cleaning or thawing	3	2
Service Sink, Flushing Rim	6	3
Service Sink, 2 inch diameter, wall outlet	2	2
Service Sink, 3 inch diameter, wall outlet	3	3
Service Sink, 2 inch diameter, floor outlet	2	2
Service Sink, 3 inch diameter, floor outlet	3	3
Shampoo Sink, barber or beauty parlor	2	1½
Surgeons, wash up	3	1½
Wash Fountain, circular and semi-circular	2	1½
Receptors of Indirect Wastes, gravity flow discharge		
1½ inch receptor outlet diameter	2	1½
2 inch receptor outlet diameter	3	2
3 inch receptor outlet diameter	4	3
4 inch receptor outlet diameter	6	4
larger than 4 inch receptor outlet diameter	8	f
Soda Dispenser	½	1¼
Sterilizers,		
Bedpan	4	2
Garbage can washer	3	3
Instrument or water	1	1½
Urinal	2	g
Water Closet, nonpublic	4	g
Water Closet, public	6	g

- a Based on discharge rate of the fixture.
- b Includes foot, sitz and infant baths and regular bathtubs with or without showers or whirlpool circulation piping.
- c Based on discharge rates and number of outlets; a 4-inch diameter trap and drain pipe minimum recommended.
- d Trap size corresponds to the size of the floor drain.
- f Trap size corresponds to the size of the drain outlet.
- g Trap size specified in referenced standards of s. Comm 84.20.

(4) SIZE OF DRAIN PIPING. (a) *Maximum loading.* 1. The total drainage load in any portion of drain piping shall not exceed the limits specified in Tables 82.30-2 and 82.30-3.

2. The drainage fixture unit values assigned to a receptor which is to receive only the indirect waste discharge from a relief valve on a domestic water heater may be disregarded when determining the minimum size of the building drain and building sewer. Any drain piping between the receptor and the building drain shall be sized by including the assigned fixture unit values for the type of receptor.

Note: See s. Comm 82.31 (17) for sizing requirements of combination drain and vent systems.

Note: See Appendix for further explanatory material.

(b) *Minimum size of underground drain piping.* Any pipe of the drain system installed underground, other than the building sewer, shall not be less than 2 inches in diameter. Any portion of underground drain piping which is 2 inches in diameter shall not exceed a length of 20 feet.

Table 82.30-2

**HORIZONTAL AND VERTICAL DRAIN PIPING**

Pipe Diameter (in inches)	Maximum Number of Drainage Fixture Units Which May Drain Through Any Portion of Horizontal and Vertical Drain Piping			
	Horizontal Drain Piping <sup>a</sup>	Vertical Drain Piping of 3 Branch Intervals or Less <sup>b</sup>	Vertical Piping in Drain Stacks of more than 3 Branch Intervals <sup>b</sup>	
			Total Discharge from Side Connections into One Branch Interval	Total Discharge through Any Portion
1 1/4	1	2	1	2
1 1/2	3	4	2	8
2	6	10	6	24
3	20 <sup>c</sup>	48 <sup>d</sup>	20 <sup>c</sup>	72 <sup>d</sup>
4	160	240	90	500
5	360	540	200	1,100
6	620	960	350	1,900
8	1,400	2,200	600	3,600
10	2,500	3,800	1,000	5,600
12	3,900	6,000	1,500	8,400

a: Does not include building drains and building sewers.

b: Drain stacks may be reduced in size as the drainage load decreases to a minimum diameter of one half of the diameter required at the base of the stack, but not smaller than that required for a stack vent under s. Comm 82.31 (14) (a).

c: Not more than 2 water closets or similar flush action type fixtures of 4 or more drainage fixture units.

d: Not more than 2 water closets or similar flush action type fixtures of 4 or more drainage fixture units within each branch interval nor more than 6 flush action type fixtures on the stack.

Table 82.30-3

**BUILDING DRAINS, BUILDING SUBDRAINS, BUILDING SEWERS AND PRIVATE INTERCEPTOR MAIN SEWERS<sup>a</sup>**

Pipe Diameter (in inches)	Maximum Number of Drainage Fixture Units Which May Drain Through Any Portion of a Building Drain, Building Subdrain, Building Sewer or Private Interceptor Main Sewer			
	Pitch (inch per foot)			
	1/16	1/8	1/4	1/2
2	NP <sup>b</sup>	NP	6	9
3	NP	36 <sup>c</sup>	42 <sup>c</sup>	50 <sup>c</sup>
4	NP	180	216	250
5	NP	390	480	575
6	NP	700	840	1,000
8	1,400	1,600	1,920	2,300
10	2,500	2,900	3,500	4,200
12	3,900	4,600	5,600	6,700
15	7,000	8,300	10,000	12,000

a: Private interceptor main sewers 6 inches or less in diameter, see s. NR 110.13 for private interceptor main sewers 8 inches or larger in diameter.

b: NP means Not Permitted.

c: Not more than 2 water closets or similar flush action type fixtures of 4 or more drainage fixture units.

(c) *Minimum size of building sewers.* 1. Gravity flow sewers. The minimum size of a gravity flow sanitary building sewer shall be 4 inches in diameter. A municipality or sanitary district by ordinance may require that portion of the building sewer between the lot line and the public sewer to be larger than 4 inches in diameter.

2. Pressurized sewers. a. Sewers pressurized through the use of sewage ejectors, sewage pumps or sewage grinder pumps shall be sized to maintain a minimum flow velocity of 2 feet per second and shall be in accordance with the ejector or pump manufacturer's recommendations.

b. Pressurized building sewers shall be sized not less than 2 inches in diameter for sewage ejectors and sewage pumps, and 1 1/4 inches in diameter for all sewage grinder pumps.

(d) *Minimum size of private interceptor main sewers.* 1. Except as provided in subd. 3., the minimum size of a gravity flow private interceptor main sewer shall be 4 inches in diameter.

2. Except as provided in subd. 3., the minimum size of pressurized private interceptor main sewer shall be such so as to maintain a minimum flow velocity of 2 feet per second.

3. A municipality or a sanitary district may by ordinance, require the minimum size of a private interceptor main sewer to be larger than 4 inches in diameter.

4. Private interceptor main sewers 6 inches or less in diameter may not exceed the drainage fixture limits in Table 82.30-3.

5. Private interceptor main sewers 8 inches or larger in diameter shall conform with the design flow criteria specified in ch. NR 110.

(e) *Future fixtures.* Where provisions are made for the future installation of fixtures, the drainage fixture unit values of such fixtures shall be considered in determining the required sizes of drain and vent pipes. Construction to provide for future installations shall be terminated with a plugged fitting or fittings.

(5) **PITCH OF HORIZONTAL DRAIN PIPING.** All horizontal drain piping 4 inches or larger in diameter shall be installed at a pitch which produces a computed velocity of at least 2 feet per second when flowing half full.

(a) *Horizontal branch drains.* 1. The minimum pitch of horizontal branch drains 2 inches or less in diameter shall be 1/4 inch per foot.

2. The minimum pitch of horizontal branch drains larger than 2 inches in diameter shall be 1/8 inch per foot.

(b) *Building drains and building sewers.* 1. The minimum pitch of building drains shall be in accordance with Table 82.30-3.

2. a. The minimum pitch of building sewers 10 inches or less in diameter shall be in accordance with Table 82.30-3.

b. The minimum pitch of building sewers 12 inches or larger in diameter shall conform with the minimum pitches specified for municipal sewers in s. NR 110.13 (2) (c).

(c) *Private interceptor main sewers.* 1. The minimum pitch of private interceptor main sewers 6 inches or less in diameter shall be in accordance with Table 82.30-3.

2. The minimum pitch of private interceptor main sewers 8 inches or larger in diameter shall conform with the minimum pitches specified for municipal sewers in s. NR 110.13 (2) (c).

(6) **OFFSETS IN VERTICAL DRAINS.** Offsets in vertical drain piping shall be in accordance with this subsection.

(a) *Offsets of 45° or less.* 1. An offset in a vertical drain, with a change in direction of 45° or less from the vertical, shall be sized as a vertical drain piping in accordance with sub. (4).

2. Where a horizontal branch connects to a stack within 2 feet above or below an offset with a change of direction of 30 to 45° from the vertical and the offset is located below 2 or more branch intervals, a relief vent shall be installed in accordance with s. Comm 82.31 (5).

(b) *Offsets of more than 45°.* A drain stack with an offset of more than 45° from the vertical shall be installed in accordance with subs. 1. to 5.

1. That portion of the stack above the highest offset fitting shall be sized as for vertical drain piping in accordance with sub. (4).

2. That portion of the offset between and including the offset fittings shall be sized as horizontal drain piping in accordance with sub. (4).

3. That portion of stack below the offset shall be not less than the size of the offset and not less than the size required for vertical drain piping in accordance with sub. (4).

4. No horizontal branch drain may connect to the stack offset downstream from the offset's highest fitting within the distance equal to 10 pipe diameters of the offset.

5. Where an offset is located below 2 or more branch intervals, a relief vent and a yoke vent shall be installed in accordance with s. Comm 82.31 (5).

Note: See Appendix for further explanatory material.

(7) **HORIZONTAL BRANCH DRAIN CONNECTION AT BASE OF A STACK.** (a) A horizontal branch drain may not connect downstream from the base fitting of a drain stack 2 inches or larger in diameter within the distance equal to 10 pipe diameters of the drain to which the horizontal branch drain connects.

(b) A building drain branch or building subdrain branch may not connect to a building drain or building subdrain downstream from the base fitting of a drain stack 2 inches or larger in diameter

within the distance equal to 20 pipe diameters of the building drain or building subdrain.

Note: See Appendix for further explanatory material.

(8) **PIPING CHANGES IN DIRECTION.** Changes in the direction of drain piping shall be accomplished in accordance with the requirements of this subsection.

(a) *Fittings.* All changes in direction of flow in drain piping shall be made by the appropriate use of 45 degree wyes, long or short sweep quarter bends, sixth, eighth, or sixteenth bends, or by a combination of these or other equivalent fittings. Except as provided in subs. 1. to 3., fittings which change the direction of flow for drain piping 8 inches or less in diameter shall conform to the minimum radii specified in Table 82.30-4.

Note: See Appendix for further explanatory material.

1. The minimum radius for the first 90° fitting downstream from a trap serving a lavatory or sink shall be 1-3/4 inches for drain piping 1-1/2 inches in diameter. The fitting shall be a tee or quarter bend.

2. The minimum radius for the first 90° bend or elbow downstream from a water closet shall be 2-1/2 inches for drain piping 3 inches in diameter.

3. The minimum radius for the first 90° bend or elbow downstream from a water closet shall be 3 inches for drain piping 4 inches in diameter.

**Table 82.30-4**  
**MINIMUM RADII OF FITTINGS (in inches)**

Diameter of pipe (in inches)	Changes in Direction of Flow	
	Horizontal to Vertical	Vertical to Horizontal and Horizontal to Horizontal
1-1/4	1-1/8	2-1/4
1-1/2	1-3/8	2-3/4
2	1-7/8	3-1/4
3	2-7/8	4-1/16
4	3-3/4	4-7/8
5	4-1/2	6-1/2
6	5	7
8	6	8

(b) *Blowout type fixtures.* Where blowout type fixtures are installed back to back, appropriate fittings shall be installed to prevent the passage of wastes from one fixture to the other.

(9) **DRAIN FITTINGS AND CONNECTIONS.** Drain fittings, connections, devices and methods of installation shall not obstruct or retard the flow of water, wastes, sewage or air in the drain system or venting system in an amount greater than the normal frictional resistance to flow, unless as otherwise permitted in this chapter or unless approved by the department.

(a) *Closet bend.* The reduction of a 4 x 3 inch closet bend or collar fitting from 4 inches to 3 inches shall not be considered an obstruction.

(b) *Side inlet tees or bends.* The side inlet of a low pattern or high pattern tee or bend shall not be used as a vent connection when the side inlet is placed in a horizontal position or when any arrangement of piping or fittings produces a similar effect.

Note: See Appendix for further explanatory material.

(c) *Prohibited fittings and connections.* The types of fittings and connections specified in subs. 1. to 4. shall not be used for drain piping:

1. A heel inlet bend when the heel inlet is in the horizontal position;

2. A fitting or connection which has an enlargement chamber or recess with a ledge or shoulder, or reduction in pipe area in the direction of flow;

3. A fitting which has running threads; and

4. A connection by means of drilling and tapping of a drain or vent pipe, unless as otherwise approved by the department.

(d) *Saddles*. If a pipe saddle is used to connect drain piping together, the saddle shall be installed in accordance with s. Comm 84.30 (5) (d).

**(10) SUMPS, EJECTORS AND PUMPS.** (a) *Sumps*. 1. General. All sanitary building subdrains shall discharge into an approved, vented sump with an airtight cover. The sump shall be so located as to receive the sewage by gravity flow, and shall be located at least 25 feet from any water well.

2. Capacity. The minimum capacity of the sump shall be determined in accordance with the provisions of subd. 2. a. to e.

a. The water supply fixture unit method shall be used to determine peak input flow in gallons per minute; only the fixtures that drain to the sump shall be included.

**Note:** When converting water fixture units to gallons per minute it is permissible to calculate the load as a supply system with predominantly flush tanks.

b. The capacity of the sump shall be such that the pump when actuated by the lowest "pump on" switch runs at least 20 seconds.

c. Between the highest "pump on" switch level and the sump inlet, the sump shall hold the amount of input that exceeds the discharge of the pumping equipment in a 5 minute peak input period, but in no case shall the vertical distance between the switch and the inlet be less than 3 inches.

d. The low water level shall be maintained in accordance with the pump manufacturer's requirements, but shall not be less than 4 inches above the sump bottom.

e. Minimum sump diameter. Sumps containing one pump shall have an inside diameter of at least 24 inches. Sumps containing 2 pumps shall have an inside diameter of at least 30 inches.

**Note:** See Appendix for further explanatory material.

3. Vents. All sumps and all drains leading to a sump shall be vented in accordance with s. Comm 82.31.

4. Materials. All sumps shall be constructed in a watertight manner of approved materials in accordance with ch. Comm 84.

5. Removable covers. Penetrations through the top of removable sump covers shall be limited to those for the electrical supply, the vent piping and the discharge piping for the pump or pumps.

(b) *Ejectors and pumps*. 1. Where required. The liquid from all sanitary building sumps shall be lifted and discharged into the building sanitary drain system by automatic ejectors, pumps or any other equally efficient method approved by the department.

2. Duplex equipment. a. Duplex ejector or pumping equipment shall be installed in a public building where 3 or more water closets or more than 20 drainage fixture units discharge into a sump.

b. Duplex ejector or pumping equipment shall be installed where the sanitary wastes of 2 or more one- or 2-family dwellings discharge into a sump.

c. Where duplex ejector or pumping equipment is installed, appropriate devices shall be installed to automatically alternate operation of the pumps or ejectors and to operate both pumps or ejectors when one unit cannot handle the load.

3. Size. The size and design of an ejector or pump shall be determined by the capacity of the sump to be served, the discharge head and discharge frequency. All ejectors and pumps shall provide a minimum flow velocity of 2 feet per second in the forced discharge piping.

**Note:** Ejectors or pumps discharging to septic tanks may disturb the normal settling properties of the tank environment; contact the Safety and Buildings Division for more information.

a. All sewage grinder pumps shall have a minimum 1<sup>1</sup>/<sub>4</sub> inch diameter discharge opening and discharge piping.

b. All nongrinder-type sewage pumps serving water closets shall be capable of passing a 2 inch diameter solid ball and shall have a minimum 2 inch diameter discharge opening and discharge piping. All other pumps handling sanitary wastes shall be rated by the manufacturer as an effluent pump, shall be capable of passing a 1/2 inch diameter solid ball and shall have a minimum 1<sup>1</sup>/<sub>4</sub> inch diameter discharge opening and discharge piping.

4. Discharge connections. a. The discharge pipe from the ejector or pump shall be connected to the gravity drain by means of a wye pattern fitting. Where the fitting connects to a horizontal drain, the bottom of the wye branch of the fitting shall be located above the horizontal center line.

b. A full flow check valve shall be installed in the discharge piping from each ejector or pump.

c. Where duplicate ejector or pumping equipment is installed, each discharge pipe from an ejector or pump shall be provided with a gate or ball type valve installed downstream of each full flow check valve.

5. Discharge pipe air relief. Air relief valves shall be provided at all high points in the discharge piping of an ejector or pump where the piping arrangement creates an air trap.

6. Prohibited connections. No fixtures may be connected to the discharge pipe between the ejector or pump and the point where it enters the gravity drain.

7. Maintenance. All ejectors, pumps and like appliances shall receive care as needed to keep them in a satisfactory operating condition.

**(11) BUILDING DRAINS AND BUILDING SEWERS.** (a) *Limitations*. No building sewer may pass through or under a building to serve another building, unless:

1. The building sewer serves farm buildings or farm houses, or both, which are all located on one property; or

2. A petition for variance is granted under s. Comm 82.20 (11). The approval or nonapproval of a petition for variance request relative to this paragraph shall be determined on an individual basis. The request shall be evaluated on site specific factors including, at least, whether:

a. The building sewer serves buildings which are located on one property;

b. The functions or operations of the buildings to be served by the building sewer are related; or

c. A document, which indicates the piping and distribution arrangement for the property and buildings, will be recorded with the register of deeds.

(b) *Building drains*. 1. Elevation. a. All building drains shall be installed below the lowest floor levels on which fixtures may be installed if the public sewer, septic tank or private interceptor main sewer elevation permits.

b. Where any portion of an above-ground building drain discharges to a vertical pipe, the building drain shall connect to the building sewer at an elevation at least 30 inches above the basement floor.

**Note:** See Appendix for further explanatory material.

2. Backwater protection. A building drain subject to backflow or backwater shall be protected with a backwater valve or with a sump with pumping equipment in accordance with sub. (10).

a. Backwater valves, when fully open, shall have a capacity not less than that of the pipes in which installed.

b. Backwater valves shall be so located as to be readily accessible for cleaning.

3. Floor drain required. Where a plumbing fixture or appliance is located on a floor which is entirely below grade, a floor drain shall be installed to serve that floor.

(c) *Building sewers*. 1. Minimum depth. a. The top of a building sewer shall be located at a depth of not less than 42 inches below finished grade, except as provided in subd. 1. b. or subd. 2.

b. The top of a building sewer which discharges to a septic tank, holding tank or grease interceptor shall be located at a depth of not less than 18 inches below finished grade.

2. Protection from frost. a. Except as provided in subd. 2. c. and d., a building sewer shall be protected from frost in accordance with subd. 3. in areas where the top of the building sewer is located less than 60 inches below a surface area from which snow will be cleared.

b. Except as provided in subd. 2. c. and d., a building sewer shall be protected from frost in accordance with subd. 3. in areas where the top of the building sewer is located less than 42 inches below a surface which snow will not be cleared.

c. Where a building sewer discharges to a septic tank, holding tank, or grease interceptor, the portion of a building sewer which is within 30 feet from the connecting building drain and which is under a surface area from which snow will not be cleared shall not be required to be protected from frost.

d. Frost protection for a building sewer shall not be required where the predicted depth of frost as determined from Figure 82.30-1 and Table 82.30-6 does not extend below the top of the building sewer.

3. Insulations for building sewers. Where required by subd. 2. a. or b., building sewer insulation for frost protection shall be provided in accordance with one of the methods specified in subd. 3. a. to c.

a. Extruded polystyrene foam insulation shall be installed at a depth of at least 18 inches below finished grade and at least 6 inches above the top of the sewer pipe. The minimum thickness and width of the foam insulation shall be determined from Figure 82.30-1 and Tables 82.30-5 to 82.30-7. If the insulation is to be installed more than 6 inches above the top of the sewer, the number of inches exceeding 6 inches shall be added to the width of insulation determined from Table 82.30-7.

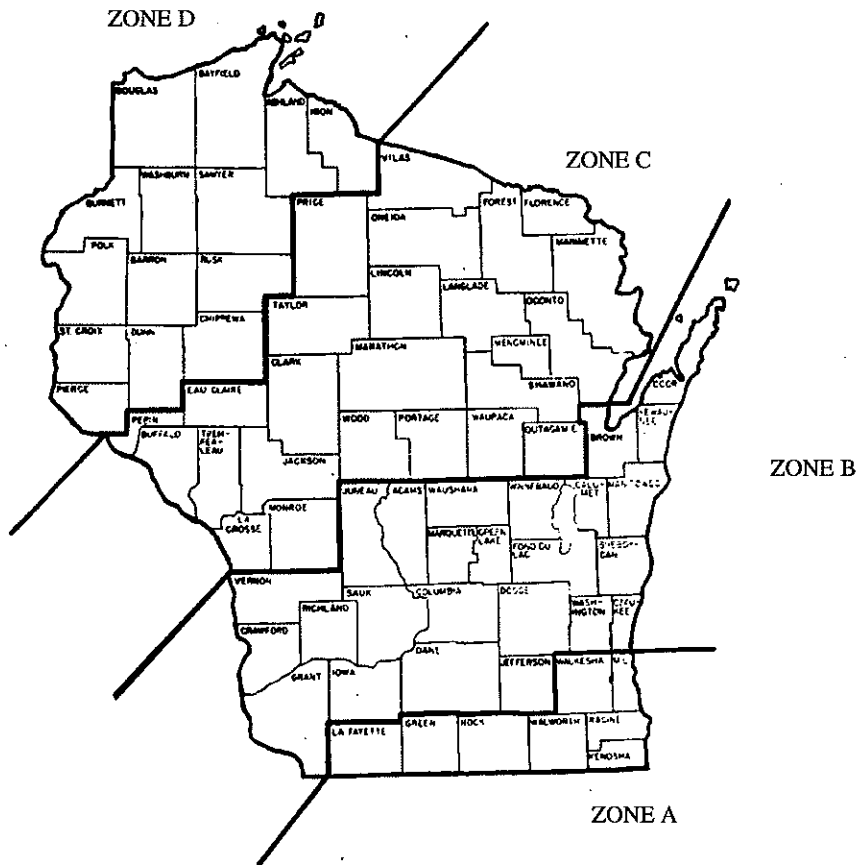


Table 82.30-5  
MINIMUM THICKNESS OF INSULATION

Installation Site Zone	Extruded Polystyrene Foam (in inches)	Insulating Concrete (in inches)
A	1.0	6
B	1.5	9
C	2.0	12
D	2.5	15

**Table 82.30-6**  
**PREDICTED DEPTH OF FROST IN VARIOUS TYPES OF BACKFILL SOIL (in feet)**

Soil Type	Installation Site Zone			
	A	B	C	D
Clay, Clay Loam	2.5	3.0	3.5	4.0
Silt Loam, Silty Clay Loam	3.5	4.0	4.5	5.5
Sandy Clay Loam	4.0	4.5	5.5	6.0
Sandy Loam, Loamy Sand	4.5	5.0	6.0	6.5
Sand	5.0	5.5	6.5	7.5
Gravelly Sand	6.0	7.5	9.0	10.0

b. Lightweight insulating concrete shall be installed to the depth of the spring line of the sewer and shall extend laterally at least 6 inches on both sides of the sewer. The minimum thickness of the insulating concrete shall be determined from Figure 82.30-1 and Table 82.30-5. The thickness shall be measured from the top of the sewer. The top of the insulation shall be installed at least 12 inches below finished grade.

c. Alternative methods of frost protection shall be approved by the department.

(d) *Location limitations.* Building drains and building sewers shall be separated from water wells by the following minimum distances:

1. Eight feet for building drains and building sewers of cast iron pipe;
2. Eight feet for building drains and building sewers of plastic pipe;
3. Twenty-five feet for building drains and building sewers of all other materials; and
4. Twenty-five feet for all pressurized building drains and building sewers.

Note: See s. Comm 82.40 for provisions regarding the separation of water supply piping and building sewer piping.

(e) *Installation of building drains and building sewers.* 1. Trenching. All excavations for building drains and building sewers shall be open trench work, unless otherwise permitted by local ordinance or accepted by the local inspector.

2. Stable bottom. Where the bottom of the trench can be maintained in a stable condition and free of water during the time of installation the building drain and the building sewer shall be bedded and initially backfilled as specified in this subdivision. Grade, as used in this subdivision, shall mean the elevation of the bottom of the building drain or the building sewer.

a. Except where sand is encountered, the trench bottom throughout its length shall be excavated to a depth at least 3 inches below the grade elevation and shall be brought back to grade with sand, pea gravel, or a graded stone bedding. The bedding material shall be of a size that all the material shall pass a  $3/4$  inch sieve. When sand is used as a bedding material it shall not contain excessive moisture and the bedding in the entire trench width shall be hand or mechanically tamped to compact it to a minimum of 90% Standard Proctor Density. All bedding shall be shaped to accommodate pipe bells or couplings. Initial backfill on the sides of the pipe and to a depth of 12 inches over the pipe shall be sand, gravel, crushed stone or excavated material which is neither corrosive nor organic in nature. A concrete floor may be placed over a building drain having less than 12 inches of initial backfill. Initial backfill material shall be of a size that all the material shall pass a one inch

sieve. Initial backfill material shall be placed in increments not exceeding 6 inches in depth and shall be well tamped for the full width of the trench and for the full length of the sewer.

b. Where the trench bottom does not contain stone larger than one inch in size or where bedrock is not encountered, the trench may be excavated to grade. Where stone larger than one inch in size or when bedrock is encountered, the trench shall be excavated to a depth at least 3 inches below the grade elevation and shall be brought back to grade with a bedding of sand, gravel, or crushed stone which shall be of a size that all the material shall pass a  $3/4$  inch sieve. The bedding material shall be shaped to accommodate the pipe bells or couplings. Initial backfill on the sides of the pipe and to a depth of 3 inches over the pipe for that part of the pipe laid on private property shall be well tamped sand, gravel, crushed stone or excavated material which is neither corrosive nor organic in nature. A concrete floor may be placed over a building drain having less than 3 inches of initial backfill. Initial backfill material shall be of a size that all the material shall pass a one inch sieve. For that portion of the sewer in the street right of way, the initial backfill material to a depth of 12 inches over the pipe shall be sand, gravel or crushed stone which shall be of a size that all the material shall pass a one inch sieve. Initial backfill material shall be placed in increments not exceeding 6 inches and shall be well tamped.

3. Unstable bottom. Where a mucky or unstable bottom is encountered in the trench, the required dry and stable foundation conditions shall be provided by sheathing driven and left in place to a depth of 48 inches below the trench bottom or to solid foundation at a lesser depth, the removal of wet and yielding material to a depth of 24 inches or to solid material, and replacement of the unstable material with limestone screenings, pea gravel or equivalent material for the bedding under the pipe. The trench bedding shall be shaped to accommodate pipe bells or couplings. In lieu of the foregoing, the required dry and stable foundation conditions may be provided by installation of a longitudinally reinforced concrete cradle the width of the trench and at least 3 inches thick or by installation of a longitudinally reinforced concrete slab the width of the trench at least 3 inches thick and bedding material as provided for in subd. 2. Initial backfill material and its placement shall conform to that specified in subd. 2. All sheathing shall be cut off at a depth of 3 feet or more below the ground surface to prevent heaving due to frost action.

4. Backfill completion. Care shall be exercised in placing the balance of the backfill to prevent breakage of the pipe. Large boulders or rock, concrete slabs, or frozen masses shall not be used in the backfill. At least 36 inches of backfill cover shall be provided over the top of the pipe before the pipe trench is wheel-loaded.



**Table 82.30-7**  
**MINIMUM WIDTH OF EXTRUDED POLYSTYRENE FOAM INSULATION (in feet)**

Predicted Depth of Frost (in feet)	Depth of Sewer (in feet)					
	2.0	2.5	3.0	3.5	4.0	4.5
2.5	2	NR				
3.0	3	2	NR			
3.5	4	3	2	NR		
4.0	5	4	3	2	NR	
4.5	6	5	4	3	2	NR
5.0	7	6	5	4	3	2
5.5	8	7	6	5	4	3
6.0	9	8	7	6	5	4
6.5	10	9	8	7	6	5
7.0	10	10	9	8	7	6
7.5	10	10	10	9	8	7
8.0	10	10	10	10	9	8
8.5	10	10	10	10	10	9
9.0	10	10	10	10	10	10
10.0	10	10	10	10	10	10

NR means Not Required.

5. Pipe openings protected. The ends of all pipes not immediately connected shall be closed so as to prevent the introduction of earth or drainage from an excavation.

(f) *Connection to public sewer.* The connections of building sewers to public sewers shall be in accordance with conditions of approval for the public sewer granted by the department of natural resources under s. 281.41, Stats.

1. Gravity public sewer. When a building sewer connection to the public sewer is not found within 3 feet of the point designated by the local governing body or its authorized representative, the connection shall be made in accordance with one of the provisions specified in subd. 1. a. to d.

a. A saddle fitting approved by the department and acceptable to the municipality or sanitary district shall be installed.

b. Where acceptable to the municipality or sanitary district a portion of the main sewer may be removed and a tee or wye fitting approved by the department may be inserted with compression joints in the public sewer acceptable to the municipality or the sanitary district. The insertion shall be made under the supervision of the authorized representative of the municipality or the sanitary district.

c. When the public sewer is concrete or clay, the end of the connecting sewer may be set upon or in an opening cut into the top half of the public sewer, but shall not protrude into the public sewer. The connection shall be secured by encasing the main sewer pipe and the connection in concrete at least 3 inches thick so as to assure permanency of the connection and adequate backing of the public sewer pipe.

d. In lieu of the use of a fitting and in the event that an opening cannot be located in the top half of the public sewer, a length of concrete or clay public sewer pipe may be removed and a section with a wye fitting shall be inserted in its place. The joints at the ends of the section shall be encased in concrete at least 3 inches thick. The connection or insertion shall be made under the supervision of the authorized representative of the municipality or the sanitary district.

2. Pressurized public sewer. Where a forced building sewer discharges to a pressurized public sewer, a full flow corporation cock, full flow curb stop, check valve and dresser type coupling shall be installed. The curb stop, check valve and dresser type coupling shall be installed on the property as close as possible to the

connection to the common forced main sewer. The check valve and dresser type coupling shall be accessible.

Note: See Appendix for further explanatory material.

(g) *Prohibited installations.* 1. Harmful discharge. No person may connect to a public sewer any building drain or building sewer through which is discharged any substance likely to cause undue corrosion, obstruction, nuisance, explosion or interference with sewage treatment processes.

2. Storm and clear water connections. Storm drain piping and clear water drain piping may not discharge to a sanitary building drain or to a private sewage system.

Note: See s. Comm 82.36 for provisions relative to storm sewers.

(12) PRIVATE INTERCEPTOR MAIN SEWERS. (a) The connection of a private interceptor main sewer to a public sewer shall be in accordance with the conditions of approval for the public sewer granted by the department of natural resources under s. 281.41, Stats.

(b) Private interceptor main sewers which discharge to a municipal treatment facility shall be designed in accordance with the appropriate water quality management plan.

(c) All private interceptor main sewers shall be tested in accordance with s. Comm 82.21.

(d) Private interceptor main sewers 6 inches or less in diameter shall be installed in accordance with the criteria for building sewers specified in sub. (11) (b) and (c) and (d) and (e).

(e) Private interceptor main sewers 8 inches or larger in diameter shall be:

1. Provided with frost protection in accordance with sub. (11) (c); and
2. Installed in accordance with the municipal sewer criteria specified in s. NR 110.13.

(f) No private interceptor main sewer may pass through or under a building to serve another building, unless:

1. The private interceptor main sewer serves farm buildings or farm houses or both which are all located on one property; or
2. A petition for variance is granted under s. Comm 82.20 (11). The approval or nonapproval of a petition for variance request relative to this paragraph shall be determined on an individual basis and shall be evaluated on site specific conditions including, at least, whether:

- a. The private interceptor main sewer serves only buildings which are all located on one property;
- b. The functions or operations of the buildings to be served by the interceptor main sewer are related; or
- c. A document, which indicates the piping and distribution arrangement for the property and buildings, will be recorded with the register of deeds.

**(13) LOCATION OF DRAIN PIPING.** (a) Drain piping located below the ceilings of areas where food, ice or potable liquids are prepared, handled, stored or displayed shall be installed with the least number of joints and shall be installed in accordance with subds. 1. to 5.

1. All pipe openings through floors shall be provided with sleeves bonded to the floor construction and protruding not less than one inch above the top of the finish floor with the space between sleeve and the piping sealed.

2. Plumbing fixtures, except bathtubs and showers, shall be of the wall mounted type. Bathtubs shall have waste and overflow connections made above the floor and piped to a trap below the floor.

3. Floor and shower drains installed shall be equipped with integral seepage pans.

4. Cleanouts for piping shall be extended through the floor construction above.

5. Piping subject to operation at temperatures that will form condensation on the exterior of the pipe shall be thermally insulated.

(b) Where drain piping is located in ceilings of areas where food, ice or potable liquids are prepared, handled stored or displayed, the ceilings shall be of the removable type, or shall be provided with access panels in order to provide an access for inspection of the piping.

(c) Exposed drain piping shall not be located over a pool, surge tank or an open filter for a pool.

**History:** Cr. Register, February, 1985, No. 350, eff. 3-1-85; am. Table 82.30-1, (8) (a), (9) (c) (intro.) and 3., and (10) (b) 3. b., r. and recr. (4) (d) 2., Table 82.30-4, (10) (a) 2. b., (11) (intro.) and (f) 2., cr. (8) (a) 1. to 3. and (9) (d), r. (9) (c) 4., renum. (9) (c) 5. to be 4. and am., Register, May, 1988, No. 389, eff. 6-1-88; r. and recr. (4) (d), am. Table 82.30-3 and 82.30-7, r. (11) (intro.), renum. (11) (a) to (f) to be (b) to (g), cr. (11) (a) and (12) (f), Register, August, 1991, No. 428, eff. 9-1-91; am. Table 82.30-1, Register, April, 1992, No. 436, eff. 5-1-92; am. (7) (a) and (b), (11) (c) 1. a., (12) (c) 1. and Table 82.30-1, cr. (10) (a) 5., r. (11) (b) 1. b., renum. (11) (b) 1. c. to be (11) (b) 1. b., Register, February, 1994, No. 458, eff. 3-1-94; reprinted to restore dropped copy in (10) (b) 3. b., Register, July, 1994, No. 463; corrections in (11) (f) and (12) (g) made under s. 13.93 (2m) (b) 7., Stats., Register, April, 1998, No. 508.

**Comm 82.31 Vents and venting systems. (1) SCOPE.** The provisions of this section set forth the requirements for the design and the installation of vents and venting systems.

**(2) MATERIALS.** All vents and venting systems shall be constructed of approved materials in accordance with ch. Comm 84.

**(3) GENERAL.** (a) *Vents.* Every trap and trapped plumbing fixture shall be provided with an individual vent, except as otherwise permitted in this chapter. Vents and venting systems shall be designed and installed so that the water seal of a trap shall be subject to a maximum pneumatic pressure differential equal to one inch of water column.

(b) *Main stack.* Each gravity-flow sanitary building sewer shall be served by at least one stack which extends from a building drain to a vent terminal or vent header. The stack shall be not less than 3 inches in diameter from the building drain to the vent terminal or vent header.

**(4) VENT STACKS AND STACK VENTS.** (a) *Where required.* Where individual vents, relief vents, or other branch vents are required, a vent stack and a stack vent shall be installed to serve all drain stacks of 2 or more branch intervals.

(b) *Installation.* 1. The connection of the vent stack to a drain stack shall be at or below the lowest branch drain connection to the drain stack. The connection to the drain stack shall be by

means of a wye pattern fitting installed in a vertical portion of the stack.

2. A vent stack and a stack vent shall:

- a. Extend to a vent terminal in accordance with sub. (16);
- b. Connect to a vent stack which extends to a vent terminal;

or

c. Connect to a stack vent at least 6 inches above the flood level rim of the highest fixture discharging into a drain stack.

3. Vent stacks and stack vents may connect into a common vent header and then shall extend to a vent terminal.

4. The connection of a vent stack with another vent may not be less than 38 inches above the next higher floor level where the plumbing fixtures are vented, but in no case lower than 2 inches above the elevation of the highest flood level rim of any fixture served by the vent.

**Note:** See Appendix for further explanatory material.

**(5) RELIEF AND YOKE VENTS FOR STACK OFFSETS.** (a) *Offsets of 30 to 45°.* Where a horizontal branch drain connects to a drain stack within 2 feet above or below a stack offset with a change of direction of 30 to 45° from the vertical and the offset is located below 2 or more branch intervals, a relief vent shall be installed in accordance with par. (c), except where an offset of more than 45° from the vertical is located in the drain stack within 12 feet above the offset of 30 to 45°.

(b) *Offsets of more than 45°.* Except as provided in subds. 1. and 2., where a drain stack has an offset of more than 45° from the vertical located below 2 or more branch intervals, a relief vent and a yoke vent shall be installed in accordance with par. (c).

1. Where an offset of more than 45° from the vertical is located in the drain stack within 12 feet above the lower stack offset, the installation of a yoke vent shall not be required.

2. Where the offset of more than 45° is located below the lowest branch drain connection, the installation of the relief vent shall not be required.

(c) *Installation.* 1. *Relief vent.* a. A relief vent serving a drain stack offset shall be installed as a vertical continuation of the portion of the stack below the offset or as a side connection to the portion of the stack below the offset. No drain connection may be installed between the offset and the side connection of the relief vent.

b. The connection of the relief vent to the drain stack shall be by means of a wye pattern fitting.

c. The connection of a relief vent with another vent may not be less than 38 inches above the next higher floor level where the plumbing fixtures are vented, but in no case lower than 2 inches above the elevation of the highest flood level rim of any fixture served by the vent.

2. *Yoke vent.* a. A yoke vent serving a drain stack offset shall connect to the drain stack at or below the lowest branch drain connection to the portion of the drain stack above the offset.

b. The connection of the yoke vent to the drain stack shall be by means of a wye pattern fitting.

c. The connection of the yoke vent to another vent may be not less than 38 inches above the next higher floor level where plumbing fixtures are installed that discharge into the drain stack.

**Note:** See Appendix for further explanatory material.

**(6) YOKE VENTS FOR STACKS OF MORE THAN 10 BRANCH INTERVALS.** Drain stacks of more than 10 branch intervals shall be provided with yoke vents.

(a) Yoke vents shall be installed not more than 10 branch intervals apart nor more than 10 branch intervals from the top or bottom of the drain stack.

(b) The connection of the yoke vent to the drain stack shall be by means of a wye pattern fitting.

(c) The connection of the yoke vent to another vent shall be not less than 38 inches above the next higher floor level where plumbing fixtures are installed that discharge into the drain stack.

(7) **RELIEF VENTS FOR BUILDING DRAINS.** A building drain with a change in elevation of 12 feet or more and at an angle of 45° or more from the horizontal shall be provided with a relief vent.

(a) The connection of the relief vent to the building drain shall be by means of a wye pattern fitting installed within 2 feet upstream of the top of the change in elevation.

(b) The connection of the relief vent to another vent shall be not less than 38 inches above the next higher floor level where plumbing fixtures are installed that discharge through the building drain.

Note: See Appendix for further explanatory material.

(8) **VENTS FOR SANITARY SUMPS.** Sanitary sumps shall be provided with a vent connecting either to the sump above the drain

inlet or to the drain inlet within 12 inches of the sump.

(9) **FIXTURE VENTS.** (a) *Developed length between vent and trap.* Each fixture trap shall be protected with a vent located in accordance with the provisions of subds. 1. and 2.

1. Each fixture trap which is not an integral part of the fixture shall be protected with a vent so located that the developed length of the fixture drain piping from the trap weir to the vent connection is within the limits set forth in Table 82.31-1.

2. Each fixture trap which is an integral part of the fixture shall be protected with a vent so located that the developed length of the fixture drain piping from fixture outlet to the vent connection is within the limits set forth in Table 82.31-1. For a floor outlet water closet or similar fixture, the point where the fixture drain piping turns horizontal shall be considered as the fixture outlet.

Table 82.31-1

**MAXIMUM DEVELOPED LENGTH BETWEEN VENT AND TRAP (in feet)**

Diameter of Fixture Drain <sup>a</sup> (in inches)	Vent Connecting to Horizontal Drain Piping			Vent Connecting to Vertical Drain Piping					
				by means of a Sanitary Tee Fitting			by means of a Wye Pattern Fitting <sup>b</sup>		
	Pitch of Fixture Drain (inch per foot)			Pitch of Fixture Drain (inch per foot)			Pitch of Fixture Drain (inch per foot)		
	1/8	1/4	1/2	1/8	1/4	1/2	1/8	1/4	1/2
1 1/4	NP <sup>c</sup>	5.0	2.5	NP	3.5	2.0	NP	1.5	1.0
1 1/2	NP	6.0	3.0	NP	5.0	3.0	NP	4.0	2.0
2	NP	8.0	4.0	NP	6.0	4.0	NP	4.5	4.0
3	24	12.0	6.0	10.0	8.0	6.0	8.0	6.0	6.0
4 <sup>d</sup>	32	16.0	8.0	12.0	10.0	8.0	10.0	8.0	8.0

a: Diameters to be selected on the basis of the smallest drain pipe installed downstream from the trap serving a particular fixture.

b: The wye pattern fitting refers to a tee-wye fitting, a combination wye and eighth bend fitting or a wye and eighth bend combination of fittings with no more than one inch between the wye fitting and eighth bend fitting.

c: NP means Not Permitted.

d: The maximum developed length for fixture drains larger than 4 inches in diameter shall be approved by the department.

(b) *Minimum distance.* A vent shall not connect to a fixture drain within the distance equal to 2 diameters of the drain piping from the weir of a trap.

Note: See Appendix for further explanatory material.

(10) **CIRCUIT VENTING.** In lieu of providing individual vents, a horizontal drain to which at least 2 but not more than 8 wall outlet fixtures or at least 2 but not more than 8 floor outlet fixtures, other than blowout type fixtures and wall-outlet carrier type water closets, are connected to the same horizontal branch drain, may be vented by a circuit vent in accordance with pars. (a) to (e).

(a) The circuit vent shall connect to the horizontal drain at a point between the 2 most upstream fixtures.

(b) 1. A circuit vented horizontal drain into which 4 or more fixtures discharge shall be provided with a relief vent. The relief vent shall connect to the circuit vented horizontal drain downstream of the most downstream fixture drain which is vented by the circuit vent and upstream of any other drain connections.

2. Two circuit vented horizontal drains serving a total of 8 fixtures, 4 on each branch, shall be provided with at least one relief vent, unless the horizontal drains connect to a drain stack with no other drain connections located above the circuit vented horizontal drains. One relief vent may serve both horizontal drains, if installed downstream of the point where the 2 horizontal drains are joined.

Note: See Appendix for further explanatory material.

(c) A horizontal drain served by a circuit vent shall not diminish in size from the connection to the drain stack to the circuit vent connection. Where a relief vent is installed, the horizontal drain served by the circuit vent shall not diminish in size from the relief vent connection to the circuit vent connection.

(d) Fixture drains served by a circuit vent shall conform to the provisions of sub. (9). The connection of the fixture drain to the branch drain served by the circuit vent shall be considered as the vent connection.

(e) Additional wall outlet fixtures with a drainage fixture unit value of one or less which are served by individual vents or common vents may discharge into a horizontal drain served by a circuit vent.

(11) **COMMON VENTS.** In lieu of providing individual vents, fixtures may be common vented in accordance with pars. (a) and (b).

(a) *Vertical drains.* A common vent may serve 2 fixture traps where both fixture drains connect to a vertical drain at the same elevation. Where this connection is by means of a sanitary tee fitting with a side inlet, the centerline of the side inlet opening may not be below the centerline of the larger opening. The drain connection of a blowout type fixture or a kitchen sink served by a common vent may not be by means of a double sanitary tee fitting.

(b) *Horizontal branches.* The fixture drains from 2 wall-outlet fixtures, each with a drainage fixture unit value of one or less, or the fixture drains from 2 traps serving a kitchen sink with or without a dishwasher may connect to a horizontal branch without individual vents provided a common vent connects to the branch drain downstream of both fixture drains. Both fixture drains shall be of the same diameter. The developed length of the drain from the vent to the farthest trap shall conform to sub. (9).

Note: See Appendix for further explanatory material.

(12) **ISLAND FIXTURE VENTING.** Island plumbing fixtures may be vented in accordance with pars. (a) to (d).

(a) Island plumbing fixtures may be vented by extending an individual vent or a common vent as high as possible under the fixture enclosure and returning the vent vertically downward and connecting it to the fixture drain by means of a wye pattern fitting.

(b) Horizontal vent piping shall connect to the vertical section of the fixture vent and extend to a point where it can extend vertically to a vent terminal in accordance with sub. (16) or connect to another vent in accordance with sub. (15).

(c) Drainage fittings shall be used on all sections of the vent pipe below the floor level and a minimum slope of  $\frac{1}{4}$  inch per foot to the drainage point shall be provided.

(d) Cleanouts shall be provided on the vent piping in accordance with s. Comm 82.35.

Note: See Appendix for further explanatory material.

Note: See sub. (17) for venting provisions relating to laboratory sinks.

**(13) WET VENTING.** In lieu of providing individual vents, fixtures may be wet vented in accordance with pars. (a) to (c).

(a) *Vertical wet vents.* 1. Where 2 wall outlet fixtures are located on the same floor level with their fixture drains connecting to the same vertical drain pipe at different elevations, the lower fixture drain may be wet vented in accordance with subd. 1. a. to e.

a. No other fixtures may discharge into the vertical drain pipe above or between the 2 wall outlet fixtures. Additional fixtures may discharge into the vertical drain pipe below the 2 wall outlet fixtures.

b. A branch vent shall connect to the vertical drain pipe immediately above the higher fixture drain connection.

c. The drain between the 2 fixtures shall be at least one pipe size larger than the upper fixture drain, but not smaller than 2 inches in diameter.

d. Both fixture drains shall conform to sub. (9). The connection of the lower fixture drain to the vertical drain shall be considered as the vent connection.

e. The higher fixture drain may not serve a water closet or urinal.

Note: See Appendix for further explanatory material.

(b) *Horizontal wet vents.* A drain from a lavatory or lavatories which are either provided with individual vents or a common vent may serve as the wet vent for not more than 2 bathtubs or showers and not more than 2 water closets in accordance with subds. 1. to 7. No other fixtures may discharge into or be served by the wet vent.

1. All of the fixtures shall be located in nonpublic bathroom groups.

2. The lavatories and bathtubs or showers shall have a common horizontal drain with the drain for the lavatories serving as a wet vent for the bathtubs or showers.

3. Where 2 bathtubs or showers are served by the same wet vent, their fixture drains shall connect independently to the common horizontal drain downstream of the vertical drain serving the lavatory or lavatories.

4. Where 2 bathtubs or showers and 2 water closets are served by the same wet vent a relief vent shall be provided, unless the wet vented horizontal drain connects to a drain stack with no other drain connections located above the wet-vented horizontal drain. The relief vent shall connect to the horizontal drain at a point downstream of the fixture drains for the water closets and upstream of any other fixture drain connections.

5. One or 2 water closets may connect to the common horizontal drain with the drain from the lavatories and bathtubs or showers also serving as a wet vent for the water closets. Where 2 water closets are served by the same wet vent, their fixture drains shall connect independently to the common horizontal drain at the same point.

6. The wet vent shall be at least 2 inches in diameter. No more than 4 drainage fixture units may discharge into a 2 inch diameter wet vent.

7. A branch vent shall connect immediately above the highest fixture drain connection and shall be sized in accordance with sub. (14).

(c) *Other types of wet vents.* An individual vent serving a floor outlet fixture, a common vent serving floor outlet fixtures, a circuit vent, a relief vent serving a circuit vented drain or a relief vent serving a wet vented horizontal drain may serve as a wet vent in accordance with subds. 1. to 4.

1. No more than 2 wall outlet fixtures, each fixture with a drainage fixture unit value of one or less, may have their fixture drains connected individually into the individual vent, common vent, circuit vent or relief vent thereby forming a wet vent.

2. The wet vent shall be at least 2 inches in diameter.

3. The branch vent to which the wet vent connects shall be sized in accordance with sub. (14). The branch vent may serve the wall outlet fixtures in lieu of individual vents or a common vent.

4. The fixtures discharging into the wet vent shall be located on the same floor level as the fixtures served by the wet vent.

**(14) VENT SIZE.** (a) *Stack vents and vent stacks.* Stack vent and vent stack pipe sizes shall be determined in accordance with Table 82.31-2 on the basis of developed length and the diameter of the drain stack at its base.

1. The developed length of the stack vent shall be measured along the vent pipe, from the highest drain branch connection to the vent terminal or to the connection to a vent header.

2. The developed length of the vent stack shall be measured along the vent pipe from the vent stack base connection to the vent terminal or to the connection to a vent header.

Note: See Appendix for further explanatory material.

(b) *Vent headers.* 1. Vent header pipe sizes shall be determined in accordance with Table 82.31-3 with the number of drainage fixture units being the sum of the fixture unit loads of the stacks vented through that portion of the header. The diameter of a vent header shall not be less than any vent connecting to it.

2. The developed length of the vent header shall be measured along the pipe from the most distant vent stack or stack vent base connection to the vent terminal.

Note: See Appendix for further explanatory material.

(c) *Branch vents.* Branch vent pipe sizes shall be determined in accordance with Table 82.31-3. The developed length of the branch vent shall be measured along the pipe from the furthest fixture drain served by the branch vent to the point where it connects to a vent pipe of a larger diameter or to a vent terminal.

Note: See Appendix for further explanatory material.

(d) *Individual vents.* Individual vent pipe sizes shall be determined in accordance with Table 82.31-3. The developed length of an individual vent shall be measured along the vent pipe from the fixture drain served by the vent to the point where it connects to a vent pipe of a larger diameter or to a vent terminal.

Note: See Appendix for further explanatory material.

(e) *Common vents.* Common vent pipe sizes shall be determined in accordance with Table 82.31-3. The developed length of a common vent shall be measured along the vent pipe from the drain served by the vent to the point where it connects to a vent pipe of a larger diameter or to the vent terminal.

**Table 82.31-2**  
**SIZE AND LENGTH OF VENT STACKS AND STACK VENTS**

Diameter of Drain Stack at Base (inches)	Maximum Developed Length of Vent (feet)									
	Diameter of Vent (inches)									
	1¼	1½ <sup>a</sup>	2	3	4	5	6	8	10	12
1½	50	150	NL <sup>b</sup>							
2	NP <sup>c</sup>	50	150	NL						
3		NP	50	400	NL					
4		NP	20	180	700	NL				
5			NP	50	200	700	NL			
6			NP	20	70	200	700	NL		
8				NP	25	60	250	800	NL	
10					NP	25	60	250	800	NL
12						NP	25	100	300	900

a: Not more than 2 water closets or similar flush action type fixtures of 4 or more drainage fixture units.  
 b: NL means No Limit.  
 c: NP means Not Permitted.

**Table 82.31-3**  
**MINIMUM DIAMETERS AND MAXIMUM LENGTH OF INDIVIDUAL, COMMON, BRANCH AND CIRCUIT VENTS AND VENT HEADERS**

Drainage Fixture Units (dfu)	Maximum Developed Length of Vent (feet)								
	Diameter of Vent (inches)								
	1¼ <sup>a</sup>	1½ <sup>b</sup>	2	3	4	5	6	8	10
2	50	NL <sup>c</sup>							
4	40	200	NL						
8	NP <sup>d</sup>	150	250	NL					
10	NP	100	200	NL					
24	NP	50	150	NL					
42	NP	30	100	500	NL				
72		NP	50	400	NL				
240		NP	40	250	NL				
500		NP	20	180	700	NL			
1100			NP	50	200	700	NL		
1900			NP	20	70	200	700	NL	
3600				NP	25	60	250	800	NL
5600					NP	25	60	250	800

a: No water closets permitted.  
 b: Not more than 2 water closets or similar flush action type fixtures of 4 or more drainage fixture units.  
 c: NL means No Limit.  
 d: NP means Not Permitted.

(f) *Circuit vents.* Circuit vent pipe sizes shall be determined in accordance with Table 82.31-3. The developed length of the circuit vent shall be measured along the vent from the connection with the branch drain served by the vent to the point where it connects to a vent pipe of a larger diameter or to a vent terminal.

(g) *Relief vents.* Relief vents shall be sized in accordance with the provisions of subds. 1. to 4. The developed length of a relief vent shall be measured along the vent from the connection with the branch drain served by the vent to the point where it connects to a vent pipe of a larger diameter or to a vent terminal.

1. Circuit vented branch drain. The diameter of a relief vent for a branch drain served by a circuit vent shall be at least one half the diameter of the branch drain. The maximum developed length shall be determined from Table 82.31-3 based on the number of drainage fixture units served by the vent.

2. Drain stacks. A relief vent serving a drain stack shall be sized as a stack vent in accordance with par. (a).

3. Building drain. The diameter of a relief vent serving a building drain, as required in sub. (7), shall be at least one half the diameter of the building drain. The maximum developed length shall be determined from Table 82.31-3 based on the number of drainage fixture units served by the vent.

4. Horizontal wet vent. The diameter of a relief vent serving a horizontal wet vent shall be at least 1½ inches. The maximum developed length shall be determined from Table 82.31-3 based on the number of drainage fixture units served by the vent.

(h) *Yoke vents.* A yoke vent serving a drain stack shall be sized as a vent stack in accordance with par. (a).

(i) *Vents for sumps.* 1. a. Except as provided in subd. 1. b., the size of a vent for a sanitary pump with other than a pneumatic ejector, shall be determined in accordance with Table 82.31-4.

b. The size of a vent for a sanitary sump located outside with other than a pneumatic ejector shall be determined in accordance with Table 82.31-4, but shall not be less than 2 inches in diameter.

2. The air pressure relief pipe from a pneumatic ejector shall not be connected to vent or vent system serving a sanitary drain system, storm drain system or chemical waste system.

a. The relief pipe shall be of a size to relieve the air pressure inside the ejector to atmospheric pressure, but shall not be less than 2 inches in diameter where the ejector is located outside and 1 1/4 inches in diameter for all other ejector locations.

b. The vent shall terminate in accordance with the provisions of sub. (16).

(15) VENT GRADES AND CONNECTIONS. (a) *Vent grade.* All vent and branch vent pipes shall be graded and connected so as to drain back to a drain pipe by means of gravity.

(b) *Installation.* Vents shall be installed in accordance with subds. 1. to 3.

1. Except for wet vent piping, the connection of a vent to horizontal drain piping shall be at a point above the horizontal center line of the drain piping.

(c) *Prohibited uses.* Vent terminals shall not be used as flag poles, support for antennas or other similar purposes.

(d) *Location of vent terminals.* 1. A vent shall not terminate under the overhang of a building.

2. All vent terminals shall be located:

a. At least 10 feet from an air intake;

b. At least 5 feet from a power exhaust vent;

c. At least 10 feet horizontally from or 2 feet above roof scuttles, doors and openable windows; and

d. At least 5 feet from or 2 inches above parapet walls.

3. Where a structure has an earth covered roof extending from surrounding grade, the vent extension shall run at least 7 feet above grade and terminate with an approved vent cap. The portion of vent pipe outside the structure shall be without joints, except one fitting may be installed where the pipe leaves the top or side of the structure.

(e) *Extension through wall.* Where approved by the department, a vent may terminate through an exterior wall. Such a vent shall terminate at least 10 feet horizontally from any lot line and shall terminate downward. The vent shall be screened and shall comply with par. (d).

(f) *Extensions outside buildings.* Drain or vent pipe extensions shall not be located or placed on the outside of an exterior wall of any new building, but shall be located inside the building.

(g) *Frost closure.* For protection against frost closure, each vent terminal shall be at least 2 inches in diameter. Where it is necessary to increase the diameter of the vent, the change in diameter shall be made at least 6 inches inside the building.

Note: See Appendix for further explanatory material.

(17) COMBINATION DRAIN AND VENT SYSTEMS. In lieu of providing individual vents, fixtures may be vented in accordance with pars. (a) to (c).

(a) *Stacks.* 1. A drain stack may serve as a combination drain and vent system for identical fixtures in accordance with subd. 1. a. to e.

a. The drain stack shall not serve more than 3 identical fixtures. Each fixture shall be located on a separate floor level.

b. The drain stack shall be limited to serving kitchen sinks with or without food waste grinders or dishwasher connections within dwelling units, drinking fountains and lavatories.

c. The drain stack shall not be offset horizontally above the lowest fixture drain connection.

d. The developed length of any fixture drain from the trap weir to the drain stack shall not exceed the limits specified in Table 82.31-1.

e. The drain stack and its attendant stack vent shall be sized in accordance with Table 82.31-5.

Note: See Appendix for further explanatory material.

Table 82.31-4

SIZE AND LENGTH OF VENTS FOR SANITARY SUMPS

Discharge Capacity of Ejector (gpm)	Maximum Developed Length of Vent <sup>a</sup> (feet)				
	Diameter of Vent (inches)				
	1 1/4	1 1/2	2	3	4
10	NL <sup>b</sup>				
20	270	NL			
40	72	160	NL		
60	31	75	270	NL	
80	16	41	150	NL	
100	10	25	97	NL	
150	NP <sup>c</sup>	10	44	370	NL
200		NP	20	210	NL
250		NP	10	132	NL
300		NP	10	88	380
400			NP	44	210
500			NP	24	130

a: The developed length of the vent is measured along the pipe from the connection to the sump, to the point where it connects to a vent pipe of a larger diameter.

b: NL means No Limit.

c: NP means Not Permitted.

2. Except as provided in subs. (12) and (17), vent piping serving a wall-outlet fixture may not offset horizontally less than 36 inches above the floor, but in no case lower than the elevation of the highest flood level rim of any fixture served by the vent.

3. Vent piping may not connect to a branch vent less than 38 inches above the floor, but in no case lower than 2 inches above the elevation of the highest flood level rim of any fixture served by the vent.

Note: See Appendix for further explanatory material.

(16) VENT TERMINALS. All vents and vent systems shall terminate in the open air in accordance with this subsection.

(a) *Extension above roofs.* Extensions of vents through a roof shall terminate at least 8 inches above the roof. Where the roof is to be used for any purpose other than weather protection, the vents shall extend at least 7 feet above the roof.

(b) *Waterproof flashings.* The penetration of a roof system by a vent shall be made watertight with an approved flashing.

Table 82.31-5

Fixtures Connected	Size of Stack (inches)
Drinking Fountains	1 1/2
Lavatories	2
Kitchen Sinks	3

f. For the purpose of this subdivision a vent stack shall not be required to serve this type of combination drain and vent arrangement.

2. A drain stack may serve as a combination drain and vent system for a kitchen sink and a laundry tray in accordance with subd. 2. a. to d.

a. One kitchen sink within a dwelling unit, with or without a food waste grinder or dishwasher connection shall connect to the drain stack above the laundry tray. No other fixtures may connect to the drain stack.

b. The drain stack shall be at least 2 inches in diameter below the kitchen sink connection and it shall be at least 4 inches in diameter below the laundry tray connection.

c. In lieu of the minimum sizes as required in subd. 2. b., the entire stack below the kitchen sink connection may be 3 inches in diameter.

d. The drain stack shall not offset horizontally above the fixture drain connection for the laundry tray.

(b) *Building drains.* A building drain or a building subdrain may serve as a combination drain and vent system for floor drains and floor outlet fixtures in accordance with subds. 1. to 6.

1. A vent stack or a drain stack at least 2 inches in diameter shall be connected upstream of any building drain branch or building subdrain branch.

2. No more than 2 water closets may connect to the building drain or building subdrain by means of building drain branches or building subdrain branches.

3. a. That portion of the building drain or building subdrain between the connection of the building drain branch or building subdrain branch and the vent stack or drain stack required in subd. 1. shall be at least one pipe size larger than the minimum size permitted in Table 82.30-3 based on the total drainage fixture unit load.

b. The vent stack or drain stack required in subd. 1. shall be at least one-half the diameter of that portion of the building drain or building subdrain which is vented by the stack, but may not be less than 2 inches in diameter.

c. A stack vent serving a drain stack required in subd. 1. shall be at least one half the diameter of that portion of the building drain or building subdrain which is vented by the stack, but may not be less than 2 inches in diameter.

4. The trap of a floor drain or a floor outlet fixture, except a water closet, connected to a building drain branch or building subdrain branch shall be at least 3 inches in diameter.

5. A building drain branch or building subdrain branch may not connect to a building drain or building subdrain downstream from the base fitting of a drain stack 2 inches or larger in diameter within the distance equal to 20 pipe diameters of the building drain or building subdrain.

6. The pitch and the developed length of the building drain branch or building subdrain branch may not exceed the limits specified in Table 82.31-1.

Note: See Appendix for further explanatory material.

(c) *Laboratory sink venting.* A horizontal drain may serve as a combination drain and vent system for island laboratory sinks in accordance with subds. 1. to 7.

1. A vent stack or a drain stack at least 2 inches in diameter shall be connected upstream of any fixture drain vented by the combination drain and vent system.

2. a. That portion of the horizontal drain between the connection of fixture drain and the vent stack or drain stack required in subd. 1. shall be at least one pipe size larger than the minimum size permitted in Table 82.30-2 based on total drainage fixture unit load.

b. The vent stack or drain stack required in subd. 1. shall be at least one-half the diameter of that portion of the horizontal drain which is vented by the stack, but may not be less than 2 inches in diameter.

c. A stack vent serving a drain stack required in subd. 1. shall be at least one half the diameter of that portion of the horizontal drain which is vented by the stack, but may not be less than 2 inches in diameter.

3. All fixture drains vented by the horizontal drain shall be at least 3 inches in diameter.

4. Fixture drains to be vented by the horizontal drain shall connect individually to the horizontal drain.

5. An individual vent or common vent shall be extended as high as possible under the sink enclosure and then returned vertically downward and connected to the horizontal drain. A cleanout shall be provided on the vent piping.

6. In lieu of connecting the vent to the horizontal drain which forms the combination drain and vent system, the vent may con-

nect to a horizontal fixture drain vented by the combination drain and vent system. The pitch and developed length of the horizontal fixture drain shall not exceed the limits specified in Table 82.31-1.

7. Fixture drains to be vented by the horizontal drain shall not connect to a horizontal drain downstream from the base fitting of a drain stack 2 inches or larger in diameter within the distance equal to 20 pipe diameters of the horizontal drain serving the stack.

Note: See Appendix for further explanatory material.

(18) PROHIBITED USES. A vent or vent system shall not be used for purposes other than the venting of the plumbing system.

(a) *Boiler blowoff basin vents.* Vent piping from boiler blowoff basins shall not be connected to a vent or vent system serving a sanitary drain system, storm drain system or chemical waste system.

(b) *Chemical waste vents.* Vent piping for chemical waste systems shall not be connected to a vent system serving a sanitary drain system or storm drain system.

(c) *Steam vents.* Vents serving steam operated sterilizers, cleansing or degreasing equipment, pressing machines or any other apparatus which normally discharges steam into the vent shall not be connected to a vent or vent system serving a sanitary drain system, storm drain system or chemical waste system.

History: Cr. Register, February, 1985, No. 350, eff. 3-1-85; am. (11) (a), (17) (b) 3. b. and (c) 2. b., r. and recr. (11) (b), r. (13) (a) 2., cr. (17) (b) 3. c. and (c) 2. c., Register, May, 1988, No. 389, eff. 6-1-88; reprinted to correct (17) (c) 4., Register, February, 1991, No. 422; cr. (4) (b) 4. and (17) (a) l. f., r. and recr. (5) (c) l. c. and (17) (c) 4., am. (5) (c) 2. c., (10) (intro.), (b) l., (11) (b), (17) (a) l. e. and (17) (b), Register, August, 1991, No. 428, eff. 9-1-91; am. (6) (c), (7) (b), (10) (intro.), (a), (b) l., (e), (13) (a) l. c., (c) (intro.), l. and 4., r. (16) (h), Register, February, 1994, No. 458, eff. 3-1-94.

### Comm 82.32 Traps and direct fixture connections.

(1) SCOPE. The provisions of this section set forth the requirements for the types and installation of traps and direct fixture connections.

(2) MATERIALS. All traps and fixture connections shall be of approved materials in accordance with ch. Comm 84.

(3) GENERAL. Each plumbing fixture, each compartment of a plumbing fixture and each floor drain shall be separately trapped by a water seal trap, except as provided in par. (a). A fixture shall not be double trapped.

(a) *Trap exceptions.* The plumbing fixtures listed in subds. 1. to 3. shall not be required to be separately trapped:

1. Fixtures having integral traps;

2. Compartments of a combination plumbing fixture installed on one trap, provided:

a. No compartment is more than 6 inches deeper than any other;

b. The distance between the compartments' waste outlets farthest apart does not exceed 30 inches; and

c. No compartment waste outlet is equipped with a food waste grinder.

3. Storm drains as provided in s. Comm 82.36 (14) (b).

(b) *Trap seals.* Each trap shall provide a liquid seal depth of not less than 2 inches and not more than 4 inches, except as otherwise specified in this chapter.

(c) *Loss of trap seal.* A trap seal primer valve may be installed on a trap subject to high rates of evaporation.

1. A trap seal primer valve shall be installed on a receptor of indirect wastes not subject to year round use.

2. Trap seal primer valves shall conform to ASSE 1018.

Note: A list of referenced standards is contained in ch. Comm 84.

(d) *Design.* Traps shall be self-scouring and shall not have interior partitions, except where such traps are integral with the fixture. Uniform diameter P-traps shall be considered self-scouring.

(e) *Size.* Traps shall be of diameters not less than those specified in Table 82.30-1 of s. Comm 82.30.

(f) *Prohibited traps.* The installation of the types of traps listed in subs. 1. to 6. shall be prohibited:

1. Bell traps;
2. Drum traps, except where specifically approved by the department;
3. S-traps which are not integral parts of fixtures;
4. Separate fixture traps which depend on interior partitions for the trap seal;
5. Traps which depend upon moving parts to maintain the trap seal; and
6. Traps which in case of defect would allow the passage of sewer air.

(4) *INSTALLATION.* (a) *Setting of traps.* All traps shall be rigidly supported and set true with respect to the water level and so located as to protect the water seals, and shall be protected from freezing and evaporation.

(b) *Distance from fixture drain outlets.* 1. Vertical distance. Except as provided in subd. 1. a. to c., the vertical distance between the top of the fixture drain outlet and the horizontal center line of the trap outlet shall not exceed 15 inches.

a. The vertical distance between the top of the strainer of a floor drain or the opening of a standpipe receptor and the horizontal center line of the trap outlet shall not exceed 36 inches.

b. The vertical distance between the top of the fixture drain outlet of a pedestal drinking fountain and the horizontal center line of the trap outlet shall not exceed 60 inches.

c. The vertical distance between the water level in the bowl of a floor outlet water closet and the center line of the horizontal portion of the fixture drain shall not exceed 36 inches.

2. Horizontal distance. The horizontal distance between the vertical center line of a fixture drain outlet and the vertical center line of the trap inlet shall not exceed 15 inches, except the horizontal distance for a pedestal drinking fountain shall not exceed 24 inches.

Note: See Appendix for further explanatory material.

(5) *DIRECT FIXTURE DRAIN CONNECTION.* Except as provided in s. Comm 82.33, all plumbing fixtures and appliances discharging wastes shall connect directly to a drain system.

(a) *Floor drains.* 1. Floor drains shall be so located as to be accessible for cleaning purposes.

2. A floor drain receiving the wash from garbage cans shall be at least 3 inches in diameter.

(b) *Kitchen sinks.* Horizontal drain piping serving a kitchen sink trap shall not connect to vertical drain piping by means of a double sanitary tee.

(c) *Water closets.* A water closet shall discharge through a drain pipe or fitting with a minimum diameter of 3 inches.

1. A floor mounted wall outlet water closet shall connect to a 4 inch or 4 × 3 inch closet collar fitting or to a horizontal or vertical carrier type fitting.

2. A floor outlet water closet shall connect to a 4 inch or 4 × 3 inch closet collar fitting. A 4 × 3 inch closet bend fitting may be installed where a 4 inch closet collar fitting is used.

3. A wall mounted wall outlet water closet shall connect to a horizontal or vertical carrier type fitting.

4. Two water closets discharging to a vertical drain from opposite sides by means of the same fitting shall be installed in accordance with subd. 4. a. and b.

a. Where the vertical drain is 3 inches in diameter, the fitting for floor outlet water closets shall be a 3 inch double wye pattern fitting.

b. Where the water closets are wall outlet types the fitting shall be a double wye pattern fitting or a carrier-type fitting.

(d) *Blowout-type fixtures.* Blowout-type plumbing fixtures shall be installed in accordance with the approval of the department.

History: Cr. Register, February, 1985, No. 350, eff. 3-1-85; am. (4) (a), cr. (5) (intro.) and (d), Register, May, 1988, No. 389, eff. 6-1-88.

### Comm 82.33 Indirect and local waste piping.

(1) *SCOPE.* (a) The provisions of this section set forth the requirements for the installation of indirect waste piping and local waste piping.

(b) Indirect waste piping and local waste piping draining the fixtures, appliances and devices having a public health concern, including but not limited to those listed in Table 82.33-1, shall be considered as plumbing and shall comply with the provisions of this section.

Table 82.33-1

#### TYPES OF FIXTURES, APPLIANCES AND DEVICES OF A PUBLIC HEALTH CONCERN

Refrigerated food storage rooms and compartments	Coffee makers and urns
Refrigerated food display cases	Food processing equipment
Ice compartments	Baptismal fountains
Vending machines	Clothes washers and extractors
Steam tables and kettles	Dishwashers
Food preparation sinks	Stills
Potato peelers	Sterilizers
Egg boilers	Bar and soda fountains
Boiler blowoff basin outlet drains	

(2) *MATERIALS.* Indirect waste piping more than 30 inches in length and all local waste piping shall be of approved materials in accordance with ch. Comm 84.

(3) *SIZE.* Except as provided in pars. (a) and (b), indirect waste piping more than 30 inches in length and all local waste piping shall be sized in accordance with s. Comm 82.30.

(a) Indirect or local waste piping not exceeding 20 feet in length for refrigerated food display cases may not be less than one inch in diameter.

(b) Indirect waste piping, attached to an appliance, appurtenance or equipment through which pressurized waste is discharged, shall be sized in accordance with specifications of the manufacturer of the appliance, appurtenance or equipment.

(4) *INSTALLATION.* Indirect waste piping and local waste piping shall be so installed as to permit access for flushing and cleaning.

(5) *TRAPS.* (a) *Indirect waste piping.* 1. Gravity flow indirect waste piping more than 30 inches in length shall be provided with a trap in accordance with s. Comm 82.32 (4), except indirect waste piping draining a sterilizer shall not be trapped.

2. All indirect waste piping draining a refrigerated compartment shall be provided with a trap in accordance with s. Comm 82.32 (4).

(b) *Local waste piping.* Local waste piping handling sanitary wastes and more than 30 inches in length shall be provided with a trap in accordance with s. Comm 82.32 (4).

(6) *MAXIMUM LENGTH.* Indirect waste piping and local waste piping handling sanitary wastes shall not exceed 30 feet in length horizontally nor 15 feet in length vertically.

Note: See Appendix for further explanatory material.

(7) *AIR-GAPS AND AIR-BREAKS.* All indirect waste piping and all local waste piping shall discharge by means of an air-gap or air-break into a receptor.

(a) *Air-gap installation.* 1. The distance of an air-gap between indirect waste piping one inch or less in diameter and the receptor shall be at least twice the diameter of the indirect waste piping.



2. The distance of an air-gap between indirect waste piping larger than one inch in diameter and the receptor shall be not less than 2 inches.

(b) *Air-break installation.* The air-break between indirect waste piping or local waste piping and the receptor shall be accomplished by extending the indirect waste piping or local waste piping below the flood level rim of the receptor.

Note: See Appendix for further explanatory material.

(8) **RECEPTORS.** A receptor receiving the discharge from indirect waste piping or local waste piping shall be of a shape and capacity as to prevent splashing or flooding. Receptors shall be installed in accordance with this subsection and shall be accessible.

(a) *Waste sinks and standpipes.* 1. A waste sink or a standpipe serving as a receptor shall have its rim at least one inch above the floor.

2. A waste sink or a standpipe serving as a receptor shall be individually trapped in accordance with s. Comm 82.32.

(b) *Floor sinks.* A floor sink serving as a receptor shall be equipped with a removable metal basket over which the indirect waste piping or local waste piping is to discharge, or the floor sink shall be equipped with a dome strainer. Indirect waste piping or local waste piping shall not discharge through a traffic grate, but shall terminate over an ungrated portion of the floor sink.

(c) *Local waste piping.* 1. Local waste piping serving as a receptor shall discharge to a waste sink, standpipe or floor sink, except as provided in subd. 2.

2. Local waste piping serving as a receptor for a water heater safety relief valve may discharge to a floor drain.

3. Local waste piping may not receive the discharge from another local waste pipe.

(d) *Prohibited receptors.* Except as provided in subds. 1. and 2., a plumbing fixture which is used for domestic or culinary purposes shall not be used as a receptor for indirect waste piping or local waste piping.

1. The indirect waste piping of a portable dishwasher or point-of-use water treatment device may discharge into a kitchen sink of a dwelling unit.

2. The indirect waste piping of an automatic clothes washer or water treatment device may discharge into a laundry tray.

Note: See Appendix for further explanatory material.

(9) **INDIRECT WASTE PIPING REQUIRED.** (a) *Boilers, pressure tanks and relief valves.* Boilers, pressure tanks, relief valves and similar equipment discharging to a drain system shall be by means of an air-gap.

1. Steam pipes shall not connect or discharge to any part of a plumbing system.

2. Waste water more than 160° F. in temperature shall not discharge into any part of a plumbing system.

(b) *Clear water wastes.* 1. Clear water wastes, except those from a drinking fountain, discharging to a drain system shall be by means of an air-gap.

2. The clear water wastes from a drinking fountain discharging to a drain system shall be by means of a direct connection.

(c) *Clothes washers.* 1. Residential types. Residential-type clothes washers shall discharge into the sanitary drain system by means of an air-break.

a. A standpipe receptor may not extend more than 36 inches nor less than 18 inches above the top of the trap weir.

b. The top of a standpipe receptor shall terminate at least 32 inches but not more than 42 inches above the floor on which the washer is located.

2. Self-service laundries. Pumped-discharge automatic clothes washing equipment in laundrettes, laundromats and self-service laundry establishments shall have the wastes discharge to a drain system by means of standpipes. The standpipes shall be installed in accordance with subd. 1.

a. The maximum number of washers which may be connected to a trap shall be in accordance with Table 82.33-2.

b. Washer wastes shall not be discharged to gutters, troughs, local waste piping, indirect waste manifold or other similar connections.

3. Commercial. Gravity discharge-type clothes washing equipment shall discharge by means of an air-break or by other approved methods into a floor receptor, trench or trough.

a. The receptor shall be sized to hold one full simultaneous discharge load from every machine draining into the receptor.

b. The size of the receptor drain shall be determined by the manufacturer's discharge flow rate and the frequency of discharge.

Note: See Appendix for further explanatory material.

c. All wastes from the washers shall flow through a Commercial laundry interceptor as specified in s. Comm 82.34.

Table 82.33-2

WASHER CONNECTIONS

Trap Diameter	Maximum Number of Washers
2 inches	2 machines
3 inches	3 machines
4 inches	4 machines

(d) *Dishwashing machines.* 1. Residential-type. A residential-type dishwashing machine shall discharge to the sanitary drain system by means of a fixed air-gap or air-break located above the high water level of the dishwashing machine. The indirect waste piping or hose from the dishwashing machine shall not exceed a developed length of 10 feet. The indirect waste piping shall be installed in accordance with one of the methods specified in subd. 1. a. and b.

a. An air-gap or air-break may be located below a countertop. Where the air-gap or air-break is located below a countertop, the indirect waste piping from the dishwashing machine shall discharge into a standpipe. The standpipe shall be at least 1½ inches in diameter and shall extend at least 12 inches above the trap inlet.

b. An air-gap may be located above a countertop. Where the air-gap is located above a countertop, the indirect waste piping from a dishwashing machine shall discharge into either a standpipe or local waste piping. The standpipe shall be at least 1½ inches in diameter and shall extend at least 12 inches above the trap inlet. The local waste piping shall connect to the fixture drain of a kitchen sink above the trap inlet. Where a hose is used for local waste piping, the developed length shall not exceed 18 inches.

2. Commercial. Commercial dishwashing machines shall discharge into a sanitary drain system by means of an air-gap or air-break into a trapped and vented receptor. The indirect waste piping may not be more than 30 inches in length.

3. Prohibited installations. No dishwashing machine may discharge into or through a food waste grinder.

Note: See Appendix for further explanatory material.

(e) *Drips and drain outlets.* Appliances, devices and apparatus not defined as plumbing fixtures which have drip or drain outlets shall be drained through indirect waste piping into an open receptor by means of an approved air-gap or air-break.

(f) *Elevator drains.* 1. All drains serving elevator pits shall discharge to the storm drain system as specified in s. Comm 82.36 (3).

2. Drains serving elevator pits shall not connect directly with the storm drain system by means of gravity flow piping.

3. A sump may not be located in an elevator machine room.

4. A drain serving an elevator pit that discharges to a sump shall have a submerged inlet constructed to maintain a minimum 6 inch trap seal.

5. A sump located in an elevator pit may only receive storm or clear water waste from the elevator pit or the elevator machine room, or both.

Note: See Appendix for further explanatory material.

(g) *Food handling establishments.* Plumbing fixtures, devices and appurtenances installed in food handling establishments engaged in the storage, preparation, selling, serving or processing of food shall be installed in accordance with this paragraph.

1. Bar and soda fountain sinks. Where a bar or soda fountain sink is so located that the trap for the sink cannot be vented as specified in s. Comm 82.31, the sink drain shall discharge to the sanitary drain system through indirect waste piping.

a. Where the indirect waste piping is not trapped, the wastes shall be discharged by means of an air-gap.

b. Where the indirect waste piping is trapped, the wastes shall be discharged by means of an air-gap or air-break.

2. Beer taps, coffee makers, glass fillers and soda dispensers. The drip pan from a beer tap, coffee maker, glass filler, soda dispenser or similar equipment shall discharge to the sanitary drain system through indirect waste piping by means of an air-break or air-gap.

3. Novelty boxes, ice compartments and ice cream dipper wells. Novelty boxes, ice compartments and ice cream dipper wells shall discharge to the sanitary drain system through indirect waste piping by means of an air-gap.

a. The indirect waste piping shall not exceed 30 inches in length.

b. The indirect waste piping draining a novelty box or ice compartment may not discharge or connect to the indirect waste piping or local waste piping of any other fixture, appliance or device other than a novelty box or ice compartment.

4. Refrigerated food storage rooms, compartments and display cases. Drains serving refrigerated food storage rooms, compartments or display cases shall discharge to the sanitary drain system through indirect waste piping. The indirect waste piping shall drain by gravity to a receptor by means of an air-gap or air-break. Where an air-break is installed, the flood level rim of the receptor shall be at least 2 inches below the top of the fixture strainer or drain opening in the refrigerated room, compartment or display case.

5. Enclosed food processing equipment. Coffee urns, egg boilers, potato peelers, steam kettles, steam tables, vending machines and similar types of enclosed food processing equipment shall be discharged to the sanitary drain system through indirect waste piping by means of an air-gap.

6. Preparation sinks. Open culinary sinks for thawing or washing food shall discharge to the sanitary drain system through indirect waste piping by means of an air-gap. The indirect waste piping may not exceed a length of 30 inches.

Note: See Appendix for further explanatory material.

(h) *Sterilizers.* Appliances, devices or apparatus, such as stills, sterilizers and similar equipment requiring waste connections and used for sterile materials, shall discharge through indirect waste piping to the sanitary drain system by means of an air-gap.

Note: See s. Comm 82.50 regarding sterilizer wastes.

(i) *Swimming pools.* 1. Waste water from swimming or wading pools, including pool drainage and backwash from sand filters, shall be discharged to the storm sewer through indirect waste piping.

2. Waste water from floor drains which serve interior walks around pools and backwash from diatomaceous earth filters shall be discharged to the sanitary sewer through indirect waste piping.

3. Where a recirculation pump is used to discharge waste pool water to the drain system, the pump shall discharge to the drain system through indirect waste piping.

4. All indirect waste piping serving pools and pool areas shall discharge by means of an air-gap.

5. The requirements for sewer connections as specified in ch. Comm 90 shall apply to all swimming pools.

(j) *Vacuum systems—central units.* Central vacuum units shall discharge by means of an air-gap or air break.

(10) *WATER TREATMENT DEVICES.* The waste discharge of a water treatment device to the drain system shall be protected in accordance with s. Comm 82.41 with respect to cross connection control.

Note: For appliances, devices and equipment not included in this section or other sections contact the department for information and proposed installation review.

History: Cr. Register, February, 1985, No. 350, eff. 3-1-85; r. and recr. Table 82.33-1 and (9) (g) 5., cr. (8) (c) 3., (9) (g) 6. and (k), Register, May, 1988, No. 389, eff. 6-1-88; r. and recr., (3), am. (9) (c) 1. a., (d) 2. and (g) 4., Register, August, 1991, No. 428, eff. 9-1-91; am. (8) (d) 1., 2. and (9) (g) 3. b., r. (9) (k), cr. (10), Register, February, 1994, No. 458, eff. 3-1-94; correction in (9) (i) 5., made under s. 13.93 (2m) (b) 7., Stats., Register, February, 1994, No. 458; r. and recr. (9) (f), Register, April, 1998, No. 508, eff. 5-1-98; correction in (9) (i) 5. made under s. 13.93 (2m) (b) 7., Stats., Register, April, 1998, No. 508.

**Comm 82.34 Interceptors and catch basins for special and industrial wastes. (1) SCOPE.** The provisions of this section set forth the requirements for design and installation of interceptors and catch basins to handle special and industrial wastes.

(2) *MATERIALS.* All piping, interceptors and catch basins for special and industrial wastes shall be of approved materials in accordance with ch. Comm 84.

(3) *GENERAL.* Any deleterious waste material which is discharged into a plumbing system shall be directed to an interceptor, catch basin or other approved device. The interceptor, catch basin or approved device shall be capable of separating the deleterious waste material from the normal sewage and retaining the deleterious waste material to facilitate its periodic removal or treatment or both.

(a) *Deleterious waste materials.* For the purpose of this subsection, deleterious waste materials include any waste material, other than that from dwelling units, which may:

1. Congeal, coagulate or accumulate in drains and sewers, thereby, creating stoppages or retarding the discharge flow;

2. Retard or interfere with municipal sewage treatment processes;

3. Pass through a treatment process and pollute the watercourse receiving the treatment effluent;

4. Create explosive, flammable, noxious, toxic or other hazardous mixtures of materials; or

5. Damage, destroy or deteriorate sewers or piping materials or structures.

Note: See ch. Comm 10 as to flammable and combustible liquids.

(b) *Private disposal systems.* The special or industrial wastes from any plumbing system which are not discharged into a public sewer system shall be treated or disposed in compliance with the rules of the state agency having jurisdiction. The treatment or disposal system shall be installed so as not to endanger any water supply which is or may be used for drinking, culinary or bathing purposes, or which may create a nuisance, unsanitary conditions or water pollution.

(c) *Velocity control.* Interceptors, catch basins and other similar devices shall be designed, sized and installed so that flow rates shall be developed and maintained in a manner that solid and floating materials of a harmful, hazardous or deleterious nature will be collected in the interceptor for disposal.

(d) *Maintenance.* All devices installed for the purpose of intercepting, separating, collecting, or treating harmful, hazardous or deleterious materials in liquid or liquid-borne wastes shall be operated and cleaned of intercepted or collected materials or of any residual from treatment at such intervals which may be required to prevent their passage through the interceptor.

(e) *Service reassembly.* Any fixed orifice, vent or trap of an interceptor, catch basin or other similar device shall remain intact and shall not be removed or tampered with except for cleaning purposes. After service, all parts of the interceptor, collector or treatment device, such as baffles, weirs, orifice plates, channels,

vents, traps, tops, and fastening bolts or screws shall be replaced in proper working position.

(f) *Location.* 1. Interceptors, catch basins and other similar devices shall be accessible for service, maintenance, repair and inspection.

a. No interceptor, catch basin or similar device may be surrounded or covered as to render it inaccessible for service or inspection.

b. No interceptor, catch basin or similar device may have its top located more than 6 feet above the surrounding floor.

c. Enough space shall be provided to enable the removal of any interior parts of the interceptor, catch basin or similar device.

d. At least 18 inches of clear space shall be provided above the top of the interceptor, catch basin or similar device.

2. An interceptor, catch basin, or similar device shall not be located within 25 feet of a water well.

(g) *Construction.* 1. Base. Site-constructed catch basins and interceptors shall have at least a 6 inch thick air-entrained concrete base with a minimum estimated compressive strength at 28 days of 3000 psi or an approved precast base.

2. Sides and tops. The sides and tops of poured-in-place concrete catch basins and interceptors shall be at least 6 inches thick air-entrained concrete with a minimum estimated compressive strength at 28 days of 3000 psi.

3. Prefabricated. Prefabricated catch basins and interceptors shall be approved by the department prior to installation.

(h) *Disposition of retained materials.* Deleterious waste materials retained by an interceptor, catch basin or similar device shall not be introduced into any drain, sewer or natural body of water without approval of the state agency having jurisdiction.

(4) **GARAGE CATCH BASINS AND INTERCEPTORS.** (a) *Public buildings.* Except as provided in subd. 1., the discharge waste from floor areas of public buildings on which self-propelled land, air or water vehicles can be driven, stored or serviced or on which engines or motorized equipment is serviced or stored shall be discharged through a garage catch basin or through a sand interceptor and an oil interceptor.

1. Exception. The discharge wastes of those floor areas where only vehicles such as forklift trucks are utilized shall not be required to be discharged through a garage catch basin or interceptor.

2. Design of garage catch basins. a. The base for a site-constructed garage catch basin shall extend at least 4 inches beyond the outside of the catch basin wall.

b. The catch basin shall have a minimum inside diameter or horizontal dimension of 36 inches and a minimum inside depth of 48 inches.

c. The outlet for a catch basin shall be at least 4 inches in diameter. The outlet shall be submerged to form a trap with a water seal of at least 6 inches. The bottom of the trap's water seal shall be at least 18 inches above the bottom of the catch basin.

d. The drain from the catch basin shall be provided with a cleanout extended to grade. The cleanout shall be sized in accordance with s. Comm 82.35.

e. The waterline in the catch basin shall be at least 2 inches below horizontal drains discharging into the catch basin.

f. The catch basin shall be provided with an open grate cover of at least 24 inches in diameter.

g. Where the outlet for a catch basin is installed so that the waterline is more than 12 inches below the floor level, a local vent pipe of at least 4 inches in diameter shall be provided. The local vent pipe shall connect to the catch basin at least 2 inches above the waterline and shall terminate in accordance with s. Comm 82.31 (16) or to the outside of the building with a return bend fitting or vent cap terminating not less than one foot above grade.

h. Not more than 8 trapped floor drains of at least 3 inches in diameter may connect individually to the lowest horizontal portion of a local vent where that lowest horizontal portion of the

local vent does not exceed a length of 100 feet. The change in elevation of the fixture drain between the trap weir of the floor drain and the local vent shall not exceed the diameter of the fixture drain pipe.

i. Trapped floor drains, at least 3 inches in diameter, may connect to a garage catch basin. The change in elevation of the fixture drain between the trap weir of the floor drain and the catch basin shall not exceed the diameter of the fixture drain pipe.

3. Trench drain. a. Each open grate trench which is to serve floor areas subject to vehicular traffic shall discharge to a catch basin by means of a fixture drain of at least 4 inches in diameter.

b. The fixture drain from a trench drain shall extend at least 6 inches below the waterline of the catch basin.

c. The developed length of the fixture drain between the trench drain and the catch basin shall not exceed the distance equal to 24 times the diameter of the fixture drain.

*Note:* See Appendix for further explanatory material.

(b) *Garages for one- and 2-family dwellings.* 1. Floor drains serving garages for one- and 2-family dwellings shall be provided with a solid bottom sediment basket.

*Note:* See Appendix for further explanatory material.

2. Catch basins serving garages for one- and 2-family dwellings shall be in accordance with par. (a).

(c) *Grates for garage catch basins, floor drains and trenches.* A garage catch basin, floor drain and trench drain shall be provided with an approved, removable cast iron or steel grate of a thickness and strength for the anticipated loads. The grate shall have an available inlet area equal to at least the outlet drain for the catch basin, floor drain or trench drain.

(5) **GREASE INTERCEPTORS.** All plumbing installations for occupancies, other than dwelling units, where grease, fats, oils or similar waste products of cooking or food are introduced into the drain system shall be provided with interceptors in accordance with this subsection. All drains and drain piping carrying oil, grease or fats shall be directed through one or more interceptors as specified in par. (a).

(a) *General.* 1. Public sewers. All new, altered or remodeled plumbing systems which discharge to public sewers shall be provided with one or more exterior grease interceptors or one or more interior grease interceptors.

a. Where one or more exterior grease interceptors are provided all and only kitchen wastes shall be discharged to an exterior interceptor.

b. Where one or more interior grease interceptors are provided the wastes from a food waste grinder or a sanitizing compartment of a sink, or both, may bypass the interceptor or interceptors.

2. Private sewage systems. All new, altered or remodeled plumbing systems which discharge to private sewage systems shall be provided with exterior grease interceptors.

a. Except as provided in subd. 2. b., only kitchen and food wastes shall be discharged to an exterior grease interceptor.

b. Where approved by the department combined kitchen wastes and toilet wastes may be discharged directly to a septic tank or tanks which conform to par. (b). The required capacity of a grease interceptor shall be added to the required septic tank capacity as specified in ch. Comm 83.

3. Existing installations. The department may require the installation of either interior or exterior grease interceptors for existing plumbing installations where the waterway of a drain system, sewer system or private sewage system is reduced or filled due to congealed grease.

(b) *Exterior grease interceptors.* Exterior grease interceptors shall receive the entire waste discharge from kitchens or food processing areas. All exterior interceptors shall be designed and constructed in accordance with this paragraph, so as to constitute an individual structure.

1. Design. a. The liquid depth of the interceptor shall not be less than 42 inches nor more than an average of 72 inches.

b. A rectangular interceptor tank shall have a minimum width of 36 inches and a minimum length of 72 inches. The longest dimension of the tank shall be parallel to the direction of waste flow.

c. A horizontal-cylindrical interceptor tank shall have a minimum inside diameter of 52 inches and a minimum length of 72 inches. The longest dimension of the tank shall be parallel to the direction of waste flow.

d. Vertical-cylindrical interceptor tanks shall have a minimum inside diameter of 72 inches.

e. Each prefabricated interceptor tank shall be clearly marked to indicate liquid capacity and the name and address or registered trademark of the manufacturer. The markings shall be impressed into or embossed onto the outside wall of the tank immediately above the outlet opening. Each site-constructed concrete tank shall be clearly marked at the outlet opening to indicate the liquid capacity. The marking shall be impressed into or embossed onto the outside wall of the tank immediately above the outlet opening.

f. The inlet and outlet openings of interceptor tanks or tank compartments shall be provided with, open-end sanitary tee fittings or baffles, so designed and constructed as to distribute the flow and retain the grease in the tank or tank compartments. The sanitary tee fittings or baffles shall extend at least 6 inches above the liquid level. At least 2 inches of clear space shall be provided above the top of the sanitary tee fittings or baffles. The sanitary tee fitting or baffle at the inlet opening shall extend below the liquid level of the tank a distance equal to  $\frac{1}{3}$  of the total liquid depth. The sanitary tee fitting or baffle at the outlet opening shall extend below the liquid level of the tank a distance equal to  $\frac{2}{3}$  of the total liquid depth. The waterline in the interceptor shall be at least 2 inches below the horizontal drain discharging to the interceptor.

g. Each compartment of an interceptor tank shall be provided with at least one manhole opening located over either the inlet or outlet opening. Additional manhole openings shall be provided such that no interior compartment wall of a tank is more than 4 feet from the edge of the manhole opening. The distance between manhole openings serving the same compartment shall not exceed 8 feet. Manhole openings shall be not less than 24 inches in the least dimension. Manholes shall terminate at or above ground surface and be of approved materials. Steel tanks shall have a minimum 2 inch collar for the manhole extensions permanently welded to the tank. The manhole extension on fiberglass tanks shall be of the same material as the tank and an integral part of the tank. The collar shall have a minimum height of 2 inches.

h. Manhole risers for interceptor tanks shall be provided with a substantial, fitted, watertight cover of concrete, steel, cast iron or other approved material. Manhole covers shall terminate at or above grade and shall have an approved locking device.

i. A minimum 4 x 6 inch permanent label shall be affixed to the manhole cover, identifying the interceptor tank with the words GREASE INTERCEPTOR. Where the tank acts as the septic tank and grease interceptor the label shall identify it as such. The wording used on the warning label shall be approved by the department, as part of the materials approval for the tank under ch. Comm 84.

j. An inlet or outlet opening which does not have a manhole opening as specified in subd. 1. g. shall be provided with an airtight inspection opening located over the inlet or outlet. The inspection opening shall be at least 4 inches in diameter. The inspection opening shall terminate at or above grade.

Note: See Appendix for further explanatory material.

2. Capacity and sizing. The minimum liquid capacity of a grease interceptor shall be determined in accordance with the provisions of this subdivision, except no grease interceptor may have a capacity of less than 1000 gallons if the interceptor is to discharge to a private sewage system or less than 750 gallons if the interceptor is to discharge to a municipal sewer system and treatment facility.

a. The minimum capacity of a grease interceptor serving a restaurant with seating shall be equal to C, where

$$C = S \times H \times A$$

where, S = Number of seats, with each drive-in car service space counting as 3 seats and each drive-up service window counting as 60 seats.

H = Hours per day that meals are served, at least 6 hours but not more than 12 hours.

A = Appliance factor:

0.75 for a kitchen with no dishwashing machine and no food waste grinder.

1.0 for a kitchen with either a dishwashing machine or a food waste grinder.

1.25 for a kitchen with both a dishwashing machine and a food waste grinder.

b. The minimum capacity of a grease interceptor serving a dining hall, hospital, nursing home, school kitchen, church kitchen or a kitchen for carryout or delivery service shall be equal to C, where:

$$C = \frac{M \times G \times H}{2 \times P}$$

where, M = Meals served per day.

G = 3 gallons per meal served.

H = Hours per day that meals are served, at least 6 hours but not more than 12 hours.

P = Meal periods per day; 1, 2 or 3.

c. The minimum capacity of a grease interceptor as determined in subd. 2. a. or b. may be halved for establishments with all paper service, but may not be less than 1000 gallons if the interceptor is to discharge to a private sewage system or less than 750 gallons if the interceptor is to discharge to a municipal sewer system and treatment facility.

3. Installation. a. Grease interceptor tanks may not be located within 5 feet of a building or any portion of the building or swimming pool; 10 feet of a water service; 2 feet of a lot line; 10 feet of a cistern or 25 feet of a reservoir or high water mark of a lake, stream, pond or flowage.

Note: The department of natural resources under ch. NR 113 requires a minimum setback of 25 feet between a grease interceptor and a well.

b. Where a grease interceptor tank is installed in groundwater, the tank shall be adequately anchored.

c. Grease interceptor tanks shall be installed on a bedding of at least 3 inches in depth. The bedding material shall be sand, gravel, granite, limerock or other noncorrosive materials of a size that all will pass through a  $\frac{3}{4}$  inch sieve.

d. The backfill material for steel and fiberglass grease interceptor tanks shall be as specified in subd. 3. c. for bedding and shall be tamped into place. The backfill material for concrete grease interceptor tanks shall be soil material, of a size that will pass through a 4 inch screen and shall be tamped into place.

e. All joints on concrete risers and manhole covers for a grease interceptor shall be tongue and groove or shiplap type and sealed watertight using neat cement, mortar or bituminous compound. All joints on steel risers for a grease interceptor shall be welded or flanged and bolted and be watertight. All steel manhole extensions from a grease interceptor shall be bituminous coated inside and outside. All methods of attaching fiberglass risers for a grease interceptor shall be watertight and approved by the department.

(c) Interior grease interceptors. 1. Flow rating. An interior grease interceptor shall be capable of accommodating a flow of at

least 15 gallons per minute, but not less than the manufacturer's specifications.

2. Flow rate related to connected capacity. Three-fourths of the total holding capacity in gallons of all fixtures and devices discharging to an interior grease interceptor, shall not exceed the value of the maximum flow rate which the interceptor can accommodate.

3. Grease holding capacity as related to flow rate. The grease holding capacity in pounds shall not be less than double the value of the maximum flow rate which the interceptor can accommodate.

4. Flow controls. Where required by the manufacturer, devices which control the rate of flow through an interior grease intercept shall be installed.

a. The flow control devices shall be accessible for inspection, service and cleaning.

b. Flow controls shall be installed in the drain branch leading to each fixture and shall be so rated that the combined flow from all combinations of discharge will not develop either sufficient static or velocity head so the established flow rate of the interceptor can be exceeded.

Note: See Appendix for further explanatory material.

5. Flow control vents. Orifice type flow controls for an interior grease interceptor shall be vented in accordance with s. Comm 82.31.

6. Prohibited locations and types. No water-cooled grease interceptor may be installed. No grease interceptor may be located where the surrounding temperatures, under operating conditions, are less than 40° F.

(d) *Prohibited treatment.* The introduction of grease or fat emulsifiers into a grease interceptor shall be prohibited.

(6) **AUTOMATIC CAR WASHES.** The wastes of floor drains and drain inlets of automatic car washes shall discharge through an approved car wash interceptor.

(a) *Design.* Except as provided in subds. 1. and 2. and par. (b), car wash interceptors shall be constructed and installed in accordance with sub. (4) (a).

1. The interceptor's outlet shall be submerged to form a trap with a water seal of at least 15 inches.

2. The bottom of the trap's water seal shall be at least 30 inches above the bottom of the interceptor.

(b) *Capacity.* The minimum liquid capacity of the interceptor shall be based on the maximum flow rate of water through the interceptor in gallons per minute.

1. Between the waterline and the bottom of the trap seal of the outlet, the interceptor shall have a capacity value equal to at least 5 times the maximum flow rate.

2. Below the bottom of the trap seal of the outlet, the interceptor shall have a capacity value equal to at least 15 times the maximum flow rate.

Note: See Appendix for further explanatory material.

(c) *Hand-held car washing wands.* The wastes of floor drains and drain inlets serving 2 or more hand-held car washing wands shall discharge through an approved car wash interceptor. The wastes of one hand-held car washing wand may discharge to a garage catch basin.

(d) *Recirculated water.* Where recirculated water is used for washing, the recirculated water shall be drawn from a separation chamber located upstream from the car wash interceptor.

(7) **COMMERCIAL LAUNDRIES.** Wastes from gravity dump-type clothes washing equipment shall be discharged through an approved laundry interceptor in accordance with this subsection.

(a) *Screening apparatus.* A laundry interceptor shall be equipped with a wire basket or other device which will prevent the passage of solids, 1/2 inch or larger in diameter, string, buttons and other detrimental materials into the drain system.

(b) *Trench type interceptors.* A floor receptor, trench or trough as specified in s. Comm 82.33 (9) (c) 3., may serve as a laundry interceptor, if no oils or quantities of sand are discharged into it.

Note: See Appendix for further explanatory material.

(c) *In-line interceptor.* 1. In-line interceptors shall have a minimum inside diameter or horizontal dimension of 24 inches.

2. An in-line interceptor shall be provided with an air-tight cover.

3. An in-line interceptor shall be provided with a vent.

a. The vent shall extend from above the flow line to a vent terminal in accordance with s. Comm 82.31 (16) or shall be connected to the venting system serving the sanitary drain system.

b. The diameter of the vent shall be at least one-half of the diameter of the interceptor's outlet, but not less than 2 inches.

4. The outlet for an in-line interceptor shall be at least 4 inches in diameter. The outlet shall be submerged to form a trap with a water seal of at least 12 inches. The bottom of the trap's water seal shall be at least 12 inches above the bottom of the interceptor.

5. The waterline in an in-line interceptor shall be at least 2 inches below the bottom of the inlet opening for the interceptor.

(8) **OIL AND FLAMMABLE LIQUIDS.** Oily and flammable wastes discharging to a building sewer shall be discharged through an approved interceptor. Where oily and flammable wastes may overflow by spillage or other circumstances, protective dikes or other similar devices shall be provided to prevent the wastes from entering the drain system.

(a) *Site-constructed interceptors.* 1. Garage catch basins. Site-constructed garage catch basins which serve as an interceptor for oily or flammable wastes shall be constructed and installed in accordance with sub. (4).

2. In-line interceptors. Site-constructed in-line interceptors for oily or flammable wastes shall be constructed and installed in accordance with this subdivision.

a. The base for an in-line interceptor shall extend at least 4 inches beyond the outside of the interceptor.

b. The in-line interceptor shall have a minimum inside diameter or horizontal dimension of 36 inches and a minimum inside depth of 48 inches. The interceptor shall have a minimum liquid capacity of one cubic foot for each 300 square feet of surface area to be drained into the interceptor.

c. The outlet for an in-line interceptor shall be at least 4 inches in diameter. The outlet shall be submerged to form a trap with a water seal of at least 6 inches. The bottom of the trap's water seal shall be at least 18 inches above the bottom of the interceptor.

d. The drain from the in-line interceptor shall be provided with a cleanout extended to grade. The cleanout shall be sized in accordance with s. Comm 82.35.

e. The waterline in the in-line interceptor shall be at least 2 inches below all horizontal drains discharging into the interceptor.

f. Covered in-line interceptors shall be vented in accordance with par. (c).

(b) *Prefabricated oil interceptors and separators.* Prefabricated oil interceptors and separators shall be of a capacity for the anticipated load and shall be installed in accordance with the manufacturer's written specifications. A manufacturer's rated capacity shall be accepted upon the approval of the department.

1. An oil interceptor or separator shall be provided with an oil storage tank for storing the residue from the interceptor or separator.

2. The oil storage tank shall be provided with a high liquid warning device which will be activated when the liquid level is less than 6 inches below the inlet pipe.

a. The warning device shall be either an audible or illuminated alarm.

b. Illuminated alarms shall be conspicuously mounted.

Note: Electrical installations are to be in accord with ch. Comm 16.

(c) *Venting.* Oil and flammable interceptors and separators shall be so designed to prevent the accumulation of explosive gases.

1. A covered interceptor or separator shall be provided with an individual vent of at least 3 inches in diameter. The vent shall extend from the top of the interceptor or separator or as high as possible, from the side of the interceptor or separator to a point at least 12 feet above grade.

2. The drain pipe to the interceptor or separator shall be provided with a fresh air inlet connected within 2 feet of the inlet of the interceptor or separator. The fresh air inlet shall terminate at least one foot above grade, but not less than 6 feet below the terminating elevation of the vent serving the interceptor or separator. The fresh air inlet shall be at least 3 inches in diameter.

Note: See Appendix for further explanatory material.

(9) **BOTTLING ESTABLISHMENTS.** Wastes containing glass of bottling establishments shall be discharged through an interceptor.

(10) **DAIRY PRODUCT PROCESSING PLANTS.** Dairy wastes from dairy product processing plants shall be discharged through an interceptor.

(11) **MEAT PROCESSING PLANTS AND SLAUGHTERHOUSES.** The wastes from meat processing areas, slaughtering rooms and meat dressing rooms shall be discharged through an approved interceptor to prevent the discharge of feathers, entrails, blood and other materials.

(12) **SAND INTERCEPTORS.** Sand interceptors and other similar interceptors for heavy solids shall be so designed and located as to be accessible for cleaning. The outlet for the interceptor shall be submerged to form a trap with a water seal of at least 12 inches.

(13) **PLASTER AND HEAVY SOLIDS TRAP TYPE INTERCEPTORS.** Plaster sinks shall be provided with plaster and heavy solids trap type interceptors.

(a) The interceptor shall be installed as the fixture trap.

(b) The drain piping between the sink and the interceptor shall not exceed a length of 36 inches.

Note: See Appendix for further explanatory material.

(14) **CHEMICAL WASTE PIPING SYSTEMS.** All chemical wastes having a pH level of less than 5.5 or more than 10.0 shall discharge to a holding tank for proper disposal or to a drain system in accordance with this subsection.

(a) *Chemical dilution and neutralizing basins.* 1. All chemical wastes discharging into a drain system shall be diluted, neutralized or treated to a pH level of 5.5 to 10.0 by passing through an approved dilution or neutralizing basin before discharging to a building sewer.

2. Dilution and neutralizing basins shall have the minimum retention capacities as specified in Table 82.34. For quantities of fixtures exceeding 150 sinks or for special uses or installations, the department shall be consulted as to the minimum capacity of the basin.

3. Where a sufficient supply of diluting water cannot be provided to a dilution or neutralizing basin, the basin shall be filled with marble or limestone chips of not less than one inch nor more than 3 inches in diameter to the level of the basin's outlet.

4. Either the inlet or outlet of a dilution or neutralizing basin shall be submerged to form a trap with a water seal of at least 4 inches.

**Table 82.34**  
**MINIMUM CAPACITIES FOR DILUTION**  
**AND NEUTRALIZING BASINS**

Maximum Number of Sinks	Minimum Retention Capacity in Gallons
1	5
4	15
8	30
16	55
25	100
40	150
60	200
75	250
100	350
150	500

(b) *Vents.* Vents for chemical waste systems shall be sized and installed in accordance with s. Comm 82.31.

1. Dilution and neutralizing basins with submerged inlets shall have a sanitary vent connected to the basin and a chemical waste vent connected to the inlet pipe. The pitch and the developed length of the drain between the submerged basin inlet and the chemical waste vent shall be in accordance with Table 82.31-1.

2. Dilution and neutralizing basins with submerged outlets shall have a chemical waste vent connected to the basin and a sanitary vent connected to the outlet pipe. The pitch and the developed length of the drain between the submerged basin outlet and the sanitary vent shall be in accordance with Table 82.31-1.

Note: See Appendix for further explanatory material.

**History:** Cr. Register, February, 1985, No. 350, eff. 3-1-85; am. (4) (a) 2. b., (5) (b) 2. intro., c. and (c) 4. b., Register, August, 1991, No. 428, eff. 9-1-91; am. (4) (a) 2. c. and g., 3. a., (5) (b) 1. f. and j., 3. a., (c) 1., (8) (a) 2. c., r. and recr. (5) (a) 1., r. (5) (b) 3. c. and (c) (intro.), renum. (5) (b) 3. f. to be (5) (b) 3. e., Register, February, 1994, No. 458, eff. 3-1-94.

**Comm 82.35 Cleanouts.** (1) **SCOPE.** The provisions of this section set forth the requirements for the installation of cleanouts and manholes for all drain piping.

(2) **MATERIALS.** Cleanouts shall be constructed of approved materials in accordance with ch. Comm 84.

(3) **WHERE REQUIRED.** (a) *Horizontal drains.* All horizontal drains within or under a building shall be accessible through a cleanout. Cleanouts shall be located so that the developed length of drain piping between cleanouts does not exceed 75 feet. For the purpose of this requirement, cleanouts in drain stacks may serve horizontal drains.

Note: See Appendix for further explanatory material.

(b) *Sanitary building sewers.* 1. Sanitary building sewers 6 inches or less in diameter shall be provided with cleanouts or manholes such that:

- Cleanouts are located not more than 100 feet apart;
- Manholes are located not more than 400 feet apart;
- The distance from a cleanout to a manhole located upstream is not more than 200 feet; or
- The distance from a manhole to a cleanout located upstream is not more than 300 feet.

2. Sanitary building sewers 8 inches or larger in diameter shall be provided with manholes at:

- a. Every change in direction of 45° or more;
- b. Every change in pipe diameter; and
- c. Intervals of not more than 400 feet.

(c) *Storm building sewers.* 1. Storm building sewers 10 inches or less in diameter shall be provided with cleanouts or manholes such that:

- a. Cleanouts are located not more than 100 feet apart;
- b. Manholes are located not more than 400 feet apart;
- c. The distance from a cleanout to a manhole located upstream is not more than 200 feet; or
- d. The distance from a manhole to a cleanout located upstream is not more than 300 feet.

2. Storm building sewers 12 inches or larger in diameter shall be provided with manholes or storm drain inlets with an inside diameter of at least 36 inches at:

- a. Every change in direction of 45° or more;
- b. Every change in pipe diameter; and
- c. Intervals of not more than 400 feet.

(d) *Private interceptor main sewers.* 1. Private interceptor main sewers 5 inches or less in diameter shall be provided with a cleanout or manhole at the most upstream point of the private interceptor main sewer and such that:

- a. Cleanouts are located not more than 100 feet apart;
- b. Manholes are located not more than 400 feet apart;
- c. The distance from a cleanout to a manhole located upstream is not more than 200 feet; or
- d. The distance from a manhole to a cleanout located upstream is not more than 300 feet.

2. Private interceptor main sewers 6 inches or larger in diameter shall be provided with a manhole at:

- a. The most upstream point of the private interceptor main sewer;
- b. Every change in direction;
- c. Every change in pipe diameter; and
- d. Intervals of not more than 400 feet.

(e) *Junction of building drain and building sewer.* A cleanout shall be provided near the junction of a building drain and a building sewer.

1. The cleanout shall be located within 5 feet of where the building drain and the building sewer connect. The cleanout may be located either inside or outside the building.

2. A cleanout in a drain stack may serve as the cleanout at the junction of the building drain and building sewer, if the stack is within 5 feet of where the building drain and building sewer connect.

(f) *Stacks.* Where a cleanout is provided in a drain stack, the cleanout shall be located 28 to 60 inches above the lowest floor penetrated by the stack.

(g) *Branches.* Cleanouts shall be provided in connection with batteries of fixtures at such points that all parts of the branch drain pipes may be reached for cleaning or removal of stoppages. For the purposes of this requirement, removable fixture traps may serve as a cleanout opening.

(h) *Greasy wastes.* Drain pipes carrying greasy wastes shall be provided with cleanouts located not more than 40 feet apart and at all changes in direction of more than 45°.

(i) *Double sanitary tees.* A cleanout shall be provided immediately above or below a double sanitary tee drain fitting which is installed in a vertical drain pipe of less than 3 inches in diameter, unless a stack cleanout is provided in accordance with par. (f).

(j) *Traps and fixture drains.* 1. All traps shall be constructed or installed so that stoppages may be removed from the traps and the horizontal portions of fixture drains.

2. If a trap is not accessible for removal or does not contain a removable dip, a cleanout or a removable inlet shall be installed

to enable cleaning of the trap passageway and the horizontal portions of the fixture drain.

(k) *Conductors.* Where a cleanout is provided in a conductor, the cleanout shall be located 28 to 60 inches above the lowest floor penetrated by the conductor.

(L) *Sampling manholes.* Municipalities or sanitary sewage districts by ordinance or rule may require the installation of sampling manholes for periodic sewage monitoring.

**Note:** The installation of sampling manholes may be needed for the monitoring of industrial wastes under chs. NR 200 to 299. See Appendix for further explanatory material.

(4) **DIRECTION OF FLOW.** Every cleanout shall be installed so as to open in the direction of the waste flow or at a right angle thereto.

(5) **ACCESSIBILITY.** Cleanout plugs shall not be covered with cement, plaster, or any other similar permanent finishing material.

(a) *Underground piping.* Cleanouts installed in underground drain piping shall be extended vertically to or above the finish grade.

1. The cleanout extension to grade shall connect to the drain piping through a wye pattern fitting.

2. A cleanout located outside of a building shall be provided with a frost sleeve.

a. The frost sleeve shall be of a material approved for building sewers in accordance with s. Comm 84.30 (2) (c).

b. Where a cleanout is located in an area subject to vehicular traffic the top of the frost sleeve shall terminate in a concrete pad at least 4 inches thick and extending at least 9 inches from the sleeve on all sides, sloping away from the sleeve.

c. The bottom of the frost sleeve shall terminate 6 to 12 inches above the top of the drain piping or at least 6 inches below the predicted frost depth in accordance with s. Comm 82.30 Table 82.30-6.

d. The frost sleeve shall have a removable watertight top of sufficient thickness and strength to sustain the weight of anticipated traffic.

**Note:** See Appendix for further explanatory material.

(b) *Concealed piping.* Cleanout access for drain piping located in concealed spaces shall be provided by either extending the cleanout to at least the surface of a wall or floor or by providing access panels of a sufficient size to permit removal of the cleanout plug and proper cleaning of the pipe.

(6) **CLEANOUT SIZE.** Cleanouts and cleanout extensions shall be sized in accordance with Table 82.35.

(7) **PROHIBITED USE OF CLEANOUT OPENINGS.** Cleanout openings shall not be used for the installation of fixtures or floor drains, except where another cleanout of equal access and capacity is provided.

(8) **MANHOLES.** (a) *Diameter.* The minimum diameter of manholes shall be 42 inches. A manhole shall have a minimum access opening of 24 inches.

(b) *Materials.* Manholes shall be constructed of approved materials in accordance with ch. Comm 84 and in accordance with the design provisions of s. NR 110.13.

**Note:** The provisions of NR 110.13 regarding the manhole's flow channel, watertightness, and drop pipe indicate the following specifications:

—The flow channel through manholes shall be made to conform to the shape and slope of the sewer.

—Solid watertight manhole covers are to be used wherever the manhole tops may be flooded by street runoff or high water. Where groundwater conditions are unfavorable, manholes of brick or block shall be waterproofed on the exterior with plastic coatings supplemented by a bituminous waterproof coating or other approved coatings. Inlet and outlet pipes are to be joined to the manhole with a gasketed flexible watertight connection or any watertight connection arrangement that allows differential settlement of the pipe and manhole wall to take place.

—An outside drop pipe is to be provided for a sewer entering a manhole where the invert elevation of the entering sewer is 2 feet or more above the spring line of the outgoing sewer. The entire drop connection shall be encased in the concrete. Inside drop connection may be approved on a case-by-case basis.

**Note:** See Appendix for further explanatory material.

**Table 82.35**  
**CLEANOUT SIZES**

Diameter of Pipe Served by Cleanout (inches)	Minimum Diameter of Cleanout Extension (inches)	Minimum Diameter of Cleanout Opening (inches)
1½	1½	1½
2	1½	1½
3	3	2½
4	4	3½
5	5	4
6	6	5
8 and larger	6	6

**History:** Cr. Register, February, 1985, No. 350, eff. 3-1-85; am. (3) (i), r. and recr. (3) (j), Register, May, 1988, No. 389, eff. 6-1-88; am. (5) (a) 2. a., Register, August, 1991, No. 428, eff. 9-1-91; r. and recr. (3) (j) and (5) (a) 2. c., Register, February, 1994, No. 458, eff. 3-1-94.

**Comm 82.36 Storm and clear water drain systems.**

**(1) SCOPE.** The provisions of this section set forth the requirements for the design and installation of storm and clear water drain systems including storm building drains and sewers.

**(2) MATERIALS.** All storm and clear water drain systems shall be constructed of approved materials in accordance with ch. Comm 84.

**(3) DISPOSAL.** (a) *Storm sewer.* Storm water, surface water, groundwater and clear water wastes shall be discharged to a storm sewer system or a combined sanitary-storm sewer system where available. Combined public sanitary-storm sewer systems shall be approved by the department of natural resources. Combined private sanitary-storm sewer systems shall be approved by the department.

(b) *Other disposal methods.* 1. Where no storm sewer system or combined sanitary-storm sewer system is available or adequate to receive the anticipated load, the final disposal of the storm water, surface water, groundwater or clear water wastes shall be discharged in accordance with local governmental requirements. If the final disposal of such waters or wastes is by means of subsurface discharge, documentation shall be submitted to this department to determine whether the method of disposal is acceptable.

2. Where approved by the local governmental authority, storm water, surface water, groundwater and clear water wastes of the properties of one- and 2-family dwellings may be discharged onto flat areas, such as streets or lawns, so long as the water flows away from the buildings and does not create a nuisance.

3. a. The clear water wastes from a drinking fountain, water heater relief valve, storage tank relief valve or water softener shall be discharged to either a sanitary drain system or a storm drain system.

b. The clear water wastes from equipment other than those listed in subd. 3. a. may be discharged to a sanitary drain system if not more than 20 gallons of clear water wastes per day per building are discharged.

(c) *Segregation of wastes.* 1. a. Except as provided in subd. 1. b., where a sanitary sewer system and a storm sewer system are available the drain piping for storm water or clear water wastes may not connect to any part of the sanitary drain system.

b. Where a combined sanitary-storm sewer system is available storm water wastes, clear water wastes and sanitary wastes may not be combined until discharging to the building sewer.

2. Storm water wastes and clear water wastes shall not be combined until discharging into the storm building drain.

**(4) LOAD ON DRAIN PIPING.** (a) *Storm water drainage.* The load factor on storm water drain piping shall be computed in terms of gallons per minute or on the square footage of the horizontal projection of roofs, paved areas, yards and other tributary areas.

(b) *Continuous flow devices.* Where there is a continuous or semicontinuous discharge into the storm building drain or storm

building sewer, as from a pump, air conditioning unit, or similar device, each gallon per minute of such discharge shall be computed as being equivalent to 26 square feet of roof area.

**(5) SELECTING SIZE OF STORM AND CLEAR WATER DRAIN PIPING.**

(a) *Horizontal storm water drain piping.* The pipe size for horizontal drain piping for storm water shall be determined from Tables 82.36-1 to 82.36-4.

(b) *Vertical conductors for storm water.* 1. A vertical conductor for storm water shall not be smaller than the largest horizontal branch connected thereto.

2. Vertical conductors shall be sized in accordance with Table 82.36-5 or the diameter D, where

$$D = 1.128 \sqrt{\frac{A}{X}}$$

where, A = the area of the roof in square feet

- X = 300 square feet per square inch for a roof covered with gravel or slag and with a pitch not exceeding ¼ inch per foot; or
- = 250 square feet per square inch for a roof covered with gravel or slag and with a pitch of greater than ¼ inch per foot; or
- = 200 square feet per square inch for a roof with a metal, tile, brick or slate covering and of any pitch.

(c) *Clear water drain piping.* Drain piping for clear water shall be sized in accordance with s. Comm 82.30 (3) and (4).

**Table 82.36-1**  
**MINIMUM SIZE OF STORM WATER HORIZONTAL DRAIN PIPING SERVING ROOF AREAS**

Pipe Diameters (in inches)	Maximum Roof Areas (in square feet)			
	Pitch of Piping Per Foot			
	1/16 inch	1/8 inch	1/4 inch	1/2 inch
3	650	910	1,300	1,820
4	1,300	1,950	2,990	3,770
5	2,470	3,640	5,070	7,020
6	4,160	5,980	8,320	11,700
8	9,320	13,000	18,200	26,000
10	17,680	24,700	33,800	50,440
12	27,300	41,080	57,200	81,900
15	52,000	72,800	105,300	146,640
18	85,800	121,550	174,200	247,000
21	156,520	179,660	256,880	374,400
24	187,200	261,560	382,200	546,000

Note: Divide square footage by 26 to obtain flow in gpm.



**Table 82.36-2**  
**MINIMUM SIZE OF STORM WATER HORIZONTAL DRAIN PIPING SERVING PAVED OR GRAVELED GROUND SURFACE AREAS**

Pipe Diameters (in inches)	Maximum Surface Areas (in square feet)			
	Pitch of Piping Per Foot			
	1/16 inch	1/8 inch	1/4 inch	1/2 inch
3	810	1,140	1,625	2,270
4	1,625	2,430	3,740	4,720
5	3,090	4,550	6,350	8,760
6	5,200	7,470	10,400	14,600
8	11,650	16,250	22,750	32,600
10	22,100	30,850	44,250	63,000
12	34,150	52,300	71,500	102,200
15	65,000	91,000	131,500	183,000
18	107,000	152,000	210,800	321,000
21	195,000	224,000	321,000	468,000
24	234,000	336,000	478,000	682,000

Note: Divide square footage by 32.5 to obtain flow in gpm.

(d) *Minimum size of underground drain piping.* Any portion of a storm or clear water drain system installed underground shall not be less than 2 inches in diameter. Underground drain piping which is 2 inches in diameter shall not exceed a length of 20 feet.

(e) *Minimum size of storm building sewers.* The pipe size for storm building sewers shall be determined from Tables 82.36-1 to 82.36-4. Storm building sewers serving combined storm water and clear water wastes shall be sized in accordance with Table 82.36-4.

1. Gravity flow sewers. a. The minimum size of a gravity flow storm building sewer shall be 3 inches in diameter between the building and lot line and 4 inches in diameter between the lot line and public sewer or private interceptor main sewer. A municipality or sanitary district by ordinance may require that portion of the storm building sewer between the lot line and public sewer or private interceptor sewer to be larger than 4 inches in diameter.

b. A gravity flow storm building sewer shall not be smaller than any storm building drain connected thereto, except a decrease in diameter in the direction of flow will be permitted if the increase in slope is sufficient to maintain the volume rate of flow. A reduction in diameter for the storm building sewer shall be made in a manhole.

2. Pressurized or forced sewers. Pressurized storm building sewers shall be not less than 1 1/4 inches in diameter.

**Table 82.36-3**  
**MINIMUM SIZE OF STORM WATER HORIZONTAL DRAIN PIPING SERVING LAWNS, PARKS AND SIMILAR LAND SURFACES**

Pipe Diameters (in inches)	Maximum Surface Areas (in square feet)			
	Pitch of Piping Per Foot			
	1/16 inch	1/8 inch	1/4 inch	1/2 inch
3	2,600	3,640	5,200	7,280
4	5,200	7,800	11,960	15,080
5	9,880	13,560	20,280	28,080
6	16,640	23,920	33,280	46,800
8	37,280	52,000	72,800	112,000
10	69,720	98,800	135,200	201,760
12	109,200	164,320	228,800	327,600
15	208,000	291,200	421,200	586,560

**Table 82.36-3 (Continued)**  
**MINIMUM SIZE OF STORM WATER HORIZONTAL DRAIN PIPING SERVING LAWNS, PARKS AND SIMILAR LAND SURFACES**

Pipe Diameters (in inches)	Maximum Surface Areas (in square feet)			
	Pitch of Piping Per Foot			
	1/16 inch	1/8 inch	1/4 inch	1/2 inch
18	343,200	490,200	596,800	988,000
21	626,080	718,640	1,027,520	1,497,600
24	748,800	1,046,240	1,528,800	2,184,000

Note: Divide square footage by 104 to obtain flow in gpm.

**Table 82.36-4**  
**MAXIMUM CAPACITY OF STORM WATER HORIZONTAL DRAIN PIPING FLOWING FULL**

Pipe Diameters (in inches)	Maximum Capacities in Gallons Per Minute			
	Pitch of Piping Per Foot			
	1/16 inch	1/8 inch	1/4 inch	1/2 inch
3	25	35	50	70
4	59	75	115	145
5	97	140	195	270
6	160	230	320	450
8	355	500	700	1,000
10	680	950	1,300	1,940
12	1,050	1,580	2,200	3,150
15	2,000	2,800	4,050	5,640
18	3,300	4,675	6,700	9,500
21	6,020	6,910	9,880	14,400
24	7,200	10,060	14,700	21,000

(6) *PITCH OF HORIZONTAL DRAIN PIPING.* All horizontal drain piping shall be installed at a pitch which will produce a computed velocity of at least one foot per second when flowing full.

(a) *Storm water drain piping.* The minimum pitch of horizontal drain piping shall be in accordance with Tables 82.36-1 to 82.36-4.

(b) *Clear water drain piping.* The minimum pitch of horizontal clear water drain piping less than 3 inches in diameter shall be 1/8 inch per foot. The minimum pitch of horizontal drain piping 3 inches or larger in diameter shall be 1/16 inch per foot.

(7) *CHANGES IN DIRECTION OF FLOW.* Changes in direction of flow for storm and clear water drain piping shall be in accordance with s. Comm 82.30 (8).

(8) *DRAINAGE FITTINGS AND CONNECTIONS.* Drain piping fittings and connections shall be in accordance with s. Comm 82.30 (9).

(9) *STACK OFFSETS.* Stack offsets in clear water drain piping shall comply with s. Comm 82.30 (6).

(10) *FIXTURE BRANCH CONNECTIONS NEAR BASE OF STACK.* Branch drains from interior clear water inlets shall not connect downstream from the base fitting or fittings of a drain stack or conductor within the distance equal to 20 pipe diameters of the building drain.

(11) *SUMPS AND PUMPS.* (a) *Sumps.* 1. General. All storm building subdrains shall discharge into a sump, the contents of which shall be automatically lifted and discharged into the storm drain system.

2. Construction and installation. a. Except as specified in subd. 2. b., the sump shall have a rim extending at least one inch above the floor immediately adjacent to the sump. The sump shall have a removable cover of sufficient strength for anticipated loads. The sump shall have a solid bottom.

b. Where the sump is installed in an exterior meter pit or elevator pit, the rim shall be level with the floor.

3. Location. All sumps installed for the purpose of receiving clear water, basement or foundation drainage water shall be located at least 15 feet from any water well.

4. Size. The size of each clear water sump shall be as recommended by the sump pump manufacturer, but may not be smaller than 16 inches in diameter at the top, 14 inches in diameter at the bottom, and 22 inches in depth.

5. Removable covers. a. Except as specified in subd. 5. b., penetrations through the top of removable sump covers shall be limited to those for the electrical supply, the vent piping and the discharge piping for the pump or pumps.

b. A sump installed in an exterior meter pit or an elevator pit may be provided with an open grate cover.

Note: In accordance with s. Comm 18.21, a sump may not be located in an elevator machine room.

(b) *Sump pump systems.* 1. Pump size. The pump shall have a capacity appropriate for anticipated use.

2. Discharge piping. Where a sump discharges into a storm building drain or sewer, a free flow check valve shall be installed.

(12) **SUBSOIL DRAINS.** Where a subsoil drain for a building is subject to backwater, it shall be protected by an accessible backwater valve or a sump with pump. Subsoil drains may discharge into an area drain, drain tile receiver or a sump with pump.

(13) **STORM BUILDING DRAINS AND SEWERS.** (a) *Limitations.* No storm building sewer or private interceptor main storm sewer may pass through or under a building to serve another building, unless:

1. The storm building sewer or private interceptor main storm sewer serves farm buildings or farm houses or both which are all located on one property; or

2. A petition for variance is granted under s. Comm 82.20 (11). The approval or nonapproval of a petition for variance request relative to this paragraph shall be determined on an individual basis and shall be evaluated on site specific conditions including, at least, whether:

a. The storm building sewer or private interceptor main storm sewer serves only buildings which are all located on one property;

Table 82.36-5

MINIMUM DIAMETER OF VERTICAL CONDUCTORS

Type of Roof	Maximum Roof Areas (in square feet)					
	Pipe Diameters (in inches)					
	2 1/2	3	4	5	6	8
Roofs covered with gravel, slag, or similar material and with a pitch of 1/4" per foot or less.	1,645	2,120	3,780	5,885	8,490	15,125
Roofs covered with gravel, slag or similar material and with a pitch greater than 1/4" per foot.	1,220	1,770	3,150	4,905	7,075	12,600
Roofs covered with metal, tile, brick, slate or similar material and of any pitch.	975	1,415	2,520	3,925	5,660	10,080

Note: Divide square footage by 26 to obtain flow in gpm.

b. The functions or operations of the buildings to be served by the building sewer or interceptor main sewer are related; or

c. A document, which indicates the piping and distribution arrangement for the property and buildings, will be recorded with the register of deeds.

(b) *Extensions to grade.* 1. The connection of a storm water leader discharging to a storm building sewer shall be made above the finished grade.

2. The diameter of the drain piping connecting a storm water leader to a storm building drain or sewer shall be in accordance with sub. (5).

(c) *Other requirements.* 1. Elevation. The elevation of storm building drains shall comply with s. Comm 82.30 (11) (b) 1.

2. Backflow protection. Storm building drains subject to backflow or backwater shall be protected in accordance with s. Comm 82.30 (11) (b) 2.

3. The location of storm building drains and building sewers shall be in accordance with s. Comm 82.30 (11) (d).

4. Storm building drains and building sewers shall be installed in accordance with s. Comm 82.30 (11) (e).

5. Storm building sewers shall be connected to main sewers in accordance with s. Comm 82.30 (11) (f).

(14) **WASTES.** (a) Traps shall be required for interior drain inlets receiving clear water wastes.

(b) Traps shall not be required for roof drains or exterior area drains for storm water waste, unless the drain inlet is located within 10 feet of an air inlet, door or openable window. Where a trap is required, the trap may be located inside the building. More than one drain inlet may discharge to the same trap.

(c) Where a subsoil drain discharges by gravity to a storm sewer the drain shall be trapped. Such a trap shall be provided with a cleanout.

(15) **VENTS.** (a) A trap receiving clear water wastes shall be vented in accordance with s. Comm 82.31. Vent piping for a clear water drain system shall not be connected to a vent system serving a sanitary drain system or chemical waste system.

(b) Vents shall not be required for traps which receive only storm water or groundwater wastes.

(16) **INTERIOR DRAIN INLETS.** Interior clear water drain inlets shall terminate at least one inch above the finished floor.

(17) **AREA DRAIN INLETS.** (a) *Drain inlet design and construction.* 1. General. Storm water area drain inlets shall be constructed in a watertight and substantial manner of approved materials in accordance with ch. Comm 84.

2. Inlet base. All site-constructed storm water area drain inlets subject to vehicular traffic shall be set on a 6 inch thick air-entrained concrete base with a minimum estimated compressive strength at 28 days of 3000 psi or on an approved precast concrete base.

3. Size. The size of masonry or concrete inlet basins shall be in accordance with subd. 3. a. and b.

a. Inlet basins 36 inches or less in depth shall have a minimum inside diameter of 24 inches. Basins shall be provided with an open bar grate not less than 18 inches in diameter.

b. Inlet basins with a depth greater than 36 inches shall have a minimum inside diameter of 36 inches. Basins shall be provided with an open bar grate not less than 24 inches in diameter.

4. Inlet grates. All inlets shall have an approved, well fitted, removable cast iron or steel grate of a thickness and strength to sustain anticipated loads. The grate shall have an available inlet area equal to or greater than the required waste outlet of the inlet.

Note: See Appendix for further explanatory material.

(b) *Subsurface areas of 50 square feet or less.* All subsurface areas, exposed to the weather, other than stairwells, with areas not

exceeding 50 square feet shall be drained. These areas may drain to subsoil drains though a minimum 2 inch diameter pipe or a continuous layer of gravel or may drain to the storm building drain, storm subdrain, or storm sewer through a minimum 3 inch diameter pipe.

(c) *Subsurface areas of more than 50 square feet and stairwells.* An area drain shall be provided in subsurface areas, greater than 50 square feet in area, and all stairwells which are exposed to the weather. These areas shall be drained to the storm building drain, storm subdrain or storm sewer. If no storm sewer exists, the discharge shall be in accordance with sub. (3) (b). The fixture drain shall have a minimum inside diameter of 3 inches and shall not discharge into a subsoil, footing or foundation drain.

(18) **ROOF DRAINS.** (a) *General roofs.* Roof drains shall be equipped with strainers extending not less than 4 inches above the surface of the roof immediately adjacent to the roof drain. Strainers shall have an available inlet area above the roof of not less than 1-1/2 times the area of the conductor to which the drain connects.

(b) *Flat decks.* Roof drain strainers for use on sun decks, parking decks and similar areas may be of the flat surface type level with the deck, and shall have an available inlet area of not less than twice the area of the conductor to which the drain connects.

(19) **CONTROLLED FLOW ROOF DRAIN SYSTEMS.** (a) *Application.* In lieu of sizing the roof storm drain piping on the basis of actual maximum horizontal projected roof areas as specified in sub. (4), the roof drain piping may be sized based on the equivalent adjusted maximum horizontal projected roof areas which result from controlled flow and storage of storm water on the roof.

*Note:* See s. Comm 53.11 (4) (d) as to provisions relating to the structural design of the roof for controlled flow drain systems.

(b) *Installation.* Control of storm water runoff shall be by control devices. Control devices shall be protected by strainers.

(c) *Sizing.* Not less than 2 drains shall be installed in roof areas 10,000 square feet or less and at least 4 drains in roofs over 10,000 square feet in area.

*History:* Cr. Register, February, 1985, No. 350, eff. 3-1-85; r. and recr. (3) (a) and (b) 1., (c) 1. and (11) (a) 4., cr. (3) (c) 3., Register, May, 1988, No. 389, eff. 6-1-88; renun. (13) (a) and (b) to be (b) and (c) and am. (b) 1., cr. (3) (b) 3. and (13) (a), r. (3) (c) 3. and (13) (intro.), Register, August, 1991, No. 428, eff. 9-1-91; reprinted to correct error in (5) (c) 2., Register, October, 1991, No. 430; am. (3) (b) 1., (c) 1. a., (13) (b) 1. and (c), cr. (11) (a) 5., Register, February, 1994, No. 458, eff. 3-1-94; r. and recr. (11) (a) 2. and 5., Register, April, 1998, No. 508, eff. 5-1-98.

## Subchapter IV — Water Supply Systems

**Comm 82.40 Water supply systems. (1) SCOPE.** The provisions of this section set forth the requirements for the design and installation of water supply systems.

*Note:* Chapter NR 811 governs the design and construction of community water systems or waterworks.

(2) **MATERIALS.** All water supply systems shall be constructed of approved materials in accordance with ch. Comm 84.

(3) **GENERAL.** (a) *Potable water required.* Every piece of equipment used in the preparation or processing of food, medical or pharmaceutical products and every plumbing fixture and appliance which demands a supply of water shall be provided with only potable water.

(b) *Hot water required.* Except as provided in subs. 1. and 2., hot water shall be provided to all plumbing fixtures, appliances and equipment used for personal washing, culinary purposes or laundering.

1. Lavatories, wash fountains and shower heads which are not located in dwelling units or living units shall be supplied with either tempered water or hot water.

a. Tempered water shall be provided to lavatories, wash fountains and shower heads by means of tempering mixing valves.

2. Lavatories located in park shelters and bath houses which are not open during the period from November 15 to March 15 and which are not places of employment shall not be required to be provided with hot water.

3. Lavatories located in waysides which are not places of employment shall not be required to be provided with hot water.

*Note:* The exception of providing hot water under subs. 1. to 3. does not supercede the requirements of other state agencies for providing hot water.

(c) *Protection.* 1. Pursuant to s. NR 811.09 (2) the interconnection of two or more water supply systems, one system served by a public supply source and the other system served by another supply source is prohibited, unless approved in writing by the department of natural resources.

2. A water supply system shall be designed and installed in accordance with s. Comm 82.41 and maintained to prevent non-potable liquids, solids or gases from being introduced into the potable water supply system through cross connections.

(d) *Identification.* 1. Where a building or a structure is served by a nonpotable water distribution system and a potable water distribution system each distribution system shall be identified in accordance with this subdivision.

a. All above ground piping supplying nonpotable water shall be identified nonpotable by tags or yellow bands. The yellow bands shall be at least 3 inches wide.

b. All above ground piping supplying potable water shall be identified potable by tags or green bands. The green bands shall be at least 3 inches wide.

c. The tags or colored bands identifying nonpotable water and potable water piping shall be placed at intervals of not more than 25 feet and at each side where the piping passes through a wall, floor or roof.

d. All valves and outlets supplying nonpotable water shall be identified nonpotable by tags.

e. All valves, except fixture stop valves, supplying potable water shall be identified potable by tags.

f. Tags used to identify nonpotable water outlets, valves and piping shall be of metal or plastic in the shape of an equilateral triangle with 4 inch sides and bearing the legend "water unsafe" or other similar wording approved in writing by the department. The lettering on the tags shall be raised or indented and at least 1/2-inch in height.

g. Tags used to identify potable water valves shall be of metal or plastic in the shape of a 3-inch diameter circle bearing the legend "safe water" or other similar wording approved in writing by the department. The lettering on the tags shall be raised or indented and at least 1/2-inch in height.

2. Where a building or a structure is served by 2 distribution systems, one system supplied by a public water supply and the other system supplied by a private well, each water distribution system shall be identified to indicate the supply source.

(e) *Metering.* When a water meter is provided pursuant to s. Comm 83.18 (10) the water meter shall:

1. Be installed in the water supply system so as to exclude the supply to those water outlets, such as exterior hose bibbs and wall hydrants, which do not discharge to the sanitary drain system; and

2. Include an accessible remote reader device located on the exterior of the building or structure.

*Note:* Section Comm 83.18 (10) requires metering when a new building or a new structure is to be served by a holding tank for sanitary wastewater disposal.

(4) **CONTROL VALVES.** (a) *Private water mains.* Private water mains shall be provided with control valves as specified in this subsection.

1. Corporation cocks. a. If a private water main 2 inches or less in diameter connects to a public water main, a corporation cock shall be installed at the connection to the public water main.

b. If a private water main 2-1/2 inches or larger in diameter connects to a public water main, a corporation cock shall be installed not more than 8 feet from the connection to the public water main.

2. Curb stops. a. Except as provided in subd. 2. b., if a private water main connects to public water main, a curb stop shall be installed in the private water main between the corporation cock and the property line.

b. If a private water main 2-1/2 inches or larger in diameter connects to a public water main, one control valve may serve as the corporation cock and the curb stop. The control valve shall be located not more than 8 feet from the connection to the public water main and shall be accessible for operation.

(b) *Water services.* Water services shall be provided with control valves as specified in this subsection.

1. Corporation cocks. a. If a water service 2 inches or less in diameter connects to a public water main, a corporation cock shall be installed at the connection to the public water main.

b. If a water service 2-1/2 inches or larger in diameter connects to a public water main, a corporation cock shall be installed not more than 8 feet from the connection to the public water main.

2. Curb stops. a. Except for water services serving farm buildings and farm houses, a curb stop shall be installed in each water service which connects to a private water main. The curb stop shall be located outside the building served by the water service.

b. Except as provided in subd. 2. c., a curb stop shall be installed in each water service which connects to a public water main. The curb stop shall be located between the corporation cock and the property line.

c. If a water service 2-1/2 inches or larger in diameter connects to a public water main, one control valve may serve as the corporation cock and the curb stop. The control valve shall be located not more than 8 feet from the connection to a public water main and shall be accessible for operation.

3. Building control valves. If a water service serves a building, a building control valve shall be provided in the water service as specified in this subsection.

a. If the water service connects to a public water supply or to a private water supply which has an external pressure tank, the building control valve shall be installed inside the building and located within 3 feet of developed length from the point where the water service first enters the building. If a water meter is provided, the building control valve shall be located upstream of the water meter.

b. If a private water supply includes an internal pressure tank, the building control valve shall be installed inside the building and located within 3 feet of developed length downstream from the internal pressure tank.

*Note:* See Appendix for further explanatory material.

(c) *Water distribution systems.* 1. Control valves shall be installed in water distribution systems serving public buildings as specified in this subdivision.

a. If a water meter is provided, a control valve shall be installed within 3 feet of developed length downstream from the outlet of the water meter. If bypass piping is provided around a water meter, a control valve shall be installed in the bypass piping.

*Note:* See sub. (8) (d) 3. for the requirements relating to the bypassing of water meters.

b. A control valve shall be installed in the supply piping to each water heater and water treatment device and in the fixture supply to each plumbing fixture, plumbing appliance and piece of equipment.

c. If a hot water circulation system is provided, a control valve shall be installed on both the inlet and outlet piping to the circulation pump. If a hot water circulation system has 2 or more return pipe lines, a balancing control valve shall be installed in each return piping line.

d. The water distribution system for buildings with more than 4 dwelling units or living units shall be provided with control valves in such numbers and at such locations so that the water supplied to all the units within the building can be isolated into groups of 4 or less units.

*Note:* See sub. (8) (g) for the valve requirements for water temperature control.

2. Control valves shall be installed in water distribution systems serving one- and 2-family dwellings as specified in this subdivision.

a. If a water meter is provided, a control valve shall be installed within 3 feet of developed length downstream from the outlet of the water meter. If bypass piping is provided around a water meter, a control valve shall be installed in the bypass piping.

*Note:* See sub. (8) (d) 3. for the requirements relating to the bypassing of water meters.

b. A control valve shall be installed in the supply piping to each water heater and water treatment device and in the fixture supply to each water closet, exterior hose bibb, plumbing appliance and piece of equipment.

c. If a hot water circulation system is provided, a control valve shall be installed on both the inlet and outlet piping to the circulation pump. If a hot water circulation system has 2 or more return pipe lines, a balancing control valve shall be installed in each return piping line.

(5) **HOT WATER SUPPLY SYSTEMS.** (a) *General.* Water heating systems shall be sized to provide sufficient hot water to supply both the daily requirements and hourly peak loads of the building.

*Note:* See Appendix for further explanatory materials regarding insulation requirements for storage tanks and recirculation piping.

(b) *Temperature maintenance.* If the developed length of hot water distribution piping from the source of the hot water supply to a plumbing fixture or appliance exceeds 100 feet, a circulation system or self-regulating electric heating cable shall be provided to maintain the temperature of the hot water within the distribution piping.

1. If a circulation system is used to maintain the temperature, no uncirculated hot water distribution piping may exceed 25 feet in developed length.

2. If a self-regulating electric heating cable is used to maintain the temperature, the cable shall extend to within 25 feet of each fixture or the appliance.

3. Water distribution piping conveying circulated water or served by a self-regulating electric heating cable shall be insulated to limit the heat loss at the external surface of the pipe insulation to a maximum of 25 BTUs per hour per square foot for above-ground piping and 35 BTUs per hour per square foot for underground piping. The maximum heat loss shall be determined at a temperature differential, T, equal to the maximum water temperature minus a design ambient temperature no higher than 65° F.

4. Water distribution piping served by self-regulating electric heating cable shall be identified as being electrically traced in accordance with ch. Comm 16.

5. The installation of self-regulating electric heating cable may be subcontracted by a plumber to another trade.

*Note:* See s. Comm 63.29 for pipe insulation requirements.

(c) *Water heaters.* All water heaters and safety devices shall be designed and constructed in accordance with s. Comm 84.20 (5) (n).

*Note:* Water heaters are to be installed in accordance with the requirements specified in chs. Comm 50 to 64 and Comm 20 to 25 with respect to enclosures and venting.

(d) *Safety devices.* Water heaters shall be equipped with safety devices as specified in this paragraph.

1. All pressurized storage-type water heaters and unfired hot water storage tanks shall be equipped with one or more combination temperature and pressure relief valves. The temperature steam rating of a combination temperature and pressure relief valve or valves shall equal or exceed the energy input rating in BTU per hour of the water heater. No shut off valve or other restricting device may be installed between the water heater or storage tank and the combination temperature and pressure relief valve.

*Note:* The temperature steam rating of a combination temperature and pressure relief valve is commonly referred to as the AGA temperature steam rating.

2. All pressurized non-storage type water heaters shall be provided with a pressure relief valve installed at the hot water outlet with no shut off valve between the heater and the relief valve.

3. Temperature and pressure relief valves shall be installed so that the sensing element of the valve extends into the heater or tank and monitors the temperature in the top 6 inches of the heater or tank.

4. A vacuum relief valve shall be installed in each water heater and hot water storage tank which, when measured from the bottom of the heater or tank, is located more than 20 feet above any faucet or outlet served by the heater or tank.

5. Every relief valve which is designed to discharge water or steam shall be connected to a discharge pipe.

a. The discharge pipe and fittings shall be made of a material acceptable for water distribution piping in accordance with s. Comm 84.30 (4) (e) 1.

b. The discharge pipe and fittings shall have a diameter not less than the diameter of the relief valve outlet.

c. The discharge pipe may not be trapped.

d. No valve may be installed in the discharge pipe.

e. The discharge pipe shall be installed to drain by gravity flow to a floor served by a floor drain or to a receptor in accordance with s. Comm 82.33 (8). The outlet of the discharge pipe shall terminate within 6 inches over the floor or receptor, but not less than a distance equal to twice the diameter of the outlet pipe. The outlet of the discharge pipe may not be threaded.

f. The discharge pipe for a water heater shall terminate within the same room or enclosure within which the water heater or hot water storage tank is located.

(e) *Controls.* 1. All hot water supply systems shall be equipped with automatic temperature controls capable of adjustments from the lowest to the highest acceptable temperature settings for the intended use.

2. A separate means shall be provided to terminate the energy supplied to each water heater and each hot water circulation system.

(6) **LOAD FACTORS FOR WATER SUPPLY SYSTEMS.** (a) *Intermittent flow fixtures.* The load factor for intermittent flow fixtures on water supply piping shall be computed in terms of water supply fixture units as specified in Tables 82.40-1 and 82.40-2 for the corresponding fixture and use. Water supply fixture units may be converted to gallons per minute in accordance with Table 82.40-3.

**Table 82.40-1**  
**WATER SUPPLY FIXTURES UNITS FOR**  
**NONPUBLIC USE FIXTURES**

TYPE OF FIXTURE <sup>a</sup>	WATER SUPPLY FIXTURE UNITS (WSFU)		
	Hot	Cold	Total
Automatic Clothes Washer	1.0	1.0	1.5
Bar Sink	0.5	0.5	1.0
Bathtub, with or without Shower Head	1.5	1.5	2.0
Bidet	1.0	1.0	1.5
Dishwashing Machine	1.0		1.0
Glass Filler		0.5	0.5
Hose Bibb:			
1/2" diameter		3.0	3.0
3/4" diameter		4.0	4.0
Kitchen Sink	1.0	1.0	1.5
Laundry Tray, 1 or 2 Compartment	1.0	1.0	1.5
Lavatory	0.5	0.5	1.0
Shower, Per Head	1.0	1.0	1.5
Water Closet, Flushometer Type		6.0	6.0
Water Closet, Gravity Type Flush Tank		2.0	2.0

**Table 82.40-1 (Continued)**  
**WATER SUPPLY FIXTURES UNITS FOR**  
**NONPUBLIC USE FIXTURES**

TYPE OF FIXTURE <sup>a</sup>	WATER SUPPLY FIXTURE UNITS (WSFU)		
	Hot	Cold	Total
Bathroom Groups:			
Bathtub, Lavatory and Water Closet-FM <sup>b</sup>	2.0	7.5	8.0
Bathtub, Lavatory and Water Closet-FT <sup>c</sup>	2.0	3.5	4.0
Shower Stall, Lavatory and Water Closet-FM	1.5	7.0	7.5
Shower Stall, Lavatory and Water Closet-FT	1.5	3.0	3.5

a: For fixtures not listed, factors may be assumed by comparing the fixture to a listed fixture which uses water in similar quantities and at similar rates.

b: FM means flushometer type.

c: FT means flush tank type.

(b) *Continuous flow devices.* The load factor for equipment which demands a continuous flow of water shall be computed on the basis of anticipated flow rate in terms of gallons per minute.

(7) **SIZING OF WATER SUPPLY PIPING.** The sizing of the water supply system shall be based on the empirical method and limitations outlined in this subsection or on a detailed engineering analysis acceptable to the department.

(a) *Methodology.* The determination of minimum pipe sizes shall take into account the pressure losses which occur throughout the entire water supply system and the flow velocities within the water distribution system. Calculations for sizing a water distribution system shall include:

1. The load factor in water supply fixture units or gallons per minute on the piping;

2. The minimum pressure available from the water main or pressure tank;

3. The pressure loss due to the differences in elevation from the:

a. Water main or pressure tank to the building control valve; and

b. Building control valve to the controlling plumbing fixture;

**Table 82.40-2**  
**WATER SUPPLY FIXTURE UNITS FOR**  
**PUBLIC USE FIXTURES**

TYPE OF FIXTURE <sup>a</sup>	WATER SUPPLY FIXTURE UNITS (WSFU)		
	Hot	Cold	Total
Automatic Clothes Washer, Individual	2.0	2.0	3.0
Automatic Clothes Washer, Large Capacity	b	b	b
Bathtub, With or Without Shower Head	2.0	2.0	3.0
Coffeemaker		0.5	0.5
Dishwasher, Commercial	b	b	b
Drink Dispenser		0.5	0.5
Drinking Fountain		0.25	0.25
Glass Filler		0.5	0.5
Hose Bibb:			
1/2" diameter		3.0	3.0
3/4" diameter		4.0	4.0
Icemaker		0.5	0.5

**Table 82.40-2 (Continued)**  
**WATER SUPPLY FIXTURE UNITS FOR PUBLIC USE FIXTURES**

TYPE OF FIXTURE <sup>a</sup>	WATER SUPPLY FIXTURE UNITS (WSFU)		
	Hot	Cold	Total
Lavatory	0.5	0.5	1.0
Shower, Per Head	2.0	2.0	3.0
Sinks:			
Bar and Fountain	1.5	1.5	2.0
Barber and Shampoo	1.5	1.5	2.0
Cup		0.5	0.5
Flushing Rim		7.0	7.0
Kitchen and Food Preparation per faucet	2.0	2.0	3.0
Laboratory	1.0	1.0	1.5
Medical Exam and Treatment	1.0	1.0	1.5
Service	2.0	2.0	3.0
Surgeon Washup	1.5	1.5	2.0
Urinal:			
Syphon Jet		4.0	4.0
Washdown		2.0	2.0
Wall Hydrant, Hot and Cold Mix:			
1/2" diameter	2.0	2.0	3.0
3/4" diameter	3.0	3.0	4.0
Wash Fountain:			
Semicircular	1.5	1.5	2.0
Circular	2.0	2.0	3.0
Water Closet:			
Flushometer		7.0	7.0
Gravity Type Flush Tank		3.0	3.0

a: For fixtures not listed, factors may be assumed by comparing the fixture to a listed fixture which uses water in similar quantities and at similar rates.  
b: Load factors in gallons per minute, gpm, based on manufacturer's requirements.

**Table 82.40-3**  
**CONVERSION OF WATER SUPPLY FIXTURE UNITS TO GALLONS PER MINUTE**

Water Supply Fixture Units	GALLONS PER MINUTE	
	Predominately Flushometer Type Water Closets or Syphon Jet Urinals	Predominately Flush Tank Type Water Closets or Washdown Urinals
1	—	1
2	—	2
3	—	3
4	10	4
5	15	4.5
6	18	5
7	21	6
8	24	6.5
9	26	7

**Table 82.40-3 (Continued)**  
**CONVERSION OF WATER SUPPLY FIXTURE UNITS TO GALLONS PER MINUTE**

Water Supply Fixture Units	GALLONS PER MINUTE	
	Predominately Flushometer Type Water Closets or Syphon Jet Urinals	Predominately Flush Tank Type Water Closets or Washdown Urinals
10	27	8
20	35	14
30	40	20
40	46	24
50	51	28
60	54	32
70	58	35
80	62	38
90	65	41
100	68	42
120	73	48
140	78	53
160	83	57
180	87	61
200	92	65
250	101	75
300	110	85
400	126	105
500	142	125
600	157	143
700	170	161
800	183	178
900	197	195
1000	208	208
1250	240	240
1500	267	267
1750	294	294
2000	321	321
2250	348	348
2500	375	375
2750	402	402
3000	432	432
4000	525	525
5000	593	593

Note: Values not specified in the table may be calculated by interpolation.  
4. The pressure losses due to flow through water heaters, water treatment devices, water meters and backflow preventers;  
5. The minimum flow pressure needed at the controlling plumbing fixture; and  
6. The pressure losses due to flow friction through piping, fittings, valves and other plumbing appurtenances. This pressure loss may be calculated in terms of equivalent lengths of piping. The equivalent length of piping to a controlling plumbing fixture, including fittings, valves and other appurtenances, may be obtained by multiplying the developed length by 1.5.

Note: See Appendix for further explanatory material.  
(b) *Private water mains and water services.* Private water mains and water services shall be designed to supply water to the water distribution systems to maintain the minimum flow pres-

sures specified in par. (d), but shall not be less than 3/4 inch in diameter.

Note: See Appendix for further explanatory material.

(c) *Maximum loading.* The calculated load on any portion of the water distribution system may not exceed the limits specified in Tables 82.40-4 to 82.40-9.

(d) *Pressure.* 1. Except as provided in subd. 1. a. to c., water supply systems shall be designed to provide at least 8 psig of flow pressure at the outlets of all fixture supplies.

a. The flow pressure at the outlets of the fixture supplies serving syphonic type urinals, washdown type urinals and water closets, and syphonic type flushometer water closets shall be at least 15 psig.

b. The flow pressure at the outlets of the fixture supplies serving one piece tank type water closets, pressure balance mixing valves, and thermostatic mixing valves shall be at least 20 psig.

c. The flow pressure at the outlets of the fixture supplies serving blowout type urinals and blowout type water closets shall be at least 25 psig.

2. a. Except as provided in subd. 3., if the water pressure available from a water main or private water supply exceeds 80 psig, a pressure reducing valve and strainer, if a strainer is not a component of the valve, shall be installed in the water distribution system.

b. A pressure reducing valve required under subd. 2. a. shall be installed upstream from all plumbing fixtures and plumbing appliances and downstream from the water meter of an utility, if a meter is provided.

3. A pressure reducing valve shall not be required to be installed in a water distribution system which supplies water directly to a water pressure booster pump.

4. If the pressure available from the water main or private water supply is inadequate by calculation to provide the minimum pressures specified in subd. 1., a hydropneumatic pressure booster system or a water pressure booster pump shall be installed to increase the supply of water.

a. Each water pressure booster pump shall be provided with an automatic low pressure cut-off switch. The cut-off switch shall be located on the inlet side of the pump and shall be set to terminate the energy supplied to the pump when a positive pressure of less than 10 psig occurs.

b. A vacuum relief valve not less than one-half inch in diameter shall be installed in each water pressure tank, if the bottom of the pressure tank is more than 20 feet above any water supply outlet served by the pressure tank.

(e) *Maximum velocity.* A water distribution system shall be designed so that the flow velocity does not exceed 8 feet per second.

(f) *Minimum sizes.* 1. Water distribution piping 1/2 inch in diameter serving 2 or more plumbing fixtures may not have a load of more than 2 water supply fixture units.

2. Water distribution piping 1/2 inch in diameter serving a shower which is not individually pressure balanced or individually thermostatically blended may not serve any additional fixtures.

(g) *Minimum sizes for fixture supplies.* Except as provided in subds. 1. to 3., the fixture supplies serving all plumbing fixtures, appliances and pieces of equipment shall be at least 1/2 inch in diameter.

1. Fixture supplies serving syphon jet type urinals shall be at least 3/4 inch in diameter.

2. Fixture supplies serving flushometer type water closets shall be at least one inch in diameter.

3. Fixture supplies serving emergency eye wash or shower outlets shall be not less than recommended by the manufacturer.

(h) *Maximum lengths for fixture supply connectors.* 1. a. A fixture supply connector may not exceed more than 24 inches in

developed length from a plumbing fixture or the body of a faucet, except as provided in subd. 1. b.

b. A fixture supply connector may not exceed more than 10 feet in developed length from a single faucet or outlet to a water cooler device, water heater, or water treatment device which is to individually serve the faucet or outlet.

2. Fixture supply connectors may not extend more than 10 feet in developed length from a plumbing appliance.

(8) *INSTALLATION.* (a) *Frost protection.* 1. Adequate measures shall be taken to protect all portions of the water supply system from freezing. All private water mains and water services shall be installed below the predicted depths of frost specified in s. Comm 82.30 (11) (c) 2. d., Figure 82.30-1 and Table 82.30-6, unless other protective measures from freezing are taken.

2. A hose bibb or a hydrant that penetrates an exterior wall of a heated structure shall be a frost proof and self-draining type.

Note: See s. Comm 82.41 (4) (m) relative to cross connection control devices.

(b) *Location.* 1. Water supply piping may not be located in, under or above sanitary sewer manholes, sewage treatment tanks, holding tanks, dosing tanks, distribution boxes, soil absorption areas or seepage pits for private sewage systems.

2. Water supply piping shall be located at least 10 feet horizontally away from a sewage treatment tank, holding tank, dosing tank, distribution box, or soil absorption area for a private sewage system.

3. Water supply piping located downslope from a mound type private sewage system shall be at 25 feet horizontally away from the toe of the basal area.

Note: See also s. Comm 84.30 (4) relative to water supply piping to be installed in contaminated soils.

4. If a private water main or a water service crosses a sanitary sewer, the water piping within 10 feet of the point of crossing shall be installed:

a. At least 12 inches above the top of the sewer from the bottom of the water piping;

b. At least 18 inches below the bottom of the sewer from the top of the water piping; or

c. Within a waterproof sleeve made of materials as specified for sanitary building sewers in s. Comm 84.30 (2).

5. Private water mains and water services 2-1/2 inches or larger in diameter shall be installed at least 8 feet horizontally from any sanitary sewer. The distance shall be measured from center to center of the piping.

6. Except as provided in subd. 5., private water mains and water services 2 inches or less in diameter shall be installed at least 30 inches horizontally from any sanitary sewer. The distance shall be measured from center to center of the piping.

7. Private water mains and water services 2 inches or less in diameter may be installed less than 30 inches horizontally from a sanitary sewer, if the bottom of the water piping is installed at least 12 inches above the sewer, except that portion of a water service within 5 feet of developed length from the point where the water service first enters the building may be less than 12 inches above the sewer.

8. No private water main or water service may be installed within 6 inches of a storm sewer.

(c) *Limitations.* No private water main or water service may pass through or under a building to serve another building, unless:

1. The private water main or water service serves farm buildings or farm houses or both which are all located on one property; or

2. A petition for variance is granted under s. Comm 82.20 (11). The approval or nonapproval of a petition for variance request relative to this paragraph shall be determined on an individual basis and shall be evaluated on site specific conditions including, at least, whether:

a. The private water main or water service serves only buildings which are all located on one property;

b. The functions or operations of the buildings to be served by the water main or water service are related; or

c. A document, which indicates the piping and distribution arrangement for the property and buildings, will be recorded with the register of deeds.

(d) *Water distribution piping.* 1. Water distribution piping shall be supported in accordance with s. Comm 82.60.

2. Provisions shall be made to evacuate all water out of the water distribution system.

3. Except where parallel water meters are installed, water distribution piping shall be provided to bypass a water meter 1½ inches or larger.

4. Water distribution piping shall be provided to bypass a water softener and an iron removal device. The bypass piping may be an internal part of the water softener or the iron removal device.

(e) *Valves.* 1. All control valves installed in a water service, except a valve serving only as a corporation cock, shall be accessible.

2. Stop and waste-type control valves may not be installed underground.

3. All control valves and fixture stop valves installed in a water distribution system shall be accessible. Control valves for the individual plumbing fixtures and appliances within dwelling units shall be accessible from within the dwelling unit.

(f) *Water hammer arrestors.* All plumbing fixtures, appliances and appurtenances with 3/8 inch or larger inlet openings and with solenoid actuated quick closing valves shall be provided with water hammer arrestors. Water hammer arrestors shall be installed in the fixture supplies serving the fixtures, appliances or appurtenances. Water hammer arrestors shall be accessible.

(g) *Temperature control.* The water temperature to all showers in public buildings shall be controlled by thermostatic mixing valves or by individually controlled pressure balanced mixing valves.

(h) *Fittings and connections.* The drilling and tapping of water supply piping shall be prohibited except for:

1. Corporation cocks for a water service or a private water main; and

2. Self-tapping valves which serve individual plumbing appliances.

(i) *Flushing and disinfection of potable water supply systems.*

1. a. Before a newly constructed water supply system is to be put into use, the piping of the system shall be filled with water and allowed to stand for at least 24 hours. After 24 hours each water outlet shall be flushed beginning with the outlet closest to the building control valve and then each successive outlet in the system. The flushing at each water outlet shall continue for at least one minute and until the water appears clear at the outlet.

b. Each portion of a water supply system which is altered or repaired shall be flushed for at least one minute and until the water appears clear.

2. New private water mains and extensions to private water mains shall be disinfected prior to use in accordance with AWWA C601 or the following method:

a. The pipe system shall be flushed with clean water until no dirty water appears at the points of outlet.

b. The system or part thereof shall be filled with a solution of water and chlorine containing at least 50 parts per million of chlorine and the system or part thereof shall be valved off and allowed to stand for 24 hours or the system or part thereof shall be filled with a solution of water and chlorine containing at least 200 parts per million of chlorine and allowed to stand for 3 hours.

c. Following the allowed standing time, the system shall be flushed with clean potable water.

d. The procedures shall be repeated if it is shown by a bacteriological examination that contamination still exists in the system.

3. The department may require a water quality analysis to be done for a new or repaired water supply system. The analysis shall be performed in accordance with acceptable nationally recognized laboratory practices. If the water supply system has been disinfected, water samples for the analysis may not be taken sooner than 24 hours after disinfection.

Note: See s. Comm 84.30 (1) regarding the bending of pipe and protection from puncture.

(9) **PIPING BY PLUMBER.** In accordance with ch. 145, Stats., piping which conveys water for human use or consumption, or to plumbing fixtures and plumbing appliances of every description, shall be installed by persons licensed by the department.

(a) Private water mains and water services shall be installed by persons licensed by the department as a plumber or utility contractor.

(b) Water distribution piping shall be installed by persons licensed by the department as a plumber.

(c) Except for automatic fire sprinkler systems, piping or piping systems, which may include water heating or water treatment equipment, and which convey water not for human use or consumption from a water distribution system to water using equipment, are not required to be installed by persons licensed by the department.

(d) Where a pipe or piping system, which conveys water not for human use or consumption, connects to a water distribution system, that connection shall be provided with an approved means of backflow prevention in accordance with s. Comm 82.41. The means of backflow prevention shall be installed by persons licensed by the department as a plumber.



**Table 82.40-4  
MAXIMUM ALLOWABLE LOAD FOR COPPER TUBE—TYPE K, ASTM B88**

Pressure Loss Due to Friction (in lbs. per 100 ft. of length)	Pipe Diameter (in inches)																											
	1/2"			3/4"			1"			1-1/4"			1-1/2"			2"			2-1/2"			3"			4"			
	WSFU		G P M	WSFU		G P M	WSFU		G P M	WSFU		G P M	WSFU		G P M	WSFU		G P M	WSFU		G P M	WSFU		G P M	WSFU			
	F M	F T		F M	F T		F M	F T		F M	F T		F M	F T		F M	F T		F M	F T		F M	F T		F M	F T	F M	F T
0.5	—	—	—	—	0.5	—	0.5	3.0	—	3.0	5.0	—	6.0	9.0	—	12.0	18.0	6.0	27.0	31.0	15.0	57.0	51.0	50.0	132	110	300	425
1	—	—	—	—	2.0	—	2.0	4.0	—	4.0	8.0	—	10.0	13.0	4.5	18.0	27.0	10.0	47.0	48.0	44.0	120	75.0	128	250	160	620	695
2	0.5	—	0.5	—	3.0	—	3.0	6.5	—	8.0	12.0	4.0	17.0	18.0	6.0	27.0	39.0	26.0	83.0	70.0	108	225	110	300	425	230	—	1180
3	1.0	—	1.0	—	4.0	—	4.0	8.0	—	10.0	15.0	5.0	22.0	23.0	7.5	38.0	50.0	48.0	128	85.0	170	300	140	485	580	280	—	1630
4	1.5	—	1.5	—	4.0	—	4.0	9.0	—	12.0	17.0	5.5	25.0	27.0	10.0	47.0	56.0	65.0	154	100	245	375	160	620	695	—	—	NP
5	2.0	—	2.0	—	5.0	—	6.0	11.0	4.0	15.0	19.0	6.0	28.5	31.0	15.0	57.0	65.0	90.0	200	115	335	450	—	—	—	—	—	NP
6	2.0	—	2.0	—	5.5	—	6.5	12.0	4.0	17.0	21.0	7.0	32.0	34.0	19.0	67.0	70.0	108	225	—	—	—	—	—	—	—	—	NP
7	2.5	—	2.5	—	6.0	—	7.0	13.0	4.5	18.0	23.0	7.5	38.0	37.0	23.0	77.0	73.0	120	240	—	—	—	—	—	—	—	—	NP
8	2.5	—	2.5	—	6.5	—	8.0	14.0	4.5	20.0	25.0	8.5	43.0	40.0	27.0	87.0	—	—	—	—	—	—	—	—	—	—	—	NP
9	3.0	—	3.0	—	7.0	—	9.0	15.0	5.0	22.0	27.0	10.0	47.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	NP
10	3.0	—	3.0	—	7.5	—	9.5	16.0	5.0	23.0	28.0	11.0	50.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	NP
11	3.0	—	3.0	—	7.5	—	9.5	17.0	5.5	25.0	30.0	14.0	55.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	NP
12	3.5	—	3.5	—	8.0	—	10.0	18.0	6.0	27.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	NP
13	3.5	—	3.5	—	8.5	—	11.0	19.0	6.0	28.5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	NP
14	3.5	—	3.5	—	9.0	—	12.0	20.0	6.5	30.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	NP
15	3.5	—	3.5	—	9.0	—	12.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	NP
16	3.5	—	3.5	—	9.5	—	12.5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	NP
17	4.0	—	4.0	—	9.5	—	12.5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	NP
18	4.0	—	4.0	—	10.0	4.0	13.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	NP
19	4.0	—	4.0	—	10.5	4.0	14.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	NP
20	4.0	—	4.0	—	11.0	4.0	15.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	NP
21	4.5	—	5.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	NP
22	4.5	—	5.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	NP
23	4.5	—	5.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	NP
24	4.5	—	5.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	NP
25	5.0	—	6.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	NP
26	5.0	—	6.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	NP
27	5.0	—	6.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	NP
28	5.0	—	6.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	NP
29	5.5	—	6.5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	NP
30	5.5	—	6.5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	NP

Notes: WSFU means water supply fixture units.  
 GPM means gallons per minute.  
 FM means predominately flushometer type water closets or syphon jet urinals.  
 FT means predominately flush tank type water closets or wash down urinals.  
 NP means not permitted, velocities exceed 8 feet per second.  
 For using this table, round the calculated pressure loss due to friction to the next higher number shown.  
 Comm 82.40 (7) (f) and (g) specifies minimum sizes for water distribution piping.

Table 82.40-5

MAXIMUM ALLOWABLE LOAD FOR COPPER TUBE—TYPE L, ASTM B88

Pressure Loss Due to Friction (in lbs. per 100 ft. of length)	Pipe Diameter (in inches)																										
	1/2"			3/4"			1"			1-1/4"			1-1/2"			2"			2-1/2"			3"		3"		4"	
	WSFU			WSFU			WSFU			WSFU			WSFU			WSFU			WSFU			WSFU	WSFU	WSFU			
	G P M	F M	FT	G P M	F M	FT	G P M	F M	FT	G P M	F M	FT	G P M	F M	FT	G P M	F M	FT	G P M	F M	FT	G P M	F M	FT	G P M	F M	FT
0.5	—	—	—	1.0	—	1.0	3.0	—	3.0	6.0	—	7.0	9.0	—	12.0	19.0	6.0	28.5	34.0	19.0	67.0	54.0	60.0	144	112	315	435
1	—	—	—	2.5	—	2.5	5.0	—	6.0	8.0	—	10.0	13.0	4.5	18.0	28.0	11.0	50.0	50.0	48.0	128	77.0	136	260	164	655	715
2	0.5	—	0.5	3.5	—	3.5	7.0	—	9.0	12.0	4.0	17.0	19.0	6.0	28.5	41.0	28.0	90.0	72.0	116	235	115	335	450	240	1540	
3	1.5	—	1.5	4.5	—	5.0	9.0	—	12.0	15.0	5.0	22.0	24.0	8.0	40.0	51.0	50.0	132	90.0	192	325	144	515	605	NP		
4	2.0	—	2.0	5.0	—	6.0	10.0	4.0	13.0	18.0	6.0	27.0	29.0	12.0	52.0	60.0	75.0	174	105	270	400	170	700	700	NP		
5	2.0	—	2.0	5.5	—	6.5	12.0	4.0	17.0	21.0	7.0	32.0	33.0	17.0	63.0	67.0	97.0	210	120	365	475	NP		NP		NP	
6	2.5	—	2.5	6.5	—	8.0	13.0	4.5	18.0	23.0	7.5	38.0	36.0	22.0	73.0	75.0	128	250	NP								
7	2.5	—	2.5	7.0	—	9.0	14.0	4.5	20.0	25.0	8.5	43.0	39.0	26.0	83.0	NP											
8	3.0	—	3.0	7.5	—	9.5	15.0	5.0	22.0	26.0	9.0	45.0	42.0	30.0	100	NP											
9	3.0	—	3.0	8.0	—	10.0	16.0	5.0	23.0	28.0	11.0	50.0	45.0	37.0	110	NP											
10	3.0	—	3.0	8.5	—	11.0	17.0	5.5	25.0	30.0	13.5	55.0	NP			NP											
11	3.5	—	3.5	9.0	—	12.0	18.0	6.0	27.0	32.0	16.0	60.0	NP			NP											
12	3.5	—	3.5	9.0	—	12.0	19.0	6.0	28.5	NP			NP														
13	3.5	—	3.5	9.5	—	12.5	20.0	6.5	30.0	NP																	
14	4.0	—	4.0	10.0	4.0	13.0	21.0	7.0	32.0	NP																	
15	4.0	—	4.0	10.5	4.0	14.0	NP			NP																	
16	4.0	—	4.0	11.0	4.0	15.0	NP																				
17	4.5	—	5.0	11.5	4.0	16.0	NP																				
18	4.5	—	5.0	12.0	4.0	17.0	NP																				
19	4.5	—	5.0	12.0	4.0	17.0	NP																				
20	4.5	—	5.0	NP			NP																				
21	5.0	—	6.0	NP																							
22	5.0	—	6.0	NP																							
23	5.0	—	6.0	NP																							
24	5.0	—	6.0	NP																							
25	5.5	—	6.5	NP																							
26	5.5	—	6.5	NP																							
27	5.5	—	6.5	NP																							
28	6.0	—	7.0	NP																							
29	6.0	—	7.0	NP																							
NP																											

Notes: WSFU means water supply fixture units.  
 GPM means—gallons per minute.  
 FM means—predominately flushometer type water closets or syphon jet urinals.  
 FT means—predominately flush tank type water closets or wash down urinals.  
 NP means—not permitted, velocities exceed 8 feet per second.  
 For using this table, round the calculated pressure loss due to friction to the next higher number shown.  
 Comm 82.40 (7) (f) and (g) specifies minimum sizes for water distribution piping.

Table 82.40-6  
**MAXIMUM ALLOWABLE LOAD FOR COPPER TUBE—TYPE M, ASTM B88**

Pressure Loss Due to Friction (in lbs. per 100 ft. of length)	Pipe Diameter (in inches)																										
	1/2"			3/4"			1"			1-1/4"			1-1/2"			2"			2-1/2"			3"			4"		
	WSFU			WSFU			WSFU			WSFU			WSFU			WSFU			WSFU			WSFU			WSFU		
	G P M	F M	FT	G P M	F M	FT	G P M	F M	FT	G P M	F M	FT	G P M	F M	FT	G P M	F M	FT	G P M	F M	FT	G P M	F M	FT	G P M	F M	FT
0.5	—	—	—	1.5	—	1.5	3.5	—	3.5	6.0	—	7.0	9.5	—	12.5	20.0	6.5	30.0	34.0	19.0	67.0	56.0	65.0	154	110	334	450
1	—	—	—	3.0	—	3.0	6.0	—	6.0	9.0	—	12.0	14.0	4.5	20.0	29.0	12.0	52.0	50.0	48.0	128	80.0	148	275	160	700	750
2	1.0	—	1.0	4.0	—	4.0	7.5	—	9.5	13.0	4.5	18.0	20.0	6.5	30.0	42.0	30.0	100	75.0	128	250	120	365	475	250	1350	
3	1.5	—	1.5	5.0	—	6.0	9.5	—	12.5	16.0	5.0	23.0	25.0	8.5	42.0	52.0	53.0	136	93.0	205	340	150	555	640	280	1630	
4	2.0	—	2.0	5.5	—	6.5	11.0	4.0	15.0	19.0	6.0	28.5	30.0	13.5	55.0	62.0	80.0	184	110	300	425	175	740	780	NP	NP	
5	2.5	—	2.5	6.5	—	8.0	12.5	4.5	17.5	22.0	7.0	35.0	34.0	19.0	67.0	70.0	108	225	120	365	475	NP	NP	NP	NP	NP	
6	2.5	—	2.5	7.0	—	9.0	14.0	4.5	20.0	24.0	8.0	40.0	37.0	23.0	77.0	77.0	136	260	NP	NP	NP	NP	NP	NP	NP	NP	
7	3.0	—	3.0	7.5	—	9.5	15.0	5.0	22.0	26.0	9.0	45.0	40.0	27.0	87.0	80.0	148	275	NP	NP	NP	NP	NP	NP	NP	NP	
8	3.5	—	3.5	8.0	—	10.0	16.0	5.0	23.0	28.0	11.0	50.0	44.0	35.0	107	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
9	3.5	—	3.5	8.5	—	11.0	17.0	5.5	25.0	30.0	13.5	55.0	46.0	40.0	113	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
10	3.5	—	3.5	9.5	—	12.5	18.0	6.0	27.0	31.0	15.0	57.0	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
11	4.0	—	4.0	10.0	4.0	13.0	19.0	6.0	28.0	32.0	16.0	60.0	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
12	4.0	—	4.0	10.0	4.0	13.0	20.0	6.5	30.0	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
13	4.0	—	4.0	10.5	4.0	14.0	21.0	7.0	32.0	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
14	4.5	—	5.0	11.0	4.0	15.0	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
15	4.5	—	5.0	11.5	4.0	16.0	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
16	4.5	—	5.0	12.0	4.0	17.0	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
17	5.0	—	6.0	12.5	4.5	17.5	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
18	5.0	—	6.0	13.0	4.5	18.0	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
19	5.0	—	6.0	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
20	5.5	—	6.5	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
21	5.5	—	6.5	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
22	5.5	—	6.5	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
23	5.5	—	6.5	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
24	6.0	—	7.0	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
25	6.0	—	7.0	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
26	6.0	—	7.0	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
27	6.0	—	7.0	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
28	6.5	—	8.0	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
	NP	—	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	

Notes:  
 WSFU means water supply fixture units.  
 GPM means—gallons per minute.  
 FM means—predominately flushometer type water closets or syphon jet urinals.  
 FT means—predominately flush tank type water closets or washdown urinals.  
 NP means—not permitted, velocities exceed 8 feet per second.  
 For using this table, round the calculated pressure loss due to friction to the next higher number shown.  
 Comm 82.40 (7) (f) and (g) specifies minimum sizes for water distribution piping.

**Table 82.40-7**  
**ALLOWABLE MAXIMUM LOAD FOR GALVANIZED STEEL PIPE, SCHEDULE 40**  
**ASTM A53**

Pressure Loss Due to Friction (in lbs. per 100 ft. of length)	Pipe Diameter (in inches)																										
	1/2"			3/4"			1"			1-1/4"			1-1/2"			2"			2-1/2"			3"			4"		
	WSFU			WSFU			WSFU			WSFU			WSFU			WSFU			WSFU			WSFU			WSFU		
	G P M	F M	FT	G P M	F M	FT	G P M	F M	FT	G P M	F M	FT	G P M	F M	FT	G P M	F M	FT	G P M	F M	FT	G P M	F M	FT	G P M	F M	FT
0.5	—	—	—	1.5	—	1.5	3.5	—	3.5	7.0	—	9.0	11.0	—	12.5	21.0	7.0	32.0	34.0	19.0	67.0	60.0	75.0	175	122	375	485
1	0.5	—	0.5	2.5	—	2.5	5.0	—	6.0	10.5	4.0	14.0	16.0	4.5	20.0	30.0	14.0	55.0	49.0	46.0	124	87.0	180	310	180	770	810
2	2.0	—	2.0	4.0	—	4.0	7.5	—	9.5	15.5	5.0	22.5	23.0	6.5	30.0	45.0	37.0	110	72.0	116	235	127	405	510	260	1440	
3	2.5	—	2.5	5.0	—	6.0	9.5	—	12.5	19.0	6.0	28.5	29.0	8.5	42.0	55.0	62.0	150	90.0	192	325	160	615	695	285	1660	
4	2.5	—	2.5	5.5	—	6.5	11.0	4.0	15.0	22.0	7.0	35.0	34.0	13.5	55.0	65.0	90.0	200	105	270	400	180	770	810	NP	NP	
5	3.0	—	3.0	6.5	—	8.0	12.5	4.5	17.5	25.0	8.5	42.0	39.0	19.0	67.0	73.0	120	240	120	365	475	NP	NP	NP	NP	NP	
6	3.5	—	3.5	7.5	—	9.5	14.0	4.5	20.0	28.0	11.0	50.0	43.0	23.0	77.0	81.0	152	280	NP	NP	NP	NP	NP	NP	NP	NP	
7	3.5	—	3.5	8.0	—	10.0	15.0	5.0	22.0	31.0	15.0	57.0	46.0	27.0	87.0	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
8	4.0	—	4.0	8.5	—	11.0	16.0	5.0	23.0	33.0	17.0	63.0	50.0	35.0	107	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
9	4.0	—	4.0	9.0	—	12.0	17.0	5.5	25.0	35.0	20.0	70.0	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
10	4.5	—	5.0	9.5	—	12.5	18.0	6.0	27.0	37.0	23.0	77.0	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
11	5.0	—	6.0	10.0	4.0	13.0	19.0	6.0	28.5	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
12	5.0	—	6.0	10.5	4.0	14.0	20.0	6.5	30.0	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
13	5.0	—	6.0	11.0	4.0	15.0	21.0	7.0	32.0	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
14	5.5	—	6.5	11.5	4.0	16.0	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
15	6.0	—	7.0	12.0	4.0	17.0	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
16	6.0	—	7.0	12.5	4.5	17.5	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
17	6.0	—	7.0	13.0	4.5	18.0	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
18	6.0	—	7.0	13.5	4.5	19.0	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
19	6.5	—	8.0	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
20	6.5	—	8.0	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
21	7.0	—	9.0	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
22	7.0	—	9.0	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
23	7.0	—	9.0	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
24	7.5	—	9.5	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
25	7.5	—	9.5	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	
	NP	—	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	

Notes:  
 WSFU means water supply fixture units.  
 GPM means gallons per minute.  
 FM means predominately flushometer type water closets or syphon jet urinals.  
 FT means predominately flush tank type water closets or wash down urinals.  
 NP means not permitted, velocities exceed 8 feet per second.  
 For using this table, round the calculated pressure loss due to friction to the next higher number shown.  
 Comm 82.40 (7) (f) and (g) specifies minimum sizes for water distribution piping.

**Table 82.40-8**  
**MAXIMUM ALLOWABLE LOAD FOR POLYBUTYLENE TUBING—ASTM D3309 and**  
**CHLORINATED POLYVINYL CHLORIDE TUBING—ASTM D2846**

Pressure Loss Due to Friction (in lbs. per 100 ft. of length)	Pipe Diameter (in inches)																	
	1/2"			3/4"			1"			1-1/4"			1-1/2"			2"		
	WSFU			WSFU			WSFU			WSFU			WSFU			WSFU		
	G P M	F M	FT	G P M	F M	FT	G P M	F M	FT	G P M	F M	FT	G P M	F M	FT	G P M	F M	FT
0.5	—	—	—	0.5	—	0.5	2.5	—	2.5	4.0	—	4.0	6.5	—	8.0	13.0	4.5	18.0
1	—	—	—	1.5	—	1.5	3.5	—	3.5	6.0	—	7.0	9.5	—	12.5	19.0	6.0	28.5
2	—	—	—	2.5	—	2.5	5.5	—	6.5	9.0	—	12.0	14.0	4.5	20.0	28.0	11.0	50.0
3	0.5	—	0.5	3.5	—	3.5	6.5	—	8.0	11.5	4.0	15.0	17.0	5.5	25.0	35.0	20.0	70.0
4	1.0	—	1.0	4.0	—	4.0	7.5	—	9.5	13.0	4.5	18.0	20.0	6.5	30.0	42.0	30.0	100
5	1.5	—	1.5	4.5	—	5.0	8.5	—	11.0	15.0	5.0	22.0	23.0	7.5	37.0	47.0	42.0	117
6	2.0	—	2.0	5.0	—	6.0	9.5	—	12.5	16.5	5.5	24.0	25.0	8.5	43.0	52.0	53.0	136
7	2.0	—	2.0	5.5	—	6.5	10.5	—	14.0	18.0	6.0	27.0	27.0	10.0	48.0	58.0	70.0	165
8	2.0	—	2.0	6.0	—	7.0	11.5	4.0	16.0	19.0	6.0	28.5	30.0	14.0	55.0	NP		
9	2.5	—	2.5	6.0	—	7.0	12.0	4.0	17.0	20.5	6.5	31.0	32.0	16.0	60.0			
10	2.5	—	2.5	6.5	—	8.0	12.5	4.5	17.5	22.0	7.0	35.0	34.0	19.0	67.0			
11	2.5	—	2.5	7.0	—	9.0	13.5	4.5	19.0	23.0	7.5	38.0	NP					
12	3.0	—	3.0	7.0	—	9.5	14.0	4.5	20.0	24.0	8.0	40.0						
13	3.0	—	3.0	7.5	—	10.0	14.5	4.5	21.0	NP								
14	3.0	—	3.0	8.0	—	10.0	15.5	5.0	22.0									
15	3.0	—	3.0	8.0	—	11.0	16.0	5.0	23.0									
16	3.5	—	3.5	8.5	—	11.0	16.5	5.5	24.0									
17	3.5	—	3.5	8.5	—	12.0	NP											
18	3.5	—	3.5	9.0	—	12.0												
19	3.5	—	3.5	9.0	—	12.0												
20	4.0	—	4.0	9.5	—	12.5												
21	4.0	—	4.0	10.0	4.0	13.0												
22	4.0	—	4.0	NP														
23	4.0	—	4.0															
24	4.0	—	4.0															
25	4.0	—	4.0															
26	4.0	—	4.0															
27	4.5	—	5.0															
28	4.5	—	5.0															
29	4.5	—	5.0															
30	5.0	—	6.0															
31	5.0	—	6.0															
	NP																	

Note: WSFU means water supply fixture units.  
 GM means gallons per minute.  
 FM means predominately flushometer type water closets or siphon jet urinals.  
 FT means predominately flush tank type water closets or washdown urinals.  
 NP means not permitted, velocities exceed 8 feet per second.

For using this table, round the calculated pressure loss due to friction to the next higher number shown.  
 Comm 82.40 (7) (f) and (g) specifies minimum sizes for water distribution piping.

**Table 82.40-9**  
**MAXIMUM ALLOWABLE LOAD FOR CROSSLINKED POLYETHYLENE (PEX) TUBING**  
**ASTM F876 and F877**

Pressure Loss Due to Friction (in lbs per 100 ft. of length)	Pipe Diameter (in inches)					
	1/2"		5/8"		3/4"	
	GPM	WSFU FT	GPM	WSFU FT	GPM	WSFU FT
0.5	0.5	0.5	1.0	1.0	1.5	1.5
1.0	0.5	0.5	1.5	1.5	2.0	2.0
2.0	1.0	1.0	2.0	2.0	3.0	3.0
3.0	1.5	1.5	2.5	2.5	3.5	3.5
4.0	1.5	1.5	2.5	2.5	4.0	4.0
5.0	2.0	2.0	3.0	3.0	4.5	5.0
6.0	2.0	2.0	3.5	3.5	5.0	6.0
7.0	2.0	2.0	4.0	4.0	5.5	6.0
8.0	2.5	2.5	4.0	4.0	6.0	7.0
9.0	2.5	2.5	4.5	5.0	6.5	8.0
10.0	2.5	2.5	4.5	5.0	7.0	9.0
11.0	3.0	3.0	5.0	6.0	7.5	9.5
12.0	3.0	3.0	5.0	6.0	7.5	9.5
13.0	3.0	3.0	5.5	6.5	8.0	10.0
14.0	3.0	3.0	5.5	6.5	8.5	11.0
15.0	3.5	3.5	5.5	6.5	8.5	11.0
16.0	3.5	3.5	6.0	7.0	9.0	12.0
17.0	3.5	3.5	6.0	7.0	NP	
18.0	3.5	3.5	6.5	8.0		
19.0	4.0	4.0	6.5	8.0		
20.0	4.0	4.0	NP			
21.0	4.0	4.0				
22.0	4.0	4.0				
23.0	4.0	4.0				
24.0	4.5	5.0				
25.0	4.5	5.0				
26.0	NP					

Note: WSFU means—water supply fixture units.  
 GPM means—gallons per minute.  
 FT means—predominately flush tank type water closets or washdown urinals.  
 NP means—not permitted, velocities exceed eight feet per second.  
 For using this table, round the calculated pressure loss due to friction to the next higher number shown.  
 Comm 82.40 (7) (f) and (g) specifies minimum sizes for water distribution piping.

**History:** 1-2-56; r. and recr. Register, November, 1972, No. 203, eff. 12-1-72; r. and recr. Register, February, 1979, No. 278, eff. 3-1-79; renum. from H 62.13, Register, July, 1983, No. 331, eff. 8-1-83; renum. from ILHR 82.13 and r. and recr. (2) (b) and (4) (d) 1., am. (4) (c) 3. and (6) (a) (intro.), cr. (6) (b), Register, February, 1985, No. 350, eff. 3-1-85; r. and recr. Register, May, 1988, No. 389, eff. 6-1-88; am. (5) (d) 5. a., r. and recr. (7) (h) 1. and (8) (c), renum. (8) (c) 2. to 6. to be (8) (b) 4. to 8. and am. (8) (b) 4. c., Register, August, 1991, No. 428, eff. 9-1-91; am. (8) (b) 1. and

2., Register, April, 1992, No. 436, eff. 5-1-92; renum. (3) (c) and (8) (a) to be (3) (c) 2. and (8) (a) 1. and am. (8) (a) 1., cr. (3) (c) 1., (e), (8) (a) 2. and Table 82.40-9, am. (7) (c), r. (3) (b) 1. b. and c., Register, February, 1994, No. 458, eff. 3-1-94; r. (5) (b) 3., renum. (5) (b) 4., 5. to be (5) (b) 3., 4., Register, December, 1996, No. 480, eff. 4-1-96; correction in (5) (b) 3., made under s. 13.93 (2m) (b) 7., Stats., Register, October, 1996, No. 490; r. and recr. (5) (b), Register, February, 1997, No. 494, eff. 4-1-97; reprinted to restore dropped copy, Register, April, 1997, No. 496.

**Comm 82.41 Cross connection control. (1) SCOPE.** The provisions of this section set forth the requirements for the protection of potable water within water supply systems when and where there is the possibility of contamination due to cross connections or backflow conditions.

Note: The Department of Natural Resources governs the operation and design of community water systems and under s. NR 811.09 requires the supplier of water to develop and implement a comprehensive cross connection control program.

**(2) MATERIALS.** (a) All devices, assemblies and mechanisms intended to protect potable water supplies relative to cross connection or backflow shall be of a type recognized and approved in accordance with ch. Comm 84 and as described in sub. (4).

(b) All methods including barometric loops and air gaps intended to protect potable water supplies relative to cross connection or backflow shall be constructed of materials suitable for water supply systems in accordance with ch. Comm 84.

**(3) GENERAL REQUIREMENTS.** Potable water supply systems and the connection of each plumbing fixture, piece of equipment, appliance, or nonpotable water piping system thereto shall be designed, installed and maintained in such a manner to prevent the contamination of potable water supplies by means of cross connections.

(a) *Types of cross connection control.* 1. Potable water supply systems shall be protected against contamination due to cross connections or backflow conditions by one of the methods or devices specified in Table 82.41-1 depending upon the situation or Table 82.41-2 depending upon the specific application or use, and the limitations specified in sub. (4).

2. For the situations described in par. (b) 3., cross connection control shall be provided as part of the fixture outlet or in the water supply piping for the fixture outlet.

**Table 82.41-1  
ACCEPTABLE CROSS CONNECTION CONTROL METHODS**

TYPES or METHODS of CROSS CONNECTION CONTROL	SITUATIONS and CONDITIONS							
	Backpressure				Backsiphonage			
	Low Hazard		High Hazard		Low Hazard		High Hazard	
	Continual Pressure	Noncontinual Pressure	Continual Pressure	Noncontinual Pressure	Continual Pressure	Noncontinual Pressure	Continual Pressure	Noncontinual Pressure
Air Gaps (ANSI A112.1.2)	X	X	X	X	X	X	X	X
Pipe Applied Atmospheric Type Vacuum Breakers (ASSE 1001)						X		X
Hose Connection Backflow Preventers (ASSE 1052)	X <sup>a</sup>	X	X <sup>a</sup>	X	X <sup>a</sup>	X	X <sup>a</sup>	X
Hose Connection Vacuum Breakers (ASSE 1011)	X <sup>a</sup>	X	X <sup>a</sup>	X	X <sup>a</sup>	X	X <sup>a</sup>	X
Backflow Preventers with Intermediate Atmospheric Vent (ASSE 1012)	X	X			X	X		
Reduced Pressure Principle Backflow Preventers (ASSE 1013)	X	X	X	X	X	X	X	X
Pressure vacuum breaker assembly (ASSE 1020)					X	X	X	X
Back siphonage backflow vacuum breaker (ASSE 1056)					X	X	X	X
Barometric Loops					X	X	X	X

<sup>a</sup> See limitation under sub. (4) (c) 1. a.

Table 82.41-2

## ACCEPTABLE CROSS CONNECTION CONTROL METHODS FOR SPECIFIC APPLICATIONS

Types or Methods of Cross Connection Control	Types of Application or Use
Water Closet Flush Tank Ball Cocks (ASSE 1002)	Gravity water closet flush tanks
Hand Held Showers (ASSE 1014)	Hand held shower assemblies
Double Check Backflow Prevention Assemblies (ASSE 1015)	Automatic fire sprinkler systems and Standpipe systems
Trap Seal Primer Valves, Water Supply Fed (ASSE 1018)	Traps for drain systems
Vacuum Breaker Wall Hydrant, Freeze Resistant Automatic Draining Type (ASSE 1019)	Hose threaded outlet connections
Backflow Preventer for Carbonated Beverage Machines (ASSE 1022)	Carbonated beverage dispensers, post mix types
Laboratory Backflow Preventers (ASSE 1035)	Laboratory faucets
Pressurized Flushing Devices (Flushometers) for Plumbing Fixtures (ASSE 1037)	Flushometer plumbing fixtures
Reduced Pressure Detector Backflow Preventer (ASSE 1047)	Automatic fire sprinkler systems
Double Check Detector Assembly Backflow Preventer (ASSE 1048)	Automatic fire sprinkler systems and Standpipe systems
Vacuum Breaker Tees [sub. (5) (k)]	Water treatment devices

(b) *Classifications.* For the purposes of this section:

1. The designation of a high hazard or low hazard situation shall be determined on the basis of how a toxic or nontoxic solution is intended or recommended by the manufacturer of the solution to interface with the potable water supply system.

2. a. A continuous pressure situation shall be considered to exist when a pressure greater than atmospheric within the water supply system exists for more than 12 continuous hours.

b. A noncontinuous pressure situation shall be considered to exist if the conditions in subd. 2. a. do not occur.

3. A high hazard cross connection situation shall be considered to exist for a connection of the water supply system to:

a. Any part of the drain system; and

b. Any other piping system conveying water from nonpotable sources, including but not limited to lakes, rivers, streams or creeks.

4. Except as provided in subd. 5., a high hazard cross connection situation shall be considered to exist at:

a. A water supply hose bibb, faucet, wall hydrant, sill cock or other outlet which terminates with hose threads allowing a hose to be attached;

b. A water supply faucet, wall hydrant or other outlet which terminates with a serrated nipple allowing a hose to be attached; and

c. A water supply faucet, hydrant or outlet serving a sink used for building maintenance in a public building.

5. A cross connection shall not be considered to exist at the hose threaded outlet installed for the sole purpose of:

a. Draining a water supply system or any portion thereof;

b. Obtaining water quality samples of the water supply system or any portion thereof; or

c. Connecting individual residential automatic clothes washers.

6. a. A high hazard situation shall be considered to exist for the connection of two water supply systems one supplied by a public water supply and the other system supplied by a private well.

*Note:* The interconnection of a public water supply system and another source of water is addressed in s. NR 811.09 and must be approved by the Department of Natural Resources.

b. Except as provided in subd. 7., a low hazard situation shall be considered to exist for the connection of a piping system, including but not limited to automatic fire sprinkler systems, standpipe systems, and processing purposes, which provides potable water for nonrequired potable water uses.

*Note:* Cross connection control devices used in conjunction with automatic fire sprinkler systems are to be listed by an acceptable testing agency for such an application under the standards governing the design and installation of automatic fire sprinkler systems.

7. A cross connection situation shall not be considered to exist for an automatic fire sprinkler system serving a one- or 2- family dwelling provided the sprinkler system is constructed of materials and joints suitable for water distribution systems as specified in ss. Comm 84.30 (4) (e) and 84.40, respectively and the sprinkler system is supplied with only potable water.

(c) *Containment.* 1. For sewerage treatment facilities which are required to conform with ch. NR 110, in addition to the cross connection control required for each potable water usage or water outlet, a reduced pressure principle backflow preventer shall be installed:

a. In the water service to each building or structure within the complex;

b. In the private water main upstream of all water services serving the facility; or

c. In the water distribution system upstream of all water outlets and in the process piping network upstream of all points of use, if both a water distribution system and a process network is contained within the same building or structure.

2. For marinas, wharves and docks where potable water outlets are provided to serve boats or ships, in addition to the cross connection control required for each potable water outlet or usage, a reduced pressure principle backflow preventer shall be installed in the water supply system to limit backflow into the water supply source.

3. The installation of a cross connection control device in the water supply system for a building or structure shall not alleviate the requirement to provide cross connection control for the connection of each plumbing fixture, piece of equipment, appliance or other piping system.

(d) *Prohibitions.* The use of a toxic solution as a heat transfer fluid in single-wall heat exchanger for potable water is prohibited.

(e) *Existing automatic fire sprinkler systems.* An alteration, modification or addition to an existing automatic fire sprinkler shall necessitate conformance with this section, if the:

1. Existing water supply line to the existing sprinkler system is increased in diameter; or



2. Existing device or method which had been previously recognized to address cross connection concerns is to be removed or replaced.

**(4) LIMITATIONS.** (a) Cross connection control devices shall be limited in use in accordance with the respective standard, unless otherwise specifically permitted under this subsection.

(b) A pipe applied atmospheric type vacuum breaker shall be installed such that the bottom of the device or the critical level mark on the device is at least 6 inches above:

1. The flood level rim of the receptor serving the water supply port; and

2. The highest point downstream from the device where backpressure would be created.

(c) 1. a. The use of a hose connection backflow preventer and a hose connection vacuum breaker in a continuous pressure situation shall be limited to campgrounds and marinas.

b. The use of a hose connection backflow preventer and a hose connection vacuum breaker shall be limited to the discharge side of a control valve such as a faucet or hose bibb.

2. A hose connection backflow preventer and a hose connection vacuum breaker may not be employed in backpressure situations of more than 10 feet of water column.

(d) A backflow preventer with intermediate atmospheric vent:

1. May not be employed in backpressure situations of more than 150 psig; and

2. May not serve boilers having a maximum steam pressure setting greater than 15 psig or a maximum water pressure setting greater than 30 psig.

(e) 1. A reduced pressure principle backflow preventer and a reduced pressure detector backflow preventer may not be subjected to a backpressure greater than twice the rated working pressure of the device.

2. A reduced pressure principle backflow preventer and a reduced pressure detector backflow preventer which serve a water-based fire protection system may have a test outlet located between the number 2 check valve and the number 2 listed indicating control valve.

3. A reduced pressure principle backflow preventer and a reduced pressure detector backflow preventer which are 2 inches or smaller in size and which serve a water-based fire protection system are not required to have a test cock on the number one listed indicating control valve.

(f) A hand-held shower may not be employed in backpressure situations of more than 2 feet of water column.

(g) 1. A double check backflow prevention assembly and a double check detector assembly backflow preventer may not be subjected to a backpressure greater than twice the rated working pressure of the device.

2. A double check backflow prevention assembly and a double check detector assembly backflow preventer which serve a water-based fire protection system may have a test outlet located between the number 2 check valve and the number 2 listed indicating control valve.

*Note:* See Appendix for further explanatory material.

3. A double check backflow prevention assembly and a double check detector assembly backflow preventer which are 2 inches or smaller in size and which serve a water-based fire protection system are not required to have a test cock on the number one listed indicating control valve.

(h) A water supply fed trap seal primer valve shall be installed such that the bottom of the device or the critical level as marked on the device is at least 12 inches above:

1. The connection to the trap; and

2. The highest point downstream from the device where backpressure would be created.

(i) A vacuum breaker wall hydrant, freeze resistant automatic draining type, may not be employed in backpressure situations of more than 10 feet of water column.

(k) 1. A pressure vacuum breaker assembly shall be installed such that the bottom of the device or the critical level mark on the device is at least 12 inches above:

a. The flood level rim of the receptor serving the water supply port; and

b. The highest point downstream from the device where backpressure would be created.

2. A pressure vacuum breaker assembly shall be located only outside.

(L) A laboratory faucet backflow preventer may not be employed in backpressure situations of more than 6 feet of water column.

(m) The cross connection control device to serve a hose bibb or hydrant that penetrates an exterior wall of a heated structure may not prevent a hose bibb or hydrant from being freeze resistant automatic draining as required under s. Comm 82.40 (8) (a).

(n) A back siphonage backflow vacuum breaker shall be installed so that the bottom of the device or the critical level mark on the device is at least 12 inches above:

1. The flood level rim of the receptor serving the water supply port; and

2. The highest point downstream from the device where backpressure would be created.

**(5) INSTALLATION.** (a) An air gap for cross connection control shall conform to ANSI A112.1.2.

*Note:* See Appendix for further explanatory material.

(b) Cross connection control methods, devices and assemblies shall be installed in accordance with the manufacturer's written installation specifications and this chapter. The methods, devices and assemblies shall be accessible for inspection, testing, maintenance and replacement.

*Note:* See s. Comm 84.30 (5) (c).

(c) Cross connection control devices shall be protected from freezing.

(d) 1. A cross connection control device may not be located in uninhabitable spaces susceptible to flooding.

2. A cross connection control device which has one or more vent ports may not be located in a pit, vault or depression which is below the adjacent grade or floor level, even if the pit, vault or depression is provided with a drain at the bottom of the pit.

(e) 1. Vent ports of cross connection control devices shall be positioned:

a. Away from areas where toxic gases and fumes may accumulate;

b. Downward or protected to protect the ports from falling debris; and

c. So as to drain dry.

2. Cross connection control devices shall be so located that any vent ports of the devices shall be provided with an air gap in accordance with par. (a).

3. a. If a reduced pressure principle backflow preventer or a reduced pressure detector backflow preventer is located within a building, a drain or receptor shall be provided to receive the discharge from the vent ports of the device. If a floor drain is to receive the discharge from the vent ports of a reduced pressure principle backflow preventer or a reduced pressure detector backflow preventer, the flow or pathway of the discharge may not create a nuisance.

b. Where drain piping is provided for the discharge from a vent port, an air gap in accordance with par. (a) shall be provided between the vent port and the drain piping.

c. Where a receptor is provided for the discharge from a vent port, an air gap in accordance with par. (a) shall be provided between the vent port and the receptor.

(f) The installation of a reduced pressure principle backflow preventer, a reduced pressure detector backflow preventer, a double check backflow prevention assembly, a double check detector assembly backflow preventer, a pressure vacuum breaker

assembly and a back siphonage backflow vacuum breaker shall conform to the following limitations:

1. The minimum distance between the floor, surface or platform which is to provide access and the lowest point of the assembly may not be less than 12 inches.
2. The maximum distance between the floor, surface or platform which is to provide access and the lowest point of the assembly may not be more than 7 feet.
3. The minimum distance between a ceiling or other obstruction and the highest point of the assembly may not be less than 18 inches.
4. The minimum distance between a wall or other obstruction and the back and ends of the assembly may not be less than 4 inches.
5. The minimum distance between a wall or other obstruction and the front of the assembly may not be less than 24 inches.

Note: See Appendix for further explanatory material.

(g) The discharge outlet of local waste piping serving a cross connection control device shall be visible and not be located within a concealed space.

(i) No control valve may be placed downstream from a pipe applied atmospheric type vacuum breaker or a laboratory faucet backflow preventer.

(j) A barometric loop to provide cross connection control for backsiphonage shall be formed by creating a loop in the potable water supply piping upstream to the source of cross connection.

1. The loop shall extend at least 35 feet above:
  - a. The highest point downstream from the loop where backpressure would be created; and
  - b. The point of discharge.
2. No outlets for potable water use shall be installed downstream of the peak of the loop.

(k) Vacuum breaker tees shall be assembled such that:
 

1. The bottom of the horizontal portion of the tee is installed at least one inch above the flood level rim of the receptor;
2. The inside diameter of the tee is equal to or greater than the inside diameter of the drain piping from the water treatment device;

3. The tee is installed in such a position that the discharge will not create a nuisance;
4. The piping upstream of the tee is of a type suitable for water distribution in accordance with s. Comm 84.30 (4) (e).
5. The vent portion of the tee is equal to or greater than the inside diameter of the drain piping from the water treatment device; and
6. The vent port of the tee is:
  - a. Positioned away from areas where toxic gases and fumes may accumulate; and
  - b. Constructed to protect the port from falling debris.

(6) MAINTENANCE AND TESTING. (a) All cross connection control devices shall be maintained and tested in accordance with s. Comm 82.21 (3).

History: 1-2-56; r. (2) through (7), Register, October, 1971, No. 190, eff. 11-1-71; r. and rec. Register, November, 1972, No. 203, eff. 12-1-72; renun. from H 62.14, Register, July, 1983, No. 331, eff. 8-1-83; renun. from ILHR 82.14 and am. (1) (b) 17., r. (2), Register, February, 1985, No. 350, eff. 3-1-85; r. and rec. Register, February, 1994, No. 458, eff. 3-1-94; am. (2) (a), Tables 82.41-1, 2, (4) (c), (e) to (j), (k) to (m), (5) (e) 3. a., (i), cr. (4) (n), r. and rec. (5) (b), (f), r. (5) (h), Register, February, 1997, No. 494, eff. 3-1-97; correction in (4) (n) made under s. 13.93 (2m) (b) 1., Register, February, 2000, No. 530.

### Subchapter V — Special Plumbing Installations

#### Comm 82.50 Health care and related facilities.

(1) PLAN APPROVAL REQUIRED. Plans for plumbing and equipment for health care facilities shall be approved by the department.

(2) SCOPE. The scope of this section shall cover devices, fixtures and equipment which are installed and maintained in health care facilities such as hospitals, nursing or rest homes, homes for the aged, infirmaries, residential care facilities, orphanages, sanitariums, sanatoriums, clinics, mortuaries, and schools of medi-

cine, surgery, dentistry, and research and testing laboratories whether enumerated or not. This section may also apply to offices of dentists and doctors.

(3) INTENT. The primary intent of the following minimum requirements is to protect public health by eliminating either potential health or safety hazards to patients and institutional personnel, and to promote the efficient use, operation and maintenance of the equipment used in the institution or establishment. Fixtures, devices and/or equipment in addition to those prescribed herein may be required dependent upon the type of occupancy, treatment, care or layout. Such additional facilities shall be installed in accord with the provisions of this chapter.

(4) PLUMBING IN MENTAL HOSPITALS. Special consideration shall be given to the design and installation of plumbing fixtures in areas where disturbed patients are housed. No pipes or traps shall be exposed and all fixtures shall be securely bolted through walls or floors.

(5) SPECIAL FIXTURES AND EQUIPMENT ACCEPTABILITY. (a) *Special fixtures.* Fixtures which are designed for any special use such as, therapy, special cleansing and/or disposal of waste materials shall be smooth, impervious, corrosion resistant materials and, if subject to temperatures in excess of 180°F, shall be able to withstand without damage, higher temperatures as may be specified. Scrub-up sinks, lavatories and sinks in patient care areas, and fixtures used by medical and nursing staff, shall have the water supply spout terminate a minimum of 5 inches above the rim of the fixture. These fixtures shall be equipped with valves or faucets which can be operated without use of the hands.

(b) *Special equipment.* All devices, appurtenances, appliances and apparatus intended to serve a special function such as sterilization, distillation, processing, cooling, storage of ice or foods, etc., which may be connected to either the water supply distribution or drainage systems or both, shall be provided with protection against back-siphonage, backflow, flooding, fouling, or any possibility of contaminating any portion of the water supply system, or equipment, or the misuse of any drain.

(c) *Therapeutic equipment.* Therapeutic equipment shall not be counted as a patient bathing fixture to meet the required patient bath ratio.

(6) FIXTURE AND EQUIPMENT INSTALLATION. (a) *Clinic sinks.* Such fixtures shall have an integral trap in which the upper portion of a visible trap seal provides a water surface. The fixture shall be designed so as to permit complete removal of the contents by siphonic and/or blow-out action, and to reseal the trap in a single flushing operation. A flushing rim shall provide water to cleanse the interior surface. The fixtures shall have flushing and cleansing characteristics similar to a water closet.

(b) *Prohibited use of clinic sinks and service sinks.* A clinic sink shall not be used as a janitor's service sink. A janitor's service sink shall not be used for the disposal of urine, fecal matter, or other human wastes.

(c) *Special requirement for ice manufacture and storage.* 1. No machines for manufacturing ice, or any device for handling or storing ice, shall be located in a room containing a bedpan hopper, clinic sink, bedpan washer, or similar fixture. Machines for manufacturing ice, or devices for handling or storing ice intended for either human consumption or packs, shall be located in a clean utility room, a floor pantry, a diet kitchen, or in other similar locations.

2. Each drain serving an ice chest or box shall discharge into an indirect waste receptor. Each drain shall discharge through an air-break above the receptor. The end of the drain shall be covered with a removable 10 mesh per inch noncorrosive screen.

(7) STERILIZERS. (a) *Descaling prohibited.* The interior of water sterilizers, stills, or similar equipment shall not be descaled or otherwise treated by acid or other chemical solutions while the equipment is connected to the water and/or drainage systems.

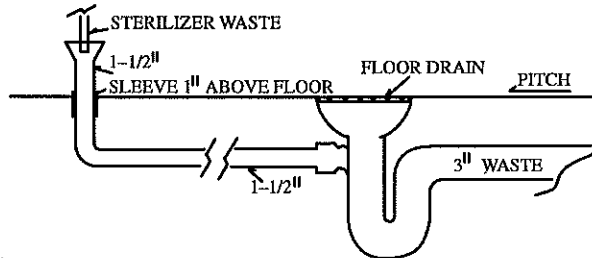
(b) *Compliance with boiler and pressure vessel code.* Pressure sterilizers and pressure type instrument washer sterilizers installed after the effective date of this code shall be constructed and stamped in accordance with the provisions of chs. Comm 41 and 42. All pressure sterilizers and pressure type instrument washer sterilizers regardless of size shall be equipped with pressure relief devices in accordance with the provisions of chs. Comm 41 and 42.

(c) *Sterilizer piping.* The connecting piping and/or devices for sterilizers shall be accessible for inspection and maintenance.

(d) *Bedpan washers and clinic sinks.* Bedpan washers and clinic sinks shall be connected to the sanitary drainage system and vented in accordance with the requirements for water closets. Vapor vents serving bedpan washers shall not connect to the plumbing system.

(8) **DRAINAGE AND VENTING.** (a) *Sterilizer wastes.* 1. Indirect wastes required. All sterilizers shall be provided with individual and separate indirect wastes, with air-gaps of not less than 2 diameters of the waste tailpiece. The upper rim of the receptor, funnel, or basket type waste fitting shall be not less than 2 inches below the vessel or piping, whichever is lower. Except as provided in subds. 3. and 5., a "P" trap shall be installed on the discharge side of and immediately below the indirect waste connection serving each sterilizer.

2. Floor drain required. In any room containing the recessed, or concealed portions of sterilizers, not less than one acceptable floor drain, connecting to the drainage system, shall be installed in a manner to drain the entire floor area. The floor drain waste and trap shall be a minimum diameter of 3 inches. It shall receive the drainage from at least one sterilizer within the room to assure maintenance of the floor drain trap seal. The sterilizer drain may be installed on a branch taken off between the floor drain trap and the strainer. No individual sterilizer waste trap shall be required on this type of installation. See following sketch.



3. Battery assemblies. A battery assembly of not more than 3 sterilizer wastes may drain to one trap, provided the trap and waste are sized according to the combined fixture unit rating; the trap is located immediately below one of the indirect waste connections; the developed distance of a branch does not exceed 8 feet; and the branches change direction through a tee-wye or wye pattern fitting.

4. Bedpan steamers, additional trap required. A trap with a minimum seal of 3 inches shall be provided in a bedpan steamer drain located between the fixture and the indirect waste connection.

5. Pressure sterilizer. Except when an exhaust condenser is used, a pressure sterilizer chamber drain may be connected to the exhaust drip tube before terminating at the indirect waste connection. If a vapor trap is used, it shall be designed and installed to prevent moisture being aspirated into the sterilizer chamber. The jacket steam condensate return, if not connected to a gravity steam condensate return, shall be separately and indirectly wasted. If necessary to cool a high temperature discharge, a cooling receiver, trapped on its discharge side, may serve as the fixture trap.

6. Pressure sterilizer exhaust condensers. The drain from the condenser shall be installed with an indirect waste. If condensers are used on pressure sterilizers, the chamber drain shall have a separate indirect waste connection.

7. Water sterilizer. All water sterilizer drains, including tank, valve leakage, condenser, filter and cooling, shall be installed with indirect waste or according to subd. 2.

8. Pressure instrument washer-sterilizer. The pressure instrument washer-sterilizer chamber drain and overflow may be interconnected. Also, they may be interconnected with the condenser.

(b) *Vapor vent material.* Material for vapor vents serving bedpan washers and sterilizer vents serving sterilizers shall be materials approved for vent piping.

(c) *Vent connections prohibited.* Connections between vapor vents serving bedpan washers, sterilizing apparatus, and/or normal sanitary plumbing systems, are prohibited.

(d) *Vapor vents and stacks.* 1. Bedpan washers. Bedpan washers shall be vented to the outer atmosphere above the roof by means of one or more vapor vents. The vapor vent for a bedpan washer shall be not less than a 2-inch diameter pipe. A vapor vent serving a single bedpan washer may drain to the fixture served.

2. Multiple installations. Where bedpan washers are located above each other on more than one floor, a vapor vent stack may be installed to receive the vapor vent on the various floors. Not more than 3 bedpan washers shall be connected to a 2-inch vapor vent stack, 6 to a 3-inch vapor vent stack, and 12 to a 4-inch vapor vent stack. In multiple installations, the connections between a bedpan washer vapor vent and a vapor vent stack shall be made by use of a tee or tee-wye sanitary pattern drainage fittings, installed in an upright position.

3. Trap required. The bottom of the vapor vent stack, except when serving only one bedpan washer, shall be drained by means of a trapped and vented waste connection to the plumbing sanitary drainage system. The trap and waste shall be the same size as the vapor vent stack.

4. Trap seal maintenance. A water supply of not less than 1/4 inch minimum tubing shall be taken from the flush supply of each bedpan washer on the discharge or fixture side of the vacuum breaker, trapped to form not less than a 3-inch seal, and connected to the vapor vent stack on each floor. The water supply shall be so installed as to provide a supply of water to the vapor vent stack for cleansing and drain trap seal maintenance each time a bedpan washer is flushed.

(e) *Sterilizer vapor vent and stacks.* 1. Connections. Multiple installations of pressure and nonpressure sterilizers shall have their vent connections to the sterilizer vent stack made by means of inverted wye fittings. Such vent connections shall be accessible for inspection and maintenance.

2. Drainage. The connection between sterilizer vent and/or exhaust openings and the sterilizer vent stack shall be designed and installed to drain to the funnel or basket-type waste fitting. In multiple installations, the sterilizer vent stack shall be drained separately to the lowest sterilizer funnel or basket-type waste fitting or receptor.

(f) *Sterilizer vapor vent stack sizes.* 1. Bedpan steamers. The minimum size of a sterilizer vent serving a bedpan steamer shall be 1-1/2 inches in diameter. Multiple installation shall be sized according to Table 22.

2. Boiling type sterilizers. The minimum size of a sterilizer vent stack shall be 2 inches in diameter when serving a utensil sterilizer, and 1-1/2 inches in diameter when serving an instrument sterilizer. Combinations of boiling type sterilizer vent connections shall be based on Table 22.

**Table 22**  
**VAPOR VENT STACK SIZES FOR BEDPAN STEAMERS AND BOILING TYPE STERILIZERS**  
 (Number of connections of various sizes permitted to various sized sterilizer vent stacks)

Stack size	Connection size	
	1½"	2"
1½-inch <sup>1</sup>	1 or	0
2-inch <sup>1</sup>	2 or	1
2-inch <sup>2</sup>	1 and	1
3-inch <sup>1</sup>	4 or	2
3-inch <sup>2</sup>	2 and	2
4-inch <sup>1</sup>	8 or	4
4-inch <sup>2</sup>	4 and	4

<sup>1</sup>Total of each size.

<sup>2</sup>Combination of sizes.

3. Pressure sterilizers. Sterilizer vent stacks shall be 2–1/2 inches minimum; those serving combinations of pressure sterilizer exhaust connections shall be sized according to Table 23.

**Table 23**  
**VAPOR VENT STACK SIZES FOR PRESSURE STERILIZERS**  
 (Number of connections of various sizes permitted to various sized vent stacks)

Stack size	Connection size			
	¾"	1"	1¼"	1½"
1½-inch <sup>1</sup>	3 or	2 or	1	
1½-inch <sup>2</sup>	2 and	1		
2-inch <sup>1</sup>	6 or	3 or	2 or	1
2-inch <sup>2</sup>	3 and	2		
2-inch <sup>2</sup>	2 and	1 and	1	
2-inch <sup>2</sup>	1 and	1 and		1
3-inch <sup>1</sup>	15 or	7 or	5 or	3
3-inch <sup>2</sup>		1 and	2 and	2
3-inch <sup>2</sup>	1 and	5 and		1

<sup>1</sup>Combination of sizes.

<sup>2</sup>Total of each size.

4. 'Pressure instrument washer-sterilizer sizes'. The minimum size of a sterilizer vent stack serving an instrument washer-sterilizer shall be 2 inches in diameter. Not more than 2 sterilizers shall be installed on a 2-inch stack, and not more than 4 on a 3-inch stack.

(9) FLOOR DRAINS PROHIBITED. Floor drains shall not be installed in operating or delivery rooms.

(10) WATER SUPPLY. (a) *Water services.* All hospitals shall be provided with at least 2 water service connections and whenever more than one street main is available, the connections shall be made to different street mains.

1. The water service pipe for all other health care facilities shall be of sufficient size to furnish water to the building in the quantities and at the pressures required in s. Comm 82.40 (4) and (5) and par. (c).

2. Water services shall be in accord with the requirements of s. Comm 82.40 (2).

(b) *Water distribution control valves.* 1. Four or less patient care units, containing not more than 2 persons per unit exclusive of intensive care coronary units, may be served with one branch control valve. All fixtures, appliances, appurtenances, lawn sprinkler faucets and wall hydrants shall be valved.

2. Control valves for risers, water heating equipment, water softeners and tank controls shall be in accord with s. Comm 82.40. Control valve accessibility and design shall be in accord with s. Comm 82.40.

(c) *Velocities and flow capacities.* Water supply piping shall be designed to provide service to upper floor installations at a minimum pressure of 15 (p.s.i.) pounds per square inch during maximum demand periods. Velocities shall not exceed 8 (f.p.s.) feet per second. Where static pressure exceeds 80 (p.s.i.) pounds per square inch, pressure reducing controls shall be installed to avoid fracture or other damage to the system. The supply demand in gallons per minute in the building water distribution system shall be determined on the basis of the load in terms of supply fixture units and of the relationship between load and supply demand as shown in Table 24 and pertinent portions of Tables 82.40–1 to 82.40–9.

**Table 24**  
**DATA FOR ESTIMATING WATER SUPPLY DEMAND AND WASTE REQUIREMENTS**

Fixture	Fixture Units		Minimum Pipe Sizes, Inches					Remarks
	Water	Waste	Waste	Trap	Vent	Cold Water	Hot Water	
Water closet (tank) . . . . .	6	6	3	2	2	3/8	½	H.W. required with bedpan washer hose only
Water closet (flush valve) . . . . .	10	8	3	2	2	1	½	
Lavatory . . . . .	2	1	1½	1¼	1¼	½	½	
Urinal (tank) . . . . .	3	4	2	2	1½	½	—	
Urinal (flush valve) . . . . .	5	4	—	—	—	1	—	
Shower . . . . .	4	2	3 FD	3	—	½	½	
Patient bath (public) . . . . .	4	3	1½	1½	1½	½	½	
Patient bath (pvt.) . . . . .	2	3	1½	1½	1½	½	½	
Drinking fountain . . . . .	1	½	1¼	1¼	1¼	½	—	
Sitz bath . . . . .	4	3	1½	1½	1½	½	½	
Clinical sink . . . . .	10 CW	6	3	3	2	1	¾	
(Flushing rim) . . . . .	4 HW	—	—	—	—	—	—	

**Table 24 (Continued)**  
**DATA FOR ESTIMATING WATER SUPPLY DEMAND AND WASTE REQUIREMENTS**

Fixture	Fixture Units		Minimum Pipe Sizes, Inches					Remarks
	Water	Waste	Waste	Trap	Vent	Cold Water	Hot Water	
Scrub sink . . . . .	4	3	2	2	1½	¾	¾	2, 3 or 4 place sink
Single sink for misc. hospital use	3	3	1½	1½	1½	½	½	
Double sink for misc. hospital use	4	4	2	2	1½	¾	¾	
Laboratory sink . . . . .	2	2	1½	1½	1½	½	½	
Ice machine . . . . .	1	1	2 SD	2	1½	¾	—	
Plaster sink . . . . .	6	4	2	2	1½	¾	¾	Use with plaster trap
X-ray tank . . . . .	4	2	1½	1½	1½	½	½	Based on 18 x 30 x 22-inch tank
Bedpan sanitizer . . . . .	10	6	3	2	2	1	—	½-inch STM connection
Autopsy table . . . . .	4	4	1½	1½	1½	½	½	
Animal area sinks . . . . .	4	4	2	2	1½	¾	¾	
Cup sink . . . . .	1	1	1¼	1¼	1¼	½	—	

(d) *Piping insulation.* Circulating, hot, cold and chilled water piping shall be insulated. Cold and chilled water pipe insulation shall have an integral or separate vapor barrier.

(e) *Special piping systems.* Distilled water, ionized water, laboratory and other special piping systems shall be included in the plans submitted. The plans shall incorporate sufficient detail to clearly establish the installation proposed.

(g) *Hot water supply control.* Hot water supply to patients' showers, therapeutic equipment, and continuous baths shall be provided with control valves automatically regulating the temperature of the water supply to the fixture. The valve shall fail in a closed position when the tempered water supply to the fixture

exceeds 110°F.

(h) *Hot water supply.* The water supply distribution system shall be designed to provide hot water at each applicable fixture at all times. The system shall be of a circulating type. The circulating pumps shall be arranged for continuous operation or shall be controlled by an aquastat in the circulating piping. See s. Comm 82.40 (5).

(i) *Water heaters and tanks.* Storage tanks when provided shall be fabricated of non-corrosive metal or be lined with non-corrosive material. The water heating equipment shall have a sufficient capacity to supply water at the temperature and amounts in Table 26.

**Table 26**

	Patient Areas	Clinical	Dietary	Laundry (2 gals. per lb. of laundry)
Gal/hr/bed . . . . .	6-1/2	6-1/2	4	4-1/2
Temp. °F. (Maximum)	110°	125°	180°	180°

(11) **ASPIRATORS.** The use of water aspirators shall be limited to those units approved by the department.

(12) **SPOUTS AND ACTIONS—HOSPITAL AND NURSING HOME FIXTURES.** (a) The selection of spouts and actions for hospital and nursing home plumbing fixtures shall comply with par. (b) and Table 27.

(b) Lavatories and sinks required in patient care areas shall

have the water supply spout mounted so that its discharge point is a minimum distance of 5 inches above the rim of the fixture. All fixtures used by medical and nursing staff, and all lavatories used by patients and food handlers shall be trimmed with valves which can be operated without the use of hands. Where blade handles are used for this purpose they shall not exceed 4-1/2 inches in length, except that handles on scrub sinks and clinical sinks shall be not less than 6 inches long.

**Table 27**

**SPOUTS AND ACTIONS FOR HOSPITAL AND NURSING HOME FIXTURES**

Location	Type of Spout	Type of Action Minimum
<b>NURSING DEPARTMENT</b>		
Patient toilet room . . . . .	Gooseneck	Wrist
Patient toilet room— isolation . . . . .	Gooseneck	Knee
Utility room . . . . .	Gooseneck	Wrist
Treatment room . . . . .	Gooseneck	Wrist
Medicine room . . . . .	Gooseneck	Wrist
Lavatory in floor kitchen . . . . .	Gooseneck	Wrist
Sink in floor kitchen . . . . .	Sink faucet	Wrist
Nurses toilet room . . . . .	Lavatory supply	Hand
Floor laboratory . . . . .	Laboratory gooseneck	Vertical hand

**Table 27 – (Continued)**  
**SPOUTS AND ACTIONS FOR HOSPITAL AND NURSING HOME FIXTURES**

Location	Type of Spout	Type of Action Minimum
<b>NURSERY</b>		
Nursery .....	Gooseneck	Wrist
Suspect nursery .....	Gooseneck	Wrist
Examination and treatment .....	Gooseneck	Wrist
Premature nursery .....	Gooseneck	Foot
Formula room .....	Gooseneck	Wrist
Labor room .....	Gooseneck	Wrist
<b>SURGICAL</b>		
Scrub room .....	Gooseneck with spray head	Knee
Sub-sterile room .....	Sink faucet	Wrist
Clean-up room .....	Sink faucet	Wrist
Frozen sections room .....	Laboratory gooseneck	Vertical hand
Surgical supply room .....	Gooseneck	Wrist
Work room .....	Sink faucet	Wrist
Cystoscopic room .....	Gooseneck with spray head	Knee
Fracture room .....	Sink faucet	Wrist
Recovery room .....	Gooseneck	Foot
<b>CENTRAL SUPPLY</b>		
Work room .....	Sink faucet	Wrist
Solutions room .....	Sink faucet	Wrist
Needle and syringe room .....	Sink faucet	Wrist
Glove room .....	Gooseneck	Wrist
Pharmacy .....	Laboratory gooseneck	Vertical hand
Manufacturing .....	Gooseneck	Wrist
<b>EMERGENCY DEPARTMENT</b>		
Observation bedroom .....	Gooseneck	Wrist
Utility room .....	Gooseneck	Wrist
Operating room .....	Gooseneck with spray head	Knee
D.O.A. room .....	Gooseneck	Wrist
Examination room .....	Gooseneck	Wrist
<b>DIAGNOSTIC AND TREATMENT</b>		
Occupational therapy .....	Gooseneck	Wrist
Hydro-therapy room .....	Gooseneck	Wrist
Examination room .....	Gooseneck	Wrist
Deep therapy .....	Gooseneck	Wrist
Superficial therapy .....	Gooseneck	Wrist
Radium treatment and exam .....	Gooseneck	Wrist
Toilet room .....	Gooseneck	Wrist
Dark room .....	Sink faucet	Hand
Autopsy .....	Gooseneck with spray head	Knee
Lavatory in autopsy shower room .....	Gooseneck	Wrist
Laboratories .....	Laboratory gooseneck	Vertical hand
<b>OUTPATIENT DEPARTMENT</b>		
Examination and treatment room .....	Gooseneck	Wrist
Dental operating .....	Gooseneck	Knee

**Table 27 – (Continued)**  
**SPOUTS AND ACTIONS FOR HOSPITAL AND NURSING HOME FIXTURES**

Location	Type of Spout	Type of Action Minimum
Dental laboratory .....	Laboratory gooseneck	Vertical hand
Dental recovery .....	Gooseneck	Wrist
Surgical room .....	Gooseneck with spray head	Knee
Eye examination room .....	Gooseneck	Knee
Ear, nose and throat room .....	Gooseneck	Knee
<b>SERVICE DEPARTMENT</b>		
Lavatory in kitchen .....	Lavatory supply	Wrist

**(13) RADIOACTIVE MATERIALS.** See ch. HSS 157.

**History:** 1-2-56; am. (3) (4) and (5), Register, August, 1961, No. 68, eff. 9-1-61; r. and recr. Register, November, 1972, No. 203, eff. 12-1-72; r. and recr., Register, February, 1979, No. 278, eff. 3-1-79; renum. from H 62.16, Register, July, 1983, No. 331, eff. 8-1-83; renum. from ILHR 82.16 and am. (7) (b), (10) (a) 1. and 2., (b) 2., (f) (intro.) and (h), Register, February, 1985, No. 350, eff. 3-1-85; r. (10) (f) and Table 25, Register, February, 1994, No. 458, eff. 3-1-94.

**Comm 82.51 Mobile home sites and parks.**

**(1) DRAIN SYSTEMS.** (a) *Private interceptor main sewer.* The maximum number of mobile homes served by private interceptor main sewer shall be in accordance with Table 82.51.

**Table 82.51**

**MAXIMUM NUMBER OF MOBILE HOMES SERVED BY A PRIVATE INTERCEPTOR MAIN SEWER**

Diameter of Private Interceptor Main Sewer (in inches)	Pitch (inch per foot)		
	1/16	1/8	1/4
4	None	7	10
5	12	18	24
6	26	34	49
8	Load Shall Not Exceed Capacity of Pipe <sup>a</sup>		

<sup>a</sup> See s. Comm 82.30 (4) (d).

(b) *Building sewer.* The building sewer for a mobile home shall be at least 4 inches in diameter.

(c) *Mobile home drain connector.* The piping between the mobile home drain outlet and the building sewer shall have a minimum slope of 1/4 inch per foot, and shall be of materials approved for above ground drain and vent pipe in accordance with ch. Comm 84. The connector shall be protected against freezing.

(d) *Other requirements.* Mobile home park sewer systems shall also conform to the applicable requirements of s. Comm 82.30.

**(2) WATER SUPPLY SYSTEMS.** (a) *Private water mains.* 1. Supply demand. The supply demand in gallons per minute in the private water main system shall be determined on the basis of the load in terms of water supply fixture units, and in terms of the relationship between load and supply demand. The demand load of a mobile home site shall be equivalent to at least 15 water supply fixture units.

2. Sizing. The private water mains shall be sized in accordance with s. Comm 82.40. A private water main serving a mobile home park shall not be less than one inch in diameter.

3. Pressure. The minimum pressure within a private water main shall be sufficient to maintain a pressure of 20 psi at each mobile home site under normal operating conditions.

4. Valving. Each private water main shall be provided with a gate or full flow valve at its source and at each branch connection. The valves shall be installed in a manhole or valve box so as to be accessible for operation.

(b) *Water services.* 1. Size. Each mobile home site shall be served by a separate water service not less than 3/4 inch in diameter.

2. Valving. a. Each water service shall be provided with a curb stop within each mobile home site but not under the parking hard stand or pad.

b. A valve, of at least 3/4 inch diameter, shall be located on the upper end of the water service pipe. In lieu of the valve located on the upper end of the water service, a freezeless type hydrant of at least 3/4 inch diameter may be used.

c. The installation of underground stop and waste valves shall be prohibited.

3. Mobile home water connector. The piping between the mobile home water inlet and the water service shall be of materials approved for water distribution pipe in accordance with s. Comm 84.30 (3).

(c) *Protection against freezing.* All water main and water service piping shall be protected against freezing.

(d) *Separation of water and sewer piping.* Separation of water and sewer piping shall be in accordance with ss. Comm 82.30 (11) (d) and 82.40 (8) (b).

(e) *Other requirements.* Mobile home park water supply systems shall also conform to the applicable requirements of s. Comm 82.40.

**(3) BUILDING SEWER AND WATER SERVICE TERMINATIONS.** (a) *Frost sleeves.* Each building sewer and water service shall have a frost sleeve extending at least 42 inches below grade. The sleeve shall be of a material approved for building sewers. Frost sleeves shall terminate at grade. A frost sleeve shall be covered or sealed when not in use.

(b) *Termination elevation.* Each water service shall terminate at least 6 inches above the surrounding finished grade. Each building sewer shall terminate at least 4 inches above the surrounding finished grade and shall not terminate higher than the water service pipe.

(c) *Piping not in use.* A building sewer or water service pipe not connected to a mobile home shall be capped or plugged.

**Note:** See Appendix for further explanatory material.

**History:** Cr. Register, February, 1985, No. 350, eff. 3-1-85; r. and recr. Table, Register, August, 1991, No. 428, eff. 9-1-91; am. (2) (d), Register, February, 1994, No. 458, eff. 3-1-94.

**Subchapter VI—Installation**

**Comm 82.60 Pipe hangers and supports.** The provisions of this section control the types, materials and installation of anchors, hangers and supports for plumbing piping.

**(1) MATERIAL.** (a) *Strength.* Hangers, anchors and supports for piping shall be of sufficient strength to support the piping and its contents. Drain piping shall be considered as being full of water. Underground piers for pipe support shall be of concrete, masonry, plastic or pressure treated wood.

(b) *Compatibility.* 1. Hangers and straps shall be of a compatible material that will reduce the potential for galvanic action with the piping.

2. Hangers and straps may not distort, cut or abrade piping.  
 (2) INSTALLATION. (a) Piping hangers and anchors shall be securely attached to the building's structure at intervals to support the piping and its contents, but not at intervals greater than those specified in Table 82.60. The connection of drain piping to a fixture or appliance shall be considered a point of support.

(b) Hubless pipe installed in the horizontal position shall be supported within 24 inches on each side of a joint, unless the joint has an alignment retaining shield.

(c) Hangers shall not be attached to a building's structure by means of wood plugs.

**Table 82.60**  
**Support Spacing**

Material	Maximum Horizontal Spacing (feet)	Maximum Vertical Spacing (feet)
Acrylonitrile Butadiene Styrene (ABS)	4	10
Brass	10	10
Cast iron	5 <sup>a</sup>	15
Copper or Copper-Alloy Pipe	12	10
Copper or Copper-Alloy Tubing:		
≤ 1¼" diameter <sup>c</sup>	6	10
≥ 1½" diameter <sup>c</sup>	10	10
Chlorinated Polyvinyl Chloride (CPVC):		
≤ 1" diameter <sup>c</sup>	3	5 <sup>b</sup>
≥ 1¼" diameter <sup>c</sup>	4	6 <sup>b</sup>
Crosslinked Polyethylene (PEX)	2 2/3	4
Ductile Iron	5 <sup>a</sup>	15
Galvanized Steel	12	15
Lead	Continuous	4
Polybutylene (PB)	2 2/3	4
Polyvinyl Chloride	4	10
Stainless Steel	12	15

<sup>a</sup> The maximum horizontal spacing for supports may be increased to 10 feet when 10-foot lengths of pipe are employed.

<sup>b</sup> Mid-story guide is to be employed.

<sup>c</sup> "≥" means greater than or equal to.

"≤" means less than or equal to.

**History:** Cr. Register, February, 1985, No. 350, eff. 3-1-85; r. and recr. Register, May, 1988, No. 389, eff. 6-1-88; r. and recr. Table 82.60, Register, February, 1994, No. 458, eff. 3-1-94.

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## Chapter Comm 83

### PRIVATE SEWAGE SYSTEMS

Comm 83.01	Purpose.	Comm 83.12	Sizing soil absorption systems.
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Comm 83.04	Specific limitations.	Comm 83.16	Maintenance and sludge disposal.
Comm 83.05	Local filing requirements.	Comm 83.17	Chemical restoration.
Comm 83.055	Issuance of building permits.	Comm 83.18	Holding tanks.
Comm 83.06	County administration.	Comm 83.19	Inspections.
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Comm 83.08	Examination of plans and specifications.	Comm 83.21	Building sewers and drains.
Comm 83.09	Site evaluation.	Comm 83.23	Mound systems.
Comm 83.10	Site requirements.		

**Note:** Chapter H 63 was created as an emergency rule effective 6-21-80; chapter H 63 as it existed on June 30, 1983 was renumbered to chapter ILHR 83. Chapter ILHR 83 was renumbered chapter Comm 83 under s. 13.93 (2m) (b) 1., Stats., and corrections made under s. 13.93 (2m) (b) 6. and 7., Stats., Register, February, 1997, No. 494.

**Comm 83.01 Purpose.** (1) **GENERAL.** The underlying principles of this chapter as authorized in s. 145.02 (2), Stats., are basic goals in environmental health and safety accomplished by proper siting, design, installation, inspection, and maintenance of private sewage systems. The prerequisites necessary for the essential protection of the health of the public and the environment are the same everywhere. As unforeseen situations arise which are not specifically covered in this chapter the basic principles enumerated in this section shall serve to define intent.

**Note:** All forms required for compliance with this chapter are available from the local county sanitary permit office and are supplied by the department from the Safety and Buildings Division, P. O. Box 7969, Madison, WI 53707.

(2) **BASIC PRINCIPLES.** (a) **Need.** Every building intended for human habitation or occupancy shall be provided with a properly functioning system for treatment and disposal of domestic waste.

(b) **Discharges prohibited.** Every private sewage system shall be designed, located and constructed to prevent any discharge of sewage or partially treated sewage into drain tiles, onto the ground surface, into the structure served, into the surface waters of the state or into the groundwater of the state including zones of seasonal soil saturation.

(c) **Maintenance.** Every private sewage system shall be adequately maintained.

(d) **Nuisance.** Every private sewage system shall be designed, located and constructed so as not to create a nuisance.

(e) **Sizing.** Every private sewage system shall be designed and constructed to adequately dispose of all the wastewater generated in the structure or facility it is serving.

**History:** Cr. Register, December, 1980, No. 300, eff. 1-1-81; renum. from H 63.01, Register, June, 1983, No. 330, eff. 7-1-83; r. (2) (b) and renum. (2) (c) to (f) to be (2) (b) to (e), Register, February, 2000, No. 530, eff. 3-1-00.

**Comm 83.02 Definitions.** For the purpose of this chapter, the following definitions shall apply. The dictionary meaning shall apply for all other words.

(1) **"Aggregate"** means washed graded hard rock that has been washed with water under pressure over a screen during or after grading to remove fine material and with a hardness value of 3 or greater on Moh's Scale of Hardness. Aggregate that can scratch a copper penny without leaving any residual rock material on the coin would have a hardness of 3 or more on Moh's Scale of Hardness.

(3) **"Approved"** means approved or accepted by the department.

(4) **"Bedrock"** means the rocks that underlie soil material or are at the earth's surface. Bedrock is encountered when the weath-

ered in-place consolidated material, larger than 2 mm in size, is greater than 50% by volume.

(5) **"Building"** means a structure having walls and a roof erected or set upon an individual foundation or slab-constructed base designed or used for the housing, shelter, enclosure or support of persons, animals or property of any kind. A mobile home is included in this definition. Each structure abutting another structure which does not have an ingress-egress doorway through the basement foundation walls, or structures with separate exterior or exterior abutting walls, or public use structures separated by an unpierced firewall, shall be considered as a separate or individual building.

(6) **"Cesspool"** means a covered excavation in the ground which receives sewage or other organic wastes from a drainage system, and so designed as to retain the organic matter and solids, permitting the liquids to seep into the soil cavities.

(7) **"Cleanout"** means a plug or cover made of material approved by the department joined by means of a screw thread to an opening in a pipe, which can be removed for the purpose of cleaning or examining the interior of the pipe.

(8) **"Clear water wastes"** means cooling water and condensate drainage from refrigeration compressors and air-conditioning equipment, water used for equipment chilling purposes, liquid having no impurities or where impurities have been reduced below a minimum concentration considered harmful, and cooled condensate from steam heating systems or other equipment.

(9) **"Color"** means the moist color of the soil based on Munsell soil color charts.

(11) **"Conventional soil absorption system"** means a system that employs gravity flow from the septic or other treatment tank and applies effluent to the soil through the use of a seepage trench, bed or pit. The distribution piping is 4 inch diameter pipe.

(12) **"County"** means the local government unit responsible for the regulation of private sewage systems. County government is the local governmental unit responsible except that towns, villages and cities are the responsible unit of government in any county that has a population in excess of 500,000.

(13) **"Department"** means the department of commerce.

(14) **"Detailed soil map"** means a map prepared by or for a state or federal agency participating in the national cooperative soil survey showing soil series, type and phases at a scale of not more than 2,000 feet to the inch and includes related explanatory information.

(15) **"Dosing soil absorption system"** means a system that employs a pump or automatic siphon to elevate or distribute effluent to the soil through the use of a seepage trench or bed. Distribution piping in seepage trenches or beds shall be 4 inch perforated pipe approved by the department.

**(16)** " Dwelling unit" means one or more rooms with provisions for living, sanitary and sleeping facilities which are used or intended to be used by one person or by 2 or more persons maintaining a common household.

**(17)** "Effluent" means liquid discharged from a septic or other treatment tank.

**(18)** "Failing private sewage system" has the meaning as given in s. 145.245 (4), Stats.

*Note:* Section 145.245 (4), Stats., reads: "A failing private sewage system is one which causes or results in any of the following conditions: (a) the discharge of sewage into surface water or groundwater; (b) the introduction of sewage into zones of saturation which adversely affects the operation of a private sewage systems; (c) the discharge of sewage to a drain tile or into zones of bedrock; (d) the discharge of sewage to the surface of the ground; (e) the failure to accept sewage discharges and back up of sewage into the structure served by the private sewage system."

**(19)** "Farm" means a parcel of 35 or more acres of contiguous land which is devoted primarily to agricultural use, as defined in s. 91.01 (1) and (5), Stats., which during the year preceding application for a mound produced gross farm profits as defined in s. 71.58 (4), Stats., of not less than \$6,000 or which during the 3 years preceding application produced gross farm profits, as defined in s. 71.58 (4), Stats., of not less than \$18,000.

**(20)** "Flood fringe" means that portion of a flood plain which is outside of the floodway and which is covered by flood waters during any regional floods. It is generally associated with standing water rather than rapidly flowing water.

**(21)** "Flood plain" means the land which has been or may be covered by flood water during regional floods. The flood plain includes the floodway and the flood fringe.

**(22)** "Floodway" means the channel of a river or stream and those portions of the flood plain adjoining the channel which carry and discharge flood water or flood flows during the regional floods.

**(23)** "Grease interceptor" means a watertight tank which is installed underground for the collection and retention of grease from cooking or food processing and which is accessible for periodic removal of the contents.

**(24)** "High groundwater" means zones of soil saturation which include: Perched water tables, shallow regional groundwater tables or aquifers, or zones that are seasonally, periodically or permanently saturated.

**(25)** "High water level" means the highest known flood water elevation of any lake, stream, pond or flowage or the regional flood elevation established by a state or federal agency.

**(26)** "Holding tank" means an approved watertight receptacle for the collection and holding of sewage.

**(27)** "Horizontal reference point" means a stationary, easily identifiable point to which horizontal dimensions can be related.

**(28)** "Industrial waste" means liquid wastes which result from processes employed in industrial establishments.

**(29)** "Legal description" means an accurate Metes and Bounds description, a lot and block number in a recorded subdivision, a recorded assessor's plat or a public land survey description to the nearest 40 acres.

**(29m)** "Local station" means a National Weather Service (NWS) precipitation station or other precipitation station accepted by the department as collecting precipitation data in accordance with NWS methods.

**(30)** "Manhole" means an opening of sufficient size to permit a person to gain access to a sewer or any portion of a plumbing system.

**(31)** "Mobile home" means a transportable structure mounted on a chassis and designed to be used with or without a permanent foundation as a dwelling unit. The phrase "without a permanent foundation" indicates that the support system is constructed with the intent that the mobile home thereon may be moved from time to time at the convenience of the owner. See ss. 218.10 (2) and 340.01 (29), Stats.

**(32)** "Mobile home park" means any plot or plots of ground owned by a person, state or local government upon which 2 or more units, occupied for dwelling or sleeping purposes regardless of mobile home ownership, are located, and whether or not a charge is made for such accommodation. See s. 66.058 (1) (i), Stats.

**(33)** "Nuisance" means any source of filth, odor or probable cause of sickness pursuant to the provisions of s. 146.14, 1991 Stats.

*Note:* 1993 Wis. Act 27 repealed s. 146.14, Stats., and replaced with the concept of "human health hazard."

**(34)** "Percolation test" means the method specified in s. Comm 83.09 (5) of testing absorption qualities of the soil.

**(35)** "Permeability" means the ease with which liquids move through the soil. One of the soil qualities listed in soil survey reports.

**(36)** "Pipe diameters" means the inside diameter.

**(37)** "Plumbing system" means a system as defined in s. 145.01 (10), Stats.

**(38)** "Potable water" means water which is satisfactory for human consumption, hygiene and culinary use and meets the requirements of the state administrative authority having jurisdiction.

**(39)** "Pressure distribution system" means a soil absorption system that employs a pump or automatic siphon and small diameter distribution piping with small diameter perforations to introduce effluent into the soil. Plan review and departmental approval is required for each system of this type.

**(40)** Private sewage system is defined in s. 145.01 (12), Stats.

**(41)** "Private residence" means a one- or 2-family building or dwelling. See dwelling unit.

**(42)** "Privy" means a structure that is not connected to a plumbing system which is used by persons for the deposition of human body wastes.

**(43)** "Public building" means any structure, including exterior parts of such building, such as a porch, exterior platform or steps providing means of ingress or egress, used in whole or in part as a place of resort, assemblage, lodging, trade, traffic, occupancy or use by the public, or by 3 or more tenants in accord with s. 101.01 (12), Stats.

**(44)** "Reservoir" means a watertight receptacle basin or vault constructed above the ground surface or underground for the storage of potable water.

**(45)** "Public garage" means a building or part of a building used for the storage of land, air or water vehicles by 3 or more persons not of the same family or habitation.

**(46)** "Regional flood" means as defined in ch. NR 116, Wis. Adm. Code.

**(47)** "Regional flood elevation" means as defined in ch. NR 116, Wis. Adm. Code.

**(48)** "Seepage bed" means an excavated area larger than 5 feet in width which contains a bedding of aggregate and has more than one distribution line.

**(49)** "Seepage pit" means an underground receptacle so constructed as to permit disposal of effluent or clear wastes by soil absorption through its floor and walls.

**(50)** "Seepage trench" means an area excavated one to 5 feet in width which contains a bedding of aggregate and a single distribution line.

**(51)** "Septic tank" means a tank which receives and partially treats sewage through processes of sedimentation, oxygenation, flotation and bacterial action so as to separate solids from the liquid in the sewage and discharges the liquid to a soil absorption system.

**(52)** "Sewage" means the liquid and water carried wastes created in and to be conducted away from residences, industrial establishments and public buildings.

(53) "Soil" means the unconsolidated material over bedrock.

(54) "Soil boring" means an observation pit dug by hand or backhoe, a hole dug by augering or a soil core taken intact and undisturbed with a probe.

(54m) "Soil consistence" means the cohesion among soil particles and the adhesion of soil to other substances.

(54q) "Soil horizon" means any layer of soil or soil material occurring approximately parallel to the land surface and differing from adjacent layers in physical, chemical, and biological properties or characteristics, including but not limited to color, texture, structure and consistency. Some types of soil horizons include:

(a) The "A" horizon means a mineral horizon that formed at the surface and is characterized by an accumulation of organic matter intimately mixed with the mineral fraction;

(b) The "B" horizon means a mineral horizon that formed below an "A" or "E" horizon and is dominated by concentrations of silicate clay, iron, aluminum, gypsum or silica; and

(c) The "E" horizon means a mineral horizon in which the main feature is the loss of silicate clay, iron, aluminum or a combination of these leaving a concentration of sand and silt particles of quartz or other resistant minerals.

(55) "Soil mottles" means spots or streaks of contrasting soil colors usually caused by soil saturation for some period of a normal year.

**Note:** Grayish colored mottles are called low chroma; reddish brown, red or yellow mottles are called high chroma.

(56) "Soil saturation" means the state when all the pores in a soil are filled with water. Water will flow from saturated soil into a bore hole.

(56m) "Soil structure" means the combination or arrangement of individual soil particles into definable aggregates or peds, which are characterized and classified on the basis of size, shape and degree of distinctness.

(56n) "Soil texture" means the relative proportions of the various soil separates in a soil, as specified in the United States department of agriculture system.

(57) "Topsoil" means the undisturbed surface horizon of a soil often characterized by a black or dark grayish brown color due to a higher content of organic matter.

(58) "Vent cap" means an approved appurtenance used for covering the vent terminal of an effluent disposal system to avoid closure by mischief or debris and still permit circulation of air within the system.

(59) "Vertical elevation reference point" means an easily identifiable stationary point or object of constant elevation for establishing the relative elevation of percolation tests, soil borings and other locations.

(60) "Water service" means a pipe extended from the water main or private pumping system or other supply source with or without lateral extensions to the building, structure or other system to be served.

(61) "Workmanship" means work of such character that will fully secure the results sought in all the sections of this chapter as intended for the safety, welfare and health protection of all individuals.

(62) "Watercourse" means a stream usually flowing in a particular direction, though it need not flow continually, it may sometimes be dry. It must flow in a definite channel, having a bed, sides or banks, and usually discharges itself into some other stream or body of water. It must be something more than a mere surface drainage over the entire face of a tract of land, occasioned by unusual freshets or other extraordinary causes. It does not include the water flowing in the hollows or ravines in land, which is the mere surface water from rains or melting snow, and is discharged through them from a higher to a lower level, but which at other times are destitute of water. Such hollows or ravines are not in

legal contemplation watercourses. (*Hoyt vs. City of Hudson* 27 Wis. 656 (1871), Wisconsin Supreme Court)

(63) MISCELLANEOUS. Standards or Specifications Abbreviations.

A.G.A. . . . .	American Gas Association, Inc. 420 Lexington Ave. New York, New York 10017
A.N.S.I. . . . .	American National Standards Institute, Inc. 1430 Broadway New York, New York 10018
A.S.M.E. . . . .	American Society of Mechanical Engineers 345 East 47th Street New York, New York 10017
A.S.S.E. . . . .	American Society of Sanitary Engineering P.O. Box 9712 Bay Village, Ohio 44140
A.S.T.M. . . . .	American Society for Testing and Materials 100 Barr Harbor Drive West Conshohocken, Pennsylvania 19428-2959
A.W.W.A. . . . .	American Water Works Association Data Processing Department 6666 West Quincy Avenue Denver, Colorado 80235
C.S. . . . .	Commercial Standards, Supt. of Documents Governmental Printing Office Washington, D.C. 20401
F.S. . . . .	Federal Specifications General Services Administration Regional Office 3 Washington, D.C. 20407
M.S.S. . . . .	Manufacturers Standardization Society of the Valve and Fittings Industry 127 Park Street, N.E. Vienna, Virginia 22180
N.S.F. . . . .	National Sanitation Foundation Interna- tional P.O. Box 130140 Ann Arbor, Michigan 48113-0140
U.L. . . . .	Underwriters' Laboratories, Inc. 333 Pfingsten Road Northbrook, Illinois 60062
W.C.F. . . . .	Water Conditioning Foundation 1201 Waukegan Road Glenview, Illinois 60025

**Note:** For definitions of master plumber, journeyman, restricted plumbers, apprentices, registered learners and certified soil tester, refer to ch. 145, Stats.

**History:** Cr. Register, December, 1980, No. 300, eff. 1-1-81; renun. from H 63.02, Register, June, 1983, No. 330, eff. 7-1-83; cr. (29m), (54m), (56m) and (56n), Register, June, 1991, No. 426, eff. 7-1-91; r. and recr. (18), cr. (54q), Register, April, 1992, No. 436, eff. 5-1-92; r. (2) and (10), Register, February, 1994, No. 458, eff. 3-1-94; corrections in (19) made under s. 13.93 (2m) (b) 7., Stats., Register, February, 1994, No. 458.

**Comm 83.03 Approvals and limitations. (1) ALLOWABLE USE.** Septic tank and effluent absorption systems or other treatment tank and effluent disposal systems as may be approved by the department may be constructed when no public sewerage system is available to the property to be served. Unless specifically approved by the department, the private sewage system of each building shall be entirely separate from and independent of that of any other building. A private sewage system may be owned

by the property owner or by a special purpose district. The use of a common system or a system on a different parcel than the structure will be subject to the same plan review procedures as for systems serving public buildings.

(2) **ABANDONMENT.** A subsurface tank or pit that is no longer used as part of a private sewage system shall be abandoned by complying with all of the following:

(a) Disconnecting all piping to the tanks and pits.

(b) Sealing all disconnected piping to the tanks and pits in accordance with s. Comm 82.21 (2) (h).

(c) Pumping and disposing of the contents from all tanks and pits.

**Note:** The disposal of the contents from septic tanks, treatment tanks, distribution tanks, seepage pits and holding tanks is addressed in ch. NR 113 which is administered by the department of natural resources.

(d) Removing all tanks or removing the covers of the tanks or pits and filling the tanks and pits with soil, gravel or an inert solid material.

**Note:** Pursuant to s. 281.45, Stats., municipalities and sanitary districts may determine the availability of, and require connection to, public sewers. Section 281.45, Stats., reads in part: "House connections. To assure preservation of public health, comfort and safety, any city, village or town or town sanitary district having a system of waterworks or sewerage, or both, may by ordinance require buildings used for human habitation and located adjacent to a sewer or water main, or in a block through which one or both of these systems extend, to be connected with either or both in the manner prescribed. If any person fails to comply for more than 10 days after notice in writing the municipality may impose a penalty or may cause connection to be made, and the expense thereof shall be assessed as a special tax against the property."

(3) **FAILING SYSTEM.** When a failing or malfunctioning private sewage system is encountered, the sewage disposal system shall be corrected or its use discontinued within that period of time required by county or departmental order, with a maximum time limit of one year.

**History:** Cr. Register, December, 1980, No. 300, eff. 1-1-81; renum. from H 63.03, Register, June, 1983, No. 330, eff. 7-1-83; r. and recr. (2), Register, February, 2000, No. 530, eff. 3-1-00.

**Comm 83.035 Petitions for variance.** The department shall consider a petition for a variance to a rule of this chapter in accordance with ch. Comm 3. The department shall grant a variance provided an equivalency to the intent of the specific rule can be established.

**Note:** The department cannot grant a petition for an issue which is also specifically covered by the statutes; for example, a petition to waive the requirement to obtain a sanitary permit to install a new private sewage system.

**Note:** As a result of a court action, s. Comm 83.035 was prevented from taking effect on June 1, 1996. Prior to June 1, 1996, s. Comm 83.035 did not exist.

**History:** Cr. Register, May, 1996, No. 485, eff. 6-1-96; correction made under s. 13.93 (2m) (b) 7., Register, February, 2000, No. 530.

**Comm 83.04 Specific limitations.** (1) **DOMESTIC WASTE.** All water carried wastes derived from ordinary living uses shall enter the septic or treatment tank unless otherwise specifically exempted by the department or this chapter.

(2) **CESSPOOLS.** Cesspools are prohibited.

(3) **INDUSTRIAL WASTES.** The department of natural resources shall be contacted in regard to the treatment and disposal of all industrial wastes including those combined with domestic waste.

(4) **CLEAR WATER.** The discharge of surface, rain and other clear water into a private sewage system is prohibited.

(5) **WATER SOFTENER AND IRON FILTER BACKWASH.** Water softener or iron filter discharge may be directed to the private sewage system, or to the ground surface if a nuisance is not created.

(6) **FLOODPLAIN.** (a) *General.* A soil absorption system shall not be installed in a floodway. Soil absorption systems in the flood fringe shall not be installed unless written approval is received from the department. The department shall receive written approval from the local government and the department of natural resources for construction in, and filling of, the floodplain area prior to reviewing and approving plans.

(b) *New developments.* 1. Floodways. New private sewage systems shall not be installed in a floodway.

2. Flood fringe. In the flood fringe the installation of individual private sewage systems will be reviewed on a case-by-case basis. It is preferable that with new systems that are allowed in "fringe" areas they be installed on land contiguous to land outside the flood plain limit. However, developments in isolated areas within the flood fringe may also be approved. Land areas shall be filled and thus removed from the flood plain designation. The amount of area to be filled is site dependent and will be evaluated on a site-by-site basis. Individual sites shall be checked by the county and may be checked by department staff to insure that soil conditions and other factors are in full accord with ch. NR 116, Wis. Adm. Code. The requirements of this chapter must be met before any placement of fill is authorized to overcome specific flooding conditions. The filled area for the building and the filled area for the private sewage system shall be connected. The extent and design of the fill for the sewage disposal system shall be in accord with the current rules of the department for systems in fill. [See s. Comm 83.10 (6).] The department of natural resources will determine whether an island within a river is located in a flood plain and if it is subject to flood plain regulations.

(c) *Existing developments.* 1. Floodway. The following types of replacement systems may be allowed on a case-by-case basis to abate a health hazard in floodway areas:

a. Holding tanks flood proofed in accordance with s. Comm 83.18 (9); or

b. The installation of a replacement soil absorption system outside the flood plain limit connected to the development by a force main or to an approved acceptable site outside the floodway but in the flood fringe area. Septic tanks in the floodway shall be flood-proofed. The site must meet the requirements set forth in this chapter.

2. Flood fringe. Malfunctioning soil absorption systems may generally be replaced provided favorable soil conditions and other site factors exist.

a. County approval and acceptance shall be documented on plumbing form SBD-6698 prior to state approval.

b. If filling is necessary and upon receipt of county approval, the specific design criteria and fill conditions will be stipulated for each installation in accord with this chapter.

**Note:** Soil absorption systems are preferable to holding tanks.

3. Processing of form SBD-6698. Form SBD-6698 serves as the basis for department approval of sewage disposal systems in flood plain areas. A copy of this form signed by the local authority will be submitted to the department of natural resources by the department. The county authority's signature is mandatory. Approval of a new or replacement system by the department of natural resources or the department will not be granted if the form is unsigned. The department of natural resources' approval indicated by signing form SBD-6698 relates only to the accuracy of the flood plain data.

(d) *Special flood plain developments.* In certain flood plain areas where the installation of sewage disposal systems may be necessary but because of unique site conditions cannot comply with ch. NR 116, Wis. Adm. Code, or this chapter, the department of natural resources may authorize or approve special flood plain developments provided they are in accord with the purpose and intent of ch. NR 116, Wis. Adm. Code, and county flood plain ordinances. Special developments may include but not be limited to such projects as campgrounds in flood plain areas, or the expansion of certain nonconforming uses.

**History:** Cr. Register, December, 1980, No. 300, eff. 1-1-81; renum. from H 63.04, Register, June, 1983, No. 330, eff. 7-1-83; am. (6) (c) 1. a., Register, April, 1992, No. 436, eff. 5-1-92.

**Comm 83.05 Local filing requirements.** (1) **SOIL TEST REPORTS.** The county shall establish a filing system for soil test reports. The county shall review soil test reports for proposed private sewage disposal systems and verify the data reported if nec-

essary. If the soil test report is considered to be adequate, the county shall file the report.

(2) COUNTY PLAN EXAMINATION FOR ONE AND 2 FAMILY RESIDENCES. (a) *General*. Complete plans and specifications shall be submitted to the county with the application for sanitary permit. Plans shall be submitted on paper not less than 8-1/2 by 11 inches in size. The county may set the number of plan copies required to adequately review the application for the sanitary permit and for the inspection of the private sewage system installation.

(b) *Plans and specifications*. All plans shall include the following:

1. Plot plan. Detailed plot plan dimensioned or drawn to scale showing the lot size; the location of all septic tanks; holding tanks or other treatment tanks; building sewers—sanitary and storm; wells; water mains or water service; streams and lakes; dosing or pumping chambers; distribution boxes; effluent systems; dual disposal systems; replacement system areas; and the location of the building served. Adjoining properties shall be checked to insure that the site location distances in s. Comm 83.10 (1) are complied with. All separating distances and dimensions shall be shown on the detailed plot plan.

2. Reference points. A vertical elevation reference point and a horizontal reference point.

3. Soil data. Soil boring and percolation test data related to the undisturbed and finished grade elevations, vertical elevation reference point and horizontal reference point. Surface elevations shall be given for all soil borings.

4. Occupancy. The maximum number of bedrooms in the residence shall be indicated.

5. Other specifications. Complete specifications for pumps and controls including dose volume, elevation differences (vertical lift), pipe friction loss, pump performance curve, pump model and pump manufacturer.

(3) FEES. The county may require plan examination fees or include these fees in the cost of the sanitary permit in accord with s. 145.19 (2), Stats.

(4) REVISED PLANS. Every installer of a private sewage system who modifies or changes the design of a system must submit to the county authority a revised plan. All changes or modifications must be approved by the county authority prior to installation.

(5) ACCEPTANCE. No private sewage system shall be used until the proper sanitary permit, inspection and a revised plan, if required, has been accepted and filed by the county authority.

(6) PLAN FILING. The county shall establish a filing system which provides a system of retrieval of sanitary permits and plans and may set by ordinance a filing fee. The county may require that additional information be included on the plan to aid in filing, indexing or retrieving permits and plans.

*History:* Cr. Register, December, 1980, No. 300, eff. 1-1-81; renun. from H 63.05, Register, June, 1983, No. 330, eff. 7-1-83.

**Comm 83.055 Issuance of building permits.** Pursuant to s. 66.036, Stats., building permits issued by a county, city, village or town for construction of any structure not served by a public sewer and requiring connection to a private sewage system shall be issued in accordance with the procedures of this section.

(1) NEW CONSTRUCTION. A county, city, village or town may not issue a building permit for construction of a new structure which requires the installation of a private sewage system unless a sanitary permit for the installation of the private sewage system has been obtained by the owner.

*Note:* Section Comm 83.06 outlines the procedures for the issuance of sanitary permits. Section 145.19, Stats., mandates that no private sewage system may be installed unless the owner of the property holds a valid sanitary permit.

(2) RECONNECTIONS. (a) A county, city, village or town may not issue a building permit for the following conditions unless the owner provides the information specified in par. (b):

1. Construction of a structure to be connected to an existing private sewage system;

2. Disconnection of a structure from an existing private sewage system and connection of another structure to the system; or

3. Reconstruction of a structure that is connected to a private sewage system and that has become uninhabitable due to damage resulting from fire, wind or other manmade or natural disasters.

(b) Documentation shall be provided to verify:

1. That the existing private sewage system is not a failing system and has sufficient size and soil conditions to accommodate the wastewater load as specified in sub. (3); and

2. That the structure meets the set back requirements as specified in sub. (4).

(c) Determinations of approved documentation shall be in the form of a sanitary permit or in writing.

(3) CONSTRUCTION INVOLVING AN INCREASE OF WASTEWATER LOAD. (a) *General*. A county, city, village or town may not issue a building permit for construction of any structure connected to a private sewage system which will increase the wastewater load to an existing private sewage system or interfere with a functioning system as specified in this subsection, unless the owner of the proposed structure:

1. Possesses a sanitary permit to either modify the existing private sewage system or construct a new private sewage system to accommodate the increased wastewater load; or

2. Provides written documentation from the department or county verifying that the existing private sewage system has sufficient size and soil conditions to accommodate the increased wastewater load.

(b) *Determination of increased wastewater load*. For the purpose of this section:

1. Increased wastewater load in public buildings and places of employment results from any change in use of the structure from the original use that results in an increased volume of wastewater above that for which the system was originally designed.

2. Increased wastewater load in dwellings results from an increase in the number of bedrooms or from construction of any addition or remodeling which exceeds 25% of the total gross area of the existing dwelling unit. Increased wastewater load in dwellings does not result from construction of decks, patios, garages, porches, reroofing, painting, wiring, residing, window replacements or replacement of equipment or appliances.

3. Counties may establish additional criteria for determining increased wastewater load by ordinance.

(c) *Documentation*. Documentation to verify whether the size of the existing private sewage system can accommodate the increased wastewater load and to verify whether the system is installed in suitable soils shall include all of the following:

1. Information on the soil conditions of the soil absorption system. The information may consist of a valid existing soil report or new soil evaluation report for the system, prepared by a certified soil tester showing conformance with the minimum 3-foot vertical separation above bedrock and groundwater specified in s. Comm 83.10 (2);

2. Information provided by a licensed master plumber or master plumber-restricted sewer, a certified soil tester, or plumbing inspector II for:

a. Sizing of the system relative to the existing usage, replacement area, and the proposed construction usage and the type of system; or

b. A copy of an affidavit signed by the owner and recorded with the register of deeds indicating that the existing private sewage system capacity serving a one- or 2-family dwelling is oversized and indicating whether a replacement area is available.

3. A plan prepared by a licensed master plumber or master plumber-restricted sewer, certified soil tester or plumbing inspec-

tor II setting forth the dimensions of the existing soil absorption area, tank location and related setbacks;

4. Information provided by a licensed master plumber or master plumber-restricted sewer, septic hauler or plumbing inspector II relative to the condition, capacities, baffles, and manhole covers for the existing treatment tanks, and the capacity of any additional treatment tanks required to accommodate the increased wastewater load; and

5. Information provided by a certified soil tester, a licensed master plumber, master plumber-restricted sewer, or plumbing inspector II showing that the system is not causing backup of sewage into the structure served, or discharge of sewage to the surface of the ground or to a drain tile, or discharge of sewage to any surface waters of the state.

(d) *On-site inspection.* If it cannot be determined from the information provided that an existing private sewage system can accommodate the increased wastewater load, the department or county may require additional information to be submitted to make the determination or the department or county shall inspect the system for:

1. The failure to accept sewage discharges and the backup of sewage into the structure served by the private sewage system;
2. The discharge of sewage to the surface waters of the ground or to a drain tile;
3. The discharge of sewage to any surface waters of the state; and
4. Conformance with the minimum 3-foot vertical separation above bedrock and groundwater specified in s. Comm 83.10 (2).

(e) *Determinations by department or county.* 1. Determination of whether an existing private sewage system is of an adequate capacity to accommodate additional wastewater loads involving one- and 2-family dwellings shall be made by the county. A county may make determinations of whether an existing private sewage system is of an adequate capacity to accommodate additional wastewater loads generated by construction other than one- and 2-family dwellings involving less than 3,000 gallons per day of wastewater load.

2. Determination of whether an existing private sewage system is of an adequate capacity to accommodate additional wastewater loads generated by construction involving structures other than one- and 2-family dwellings and 3,000 gallons or more per day of wastewater load shall be made by the department.

(f) *Determination on soil conditions.* 1. If the existing private sewage system is a failing system, the system shall be ordered replaced.

2. If the existing private sewage system is installed in mottled soils, the owner may request a variance to use the existing system and perform groundwater monitoring to verify seasonal saturation conditions under s. Comm 83.09 (7).

3. If the construction affects the only soil replacement area, written notice shall be provided to the owner indicating future wastewater options the owner may have available.

(g) *Determination on tanks.* 1. If the tanks are leaking, the tanks shall be ordered replaced.

2. If the baffles in the tank are deteriorated or missing, the baffles shall be ordered replaced.

3. If the exposed tank cover has no cover or is not locked or labeled, the cover shall be ordered replaced, locked and labeled.

4. If the tank capacity services a one- and 2-family dwelling and is:

a. Less than 500 gallons, the tank shall be ordered replaced or additional tank capacity shall be ordered added;

b. At least 750 gallons, the existing tank may be used provided no more than one additional bedroom is added;

c. At least 750 gallons and 2 or more bedrooms are being added, additional tank capacity shall be ordered added.

5. If the tank serves any structure other than a one- and 2-family dwelling, additional tank capacity shall be ordered.

(h) *Determinations on setbacks.* All determinations on setbacks involving an increase in wastewater loads shall conform to sub. (4) (c) and (d).

(4) **CONSTRUCTION NOT INCREASING WASTEWATER LOADS.** (a) A county, city, village or town may issue a building permit for construction of:

1. Any structure on a property containing a private sewage system if the construction does not increase the wastewater load as specified in sub. (3); or

2. An accessory structure not connected to a private sewage system.

3. The completed construction shall conform to the setback limitations specified in s. Comm 83.10 (1), 83.15 (4) (a) or 83.18 (7) (a).

(b) Documentation shall be provided by the owner, licensed master plumber or master plumber-restricted sewer, certified soil tester or plumbing inspector II showing the location and setback distances for the proposed construction of any structure relative to the components of the private sewage system.

(c) Determinations of whether the location and setback distances of a proposed construction will interfere with an existing private sewage system shall be made by the department or the county. On-site inspections may be made to verify the location and setback distances. Determinations shall be made in writing and provided to the agency responsible for issuing the building permit.

(d) No sanitary permit shall be required for construction that conforms to the setback requirements and that does not involve an increase in wastewater load.

(e) No building permit may be issued where setback requirements cannot be met unless:

1. A petition for variance is obtained from the department; or

2. The owner agrees in writing to correct any deficiencies discovered during construction for a system that cannot be located.

(f) Any variance submitted under this section shall be reviewed by the county prior to submitting to the department. The county may submit any information relative to the variance.

(5) **FEEES.** The department or county may assess and collect a fee to defray the cost of administering this section.

**History:** Emerg. cr. 12-1-88; cr. Register, August, 1989, No. 404, eff. 9-1-89.

**Comm 83.06 County administration.** (1) **PRIVATE SEWAGE SYSTEM ORDINANCE.** (a) *Adoption of ordinance.* Every county shall adopt an ordinance governing private sewage systems which conforms with this chapter. The ordinance shall apply to the entire area of the county. (Ref. s. 59.065 (1), Stats.)

(b) *Enforcement.* The county shall administer the private sewage system ordinance in accordance with s. 145.20, Stats., and this chapter.

(2) **SANITARY PERMITS.** (a) *General.* The county shall establish administrative procedures for the approval, disapproval or issuance of state sanitary permits in accord with s. 145.135, and s. 145.19, Stats., and this chapter.

(b) *Application.* The application for a sanitary permit shall be made on forms furnished by the department. Before a private sewage system is installed a licensed master plumber or master restricted plumber (sewer) shall sign the application for permit and assume responsibility for installation of the system. (Ref. ss. 145.06 and 145.135, Stats.)

(c) *Permit transfer.* When there is a change of ownership, building use or master plumber, a permit transfer form furnished by the department shall be submitted to the county for approval prior to the installation of a private sewage system. Failure to submit transfer forms to the county shall invalidate the sanitary per-

mit in accord with s. 145.135 (1), Stats. The county may charge a fee for the transfer of a sanitary permit.

(d) *Posting.* The sanitary permit shall be issued by the county on forms furnished by the department. The sanitary permit shall be displayed conspicuously so as to be visible from the road fronting the lot during construction.

(3) COUNTY ORGANIZATION AND PERSONNEL. (a) *Assignment of duties.* The county board may assign the duties of administering the private sewage system program to any county office, department, committee, board, commission, position or employee.

(b) *Certified soil tester.* The county shall obtain the services of a certified soil tester, either as a county employe or under contract, to review and verify certified soil tester reports.

(4) COUNTY RESPONSIBILITIES. (a) *Review of soil test reports.* The county shall review certified soil tester reports for proposed private sewage systems and verify the report at the proposed site, if necessary.

(b) *Review of applications for sanitary permits.* The county shall approve or disapprove applications for sanitary permits and assist applicants in preparing an approvable application.

(c) *Written notice.* The county shall issue written notice to each applicant whose sanitary permit application is disapproved. Each notice shall state the specific reasons for disapproval and amendments to the application, if any, which render the application approvable. Each notice shall also give notice of the applicant's right to appeal and the procedures for conducting an appeal under ch. 68, Stats.

(d) *Inspections.* The county shall inspect all private sewage systems after construction but before backfilling no later than the end of the next workday, excluding Saturdays, Sundays and holidays, after receiving notice from the plumber in charge. Inspections shall be reported on forms furnished by the department.

(e) *Reports and surveys.* The county shall file reports and conduct surveys and inspections as required by the county or the department.

(f) *Investigate violations.* The county shall investigate violations of the private sewage system ordinance and s. 146.13, Stats., issue orders to abate the violations and submit orders to the district attorney, corporation counsel or attorney general for enforcement.

(g) *Other duties.* The county shall perform other duties regarding private sewage systems as considered appropriate by the county or as required by the rules of the department.

(5) DEPARTMENT RESPONSIBILITIES. (a) *Department approval.* The department may specify categories of private sewage systems for which approval by the department is required prior to issuance of sanitary permits by the county.

(b) *Department audit.* The department shall review the private sewage system program in each county to ascertain compliance with s. 145.20 (2), Stats., and with rules promulgated by the department. This review shall include a random audit of sanitary permits, including verification by on-site inspection.

(c) *Compliance.* If a county board does not adopt a private sewage system ordinance meeting the requirements of s. 59.065, Stats., or if the county does not appoint personnel meeting the requirements of s. 145.20 (1), Stats., or if the county does not comply with the requirements of s. 145.20 (2), Stats., the department may conduct hearings in the county seat upon 30 days notice to the county clerk. As soon as practicable after the public hearing, the department shall issue a written decision regarding compliance with s. 59.065 or 145.20 (1) and (2), Stats. If the department determines that there is a violation of these provisions, the county may not issue a sanitary permit for the installation of a private sewage system until the violation is corrected.

(d) *Training.* The department shall conduct training and informational programs for county officials and employes and persons licensed under this chapter and s. 146.20, Stats., to improve the delivery of service under the county private sewage system pro-

gram. The department shall obtain the assistance of the Wisconsin county boards association in planning and conducting the training and informational programs.

Note: Subsections (3) to (5) are taken from ch. 145, Stats.

History: Cr. Register, December, 1980, No. 300, eff. 1-1-81; renum. from H 63.06, Register, June, 1983, No. 330, eff. 7-1-83.

**Comm 83.07 Plan review—department. (1) APPROVALS.** (a) *One- and 2-family residences.* Unless required elsewhere in this chapter, the submission of plans and specifications and departmental approval of initial, modified, additional or replacement construction of private sewage systems serving one- and 2-family residences is not required. All applicable plans, permits and approvals required by county government shall be obtained prior to the commencing of construction. The county government shall require plans and specifications prior to issuing permits or approval. [See s. Comm 83.05 (2).]

(b) *Public buildings—department approval.* Complete plans and specifications shall be submitted in accord with this section. Written approval shall be received before sanitary permits are issued for the initial installation of a private sewage system or for the addition to, modification or replacement of the system, if the system serves or will serve any public buildings. The owner shall submit a copy of the approved plans to the county authority. Included as public buildings but not limited by enumeration are: Theaters and assembly halls; schools and other places of instruction; apartment buildings, hotels and places of detention; factories, office and mercantile buildings; mobile home parks, campgrounds and camping resorts and parks.

(c) *Public buildings—local approval.* Approval by the county shall not eliminate the need for approval by the department for the installation of private sewage systems serving public buildings. Departmental approval shall not eliminate the need for obtaining all required county permits and approvals.

(d) *Plan review processing time.* The department shall review and make a determination on an application for plan review within 15 business days of receiving the required information and fees.

(2) SUBMISSION OF PLANS AND SPECIFICATIONS—PUBLIC BUILDINGS. All plans and specifications shall be submitted in duplicate and shall include the following:

(a) *Plot plan.* Detailed plot plan dimensioned or drawn to scale showing the lot size; the location of all septic tanks, holding tanks or other treatment tanks, building sewers—sanitary and storm, wells, water mains or water service, streams and lakes, dosing or pumping chambers, distribution boxes, effluent disposal systems, dual disposal systems, and disposal replacement areas; and the location of the public building served by such systems. Adjoining properties shall be checked to insure that the site location distances in s. Comm 83.10 (1) are complied with. All distances and dimensions shall be shown on the detailed plot plan;

(b) *Legal description.* Legal description of the property on which the system is to be installed;

(c) *Reference points.* A vertical elevation reference point and a horizontal reference point;

(d) *Soil data.* Soil boring and percolation test data related to the undisturbed and finished grade elevations and vertical elevation reference point and horizontal reference point;

(e) *Contours—original grade.* Ground slope with 2-foot contours for the original, undisturbed grade elevation of the entire area of the soil absorption system and the area on all sides for a distance of 25 feet;

(f) *Contours—altered sites.* Ground slope with 2-foot contours for the grade elevation of the entire area of the soil absorption system and the area on all sides for a distance of 25 feet after alteration of the landscape;

(g) *Use and occupancy.* Complete data relative to the maximum expected use and occupancy of the building to be served considering all anticipated future growth plans;

(h) *Other specifications.* Complete specifications for pumps and controls including dose volume, elevation differences (vertical lift), friction loss, pump performance curve, pump model and pump manufacturer.

(3) **PLAN EXAMINATION FEE.** All plans and specifications submitted to the department for review shall be accompanied with fees as established in s. Comm 83.08.

(4) **PLAN REVISIONS.** Revisions to approved plans and specifications shall be approved by the department.

(5) **PLAN AVAILABILITY.** One set of plans bearing the department's stamp of approval shall be maintained at the project site during construction of any private sewage system serving a public building.

*History:* Cr. Register, December, 1980, No. 300, eff. 1-1-81; renum. from H 63.07, Register, June, 1983, No. 330, eff. 7-1-83; cr. (1) (d), Register, February, 1985, No. 350, eff. 3-1-85.

**Comm 83.08 Examination of plans and specifications.** (1) **PLAN EXAMINATION REQUIRED.** (a) Except as provided in sub. (2) (d), plans and specifications for the following types of private sewage systems shall be submitted to the department for review:

1. Pressure distribution system;
2. Mound system;
3. Holding tank;
4. Experimental system; and
5. A conventional soil absorption system to serve a public building.

(b) When plans and specifications for a type of private sewage system specified in par. (a) are submitted to the department for review, written approval for the plans shall be obtained from the department prior to a sanitary permit being issued for the system or installation of the system commences.

(2) **PLAN SUBMISSION.** (a) *Stamping and signing plans.* All plans and specifications shall be sealed or stamped in accord with ch. A-E 2, Wis. Adm. Code by a registered architect, engineer or registered plumbing designer. A master plumber may design and submit for approval plumbing plans and specifications for a private sewage system which they are to install. Each sheet of plans and specifications the master plumber submits shall be signed, dated and include their Wisconsin master plumber license number. When more than one sheet is bound together into one volume, only the title sheet or index sheet need be signed and dated by the master plumber responsible for their preparation, provided the signed sheet clearly identifies all of the other sheets comprising the bound volume.

(b) *Submitting data.* All plans, preliminary or complete, shall be submitted in duplicate. Work shall not commence until written approval for the preliminary or complete plans is received from the department. The plans submitted shall be prints that are clear, legible and permanent. All pertinent data shall be a part of or shall accompany all plans submitted for review. Plans will be examined in the order of receipt.

(c) *Additions and alterations.* This section shall apply to all additions, alterations and modifications as well as to all new private sewage systems and shall apply to all cases where there is a change of the type of occupancy or use of building which requires changes to or intended use of the plumbing or private sewage system so as to comply with this chapter for that occupancy or use.

(d) *Agent municipalities.* 1. Upon request from a county, the department may delegate to a county the review of plans for one or more of the following types of private sewage systems which are to be or are located within the jurisdiction of that county:

- a. Holding tank; and
- b. Conventional soil absorption system serving a public building.

2. A request by a county to review the types of plans specified in subd. 1. shall be made in writing. The request shall include

information delineating how the systems are to be processed and reviewed and how plan review decisions are to be recorded and maintained.

3. The delegation of plan review by the department shall be contingent upon a county's request demonstrating sufficient and adequate capabilities and methods, including the involvement of one or more individuals certified to conduct soil morphological evaluations, to provide assistance in the plan review process.

*Note:* The requirements of this subdivision do not require the employment of 2 individuals in order to perform plan review. The individual who is to perform the plan review may also be a soil tester certified to conduct soil morphological evaluations.

4. a. The delegation or the denial of delegation relative to a request concerning plan review under this paragraph shall be made in writing by the department.

b. The delegation for plan review shall be such that the submission and review of plans for the types of plans specified in subd. 1. may, at the discretion of the submitter, be made to the department or the delegated county.

5. The department shall include as part of the audits conducted in accordance with s. Comm 83.06 (5) an evaluation of the plan review functions which may have been delegated to a county under this paragraph.

6. A county which wishes to discontinue the delegated plan review function under this paragraph shall notify the department in writing at least 30 days prior to the discontinuance.

(3) **PLAN EXAMINATION FEES.** Fees shall be charged in accordance with s. Comm 2.65.

(4) **REVISIONS.** After written approval is granted, plans and specifications of plumbing systems shall not be changed without written consent of the department and the architect, engineer, designer or master plumber responsible for the design.

(5) **LIMITATIONS.** In granting approval of plans, specifications, products, devices or materials, the department is not liable for any defects in construction, nor for any damages that may result from the specific installation.

(6) **PLAN AVAILABILITY.** The architect, professional engineer, registered designer, owner or plumbing contractor shall keep at the construction site one set of plans bearing the stamp of approval of the department.

*History:* Cr. Register, December, 1980, No. 300, eff. 1-1-81; r. and recr. (3), Register, June, 1982, No. 318, eff. 7-1-82; renum. from H 63.08, Register, June, 1983, No. 330, eff. 7-1-83; r. and recr. (1) and (2) (d), Register, February, 1994, No. 458, eff. 3-1-94; correction in (3) made under s. 13.93 (2m) (b) 7., Stats., Register, February, 1994, No. 458.

**Comm 83.09 Site evaluation.** (1) **GENERAL.** Site evaluation shall be conducted by a soil tester certified by the department in accord with ch. Comm 5. The evaluation shall include soil conditions, properties and permeability, depth to zones of soil saturation, depth to bedrock, slope, landscape position, all setback requirements and the potential for flooding. Soil test data shall relate to the undisturbed elevations and a vertical elevation reference point or benchmark must be established. Evaluation data shall be reported on forms provided by the department and signed by the certified soil tester. Reports shall be filed for all sites investigated within 30 days of the completion of testing.

(2) **REPLACEMENT SYSTEM AREA.** (a) *General.* On each parcel of land being initially developed, sufficient area of suitable soils, based on the soil tests and system location and site requirements contained in this chapter, for one replacement system shall be established. Where bore hole test data in the replacement system area are equivalent to that in the proposed system area, the percolation test may be eliminated.

(b) *Non-conforming site conditions.* The department shall be contacted for approval of replacement systems for all public buildings and all buildings where site conditions do not permit systems in accord with this chapter. Alternates for the disposal of effluents emanating from existing structures may be accomplished by means other than those outlined in this chapter provided written local approval is obtained and submitted along with



detailed plans and specifications to the department for review and consideration. Written approval shall be received from the department prior to the county issuing permits or work commences on these systems.

(c) *Undisturbed site.* The replacement system area shall not be disturbed to the extent that it is no longer a suitable system area. The replacement system area shall not be used for the following:

1. Construction of buildings;
2. Parking lots or parking areas;
3. Below ground swimming pools;
4. Any other use that may adversely affect the replacement area.

(3) **SLOPE.** (a) *General.* A conventional soil absorption system shall not be located on a land slope of greater than 20%. A conventional soil absorption system shall be located at least 20 feet from the crown of a land slope that is greater than 20% except where the top of the aggregate of a system is at or below the bottom of an adjacent roadside ditch.

(b) *Specific system designs.* Where a more restrictive land slope is to be observed for a soil absorption system other than a conventional system, the more restrictive land slope specified in the design sections of this chapter shall apply.

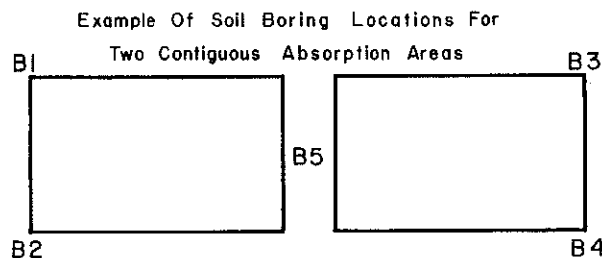
(4) **SOIL BORINGS AND PROFILE DESCRIPTIONS.** (a) *General.* Soil borings shall be conducted on all sites regardless of the type of private sewage system planned to serve the parcel. Borings shall extend at least 3 feet below the bottom of the proposed system. Borings shall be of sufficient size and extent to determine the soil characteristics important to on-site liquid waste disposal. Borehole data shall be used to determine the suitability of the soils at the site with respect to zones of seasonal or permanent soil saturation, and the depth to bedrock. Borings shall be conducted prior to percolation tests to determine whether the soils are suitable to warrant percolation tests and if suitable, at what depth percolation tests shall be conducted. The use of power augers for soil borings is prohibited.

*Note:* Backhoe borings are preferable to borings augered or dug by hand.

(b) *Number.* There shall be a minimum of 3 suitable borings per soil absorption site. More soil borings may be necessary for accurate evaluation of a site.

1. *Depth of borings.* Borings shall be constructed to a depth of at least 3 feet below the proposed depth of the system.

2. *Exceptions.* On new parcels, the requirement of 6 borings (3 for initial area and 3 for replacement area) may be reduced to 5 if the initial and replacement system areas are contiguous and one boring is made on each outer corner of the contiguous area and the fifth boring is made between the system areas. See diagram.



3. *Reports.* Regardless of the number of borings evaluated and conditions observed in borings, all soil information derived from borings shall be reported.

4. *Location.* Each borehole location shall be accurately located and referenced to the vertical elevation and horizontal reference point. Reports of boring locations shall either be drawn to scale, or have the horizontal dimensions clearly indicated between the borings and the horizontal reference point.

(c) *Soil description.* Soil profile descriptions shall be written for all borings. The thickness in inches of the different soil horizons observed shall be indicated. Horizons shall be differentiated on the basis of color, texture, soil mottles or bedrock. Depths shall be measured from the ground surface.

(d) *Soil mottles.* Zones of seasonal or periodic soil saturation shall be estimated at the highest level of soil mottles. The county or department may require a detailed description of the soil mottling on a marginal site. The abundance, size, contrast and color of the soil mottles should be described in the following manner.

1. *Abundance.* Abundance shall be described as few if the mottled color occupies less than 2% of the exposed surface; common if the mottled color occupies from 2 to 20% of the exposed surface; or many if the mottled color occupies more than 20% of the exposed surface.

2. *Size.* Size refers to length of the mottle measured along the longest dimension and shall be described as fine if the mottle is less than 5 millimeters; medium if the mottle is from 5 millimeters to 15 millimeters; or coarse if the mottle is greater than 15 millimeters.

3. *Contrast.* Contrast refers to the difference in color between the soil mottle and the background color of the soil and is described as faint if the mottle is evident but recognizable with close examination; distinct if the mottle is readily seen but not striking; or prominent if the mottle is obvious and one of the outstanding features of the horizon.

4. *Color.* The color(s) of the mottle(s) shall be given.

(e) *Observed groundwater.* The depth to groundwater if present shall be reported. Observed groundwater shall be reported at the level groundwater reaches in the soil borehole, or at the highest level of sidewall seepage into the boring. Measurements shall be made from ground level. Soil above the water level in the boring shall be checked for the presence of soil mottles.

(f) *Color patterns not indicative of soil saturation.* 1. One foot exception. Soil profiles that have an abrupt textural change with finer textured soils overlying more than 4 feet of unmottled, loamy sand or coarser soils can have a mottled zone in the finer textured material. If the mottled zone is less than 12 inches thick and is immediately above the textural change, then a soil absorption system may be installed in the loamy sand or coarser material below the mottled layer. If any soil mottles occur within the sandy material, then the site shall be unsuitable. The county or department may determine certain coarse sandy loam soils to be included as a coarse material.

2. *Other soil color patterns.* Soil mottles can occur that are not due to zones of seasonal or periodic soil saturation. Examples of such soil conditions not limited by enumeration are:

- a. Soil mottles formed from residual sandstone deposits.
- b. Soil mottles formed from uneven weathering of glacially deposited material, or glacially deposited material that may be naturally gray in color. This may include concretionary material in various stages of decomposition.
- c. Deposits of lime in a profile derived from highly calcareous parent material.
- d. Light colored silt coats deposited on soil ped faces.
- e. Soil mottles that are usually vertically oriented along old or decayed root channels with a dark organic stain usually present in the center of the mottled area.

3. *Reporting exceptions.* A certified soil tester shall report any mottled soil condition. If soil mottles are observed that may not be due to soil saturation, the soil tester still shall report such condition and may request a determination from the department or the county authority on the acceptability of the site.

(g) *Bedrock.* The depth to bedrock except sandstone shall be established at the depth in a soil boring where greater than 50% of the weathered in-place material is consolidated. Sandstone

bedrock shall be established at the depth where an increase in resistance to penetration of a knife blade occurs.

(4m) SOIL EVALUATION FOR ABSORPTION SYSTEMS. System sizing and siting for all soil absorption systems shall be based on soil

morphological conditions specified in sub. (4) and Table 0, or percolation tests specified in sub. (5). Percolation tests shall not be performed nor shall percolation test results be accepted after July 1, 1994 except in accordance with sub. (4n).

**TABLE 0**  
**MAXIMUM WASTEWATER INFILTRATION RATES FOR SOIL ABSORPTION SYSTEMS**

If the answer to the condition is yes, the infiltrative, exposed natural soil surface for the system shall be sized using the identified soil loading factor in gallons per square foot per day.<sup>1,2,3</sup>

Soil Condition	Beds	Trenches
A. Is the soil texture of the entire profile 3 feet below the infiltrative surface extremely gravelly sand, gravelly coarse sand or coarser?	0.4 <sup>4</sup>	0.4 <sup>4</sup>
B. Is the soil structure of the horizon moderate or strong platy?	NP <sup>5,6</sup>	0.2 <sup>7</sup>
C. Is the soil texture of the horizon sandy clay loam, clay loam, silty clay loam, silt loam or finer, and the soil structure weak platy?	NP <sup>5,6</sup>	0.3 <sup>7</sup>
D. Is the moist soil consistence of the horizon stronger than firm or any cemented class?	NP <sup>5,6</sup>	NP <sup>5,6</sup>
E. Is the soil texture of the horizon sandy clay, clay or silty clay of high clay content, and the soil structure massive or weak?	NP <sup>5,6</sup>	NP <sup>5,6</sup>
F. Is the soil texture of the horizon sandy clay loam, clay loam, silty clay loam, silt or silt loam and the soil structure massive?	NP <sup>5,6</sup>	0.2 <sup>7</sup>
G. Is the soil texture of the horizon sandy clay, clay or silty clay of low clay content, and the soil structure moderate or strong?	0.2	0.3
H. Is the soil texture of the horizon sandy clay loam, clay loam, silty clay loam or silt loam and the soil structure weak?	0.2	0.3
I. Is the soil texture of the horizon sandy clay loam, clay loam or silty clay loam, and the soil structure moderate or strong?	0.4	0.5
J. Is the soil texture of the horizon loam or sandy loam and the soil structure massive?	0.3	0.4
K. Is the soil texture of the horizon loam or sandy loam and the soil structure weak?	0.4	0.5
L. Is the soil texture of the horizon sandy loam, loam or silt loam, and the soil structure moderate or strong?	0.5	0.6
M. Is the soil texture of the horizon very fine sand or loamy very fine sand? Or condition N below but with massive soil structure?	0.4	0.5
N. Is the soil texture of the horizon fine sand or loamy fine sand?	0.5	0.6
O. Is the soil texture of the horizon loamy sand, sand or coarse sand?	0.7	0.8

Footnotes to Table 0

- The infiltration rates may be adjusted due to crossing horizons at the proposed infiltrative surface. Where such conditions occur, a weighted average may be used to determine the infiltration rate.
- The infiltration rates and soil conditions specified may be verified by the county or department, who may require modification of these rates, particularly where soil conditions exist that are not specifically referenced in this table.
- A soil description report (SBD-8330) shall be completed for each soil profile. The reported texture, structure and consistence shall be used in calculating the loading rate of the infiltrative soil surface.
- Pressure distribution shall be provided in accordance with s. Comm 83.14, except that doses shall be provided more than 4 times per day to increase retention time. Department written approval is required for sites where voids between gravels and cobbles are not filled with soil material of 2 millimeters or less in size. If at least a 6-foot separation below the proposed system to a limiting factor is evaluated and determined, or if a sand textured blanket at least one-foot thick is provided at the infiltrative surface, then a soil loading rate of 0.8 may be used with or without pressure distribution. Split spoon or power auger equipment may be used for evaluations at depths of more than 3 feet below the proposed system, provided such usage is noted on the soil description report.
- NP = Not permitted. Systems may be permitted in these soils only with prior department approval. Site specific department approval will not be required where standard approvals have been issued based on a design concept or regional soil conditions.
- Soil horizons meeting conditions D or E are not permitted within 3 feet below the infiltrative surface of either seepage beds or trenches. Soil horizons meeting conditions B, C or F are not permitted within 3 feet below the infiltrative surface of seepage beds.
- Pressure distribution is required.

(4n) PERCOLATION TEST RESULTS FOR SIZING ABSORPTION SYSTEMS. The sizing of soil absorption systems shall be based upon either:

(a) Tables 1 and 4 if percolation test results are filed with the county in accordance with sub. (1), prior to July 1, 1991; or

(b) Tables 1a, 1b, and 4a if percolation test results are filed with the county in accordance with sub. (1) after July, 1991;

(c) Table 0 if soil evaluation reports as specified in sub. (4m) are filed with the county in accordance with sub. (1).

(5) PERCOLATION TESTS AND PROCEDURES. (a) *Number and location.* At least 3 percolation tests in each system area shall be conducted. The holes shall be located uniformly in the location and to the bottom depth of the proposed absorption system. More percolation tests may be necessary depending on system design.

(b) *Exemption.* Percolation tests may not be required where a detailed soil map clearly indicates loamy sand or coarser material conditions at the depth of the proposed system, and for 3 feet below and the soil condition is confirmed by soil borings. The percolation rate for design purposes shall be calculated using the slowest permeability listed in the soil survey report for the map unit. The county or department may require proof of the map findings or soil texture and resultant anticipated percolation rate. The exemption of percolation tests does not eliminate the required bore hole test data.

(c) *Percolation test hole.* The test hole shall be dug or bored. It shall have vertical sides and have a horizontal dimension of 4 to 8 inches. The bottom and sides of the hole shall be carefully scratched with a sharp pointed instrument to expose the natural soil. All loose material shall be removed from the hole and the bottom shall be covered with 2 inches of gravel or coarse sand.

(d) *Test procedure—sandy soils.* For tests in sandy soils the hole shall be carefully filled with clear water to a minimum depth of 12 inches above the bottom of the hole. The time for this amount of water to seep away shall be determined and this procedure shall be repeated. If the water from the second filling of the hole seeps away in 10 minutes or less, the test may proceed immediately as follows. Water shall be added to a point not more than 6 inches above the gravel or coarse sand. Thereupon, from a fixed reference point, water levels shall be measured at 10-minute intervals for a period of one hour. If 6 inches of water seeps away in less than 10 minutes, a shorter interval between measurements shall be used, but in no case shall the water depth exceed 6 inches. If 6 inches of water seeps away in less than 2 minutes, the test shall be stopped and a rate of less than 3 minutes per inch shall be reported. The final water level drop shall be used to calculate the percolation rate. Soils not meeting the above requirements shall be tested as in par. (e).

(e) *Test procedure—other soils.* The hole shall be carefully filled with clear water and a minimum water depth of 12 inches shall be maintained above the bottom of the hole for a 4-hour period by refilling whenever necessary or by use of an automatic siphon. Water remaining in the hole after 4 hours shall not be removed. Thereafter the soil shall be allowed to swell not less than 16 hours nor more than 30 hours. Immediately following the soil swelling period, the measurements for determining the percolation rate shall be made as follows. Any soil which has sloughed into the hole shall be removed and the water level shall be adjusted to 6 inches over the gravel or coarse sand. Thereupon, from a fixed reference point, the water level shall be measured at 30-minute intervals for a period of 4 hours unless 2 successive water level drops do not vary by more than 1/16 of an inch. At least 3 water level drops shall be observed and recorded. The hole shall be filled with clear water to a point not more than 6 inches above the gravel or coarse sand whenever it becomes nearly empty. Adjustment of the water level shall not be made during the last 3 measurement periods except to the limits of the last measured water level drop. When the first 6 inches of water seeps away in less than 30 minutes, the time interval between measurements shall be 10 minutes and the test run for one hour. The water depth shall not exceed 6 inches at any time during the measurement period. The drop that occurs during the final measurement period shall be used in calculating the percolation rate.

(f) *Mechanical test equipment.* Mechanical percolation test equipment shall be submitted to the department for approval.

(6) **VERIFICATION.** (a) *Borings.* Depth to soil mottles, depth to high groundwater, soil textures, depth to bedrock and land slope may be subject to verification by the county or the department. The county or the department may require backhoe pits to be provided for verification of soil boring data.

(b) *Percolation tests.* The results of percolation tests may be subject to verification by the county or the department. The

county or the department may require that percolation tests be reconducted under supervision.

(c) *Filling.* Where the natural soil condition has been altered by filling or other methods used to improve wet areas, the department may require observation of high groundwater levels under saturated soil conditions.

Note: Detailed soil maps are of value for determining estimated percolation rates and other soil characteristics.

(7) **MONITORING GROUNDWATER LEVELS.** (a) *General.* A property owner or developer may provide documentation to the department and the county that soil mottling or other soil color patterns at a particular site are not an indication of seasonally saturated soil conditions or high groundwater levels. Documentation shall be made by conforming to the criteria in either subd. 1. or 2., unless sites are monitored against broad regional water tables in accordance with par. (b) 2.

1. A written report evaluating soil mottling and soil color patterns may be submitted to the department for review and approval. The report shall be prepared by a certified soil tester who has passed the examination specified in ch. Comm 5. The written report shall include the following:

a. A review of the soils and landscape in the area of the proposed system installation;

b. Soil descriptions to a depth of 5 feet below the bottom of the proposed system, to the depth of bedrock, or to a saturated zone, whichever is shallower, using the United States department of agriculture system. The soil description shall identify each soil horizon for its texture, structure, consistence, Munsell colors, depth measured from the soil surface, macroporosity, continuity, boundary conditions, and any other factors that would influence the operation or design of the proposed soil absorption system;

c. Description of the mottling including size, abundance, contrast and Munsell color and reasons for the mottling;

d. A recommended design loading rate from Tables 0, 1 or 4; linear loading rate; depth of the proposed system, geometry, and type of suitable soil absorption system that should be used on the site for disposal of wastewater;

e. The soil types or series listed in a United States department of agriculture soil survey in the immediate area;

f. A description of the site, including a 2 foot topographic contour map of the system area and 25 feet beyond; description of the vegetation and current land use; details of any artificial drainage; location of all compacted areas including roads and drives; and drainage patterns that may affect the proposed soil absorption system; and

g. Written comments provided by the county. If the county has no comments, the county shall so state.

2. Groundwater levels may be monitored at specific sites in accordance with the procedures in pars. (b) through (f). Written notice of an intent to monitor shall be submitted to the department and the county with a completed "Soil Description Report" (SBD-8330) prior to monitoring.

3. The report shall be submitted to the department for review and approval. The department may perform an onsite inspection to review the soil conditions.

(b) *Precipitation.* 1. In areas not subject to broad regional water tables, monitoring results shall be considered when the highest of either the precipitation received at a local station, or the average of the 3 closest local stations, equals or exceeds, for both the periods (September 1 through the last day of February, and March 1 through May 31), 8.5 inches and 7.6 inches respectively.

2. Where sites are subject to broad regional water tables, such as large areas of sandy soils, the fluctuation observed over a several year cycle shall be considered. In such cases, data obtained from the United States geological survey or other independent agency utilizing United States geological survey procedures shall

be used to determine if a regional water table is at or near its normal level. Determinations shall be made using hydrograph data and submitted on forms provided by the department.

(c) *Artificial drainage.* Areas which are to be monitored shall be carefully checked for drainage tile and open ditches which could have altered natural high groundwater levels. Where such factors are involved, information on the location, design, ownership and maintenance responsibilities for such drainage shall be provided. Documentation shall be provided to show that the drainage network has an adequate outlet, and can and will be maintained. Sites affected by agricultural drain tile shall not be acceptable for system installation.

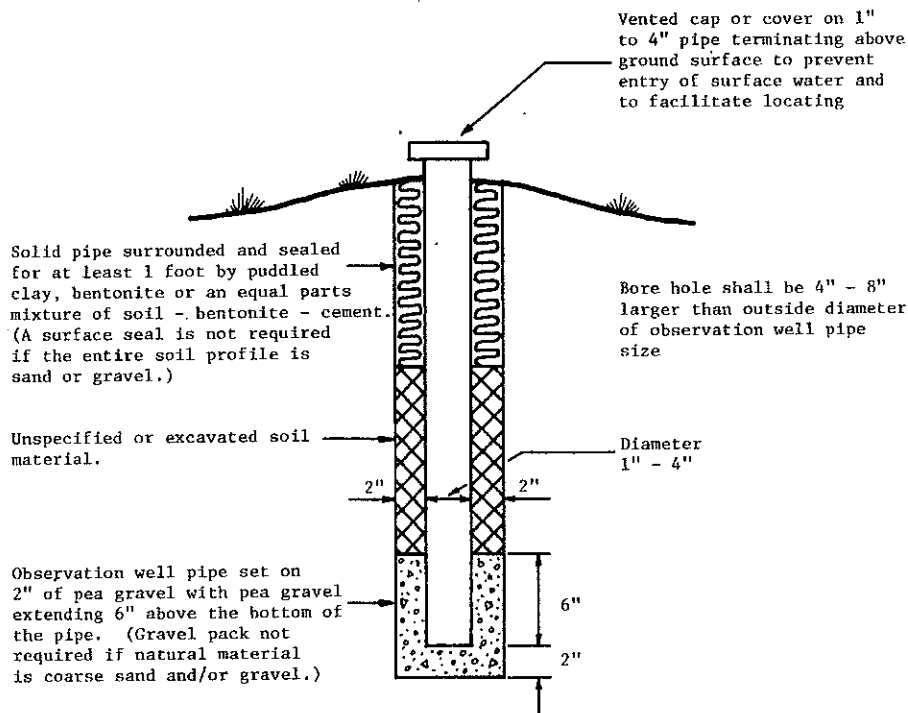
(d) *Procedures.* 1. Soil tester. Monitoring shall be done by a certified soil tester.

2. Notification. The certified soil tester shall notify in writing, the county sanitary permit issuing authority or the department, of intent to monitor. It is expected the county authority or department

may field check the monitoring at least once during the time of expected saturated soil conditions.

3. Number of wells. At least 3 wells shall be monitored at a site for a proposed system and replacement. If in the judgement of the county authority or the department more than 3 monitoring sites are needed, the certified soil tester shall be so advised in writing.

4. Monitoring well design. Monitoring wells designed as shown in the following sketch shall be constructed for monitoring. At least 2 wells shall extend to a depth of at least 6 feet below ground surface and shall be a minimum of 3 feet below the designed system depth. However, with layered mottled soil over permeable unmottled soil, at least one well shall terminate within the mottled layer. Site conditions may, in some cases, require monitoring at greater depths. It will be the responsibility of the certified soil tester to determine the depth of the monitoring wells for each specific site and if in doubt, they shall request the guidance of the county or the department.



(e) *Observations.* 1. Minimum frequency. The first observation shall be made on or before March 15th. Observations shall be made thereafter every 7 days or less until June 1st or until the site is determined to be unacceptable, whichever comes first. If water is observed above the critical depth at any time, an observation shall be made 1 week later. If water is present above the critical depth at both observations, monitoring may cease because the site is considered unacceptable. If water is not present above the critical depth at the second observation, monitoring shall continue until June 1st. If any 2 observations 7 days apart show the presence of water above the critical depth, the site is unacceptable and the department shall be notified in writing.

2. More frequent interval. The occurrence of rainfall(s) of 1/2 inch or more in a 24 hour period during monitoring may necessitate observations at more frequent intervals.

(f) *Reporting data.* 1. Unsuccessful site. When monitoring shows saturated conditions, data giving test locations, ground elevations at the wells, soil profile descriptions, soil series if available from soil maps, dates observed, depths to observed water and local precipitation data (monthly from September 1st to June 1st

and daily during monitoring) shall be submitted in writing, with 2 copies sent to the department and one to the county authority.

2. Successful site. When monitoring discloses that the site is acceptable, documentation including location and depth of test holes, ground elevations at the wells, soil profile descriptions; soil series if available from soil maps; dates observed; results of observations, local precipitation data (monthly from September 1st to June 1st and daily during monitoring) and information on artificial drainage shall be submitted in writing, with 2 copies to the department and one to the county authority. A request to install a soil absorption system shall be made to the department along with the appropriate review fee in s. Comm 83.08 (3) (c).

(8) **WINTER SOIL TESTING.** (a) *General.* Soil testing should be done only when weather and light conditions make accurate evaluation of site conditions possible. Soil testing attempted under winter conditions is difficult and precautions should be observed.

(b) *Soil borings.* Soil borings and profile evaluations conducted between November 15th and March 15th shall be in accord with the following procedures. Borings shall be made with a backhoe. Soil profiles shall only be evaluated between the hours of

10:00 a.m. and 2:00 p.m. Soil profiles shall not be evaluated during times when the sky is completely overcast. When soil horizons are frozen, soil material must be thawed for hand texturing.

(c) *Percolation tests.* Percolation tests that are unprotected shall be conducted only on days when the air temperature is 20° F. or higher and the wind velocity is 10 m.p.h. or less. A heated structure or other protection from freezing shall be provided when the weather conditions listed above are not met. The bottom of the percolation hole shall be at least 12 inches below frost depth. If water freezes in the test hole at any time, the test data shall be void.

**History:** Cr. Register, December, 1980, No. 300, eff. 1-1-81; renun. from H 63.09, Register, June, 1983, No. 330, eff. 7-1-83; cr. (4m) and (4n), r. and rec. (7) (a) and (b), Register, June, 1991, No. 426, eff. 7-1-91; r. and rec. (4n), Register, April, 1992, No. 436, eff. 5-1-92.

**Comm 83.10 Site requirements. (1) SOIL ABSORPTION SITE LOCATION.** The surface grade of all soil absorption systems shall be located at a point lower than the surface grade of any nearby water well or reservoir on the same or adjoining property, however, when this is not possible, the site shall be so located that surface water drainage from the site is not directed toward a well or reservoir and will by-pass the well or reservoir site by several feet. The soil absorption system shall be located not less than 5 feet from any lot line; 10 feet from a water service, or an uninhabited slab constructed building; 15 feet from a swimming pool or habitable slab constructed building measured from the slab; 25 feet from the below grade foundation of any occupied or habitable building or dwelling, public water main or cistern; 50 feet from any water well, reservoir or from the high water mark of any lake, stream or other watercourse. Private sewage systems in compacted areas such as parking lots and driveways are prohibited. Surface waters shall be diverted away from any soil absorption site on the same or neighboring lots.

(2) **GROUNDWATER, BEDROCK OR SLOWLY PERMEABLE SOILS.** There shall be a minimum of 3 feet of soil between the bottom of the soil absorption system and high groundwater, or bedrock. Soil having a percolation rate of 60 minutes per inch or faster shall exist for the depth of the proposed soil absorption system and for at least 3 feet below the proposed bottom of the soil absorption system. There shall be 56 inches of suitable soil from original grade for a conventional soil absorption system.

(3) **PERCOLATION RATE OR SOIL EVALUATION—TRENCH OR BED.** A trench or bed type soil absorption system shall not be installed if the percolation rate for any one of the 3 tests is greater than 60 minutes per inch. The soil infiltration rate listed in Table 0 or the slowest percolation rate shall be used to determine sizing of the soil absorption area.

(4) **PERCOLATION RATE OR SOIL EVALUATION—SEEPAGE PIT.** For a seepage pit, percolation tests shall be made in each horizon penetrated below the inlet pipe. Soil strata in which the percolation rates are greater than 30 minutes per inch shall not be included in sizing the soil absorption area. The infiltration rate determined

from Table 0 or the slowest percolation rate shall be used to size the soil absorption area.

(5) **SOIL MAPS.** When a parcel of land consists entirely of soils having very severe or severe limitations for on-site liquid waste disposal as determined by use of a detailed soil map and interpretive data, that map and interpretive data may be used as a basis for denial for an on-site waste disposal system. However, the property owner shall be permitted to present evidence that a suitable site for an on-site liquid waste disposal system does exist.

(6) **FILLED AREA.** (a) *Departmental approval.* A soil absorption system shall not be installed in a filled area unless written approval is received from the department except if filled prior to certification as a subdivision lot under ch. Comm 85.

(c) *Site and soil requirements.* 1. **Bedrock.** Sites that have less than 56 inches but at least 30 inches of soil over bed-rock, where the original soil texture is sand or loamy sand (sand that has very few fine particles of silt or clay), may be filled with the same soil texture as the natural soil or coarser material up to and including medium sand in an attempt to overcome the site limitations. The fill material shall not be of a finer texture than the natural soil.

2. **High groundwater.** Sites that have less than 56 inches of soil over high groundwater or estimated high groundwater, where the original soil texture is sand or loamy sand (sand that has very few fine particles of silt or clay), may be filled following the criteria noted in this subsection.

3. **Natural soil.** Sites with soils finer than sand or loamy sand shall not be approved for systems in fill.

4. **Monitoring.** Sites that will have 36 inches of soil or less above high groundwater after the topsoil is removed shall be monitored for high groundwater levels in the filled area in accordance with s. Comm 83.09 (7).

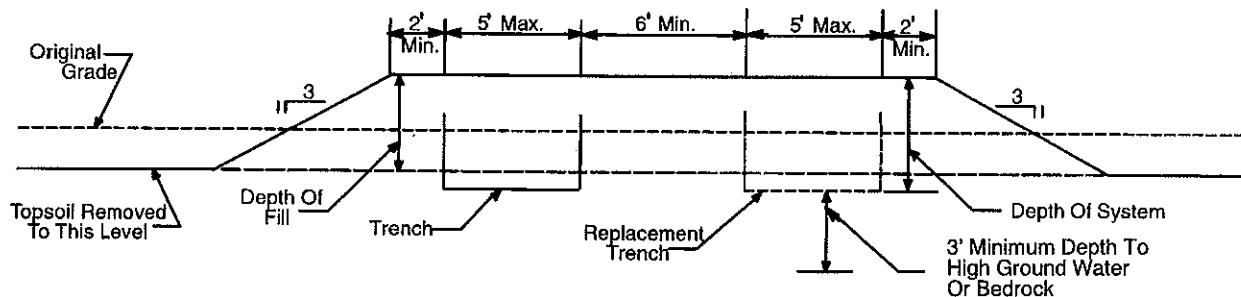
5. **Inspection of fill.** Placement of the fill material shall be inspected by the county or the department.

(d) *Design requirements.* 1. **Size.** A filled area shall be large enough to accommodate a shallow trench system and a replacement system. The size of the filled area shall be determined from the percolation tests or soil infiltration rate as determined from Table 0, based on natural soil and use of the building. When any portion of the trench system or its replacement is in the fill, the fill shall extend to 2 feet beyond all sides of both systems before the side slope of the fill begins.

2. **Soil test.** Soil borings and percolation tests shall be conducted before filling to determine soil textures and depth to high groundwater or bedrock.

3. **Topsoil.** Vegetation and topsoil shall be removed prior to filling.

4. **Side slope.** Slopes at the edge of the filled areas can be a maximum 3 to 1 ratio, providing the 2 foot separating distance is maintained. See following sketch.



(7) ALTERING SLOPES. (a) *General.* In some cases, areas with slopes exceeding those specified in s. Comm 83.09 (3) may be graded and reshaped to provide soil absorption sites. Care must be taken when altering any natural landscapes. Successful site alteration may be accomplished in accord with the following:

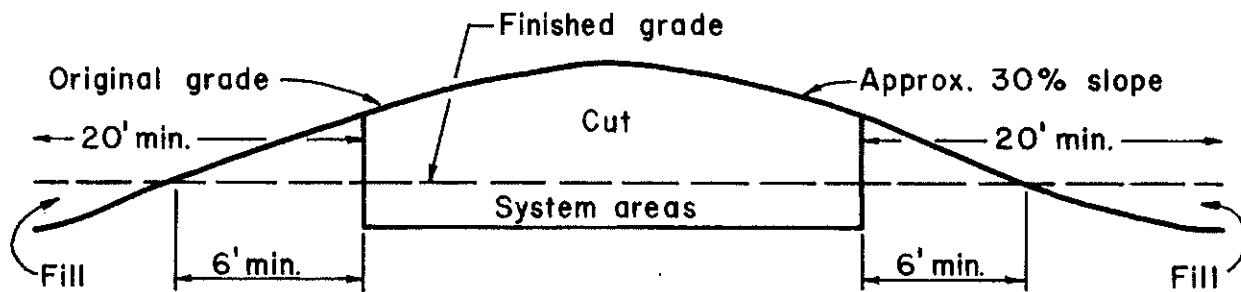
(b) *Site investigation.* Soil test data shall show that a sufficient depth of suitable soil material is present to provide the required amount of soil over bedrock and groundwater after alteration. In addition, a complete site evaluation as specified in s. Comm 83.09 shall be performed after alteration of the site.

(c) *System location.* A soil absorption system must be installed in the cut area of an altered site. A soil absorption system shall not be installed in the fill area of an altered site. The area of fill on an altered site may be used as a portion of the required 20 foot separation distance from the crown of a critical slope. There shall be a minimum of 6 feet of natural soil between the edge of a system area and the downslope side of the altered area.

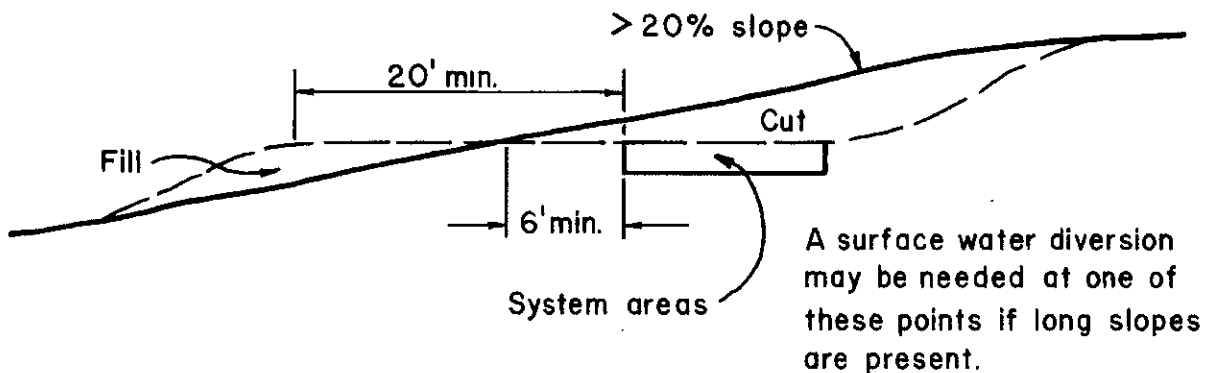
(d) *Site protection.* All altered slope areas shall be altered such that surface water drainage will be diverted away from the system areas. In some cases this may require the use of grassed waterways or other means of diverting surface waters. All disturbed areas shall be seeded or sodded with grass and appropriate steps must be taken to control erosion. Conceptual design sketches for altering slopes follow.

*History:* Cr. Register, December, 1980, No. 300, eff. 1-1-81; renum. from H 63.10 and am. (6) (a), Register, June, 1983, No. 330, eff. 7-1-83; am. (3), (4), (6) (d) 1. and 4., Register, June, 1991, No. 426, eff. 7-1-91; r. (6) (b), Register, February, 1994, No. 458, eff. 3-1-94.

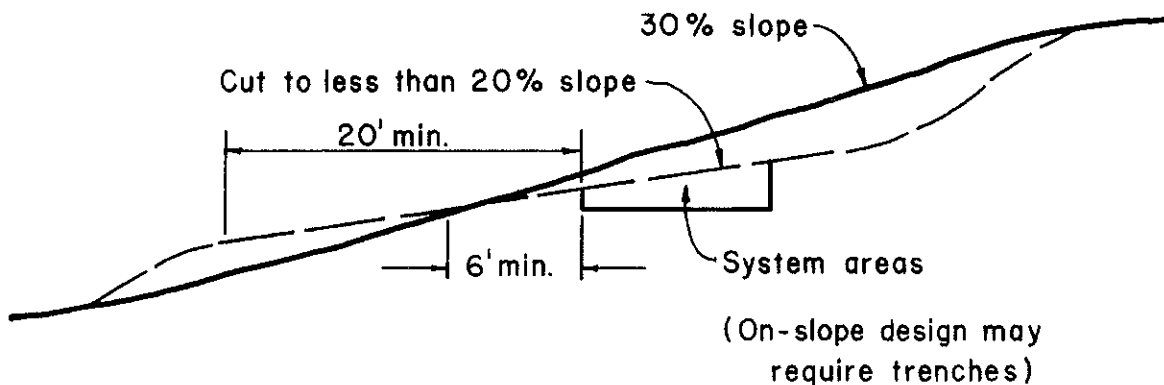
**A. Excavation of complete hilltop**



**B. Excavation into hillside**



**C. Regrade of hillside**



**Comm 83.12 Sizing soil absorption systems.**

**(1) GENERAL.** Effluent from septic tanks and other approved treatment tanks shall be disposed of by soil absorption or by such other manner approved by the department.

(a) *Daily wastewater volumes of 5,000 gallons or less.* For systems having a daily effluent application of 5,000 gallons or less, sizing shall be in accord with this section.

(b) *Daily wastewater volumes of 5,000 gallons or more.* For systems receiving effluents in excess of 5,000 gallons per day, this section shall apply except that 2 systems of equal size shall be required. Each system shall have a capacity of no less than 75% of the area required for a single system. A suitable means of alternating waste application shall be provided. The dual system shall be considered as one system.

**(2) METHOD OF DISCHARGE.** (a) *Daily flow 1,500 gallons or less.* For facilities having a daily effluent application of 1,500 gallons or less, flow from the septic or treatment tank to the soil absorption system may be by gravity or by dosing.

(b) *Systems over 1,500 gallons.* For systems over 1,500 gallons, the tank effluent must be discharged by pumping or by use of an automatic siphon.

Note: The dosing of effluents is recommended for all systems.

**(3) SIZING—RESIDENTIAL SYSTEMS.** (a) *Sizing based upon percolation tests.* The minimum amount of soil absorption area for a gravity flow system to serve a one- or 2-family dwelling based upon percolation results shall be determined in accordance with either Table 1 or Table 1a depending upon:

1. When the percolation results have been filed with the county as specified in s. Comm 83.09 (1);

2. The total number of bedrooms contained within the dwelling; and

3. The method of absorption—trench, bed or pit.

(b) *Sizing based upon soil evaluation.* The minimum amount of soil absorption area for a gravity flow system to serve a one- or 2-family dwelling based upon soil evaluation conducted in accordance with s. Comm 83.09 (4m) shall be determined by dividing the wastewater flow of 150 gallons per day per bedroom by the appropriate loading factor specified in Table 0.

**TABLE 1**

**MINIMUM SOIL ABSORPTION AREAS FOR ONE- AND 2-FAMILY DWELLINGS BASED UPON PERCOLATION TEST RESULTS FILED PRIOR TO JULY 1, 1991**

Percolation Rate (minutes per inch)	Minimum Absorption Area (square feet)		
	Trenches (bottom area)	Beds (bottom area)	Pits (sidewall area)
0 to less than 10	165	205	165
10 to less than 30	250	315	250
30 to less than 45	300	375	300
45 to 60	330	415	330

**(4) SIZING PUBLIC BUILDING SYSTEMS.** (a) *Sizing based upon percolation tests.* 1. The minimum amount of soil absorption area for a gravity flow system to serve a building or structure other than a one- or 2-family dwelling based upon percolation results shall depend upon:

a. The type of occupancies or uses contained within the building or structure; and

b. The method of absorption—trench, bed or pit.

2. The minimum amount of soil absorption area for a gravity flow system to serve a building or structure other than a one- or 2-family dwelling based upon percolation results shall be determined by using Tables 1b and 2, and the following formula:

$$\text{Minimum Soil Absorption Area (sq ft)} = (\text{Soil Absorption Area, Table 1b}) \times (\text{Factor in Column 3, Table 2}) \times (\text{Number of Units in Column 2, Table 2})$$

**TABLE 1a**

**MINIMUM SOIL ABSORPTION AREAS FOR ONE- AND 2-FAMILY DWELLINGS BASED UPON PERCOLATION TEST RESULTS FILED ON OR AFTER JULY 1, 1991**

Percolation Rate (minutes per inch)	Minimum Absorption Area (square feet)		
	Trenches (bottom area)	Beds (bottom area)	Pits (sidewall area)
0 to less than 10	195	240	195
10 to less than 30	275	350	275
30 to less than 45	315	390	315
45 to 60	330	415	330

(b) *Sizing based upon soil evaluation.* The minimum amount of soil absorption area for a gravity-flow system to serve a building or structure other than a one- or 2-family dwelling based upon soil evaluation conducted in accordance with s. Comm 83.09 (4m) shall be determined by dividing the appropriate wastewater flow as specified in Table 12 by the appropriate loading factor specified in Table 0.

**TABLE 1b**

**MINIMUM SOIL ABSORPTION AREAS FOR PUBLIC BUILDINGS AND STRUCTURES BASED UPON PERCOLATION TEST RESULTS**

Percolation Rate (minutes per inch)	Minimum Absorption Area (square feet)		
	Trenches (bottom area)	Beds (bottom area)	Pits (sidewall area)
0 to less than 10	110	140	110
10 to less than 30	165	205	165
30 to less than 45	200	250	200
45 to 60	220	280	220

**TABLE 2**

COLUMN 1 Building Classification	COLUMN 2 Units	COLUMN 3 Factor
Apartment building	1 per bedroom	1.5
Assembly hall—no kitchen	1 per person	0.02
Bar and cocktail lounge	1 per patron space	0.2
Beauty salon	1 per station	2.4
Bowling alley	1 per bowling lane	2.5
Bowling alley with bar	1 per bowling lane	4.5
Camp, day use only	1 per person	0.2
Camp, day and night	1 per person	0.45

COLUMN 1	COLUMN 2	COLUMN 3
Building Classification	Units	Factor
Campground and camping resort	1 per camping space	0.9
Campground and sanitary dump station	1 per camping space	0.085
Car wash (automatic)	Subject to state approval	
Car wash (per car handwash)	1 per car	1.0
Catch basin—garages, service stations, etc.	1 per basin	2.0
Catch basin—truck wash	1 per truck	5.0
Church—no kitchen	1 per person	0.04
Church—with kitchen	1 per person	0.09
Condominium	1 per bedroom	1.5
Country club	Subject to state approval	
Dance hall	1 per person	0.06
Dining hall—kitchen and toilet	1 per meal served	0.2
Dining hall—kitchen only	1 per meal served	0.06
Dining hall—kitchen and toilet waste with dishwasher and/or food waste disposer	1 per meal served	0.25
Drive-in restaurant (all paper service)	1 per car space	0.3
Drive-in restaurant (inside seating)	1 per seat	0.3
Drive-in theater	1 per car space	0.1
Employes—in all buildings	1 per person	0.4
Hotel or motel and tourist rooming house	1 per room	0.9
Floor drain	1 per drain	1.0
Hospital	1 per bed space	2.0
Medical office buildings, clinics and dental offices		
Doctors, nurses and medical staff	1 per person	0.8
Office personnel	1 per person	0.25
Patients	1 per person	0.15
Migrant labor camp—central bathhouse	1 per employe	0.25
Mobile home (single installation)	(Use Comm 83.12 (3))	
Mobile home park	1 per mobile home site	3.0
Nursing or rest homes	1 per bed space	1.0
Outdoor sports facility—toilet waste only	1 per person	0.085
Park—toilet waste only	1 per acre	4.0
Park—showers and toilets	1 per acre	8.0
Restaurant—kitchen waste only	1 per seating space	0.18
Restaurant—toilet waste only	1 per seating space	0.42
Restaurant—kitchen and toilet	1 per seating space	0.6
Restaurant—(24-hr) kitchen and toilet	1 per seating space	1.2
Restaurant—dishwasher and/or food waste disposer	1 per seating space	0.15
Restaurant—(24-hr) with dishwasher/dispenser	1 per seating space	1.5
Retail store	1 per customer	0.03
(Number of customers = 70% total area divided by 30 square feet/customer.)		
Self-service laundry—toilet wastes only	1 per machine	1.0
Auto washer (service bldgs., etc.)	1 per machine	6.0
Service station	1 per car served	0.15
Swimming pool bathhouse	1 per person	0.2
School—no meals, no showers	1 per classroom	5.0
School—meals served or showers	1 per classroom	6.7
School—meals and showers	1 per classroom	8.0
Showers—public	1 per shower	0.3

**History:** Cr. Register, December, 1980, No. 300, eff. 1-1-81; renum. from H 63.12, Register, June, 1983, No. 330, eff. 7-1-83; am. (3) and (4), Register, June, 1991, No. 426, eff. 7-1-91; r. and recr. (3), (4) and Table 1, cr. Tables 1a and 1b, Register, April, 1992, No. 436, eff. 5-1-92; r. (1) (c), Register, February, 1994, No. 458, eff. 3-1-94.

**Comm 83.13 Installation—conventional soil absorption systems.** (1) **SEEPAGE TRENCH EXCAVATIONS.** Seepage trench excavations shall be 1 to 5 feet in width. Trench excavations shall be spaced at least 6 feet apart. The absorption area of a seepage trench shall be computed by using the bottom area only. The bottom area of the distribution header excavation

shall not be computed as absorption area. Individual seepage trenches should not be over 100 feet long.

(2) **SEEPAGE BED EXCAVATIONS.** Seepage bed excavations shall be more than 5 feet wide and have more than one distribution pipe. The absorption area of a seepage bed shall be computed by using the bottom area only. Distribution piping in a seepage bed shall be uniformly spaced, no more than 6 feet and no less than 3 feet apart, and no more than 3 feet or less than 1 foot from the sidewall.

(3) **SEEPAGE PITS.** A seepage pit shall have a minimum inside diameter of 5 feet and shall consist of a chamber walled-up with



material such as perforated precast concrete ring, concrete block, brick or other material approved by the department which allows effluent to percolate into the surrounding soil. The pit bottom shall be left open to the soil. Aggregate of 1/2 to 2 1/2 inches in size shall be placed into a 6-inch minimum annular space separating the outside wall of the chamber and sidewall excavation. The depth of the annular space shall be measured from the inlet pipe to the bottom of the chamber. Each seepage pit shall be provided with a 24-inch manhole extending to within 6 inches of the ground surface and a 4-inch diameter fresh air inlet which shall meet the requirements of sub. (7). An observation pipe is not required. Seepage pits shall be located 6 feet or more apart. Excavation and scarifying shall be in accord with sub. (4). The effective area of a seepage pit shall be the vertical wall area of the walled-up chamber for the depth below the inlet for all strata for which the percolation rates are less than 30 minutes per inch. The 6 inches of annular opening outside the vertical wall area may be included for determination of effective area. Table 3 may be used for determining the effective sidewall area of circular seepage pits:

**TABLE 3**  
**EFFECTIVE ABSORPTION AREA FOR SEEPAGE PITS**

Inside diameter of chamber in feet plus 1 foot for wall thickness plus one foot for annular space	Depth in feet of Permeable Strata Below Inlet					
	3	4	5	6	7	8
7	75	101	126	151	176	201
8	85	113	142	170	198	226
9	94	126	157	188	220	251
10	104	138	173	208	242	277
12	123	163	204	245	286	327

(4) **EXCAVATION AND CONSTRUCTION.** The bottom of a trench or bed excavation shall be level. Seepage trenches or beds shall not be excavated when the soil is so wet that soil material rolled between the hands will form a soil wire. All smeared or compacted soil surfaces in the side walls or bottom of the seepage trench or bed excavation shall be scarified to the depth of smearing or compaction and the loose material removed. If rain falls on an open excavation, the soil must be left until dry enough that a soil wire will not form when soil from the excavation bottom is rolled between the hands. The bottom area shall then be scarified and loose material removed.

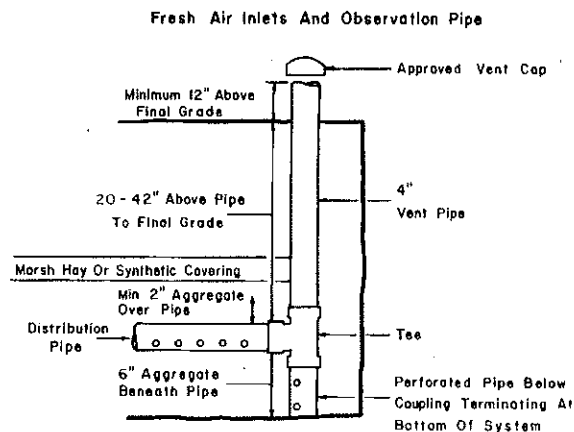
(5) **AGGREGATE AND BACKFILL.** A minimum of 6 inches of aggregate ranging in size from 1/2 to 2 1/2 inches shall be laid into the trench or bed below the distribution pipe elevation. The aggregate shall be evenly distributed a minimum of 2 inches over the top of the distribution pipe. The aggregate shall be covered with synthetic materials approved by the department or with 9 inches of uncompacted marsh hay or straw. Building paper shall not be used to cover the aggregate. A minimum of 18 inches of soil backfill shall be provided above the covering.

(6) **DISTRIBUTION PIPING.** (a) *General.* Distribution piping for gravity systems shall be a minimum of 4 inch I.D. approved pipe. The distribution header shall be constructed of approved solid wall pipe. The top of the distribution piping shall be laid 8 to 42 inches below the original surface in continuous straight or curved lines. The slope of the distribution pipes shall be 2 to 4 inches per 100 feet.

(b) *Distribution of effluent.* Distribution of effluent to seepage trenches on sloping sites may be accomplished by utilizing a drop box design. Where dosing is required, the siphon or pump shall discharge a dose of minimum capacity equal to 75% of the combined volume of the distribution piping in the absorption system.

When dosing is required, the dosing frequency shall be a maximum 4 times daily.

(7) **FRESH AIR INLETS AND OBSERVATION PIPE.** Fresh air observation inlets shall be provided and connected to the perforated distribution pipe with an approved fitting or junction box and be placed so as to assure a free flow of air throughout the entire installation. The vent pipes shall be at least 4 inches in diameter and extend at least 12 inches above the final grade and terminate with an approved vent cap. The observation pipe shall be perforated and extend to the bottom of the aggregate. See following sketch. Fresh air inlets shall be located at least 25 feet from any window, door or air intake of any building used for human habitation. A maximum of 4 distribution pipe lines may be served by one common 4-inch vent when interconnected by a common header pipe.



(8) **WINTER INSTALLATION.** (a) *General.* Installation of soil absorption systems during periods of adverse weather conditions is not recommended. A soil absorption system shall not be installed if the soil at the system elevation is frozen.

(b) *Removal of snow cover.* Snow cover must be removed from the soil absorption area before excavation begins. Snow must not be placed in a manner that will cause water to pond on the soil absorption system area during snowmelt.

(c) *Excavated and backfill material.* Excavated soil material may be used as backfill for the system if the following conditions are met: The excavated material must be protected from freezing. If the excavated material freezes solid, it shall not be used as backfill. The first 12 inches of backfill shall be loose, unfrozen soil. The protective covering over the bed or trench gravel shall be a synthetic material approved by the department or 9 inches of uncompacted marsh hay or straw.

(d) *System inspection.* Inspection of systems installed during winter conditions shall include inspection of the trench or bed excavation prior to placement of gravel and inspection of backfill material at the time of placement.

**History:** Cr. Register, December, 1980, No. 300, eff. 1-1-81; renum. from H 63.13, Register, June, 1983, No. 330, eff. 7-1-83; am. (6) (b), Register, April, 1992, No. 436, eff. 5-1-92; am. (6) (b) and (7), Register, February, 1994, No. 458, eff. 3-1-94.

**Comm 83.14 Pressure distribution systems.**

(1) **GENERAL.** A pressure distribution system may be used on any site meeting the criteria listed in s. Comm 83.10. There shall be a minimum depth to the top of the distribution piping of 6 inches from original grade. The minimum required suitable soil depths from original grade for a pressure distribution network are as follows:

- 1 inch distribution pipe—49 inches suitable soil
- 2 inch distribution pipe—50 inches suitable soil

- 3 inch distribution pipe—52 inches suitable soil
- 4 inch distribution pipe—53 inches suitable soil

(2) SOIL ABSORPTION AREA. (a) *Sizing*. The required soil absorption area shall be determined by dividing the total daily wastewater flow by the design loading rate.

(b) *Estimating wastewater flow*. 1. Residential. The estimated wastewater flow from a residence shall be 150 gallons per bedroom per day.

2. Public buildings. Daily wastewater flow rates for public buildings shall be based on the usage factors listed in s. Comm 83.15 (3) (c) 2.

(c) *Design loading rate*. 1. Loading rates based on percolation test results shall be determined using Tables 4 or 4a, depending upon when the test results were filed with the county in accordance with s. Comm 83.09 (1).

2. Loading rates based on soil evaluation conducted in accordance with s. Comm 83.09 (4m) shall be based on using Table 0.

**TABLE 4**  
**MAXIMUM DESIGN LOADING RATES BASED UPON PERCOLATION TEST RESULTS FILED PRIOR TO JULY 1, 1991**

Percolation Rate (minutes per inch)	Design Loading Factor (gal/sq ft/day)
0 to less than 10	1.2
10 to less than 30	0.8

30 to less than 45	0.72
45 to 60	0.4
greater than 60 to 120	0.24 <sup>a</sup>

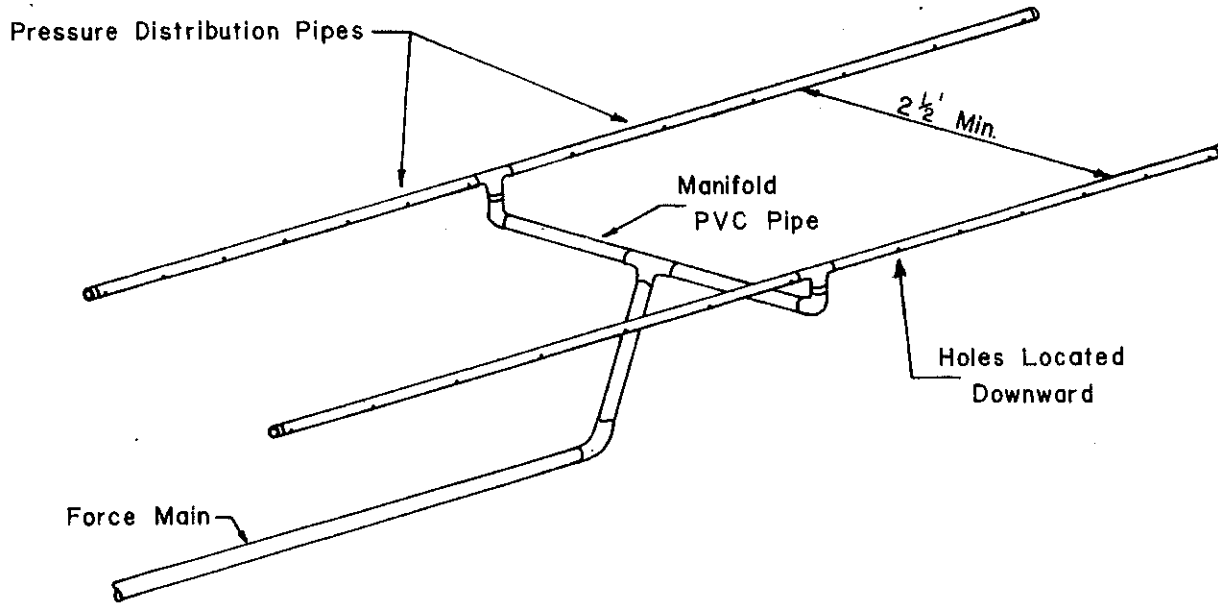
<sup>a</sup> For mound type systems only.

**TABLE 4a**  
**MAXIMUM DESIGN LOADING RATES BASED UPON PERCOLATION TEST RESULTS FILED ON OR AFTER JULY 1, 1991**

Percolation Rate (minutes per inch)	Design Loading Factor (gal/sq ft/day)
0 to less than 10	0.8
10 to less than 30	0.6
30 to less than 45	0.5
45 to 60	0.4
greater than 60 to 120	0.3 <sup>a</sup>

<sup>a</sup> For mound type systems only.

(3) PRESSURE DISTRIBUTION SYSTEM DESIGN. (a) *General*. Pressure distribution systems may discharge effluent into trenches or beds. Each pipe that is connected to an outlet of a manifold shall be counted as a separate distribution pipe. The horizontal spacing of distribution pipes shall be 30 to 72 inches. (See following sketch.) All distribution piping should be installed at the same elevation, or the plans and specifications shall provide for a design that insures equal flow through each of the perforations.



**Bed Design Is Recommended Over Trenches**

(b) *Design calculations*. Pressure distribution systems requiring less than 5,000 square feet of absorption area shall be designed using Tables 5 through 11. Systems requiring more than 5,000 square feet of absorption area shall be designed using design specifications and calculations other than those specified in Tables 5 through 11. Design specifications and calculations must be submitted and include perforation discharge rate, total headloss

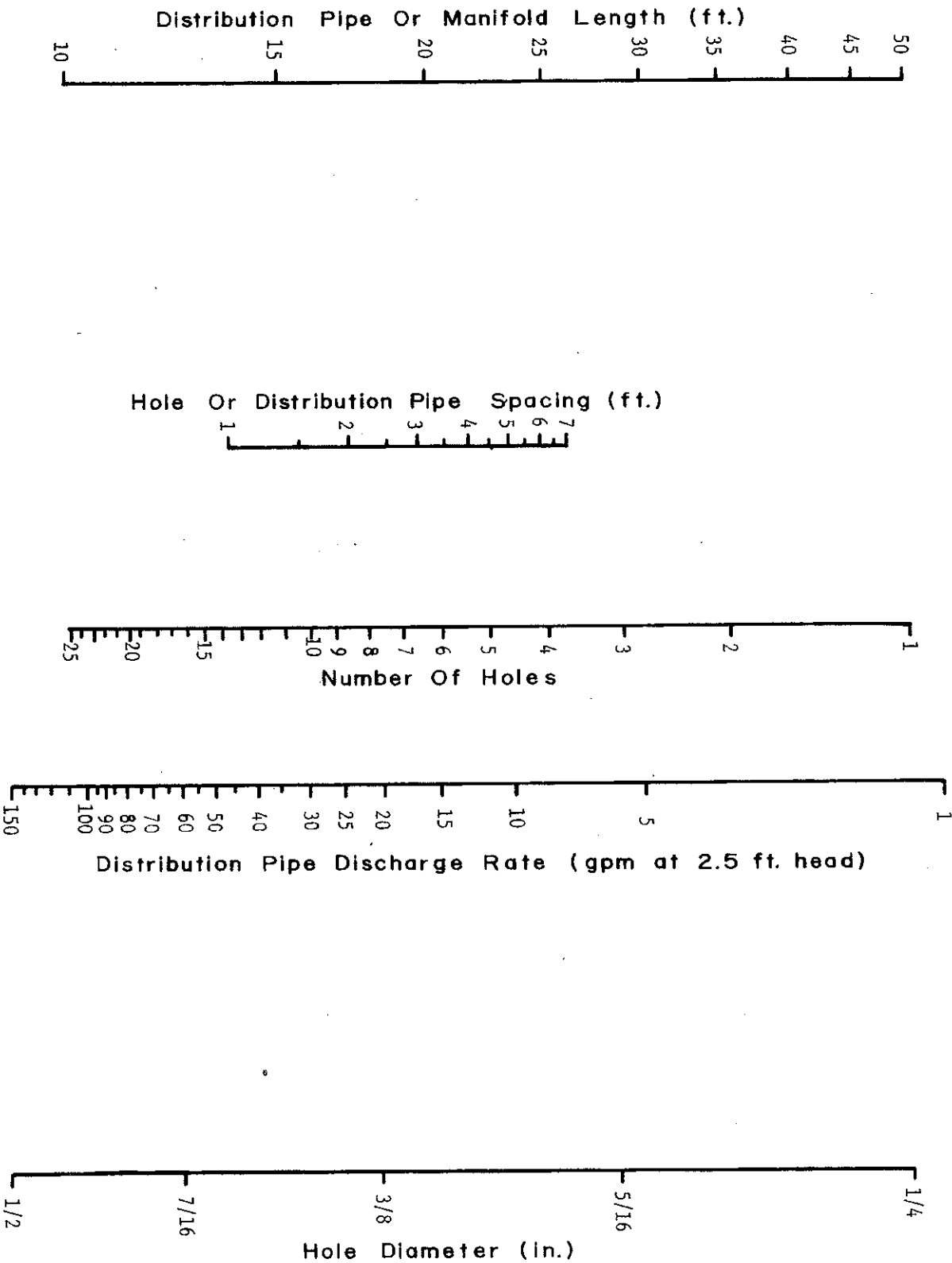
through the distribution piping, headloss through manifold piping, pump or siphon size and dosing volume. Formulas for these calculations may be obtained from the department.

(c) *Distribution pipe size*. Distribution pipe diameters may vary depending on the length of bed or trenches. Table 5 specifies maximum allowable distribution pipe lengths for various pipe and perforation sizes.

**Table 5: Required Distribution Pipe Diameters For Various Hole Diameters, Hole Spacings  
And Distribution Pipe Lengths (for plastic pipe only)**

Distribution Pipe Length (ft.)	Distribution Pipe Diameter (in.)																																		
	Hole Diameter (in.) $\frac{1}{4}$							Hole Diameter (in.) $\frac{5}{16}$							Hole Diameter (in.) $\frac{3}{8}$							Hole Diameter (in.) $\frac{7}{16}$							Hole Diameter (in.) $\frac{1}{2}$						
	Hole Spacing (ft.)							Hole Spacing (ft.)							Hole Spacing (ft.)							Hole Spacing (ft.)							Hole Spacing (ft.)						
	2	3	4	5	6	7	2	3	4	5	6	7	2	3	4	5	6	7	2	3	4	5	6	7	2	3	4	5	6	7					
10																													1"						
15															1"							1"							1"						
20	1"							1"							1"							$\frac{1}{2}$ "							$\frac{1}{2}$ "						
25	1"							1"							$\frac{1}{2}$ "							$\frac{1}{2}$ "							$\frac{1}{4}$ "						
30	1"							$\frac{1}{2}$ "							$\frac{1}{2}$ "							$\frac{1}{4}$ "							$\frac{1}{2}$ "						
35	$\frac{1}{2}$ "		$\frac{1}{4}$ "					1"							$\frac{1}{4}$ "							$\frac{1}{4}$ "							$\frac{1}{2}$ "						
40	$\frac{1}{2}$ "		$\frac{1}{4}$ "					$\frac{1}{2}$ "							1"							2"							2"						
45	2"		$\frac{1}{2}$ "					2"							$\frac{1}{2}$ "							3"							3"						
50	2"		$\frac{1}{2}$ "					3"							$\frac{1}{2}$ "							3"							3"						

TABLE 6





(d) *Manifolds*. 1. *Size*. The size of the manifold is based on the number, length and discharge rate of the distribution pipes. Table 6 shall be used for calculating distribution pipe discharge rate. Table 7 shall be used for calculating manifold diameter.

2. *Distribution pipe connection*. Distribution pipes should be connected to the manifold with tee's or 90° ells. Distribution pipes shall have the ends capped.

(e) *Force main*. The size of the force main between the pump and the manifold shall be based on the friction loss and velocity of effluent through the pipe. Force mains shall be constructed of approved pipe.

(4) **BED AND TRENCH CONSTRUCTION.** (a) *General*. The excavation and construction requirements for pressure distribution system trenches and beds shall meet the requirements speci-

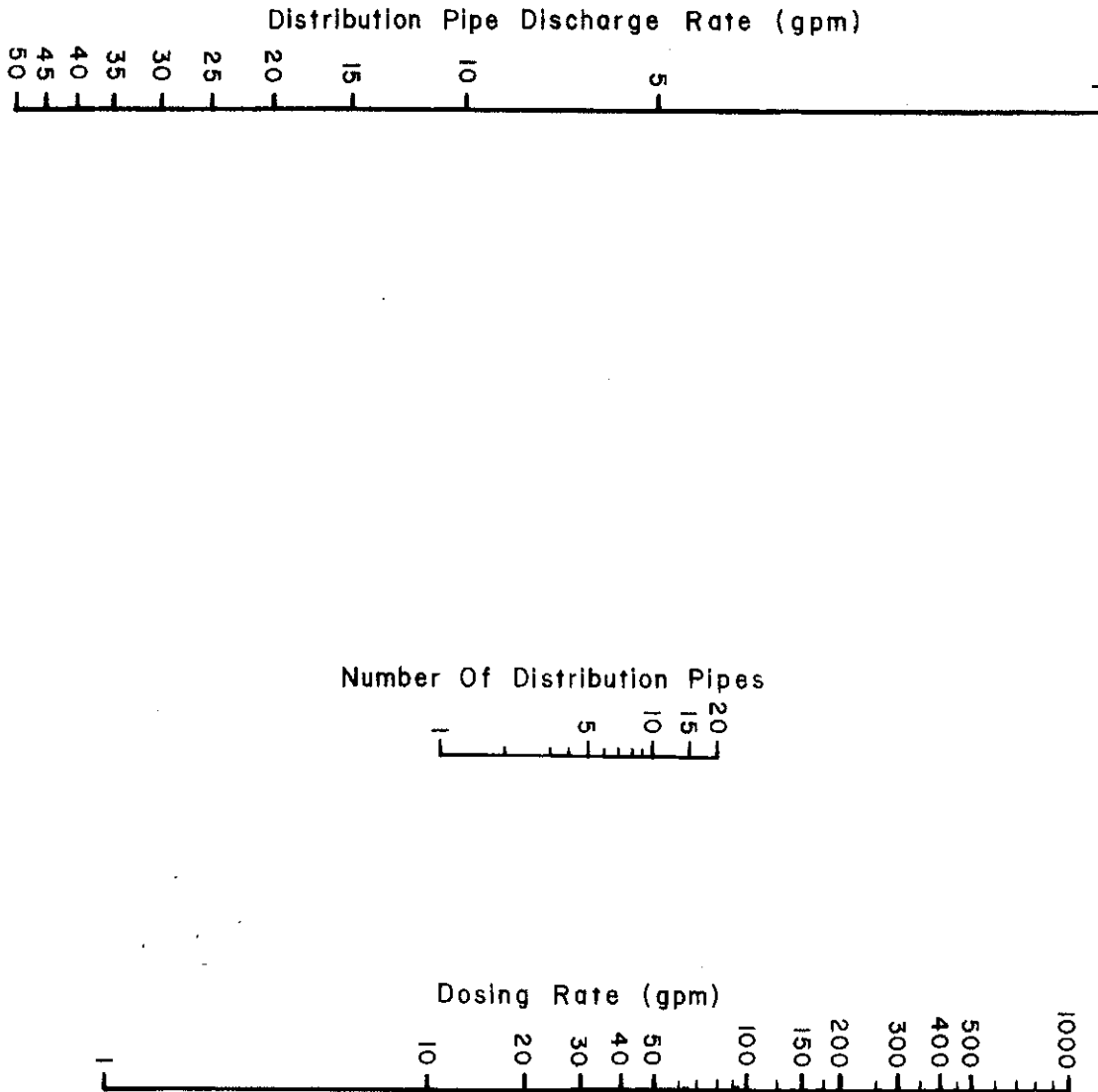
fied in s. Comm 83.13 (1), (2), (4), (5), (8).

(b) *Aggregate*. Aggregate shall be placed to a minimum depth of 6 inches beneath the distribution pipe with 2 inches spread evenly above the pipe. The aggregate shall be clean, non-deteriorating 1/2 to 2-1/2 inch stone.

(5) **PUMPS AND PUMP CONTROLS.** (a) *Pump selection*. Pump selection shall be based on the pump performance curve of the model selected. Pumps shall be rated by the manufacturer for use for sewage or effluent. The pump shall be capable of providing a minimum 2.5 feet of head at all of the perforations in the distribution network.

(b) *Discharge rate*. Table 8 shall be used to determine pump dosing rate based on the distribution pipe discharge rate and number of distribution pipes.

TABLE 8



(c) *Friction loss*. Table 9 is the friction loss chart for schedule 40 plastic pipe (C = 150). The diameter of the pipe shall be increased if the velocity falls in the excessive range based upon flow rates in Table 9.

(d) *Pump and alarm controls*. 1. *General controls*. The control system for the pumping chamber shall consist of a control for operating the pump and an alarm system to detect when the pump is malfunctioning. Pump controls should be selected which give

flexibility in adjusting the on/off depth. All pump and alarm controls shall be approved by the department. Pressure diaphragm switches shall not be used. The following types of controls may be used.

a. Mercury level control. Mercury level control switches con-

sist of a mercury switch sealed inside a bulb. Strictly an on/off switch, 2 are required.

b. Adjustable weight switch. Adjustable weight switches consist of a control located above the water level and 2 weights attached to a single cable which extends into the liquid.

**TABLE 9**  
**FRICITION LOSS IN SCHEDULE 40 PLASTIC PIPE (C = 150)**

Flow gpm	Pipe Diameter (in)								
	1	1-1/4	1-1/2	2	3	4	6	8	10
	ft/100 ft								
1	0.07								
2	0.28	0.07							
3	0.60	0.16	0.07						
4	1.01	0.25	0.12						
5	1.52	0.39	0.18						
6	2.14	0.55	0.25	0.07					
7	2.89	0.76	0.36	0.10					
8	3.63	0.97	0.46	0.14					
9	4.57	1.21	0.58	0.17					
10	5.50	1.46	0.70	0.21					
11		1.77	0.84	0.25					
12		2.09	1.01	0.30					
13		2.42	1.17	0.35					
14		2.74	1.33	0.39					
15		3.06	1.45	0.44	0.07				
16		3.49	1.65	0.50	0.08				
17		3.93	1.86	0.56	0.09				
18		4.37	2.07	0.62	0.10				
19		4.81	2.28	0.68	0.11				
20		5.23	2.46	0.74	0.12				
25			3.75	1.10	0.16				
30			5.22	1.54	0.23				
35				2.05	0.30	0.07			
40				2.62	0.39	0.09			
45				3.27	0.48	0.12			
50				3.98	0.58	0.16			
60					0.81	0.21			
70					1.08	0.28			
80					1.38	0.37			
90					1.73	0.46			
100					2.09	0.55	0.07		
125						0.85	0.12		
150						1.17	0.16		
175						1.56	0.21		
200							0.28	0.07	
250							0.41	0.11	
300							0.58	0.16	
350							0.78	0.20	0.07
400							0.99	0.26	0.09
450							1.22	0.32	0.11
500								0.38	0.14
600								0.54	0.18
700								0.72	0.24
800									0.32
900									0.38
1000									0.46

Velocities in this area  
become too great for the  
various flow rates and  
pipe diameter.

**TABLE 10**  
**VOID VOLUME FOR VARIOUS DIAMETER PIPES**

Diameter (inch)	Volume (gal/ft length)
1	0.041
1¼	0.064
1½	0.092
2	0.164
3	0.368
4	0.655
6	1.47

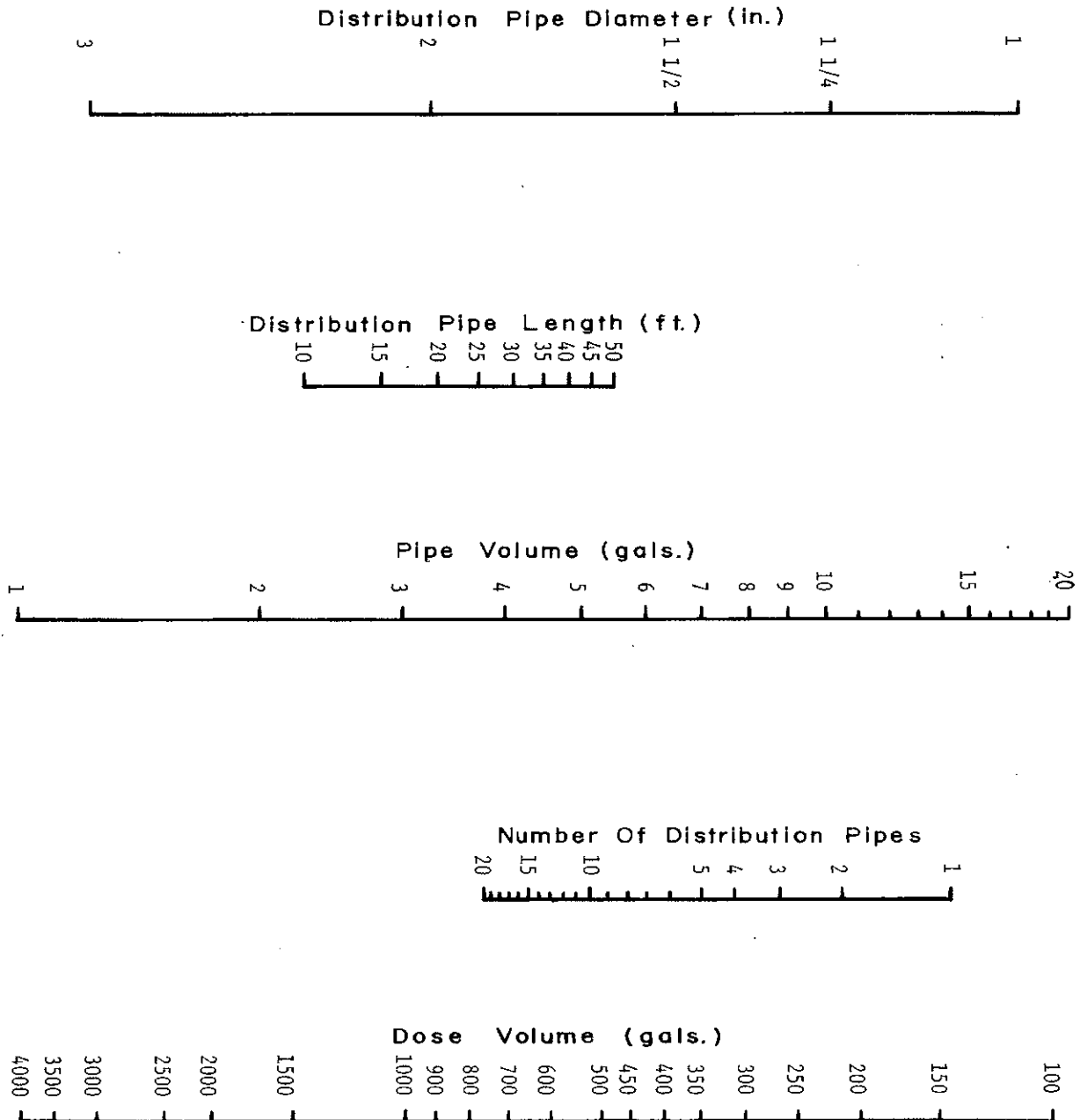
2. Alarm system. The alarm system shall consist of a bell or

light mounted in the structure and shall be located so it can be easily seen or heard. The high water warning device shall be installed 2 inches above the depth set for the on pump control. Alarm systems shall be installed on a separate circuit from the electrical service.

3. Electrical connections. Electrical connections shall be located outside the pumping chamber. All wiring to the pump chamber shall be installed in a conduit.

4. Duplex pumps. When 2 or more pumps are employed within a dosing tank, the pumps shall be interconnected such that the pumps alternate dosing, and dosing continues in the event that one pump fails. Failure of a pump shall activate an alarm which is to remain audible or visible until manually turned off.

**TABLE 11**





(6) **DOSING.** The dosing frequency shall be a maximum of 4 times daily. To establish the volume per dose, divide the daily wastewater flow by the dosing frequency. In addition, the dosing volume shall be at least 10 times the capacity of the distribution pipe volume. Table 10 provides the void volume for various pipe diameters. Table 11 shall be used to determine minimum dose volume based on distribution pipe diameter, length and number of distribution pipes.

**History:** Cr. Register, December, 1980, No. 300, eff. 1-1-81; renun. from H 63.14, Register, June, 1983, No. 330, eff. 7-1-83; am. (2) (a), r. and rec. (2) (c), Register, June, 1991, No. 426, eff. 7-1-91; r. and rec. (2) (a), (c), (5) (a) and Table 4, cr. (5) (d) 4. and Table 4a, Register, April, 1992, No. 436, eff. 5-1-92; am. (1), r. (4) (c), Register, February, 1994, No. 458, eff. 3-1-94.

**Comm 83.15 Septic tanks and other treatment tanks.** (1) **GENERAL.** Septic tanks shall be fabricated or constructed of welded steel, monolithic concrete, fiberglass or other materials approved by the department. All tanks shall be watertight and fabricated so as to constitute an individual structure. The design of prefabricated septic tanks shall be approved by the department. Plans for site-constructed concrete tanks shall be approved by the department prior to construction.

(2) **DESIGN OF SEPTIC TANKS.** (a) *Liquid depth.* The liquid depth shall not be less than 3 feet nor more than an average of 6 feet. The total depth shall be at least 8 inches greater than the liquid depth.

(b) *Rectangular tanks.* Rectangular tanks shall have a minimum width of 36 inches and shall be constructed with the longest dimensions parallel to the direction of flow.

(c) *Cylindrical tanks.* Cylindrical tanks shall have an inside diameter of not less than 48 inches.

(d) *Label.* Each prefabricated tank shall be clearly marked to show liquid capacity and the name and address or registered trade mark of the manufacturer. The markings shall be impressed into or embossed onto the outside wall of the tank immediately above the outlet opening. Each site-constructed concrete tank shall be clearly marked at the outlet opening to show the liquid capacity. The marking shall be impressed into or embossed onto the outside wall of the tank immediately above the outlet opening.

(e) *Materials.* For septic tank material and construction specifications, see s. Comm 83.20.

(f) *Inlet and outlet.* The inlet and outlet on all tanks or tank compartments shall be provided with open-end coated sanitary tees or baffles made of approved materials, so constructed as to distribute flow and retain scum in the tank or compartments. The inlet and outlet openings on all tanks shall contain a "boss" stop or other provision which will prevent the insertion of the sewer piping beyond the inside wall of the tank. The tees or baffles shall extend at least 6 inches above and 9 inches below the liquid level, but not to exceed 1/3 the liquid depth. At least 2 inches of clear space shall be provided over the top of the baffles or tees. The bottom of the outlet opening shall be at least 2 inches lower than the bottom of the inlet.

(g) *Manholes.* 1. Each single-compartment tank and each unit of a multi-compartment tank shall be provided with at least one manhole opening located over either the inlet or outlet opening.

2. Manholes and manhole risers for tanks shall provide an inside clearance of no less than 24 inches in diameter.

3. A manhole or top of a manhole riser for a tank shall terminate either:

- a. At or below final grade, but no deeper than 6 inches; or
- b. At least 4 inches above final grade.

4. a. Tanks of steel and fiberglass shall be provided with collars to accommodate manhole risers or extensions.

b. Collars for steel tanks and fiberglass tanks shall be of the same material as the tank.

c. Collars for steel tanks and fiberglass tanks shall be at least 2 inches in height.

d. Collars for steel tanks shall be permanently welded to the tank.

e. Collars for fiberglass tanks shall be an integral part of the tank.

(h) *Manhole covers.* 1. Manhole risers for tanks shall be provided with a substantial, fitted, watertight cover.

2. Manhole tank covers that are not buried shall have locking devices.

3. a. Manhole covers for tanks shall have warning labels printed in red or other contrasting color affixed to the manhole covers.

b. The wording used on the warning label shall clearly indicate the hazards present when entering a sewage or other treatment tank.

4. Covers, locking devices and warning labels shall be reviewed and approved as specified in s. Comm 84.10.

(i) *Inspection opening.* An inspection pipe shall be provided directly over any inlet baffle or outlet baffle for a tank compartment over which a manhole opening is not provided. An inspection pipe shall:

- 1. Be of a material as listed in s. Comm 84.30 (2) for vent systems;
- 2. Be at least 4 inches in diameter;
- 3. Terminate at least 6 inches above the adjacent final grade; and
- 4. Terminate with a removable watertight cap or plug.

(3) **CAPACITY AND SIZING.** (a) *Minimum capacity.* The capacity of a septic tank or other treatment tank shall be based on the number of persons using the building to be served or upon the volume and type of waste. The minimum liquid capacity shall be 750 gallons.

(b) *Multiple tanks.* When the required capacity is to be provided by more than one tank, the minimum capacity of any tank shall be 750 gallons. When 3 or 4 tanks are installed, approval of the design of the system shall be obtained from the department. The installation of more than 4 tanks in series is prohibited. Installation of septic tanks in parallel is prohibited.

(c) *Sizing of tank.* 1. Residential. The minimum liquid capacity for one- and two-family residences is as follows:

<b>SEPTIC TANK CAPACITY ONE- AND TWO-FAMILY RESIDENCES</b>	
Number of Bedrooms	Septic Tank
1 .....	750
2 .....	750
3 .....	975
4 .....	1,200
5 .....	1,425
6 .....	1,650
7 .....	1,875
8 .....	2,100

2. Public buildings. For buildings other than one and two family residences the liquid capacity shall be increased above the 750-gallon minimum as established in Table 12. For such buildings having kitchen and/or laundry waste, the tank capacity shall be increased to receive the anticipated volume for a 24-hour period from the kitchen and/or laundry. The liquid capacities established in Table 12 do not include employees.

TABLE 12

Apartment buildings (per bedroom—includes auto washer)	150 gals.
Assembly hall (per person—no kitchen)	2 gals.
Bars and cocktail lounges (per patron space)	9 gals.
Beauty salons (per station—includes customers)	140 gals.
Bowling alley (per alley)	125 gals.
Bowling alley with bar (per alley)	225 gals.
Campgrounds and camping resorts (per camp space)	100 gals.
Campground sanitary dump stations (per camp space) (omit camps spaces with sewer connection)	5 gals.
Camps, day use only—no meals served (per person)	15 gals.
Camps, day and night (per person)	40 gals.
Car wash (automatic)—subject to state approval	
Car wash (per car handwash)	50 gals.
Catch basins—garages, service stations, etc.(per basin, etc.)	100 gals.
Catch basins—truck washing (per truck)	100 gals.
Churches—no kitchen (per person)	3 gals.
Churches—with kitchen (per person)	7.5 gals.
Condominiums (per bedroom—includes auto washer)	150 gals.
Country clubs—subject to state approval	
Dance halls (10 sq. ft. per person)	3 gals.
Dining hall—kitchen and toilet waste—with dishwasher and/or with disposer (per meal served)	11 gals.
Dining hall—kitchen waste only (per meal served)	3 gals.
Drive-in restaurants—all paper service (per car space)	15 gals.
Drive-in restaurants—all paper service inside seating (per seat)	15 gals.
Drive-in theaters (per car space)	5 gals.
Employee—in all buildings, per employee—total all shifts	20 gals.
Floor drain (per drain)	50 gals.
Hospitals (per bed space)	200 gals.
Hotels or motels and tourist rooming houses (per room—2 persons per room)	100 gals.
Medical office buildings, clinics and dental offices	
Doctors, nurses, medical staff (per person)	75 gals.
Office personnel (per person)	20 gals.
Patients (per person)	10 gals.
Migrant labor camp, central bathhouse (per employe)	30 gals.
Mobile homes, single installation (use Comm 83.15 (3) (c) 1.)	
Mobile home parks, homes with bathroom groups (per site)	300 gals.
Nursing and rest homes—without laundry (per bed space)	100 gals.
Outdoor sport facilities (toilet waste only—per person)	5 gals.
Parks, toilet wastes (per person—75 persons per acre)	5 gals.
Parks, with showers and toilet wastes (per person—75 persons per acre)	10 gals.
Restaurant—kitchen waste only—without dishwasher and/or disposer (per seat)	9 gals.
Restaurant—toilet waste only (per seat)	21 gals.
Restaurant—kitchen and toilet wastes (per seating space)	30 gals.
Restaurant (24-hr)—kitchen and toilet wastes (per seating space)	60 gals.
Restaurant—dishwasher and/or food waste disposer (per seat)	3 gals.
Restaurant (24-hr)—dishwasher and/or food waste disposer (per seat)	6 gals.
Retail store—customers (Number of customers = 70% total area divided by 30 square feet/customer.)	1.5 gals.
Schools (per classroom—25 pupils per classroom)	450 gals.
Schools with meals served (per classroom—25 pupils per classroom)	600 gals.
Schools with meals served and showers provided (per classroom)	750 gals.
Self-service laundries (toilet waste only, per machine)	50 gals.
Auto washer (apartments, service buildings, etc.—per machine)	300 gals.
Service stations (per car)	10 gals.
Showers—public (per shower taken)	15 gals.
Swimming pool bathhouses (per person)	10 gals.

(4) **INSTALLATION.** (a) *Location.* 1. The location of sewage treatment tanks and pump and siphon tanks shall be in conformance with the setback distances listed in Table 12m.

2. a. A sewage treatment tank may not be located within a building or under a building, except as permitted in subpar. b.

b. A sewage treatment tank and pump or siphon tank may be located either under a cantilevered portion of a building or under an unenclosed deck structure, if at least 5 feet of vertical clearance for servicing purposes is provided between the top of the manhole and the obstruction.

3. No structural supports of buildings, portions of buildings, decks or porches may rest upon any portion of a sewage or other treatment tank.

Note: Pump and siphon tanks are commonly referred to as dosing tanks.

TABLE 12m

**MINIMUM SETBACK DISTANCES FOR TREATMENT TANKS, PUMP AND SIPHON TANKS, SERVICING SUCTION LINES AND PUMP DISCHARGE LINES**

Setback Element	Horizontal Distance (feet)
All Structures, Swimming Pools <sup>a</sup>	5
Lot or Property Line	2
Underground Water Supply System and Cistern	10
Well <sup>b</sup> , High Water Mark of Lake, Stream, Pond, Flowage or Reservoir	25

<sup>a</sup>All structures include any building and portions of buildings with any type of foundation. Swimming pools include above ground and below ground pools.

<sup>b</sup>For location of wells, public, private or high capacity, reference should be made to ch. NR 812. For floodplains, refer to s. Comm 83.18 (9).

(b) *Groundwater.* If the tank is installed in groundwater, adequate anchoring provisions shall be made.

(c) *Bedding.* A 3-inch thick compacted bedding shall be provided for all septic and other treatment tank installations. The bedding material shall be sand, gravel, granite, limestone or other non-corrosive materials of such size that 100% will pass a 1/2-inch screen.

(d) *Backfill.* 1. Steel and fiberglass tanks. The backfill material for steel and fiberglass tanks shall be as specified for bedding and shall be tamped into place, care being taken to prevent damage to the coating.

2. Concrete tanks. The backfill for concrete tanks shall be soil material, 100% of which shall pass a 4-inch screen and shall be tamped into place.

(e) *Manhole riser joints.* 1. Concrete. All joints on concrete risers and manhole covers shall be tongue and groove or shiplap type and sealed watertight using neat cement, mortar or bituminous compound.

2. Steel. All joints on steel risers shall be welded or flanged and bolted and be watertight. All steel manhole extensions shall be bituminous coated inside and outside.

3. Fiberglass. All methods of attaching fiberglass risers shall be watertight and approved by the department.

(5) **DOSING TANKS.** (a) *Material and construction.* 1. Dosing tanks. Dosing tanks shall be watertight and constructed of materials as specified in s. Comm 83.20.

2. Review and approval. The design of site-constructed dosing tanks shall be reviewed and approved by the department prior to installation in accordance with s. Comm 83.08.

3. Manholes. a. A dosing tank shall be provided with a manhole opening as specified in sub. (2) (g).

b. The dosing tank manhole cover shall terminate no less than 4 inches above grade and be provided with both a locking device and warning label as specified in sub. (2) (h) 1. to 3.

4. Label. A dosing tank shall be labeled in accordance with sub. (2) (d).

(b) *Capacity and sizing of pump tanks.* The minimum liquid capacity of a dosing tank or a dosing tank compartment employing one pump shall be determined from the distance between the bottom of the tank and the level of the inlet pipe to accommodate the cumulative volumes as specified in subs. 1. to 4. The minimum liquid capacity of dosing tank or dosing tank compartment employing multiple pumps shall accommodate the cumulative volumes as specified in subs. 2. to 4.

1. A reserve capacity shall be provided above the high-water alarm that is at least equal to the daily wastewater discharged from the building served. This volume shall be determined for one- and 2-family residences based on 100 gallons per bedroom, or by using Table 12 for other uses.

2. The dose volume shall be provided as determined by the system type as specified in s. Comm 83.13 (6) (b) or 83.14 (6).

3. A liquid volume between the pump "on" setting and the alarm float level shall be provided.

4. A liquid volume shall be provided as calculated from the bottom of the tank to the pump "off" setting.

(c) *Capacity and sizing of siphon tanks.* The minimum liquid capacity of a dosing tank employing a siphon shall be sufficient to accommodate volumes necessary to provide dosing as specified by the system type.

(d) *Venting.* 1. A dosing tank or a dosing tank compartment shall be provided with a vent that:

a. Is sized in accordance with Table 82.31-4, but not less than 2 inches in diameter; and

b. Is of a material listed in s. Comm 84.30 (2).

2. Except as provided in subd. 3., a vent serving a dosing tank or dosing tank compartment shall:

a. Terminate at least 12 inches above the adjacent final grade;

b. Terminate with a vent cap or return bend; and

c. Be located at least 10 feet horizontally from any door, window or fresh air intake.

Note: Rules of other federal or state agencies may specify greater separation distances between vents and fresh air intakes for hospitals and nursing homes.

3. A vent serving a dosing tank or a dosing tank compartment may:

a. Connect to the venting system serving a building or a structure, in which case the vent shall conform with the requirements specified in s. Comm 82.31 (15) and (16); or

b. Be attached to the exterior of a building or a structure, in which case the vent shall conform with the requirements specified in s. Comm 82.31 (16) (a) to (e).

(6) **DESIGN OF OTHER SEWAGE TREATMENT TANKS.** Other types of sewage treatment tanks shall be constructed in accordance with s. Comm 83.20. Designs for site-constructed tanks shall be reviewed and approved by the department prior to installation in accordance with s. Comm 83.08. Designs for prefabricated tanks shall be reviewed and approved by the department in accordance with s. Comm 84.10.

History: Cr. Register, December, 1980, No. 300, eff. 1-1-81; renum. from H 63.15, Register, June, 1983, No. 330, eff. 7-1-83; am. (4) (e), Register, February, 1985, No. 350, eff. 3-1-85; r. and recr. (2) (g) to (i), (4) (a), (5), (6), cr. Table 12m, r. (4) (e) and Table 13, renum. (4) (f) to be (4) (e), Register, April, 1992, No. 436, eff. 5-1-92; am. (2) (i) 1. and (5) (d) 1. b., Register, February, 1994, No. 458, eff. 3-1-94.

**Comm 83.16 Maintenance and sludge disposal.**

(1) **MAINTENANCE.** Septic tanks and other treatment tanks shall be cleaned whenever the sludge and scum occupies 1/3 of the

tank's liquid capacity. All sludge, scum, liquid and any other material removed from a private domestic sewage treatment and disposal system is hereafter referred to as sludge.

(2) **SLUDGE DISPOSAL.** See ch. NR 113, Wis. Adm. Code.

(3) **COUNTY OPTION.** Counties may establish a mandatory maintenance program to insure continuing maintenance of private sewage systems.

**History:** Cr. Register, December, 1980, No. 300, eff. 1-1-81; renun. from H 63.16, Register, June, 1983, No. 330, eff. 7-1-83.

**Comm 83.17 Chemical restoration.** No products for chemical restoration or chemical restoration procedures for private sewage systems may be used unless approved by the department.

**History:** Cr. Register, December, 1980, No. 300, eff. 1-1-81; renun. from H 63.17, Register, June, 1983, No. 330, eff. 7-1-83.

**Comm 83.18 Holding tanks. (1) APPROVAL.** Plans shall be submitted in accordance with ss. Comm 83.07 and 83.08, for each application to install a holding tank. An application for a holding tank shall not be approved, if:

(a) Any other type of private sewage system may be utilized as permitted under this chapter or ch. 145, Stats.; and

(b) The property contains an area of soil suitable for any other type of private sewage system as permitted under this chapter.

(2) **PROHIBITION OF HOLDING TANKS. (a) Department. 1.** The department may prohibit the installation and use of holding tanks for new construction in areas where:

a. The methods of final disposal of septage from existing holding tanks are not in compliance with the rules adopted under s. 146.20 (4g), Stats.;

b. There is insufficient disposal capacity for the septage at wastewater treatment facilities or land disposal sites;

c. Previously installed holding tanks have been found not to be watertight by the department or county due to geological conditions;

d. The county has failed to provide to the department accurate annual pumping reports required under sub. (4) (a) 3.; or

e. The results of the department's audits under s. 145.20 (3), Stats., indicate that sanitary permits have been issued for holding tanks in violation of sub. (1).

2. A departmental prohibition for the installation and use of holding tanks shall be established by departmental orders in accordance with s. 145.02 (3) (f), Stats. The order shall specify the conditions which must be corrected before the order will be lifted.

(b) **Local. 1.** A county may prohibit by ordinance the installation and use of holding tanks for new construction. If a county does not prohibit the installation and use of a holding tank for new construction, then any city, village or town within that county may prohibit by ordinance the installation and use of holding tanks for new construction.

2. An ordinance adopted under subd. 1. may prohibit the installation and use of holding tanks for specific building occupancies or specific geographical areas.

3. Before adopting an ordinance prohibiting the installation and use of holding tanks for new construction the local governmental unit shall submit a copy of the proposed ordinance to the department for review.

4. If a local governmental unit prohibits the installation and use of holding tanks for new construction, the local governmental unit shall establish an appeal procedure to the prohibition. Under the appeal procedure the local governmental unit may grant variances to the prohibition. The local governmental unit shall inform the department in writing of each variance granted.

(3) **HOLDING TANKS ON PROPERTIES WITH EXISTING BUILDINGS.** When the use of a holding tank becomes the only available alternative for the disposal of sanitary liquid waste for an existing

building, local government shall allow the use of a holding tank or condemn the property. The requirements established for use of holding tanks for newly developed properties in this section shall also apply to replacement system uses.

(4) **SERVICING CONTRACTS, AGREEMENTS AND STATEMENTS. (a)** 1. Prior to the issuance of a sanitary permit for the installation of a holding tank the owner of the holding tank shall, except as provided by s. 146.20 (3) (d), Stats., contract with a person who is licensed under ch. NR 113 to have the holding tank serviced. The owner shall file a copy of the contract or their registration with the local governmental unit which has signed the pumping agreement under par. (b) and with the county. The owner shall file a copy of any changes to the service contract or a copy of a new service contract with the local governmental unit within 10 business days from the date of change to the service contract.

**Note:** Section 146.20, Stats., relates to the servicing of septic tanks, soil absorption fields, holding tanks, grease traps and privies.

2. The person responsible for servicing a holding tank under subd. 1. shall submit to the local governmental unit which has signed the pumping agreement under par. (b) and to the county a report for the servicing on a semiannual basis. The service report shall include:

a. The name and address of the person responsible for servicing the holding tank;

b. The name of the owner of the holding tank;

c. The location of the property on which the holding tank is installed;

d. The sanitary permit number issued for the holding tank;

e. The dates on which the holding tank was serviced;

f. The volumes in gallons of the contents pumped from the holding tank for each servicing; and

g. The disposal sites to which the contents from the holding tank were delivered.

3. The county shall submit to the department an annual report summarizing the semiannual service reports which it is required to receive under subd. 2.

(b) 1. The owner of a holding tank shall enter into agreement with the appropriate county, city, village or town guaranteeing that the county or local governmental unit which signed the agreement will service the holding tank, if the owner fails to have the holding tank properly serviced in response to orders issued by the department, county or local governmental unit to prevent or abate a nuisance as described in ss. 146.13 and 146.14, Stats.

2. The owner or agent shall submit a copy of the pumping agreement required under subd. 1. to the department when plans for the proposed holding tank are submitted to the department for review under s. Comm 83.08.

3. The pumping agreement required under subd. 1. shall be binding upon the owner, the heirs of the owner and assignees of the owner. The owner shall file the pumping agreement with the register of deeds. Upon receipt of a holding tank agreement, the register of deeds shall record the agreement in a manner which will permit the existence of the agreement to be determined by reference to the property where the holding tank is installed.

(c) The owner of a building or facility which will discharge more than 3,000 gallons of wastewater per day, as determined under s. Comm 83.15 (3) (c) 2., to one or more holding tanks shall provide a written statement to the department describing the method of final disposal for the septage from the holding tanks. The department may not approve these types of holding tanks until the department receives written verification that the proposed methods of final disposal are acceptable to the department of natural resources. The department shall notify the department of natural resources when a system of this type is approved.

(5) **SIZING. (a) One- and 2-family residences.** The minimum liquid capacity of a holding tank for one- and 2-family residences is as follows:

Number of Bedrooms	Holding Tank
1	2,000
2	2,000
3	2,000
4	2,500
5	3,000
6	3,500
7	4,000
8	4,500

(b) *Public buildings.* Public buildings shall have a minimum 5-day holding capacity, but not less 2,000 gallons. Sizing shall be based in accord with s. Comm 83.15 (3) (c) 2. The 750 gallon minimum referred to in s. Comm 83.15 (3) does not apply to holding tanks. No more than 4 holding tanks installed in series will be permitted.

(6) *CONSTRUCTION.* Holding tanks shall be constructed of welded steel, monolithic concrete, glass-fibre reinforced polyester or other materials approved by the department.

(7) *INSTALLATION.* (a) *Location.* 1. Holding tanks shall be located in conformance with the setback distances listed in Table 12m.

2. The service port or manhole cover of a holding tank shall be located no more than 25 feet from a service drive or road.

(b) *Warning device.* A high water warning device shall be installed so that it activates 1 foot below the inlet pipe. This device shall be either an audible or illuminated alarm. If the latter, it shall be conspicuously mounted. Electrical junction box, including warning equipment junctions, shall be located outside the holding tank unless they are housed in waterproof, explosion-proof enclosures. Electrical relays or controls shall be located outside the holding tank.

(c) *Manholes.* Each tank shall be provided with a manhole opening no less than 24 inches square or 24 inches inside diameter extending to a minimum of 4 inches above ground. Finish grade must be sloped away from the manhole to divert surface water from the manhole. Each manhole cover shall have an effective locking device. Manhole covers may have a service port reduced in size to 8 inch inside diameter 4 inches above finish grade level. The reduced opening must have an effective locking cover or a brass cleanout plug. Reduced locking devices or clean-outs must be approved by the department.

(d) *Septic tank.* If an approved septic tank is installed to serve as a holding tank, the inlet and outlet baffle may be removed and the outlet shall be sealed.

(e) *Vent.* 1. A holding tank shall be provided with a vent that:

- Is not less than 2 inches in diameter; and
- Is of a material listed in s. Comm 84.30 (2).

2. Except as provided in subd. 3., a vent serving a holding tank shall:

- Terminate at least 12 inches above the adjacent final grade;
- Terminate with a vent cap or return bend; and
- Be located at least 10 feet horizontally from any door, window or fresh air intake.

**Note:** Rules of other federal or state agencies may specify greater separation distances between vents and fresh air intakes for hospitals and nursing homes.

3. A vent serving a holding tank may:

- Connect to the venting system serving a building or a structure, in which case the vent shall conform with the requirements specified in s. Comm 82.31 (15) and (16); or
- Be attached to the exterior of a building or a structure, in which case the vent shall conform with the requirements specified in s. Comm 82.31 (16) (a) to (e).

(f) *Servicing.* Holding tanks shall be serviced in accord with ch. 146, Stats., and ch. NR 113, Wis. Adm. Code.

(8) *SERVICE SUCTION AND DISCHARGE LINES.* (a) A service suction line or discharge line serving a holding tank for servicing purposes shall:

- Be constructed of piping materials in accordance with ch. Comm 84;
- Terminate with a service port consisting of a quick disconnect fitting with a removable plug;
- Have the service port of the suction line terminate at least 2 feet above final grade;
- Have the service port identified as a sewage suction line with a permanent sign with lettering at least ½ inch in height;
- Have the service port secured to a permanent support;
- Be protected against frost in accordance with s. Comm 82.30 (11) (b), unless the entire length of the line is drained after each pumping of the tank; and
- Be at least 3 inches in diameter.

(b) A suction line serving a holding tank may not be installed such that the tank can be drained by gravity or by siphonic action.

(c) Where a lift station is employed for servicing the holding tank, the pump discharge line shall conform with par. (a), except that:

- The discharge line shall be at least 2 inches in diameter; and
- The lift station pump shall be activated by means of a keyed-switch at the service port.

(9) *TANK IN FLOODPLAIN.* (a) *Vent.* A vent serving a holding tank located in a floodplain shall terminate at least 2 feet above the established regional flood elevation.

(b) *Anchoring.* Anchoring of a holding tank located in a floodplain shall be provided to counter buoyant forces caused by a regional flood or periodic saturated soil conditions using the following formula:

$$\text{Weight of the tank plus the weight of the anchor} = 1.5 \times (\text{volume of water the tank displaces}) \times [\text{the weight of water (62.4 pounds/cubic foot at } 39^{\circ}\text{F)}]$$

(c) *Manhole.* For a holding tank located in a floodplain:

- At least 2 feet of elevation shall be provided between the top of the service manhole of a holding tank and the recorded regional flood elevation; or
- A watertight manhole cover or service port shall be provided which is threaded or bolted to the riser.

(10) *METERING.* (a) New buildings and new structures to be served by holding tanks shall include the installation of water meters to measure the flows of the water supplies to allow comparisons to the data of holding tank pumping reports.

(b) A water meter required under par. (a) shall be installed in accordance with s. Comm 82.40 (3) (e).

**History:** Cr. Register, December, 1980, No. 300, eff. 1-1-81; renum. from H 63.18, Register, June, 1983, No. 330, eff. 7-1-83; emerg. r. and recr. (1), (2) and (4) eff. 3-6-85; r. and recr. (1), (2) and (4), Register, September, 1985, No. 357, eff. 10-1-85; r. and recr. (7) (a), (e) and (8), cr. (9), Register, April, 1992, No. 436, eff. 5-1-92; am. (1) (intro.) and (7) (e) l.b., cr. (10), Register, February, 1994, No. 458, eff. 3-1-94.

**Comm 83.19 Inspections.** (1) Pursuant to s. 145.20 (2) (d), Stats., no part of a private sewage system may be covered by backfill until the county or the department has had an opportunity to inspect the system in accordance with this section.

(a) The plumber responsible for the installation of a private sewage system shall notify the county when the system is ready for inspection. The notification shall be in person, in writing, or by telephone or electronic communication.

(b) The plumber shall be responsible for maintaining records of the inspection notifications. The records shall include information relative to the date and time of notification and the person contacted.

(c) If an inspection is not made by the end of the next workday, excluding Saturdays, Sundays and holidays, after notifying the county, the plumber may proceed with the installation of the system, including backfilling.

(2) Pursuant to s. 145.20 (2) (g), Stats., a county by ordinance may require other inspections in addition to that specified in sub. (1).

(3) (a) A county shall maintain a written record of each inspection conducted for a private sewage system. The record shall include information relative to:

1. The location of the system;
2. The date and time of the inspection;
3. The nature and findings of the inspection.

(4) A county shall make available to the department upon request inspection records for private sewage systems.

History: Cr. Register, December, 1980, No. 300, eff. 1-1-81; renum. from H 63.19, Register, June, 1983, No. 330, eff. 7-1-83; r. and recr. Register, February, 1994, No. 458, eff. 3-1-94.

**Comm 83.20 Materials. (1) MINIMUM STANDARDS.** (a) *Approval.* Unless otherwise provided for in this chapter, all materials, fixtures or devices sold, used or entering into the construction of a private sewage system or parts thereof, shall be submitted to the department for approval and shall conform to approved applicable standards or to other equivalent standards acceptable to the department and shall be free from defects.

(b) *Identification.* Each length of pipe and each pipe fitting, fixture, material and device used in a private sewage system shall have cast, embossed, stamped or indelibly marked on it the maker's mark or name, the weight and quality of the product or identified in accord with the applicable approved standard. All materials and devices used in the construction of a private sewage system or parts thereof shall be marked and identified in a manner satisfactory to the department.

(c) *Conformance.* Standards listed or referred to in this section cover materials which shall conform to the requirements of this chapter when used in accordance with the limitations imposed in this chapter. Designs and materials for special conditions or materials not provided for herein may be used only after the department has been satisfied as to their adequacy and granted approval.

Note: Chapter Comm 84 contains accepted and approved plumbing materials and the applicable standards.

(d) *Alterations.* In existing buildings or premises in which plumbing installations are to be altered, repaired or renovated, the department has discretionary powers to permit deviation from the provisions of this chapter provided that such a proposal to deviate is first submitted to the department for proper determination and approval.

(e) *Tests.* The department may require tests to be made or repeated, if at any time, there is reason to believe that any material or device no longer conforms to the requirements on which its approval was based.

(2) **MATERIAL STANDARDS.** Each material listed in Table 32 of s. Comm 82.19, shall conform to at least one of the standards opposite it. Products conforming to one or more of the specifications listed shall be considered acceptable subject to limitations specified. See s. Comm 83.02 (63) for a list of abbreviations. For materials not listed, consult the department.

(3) **PRECAST CONCRETE AND SITE CONSTRUCTED TANKS.** (a) *Wall thickness.* Precast concrete tanks shall have a minimum wall thickness of 2 inches.

(b) *Materials.* The concrete used in constructing a precast or site-constructed tank shall be a mix to withstand a compressive load at least 3,000 pounds per square inch. All concrete tanks shall be designed to withstand the pressures to which they are subjected.

(c) *Joints.* The floor and sidewalls of a site-constructed concrete tank shall be monolithic except a construction joint will be permitted in the lower 12 inches of the sidewall of the tank. The

construction joint shall have a keyway in the lower section of the joint. The width of the keyway shall be approximately 30% of the thickness of the sidewall with a depth equal to the width. A continuous water stop or baffle at least 6 inches in width shall be set vertically in the joint, embedded 1/2 its width in the concrete below the joint with the remaining width in the concrete above the joint. The water stop or baffle shall be copper, neoprene, rubber or polyvinylchloride designed for this specific purpose. Joints between the concrete septic tank and its cover and between the septic tank cover and manhole riser shall be tongue and groove or shiplap type and sealed watertight using neat cement, mortar or bituminous compound.

(4) **STEEL SEPTIC TANKS.** For general tank design see s. Comm 83.15. Steel tanks shall be fabricated of new, hot rolled commercial steel. The tanks including cover with rim, inlet and outlet collars and manhole extension collars shall be fabricated with welded joints in such a manner as to provide structural stability and water tightness. Steel tanks shall be coated, inside and outside in compliance with U.L. Standard 70 Bituminous Coated Metal Septic Tanks. Any damage to the bituminous coating shall be repaired by recoating. The gauge of the steel shall be as follows:

**SEPTIC TANK CAPACITY**

Tank Design			
Vertical Cylindrical			
500 thru 1,000 gallons . . .	Bottom and sidewalls	14 ga	None
.....	Cover	12 ga	
.....	Baffles	12 ga	
1,001 thru 1,250 gallons . . .	Complete tank	10 ga	None
1,251 thru 1,500 gallons . .	Complete tank	7 ga	None
Horizontal Cylindrical			
500 thru 1,000 gallons . . .	Complete tank	13 ga	54" dia
1,001 thru 1,500 gallons . .	Complete tank	12 ga	64" dia
1,501 thru 2,500 gallons . .	Complete tank	10 ga	76" dia
2,501 thru 9,000 gallons . .	Complete tank	7 ga	76" dia
9,001 thru 12,000 gallons .	Complete tank	1/4" plate	None
12,001 or more gallons . .	Complete tank	5/16" plate	None

(5) **FIBERGLASS SEPTIC TANKS.** (a) *General.* The following paragraphs apply to septic tanks made of glass-fiber reinforced polyester and intended for use in nonindustrial private sewage systems. For general septic tank design see s. Comm 83.15. Unless otherwise indicated, the plastic terminology used in this section is in accordance with the definitions given in ASTM Standard D 883.

(b) *Materials.* Septic tanks, covers, baffles, flanges, manholes, etc., shall be made from polyester resins with glass-fiber reinforcement and meet the general design criteria as prescribed in s. Comm 83.15 (1).

(c) *Resin.* The resin shall be a commercial grade of polyester resin and shall be evaluated as a laminate by tests conducted in accordance with ASTM Standard C 581. Unless otherwise approved by the department the same resin shall be used throughout the laminate.

(d) *Reinforcing material.* The reinforcing material shall be of a suitable commercial grade of glass-fiber (E Glass) treated with a coupling agent, approved by the glass-fiber manufacturer, that will provide a compatible bond between the resin and the glass. Glass-fiber surfacing materials, if used, shall be of a chemical-resistant glass (C glass) bonded with a suitable binder.

(e) *Fillers and pigments.* The resins used shall not contain fillers except as required for viscosity control. Up to 5% by weight of the total resin content of thixotropic agent that will not interfere with visual inspection may be added to the resin for viscosity control. Resins may contain pigments and dyes recognizing that such additions may interfere with visual inspection of laminate quality.

(f) *Laminate.* The laminate shall consist of the following: Primary chemical resistant surface; internal anti-wicking barrier; additional structural reinforcing section if required to meet the properties described in par. (h) and the following table; and exterior surface. (See following sketch.)

- 1) Primary Chemical-Resistant Surface
- 2) Internal Anti-Wicking Barrier

1)	2)	2)	3)	3)	3)	To Desired Thickness	3)	3)	3)	4)
						For Strength				

- 3) Additional Structural Reinforcing Section
- 4) Exterior Surface

(g) *Primary chemical resistant surface.* This surface shall be between 0.005 and 0.012 inch thick. It shall be a reinforced resin-rich surface. It shall be free from cracks and crazing and have a smooth finish.

(j) *Exterior surface.* This surface shall consist of a chopped strand glass over which shall be applied a resin-rich coating. This resin-rich surface layer shall contain less than 20% of reinforcing material.

(h) *Internal anti-wicking barrier.* Not less than 0.100 inch of chemical resistant laminate next to the inner surface shall be reinforced with not less than 20% or more than 30% by weight of mat or chopped strand.

(k) *Cut edges.* All cut edges shall be coated with resin so that no glass fibers are exposed and all voids are filled. Structural elements having edges exposed to the chemical environment shall be made with chopped strand glass reinforcement only.

(i) *Additional structural reinforcing sections.* This layer or body of the laminate shall be of chemically resistant construction suitable for the intended use and providing the additional strength necessary to meet the tensile and flexural requirements. When separate layers such as mat, cloth or woven roving are used, all layers shall be lapped at least one inch. Laps shall be staggered as much as possible. If woven roving or cloth is used, layers of chopped strand glass shall be placed as alternate layers.

(L) *Wall thickness.* The minimum wall thickness shall be as recommended by the manufacturer but in no case shall it be less than 3/16 inch regardless of operating conditions. Isolated small areas may be as thin as 80% of the specified minimum wall thickness.

(m) *Mechanical properties.* To establish proper wall thickness and other design characteristics, the minimum physical properties for any laminate shall be as shown in the following table and par. (n) below.

**REQUIREMENTS FOR PROPERTIES OF NEWLY FABRICATED REINFORCED POLYESTER LAMINATES**

Property at 73.4°F. in psi (MPa)*	Thickness in inches				Test Method
	3/16	1/4	5/16	3/8 & up	
Ultimate tensile strength, min.	9,000 (62)	12,000 (83)	13,500 (93)	15,000 (103)	ASTM D 638
Flexural strength, min.	16,000 (110)	19,000 (131)	20,000 (137)	22,000 (152)	ASTM D 790
Flexural modulus of elasticity (tangent), min.	700,000 (4823)	800,000 (5512)	900,000 (6201)	1,000,000 (6895)	ASTM D 790

\*(MPa)=mega pascals

(n) *Surface hardness.* The laminate shall have a Barcol hardness of at least 90% of the manufacturer's minimum specified hardness for the cured resins when tested in accordance with ASTM D 2583. This requirement applies to both interior and exterior surfaces.

wise specified, ASTM D 2563 visual acceptance level 3 shall be the minimum standard for acceptance.

(o) *Appearance.* The finished laminate shall be as free as commercially practicable from visual defects such as foreign inclusions, dry spots, air bubbles, pinholes, pimples and delamination. The inner surface shall be free from cracks and crazing and have a smooth finish and an average of not more than 2 pits per square foot providing the pits are less than 1/8 inch diameter and not more than 1/32 inch deep and are covered with sufficient resin to avoid exposure of inner surface fabric. Some waviness is permissible provided the surface is smooth and free from pits. Unless other-

(p) *Tank design.* All tanks shall meet the general design criteria as outlined in s. Comm 83.15 (1) and (2). Horizontal cylindrical tanks standard end enclosed shall be convex heads with a maximum radius of curvature equal to the tank diameter. Rectangular tanks shall have external ribs to prevent sidewall deflection exceeding 1/2% of span at any location when tested by filling with water.

(q) *Shell joints.* Where tanks are manufactured in sections and joined by use of a laminate bond, the joint shall be glass-fiber reinforced resin at least the thickness of the heaviest section being joined. The reinforcement shall extend on each side of the joint a

sufficient distance to make the joint at least as strong as the tank wall, and shall be not less than the minimum joint widths specified in the following table. The reinforcement shall be applied both inside and out, with the inner reinforcement considered as a corrosion resistant barrier only and not structural material.

**MINIMUM TOTAL WIDTHS OF OVERLAYS FOR REINFORCED-POLYESTER TANK SHELL JOINTS**

Tank wall thickness in inches	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4
Minimum outside overlay width in inches	4	4	5	6	7	8	9	10	11	12
Minimum inside overlay width in inches	4	4	5	5	6	6	6	6	6	6

(r) *Resistance to static load.* There shall be not more than 0.25% difference in dimensions before and after the tanks are statically loaded. For the static load test bed an empty tank in dry sand to a depth not exceeding 4 inches and oriented as in service. Load top segment of empty tank with evenly distributed load to a total weight in pounds equal to:

$$L = 140 \times A_1 \times b$$

where L = total load  
 A<sub>1</sub> = horizontal cross-sectional area of tank  
 b = depth of overburden expected

Rotate tank through 90° on its major axis. Bed tank in dry sand to a depth not exceeding 4 inches. Load sides of empty tank with evenly distributed load to total weight in pounds equal to:

$$L = 70 \times A_2 \times b$$

where L = total load  
 A<sub>2</sub> = vertical cross-sectional area of tank  
 b = depth of overburden expected

(s) *Siphoning or pumping.* There shall be no permanent deflection or change in length of any internal or external component of the tank during the pumping or siphoning when the tank is filled to its working level. There shall be no signs of leaking, weeping or other failure.

(t) *Weight.* No tank shall differ in gross weight by more than +10 or -5% from the weight of tanks that have been subjected to the tests for siphoning and static pressure.

(u) *Tests.* Tensile strength test shall be in accordance with ASTM D 638, except that the specimens shall be the actual thickness of the fabricated article and the width of the reduced section shall be one inch. Other dimensions of specimens shall be as designated by the ASTM standard for type one specimens for materials over 1/2 inch to one inch inclusive. Specimens shall not be machined on the surface. Test 5 specimens at 0.20 to 0.25 inch/minute crosshead speed, and average the results. Flexural strength shall be determined in accordance with Procedure A and Table 1 of ASTM D 790, except that the specimens shall be actual thickness of the fabricated article and the width shall be one inch. Other dimensions of specimens shall be as designated by the ASTM standard. Specimens shall not be machined on the surface. Test 5 specimens, with the resin-rich side in compression. Determine the tangent modulus of elasticity in flexure by ASTM D 790.

(6) **ALTERNATE AND EXPERIMENTAL MATERIALS.** (a) *Intent.* The provisions of this chapter are not intended to prevent the use of any alternate material provided the material has first been approved and its use authorized by the department.

(b) *Approval.* The department may approve an alternate or experimental material in accord with s. 145.02 (2) (b), Stats., provided the proposed alternate or the experimental concepts are satisfactory and comply with the intent of this chapter.

(c) *Evidence or proof.* The department shall require that sufficient evidence or proof be submitted to substantiate any claims that may be made regarding the sufficiency of any proposed material.

(d) *Tests and standards.* Tests shall be made in accord with approved standards but in the absence of such standards, the department shall specify the test procedure.

(e) *Repeating tests.* The department may require tests to be made or repeated if at any time there is reason to believe that any material no longer conforms to the requirements on which its approval is based.

*History:* Cr. Register, December, 1980, No. 300, eff. 1-1-81; renum. from H 63.20, Register, June, 1983, No. 330, eff. 7-1-83; r. and recr. (1) (c), Register, February, 1985, No. 350, eff. 3-1-85.

**Comm 83.21 Building sewers and drains.** (1) **GENERAL.** Building sewers which terminate in a septic tank shall meet the same general criteria as listed in s. Comm 82.30, except where specified in this section. All sanitary or special type drainage systems shall be connected by means of independent connections with a public sewer, approved private interceptor main sewer or private sewage system.

(2) **COVER.** Building sewers which terminate in a septic tank shall not be less than 18 inches from the top of the pipe to finished grade.

(3) **MATERIALS.** All building sewers which terminate in a septic tank shall be constructed of cast iron, vitrified clay, concrete, asbestos cement, plastic or bituminous fiber pipe or other materials approved by the department. The pipe from the septic tank to the soil absorption area shall be constructed of solid wall pipe approved by the department as specified in ch. Comm 84.

*History:* Cr. Register, December, 1980, No. 300, eff. 1-1-81; renum. from H 63.21, Register, June, 1983, No. 330, eff. 7-1-83; am. (1) and (3), Register, February, 1985, No. 350, eff. 3-1-85.

**Comm 83.23 Mound systems.** (1) **SOIL AND SITE REQUIREMENTS.** (a) *General.* The installation of a mound in a floodplain or filled area is prohibited. Removal of fill material may not make a site suitable. A mound shall not be installed in a compacted area. A mound shall not be installed over a failing private sewage system.

(b) *Soil boring and percolation tests.* A minimum of 3 soil borings shall be conducted in accord with s. Comm 83.09 to determine depth to seasonal or permanent soil saturation or bedrock. Identification of a replacement system area is not required.

1. *Slowly permeable soils.* Mound sizing shall be based on soil evaluation or percolation test results. Where sizing is based on soil evaluation, the most limiting condition from Table 0 that occurs within the top 12 inches of the natural soil shall be used to determine the soil loading factor. Where sizing is based on percolation test results, percolation tests shall be conducted in the most restrictive soil horizon within 24 inches measured vertically from the top of existing grade. A mound system is suitable for the site if the percolation rate is greater than 60 minutes per inch and less than or equal to 120 minutes per inch. A site with a percolation rate of greater than 60 minutes per inch and less than or equal to 120 minutes per inch or a maximum wastewater infiltration rate of 0.3 or less shall be designated as a site with slowly permeable soils.

*Note:* As a result of a court action, s. Comm 83.23 (1) (b) 1, as printed was prevented from taking effect on June 1, 1996. Prior to June 1, 1996, s. Comm 83.23 (1) (b) 1, read as follows:

Comm 83.23 (1) (b) 1. 'Slowly permeable soils'. Mound sizing shall be based on soil evaluation or percolation test results. Where sizing is based on soil evaluation, the most limiting condition from Table 0 that occurs within the top 12 inches of the natural soil shall be used to determine the soil loading factor. Where sizing is based on percolation test results, percolation tests shall be conducted in the most restrictive soil horizon within 24 inches measured vertically from the top of existing grade. A



mound system is suitable for the site if the percolation rate is greater than 60 minutes per inch and less than or equal to 120 minutes per inch.

2. Shallow permeable soils over creviced bedrock. Mound sizing shall be based on soil evaluation or percolation test results. Where sizing is based on soil evaluation, the most limiting condition from Table 0 that occurs within the top 12 inches of the natural soil shall be used to determine the soil loading factor. Where sizing is based on percolation testing, percolation tests shall be conducted in the most restrictive soil horizon within 18 inches measured vertically from the top of existing grade. A mound system is suitable for this site condition if the percolation rate is greater than 3 minutes per inch and less than or equal to 60 minutes per inch.

3. Permeable soils with high groundwater. Mound sizing shall be based on soil evaluation or percolation test results. Where sizing is based on soil evaluation, the most limiting condition from Table 0 that occurs within the top 12 inches of the natural soil shall be used to determine the soil loading factor. Where sizing is based on percolation testing, percolation tests shall be conducted in the most restrictive soil horizon within 24 inches measured vertically from the top of existing grade. A mound system is suitable for this site condition if the percolation rate is greater than 0 minutes per inch and less than or equal to 60 minutes per inch.

(c) *Depth to pervious rock.* A mound system shall be allowed where at least 24 inches of natural soil exists above creviced or porous bedrock.

**Note:** As a result of a court action, s. Comm 83.23 (1) (c) as printed was prevented from taking effect on June 1, 1996. Prior to June 1, 1996, s. Comm 83.23 (1) (c) read as follows:

(c) *Depth to pervious rock.* There shall be at least 24 inches of unsaturated natural soil over creviced or porous bedrock.

(d) *Depth to groundwater.* A mound system shall be allowed where at least 8 inches of unsaturated natural soil exists above estimated high groundwater as indicated by soil morphological conditions and provided:

1. The soils are not mottled or gleyed in the "E" or "B" horizon which is within 4 inches of the bottom of the "A" horizon; and

2. The cumulative depth of sand, as specified in sub. (2) (d) 1. a., and depth of unsaturated natural soil provides at least 3 feet of vertical separation to high groundwater.

**Note:** As a result of a court action, s. Comm 83.23 (1) (d) as printed was prevented from taking effect on June 1, 1996. Prior to June 1, 1996, s. Comm 83.23 (1) (d) read as follows:

(d) *Depth to groundwater.* 1. Except as provided in subd. 2., a mound system shall be allowed where at least 24 inches of unsaturated natural soil exists above estimated high groundwater as indicated by soil morphological conditions.

2. A mound system replacing an existing private sewage system shall be allowed where less than 24 inches of unsaturated natural soil exists above estimated high groundwater provided that:

a. The soils are not mottled or gleyed in the "E" or "B" horizon which is within 4 inches of the bottom of the "A" horizon; and

b. The cumulative depth of sandfill, as specified in sub. (2) (d) 1. a., and depth of suitable soil provides at least 3 feet of vertical separation to high groundwater.

TABLE 14

MINIMUM SAND FILL DEPTH (D) FOR MOUNDS  
ON SITES HAVING AT LEAST 24 INCHES  
ABOVE A SOIL OR SITE FACTOR

Soil or Site Factor <sup>a</sup>	Minimum Sand Fill Depth (D) (Inches)
Slowly Permeable Soils <sup>b</sup>	12
Estimated High Groundwater	12
Bedrock	
creviced	24 <sup>c</sup>
poorly cemented sandstone	12

<sup>a</sup>Soil type as identified in s. Comm 83.23 (1).

<sup>b</sup>Refer to s. Comm 83.23 (1) (b) 1. for soils having loading rates 0.3 or less.

<sup>c</sup>Minimum depth may be reduced to 18 inches on slopes 10% or greater.

**Note:** As a result of a court action, Table 14 as printed was prevented from taking effect on June 1, 1996. Prior to June 1, 1996, Table 14 read as follows:

TABLE 14  
MINIMUM SAND FILL DEPTH (D) FOR MOUNDS  
ON SITES HAVING AT LEAST 24 INCHES  
ABOVE A SOIL OR SITE FACTOR

Soil or Site Factor <sup>a</sup>	Minimum Sand Fill Depth (D) (Inches)
Slowly Permeable Soils <sup>b</sup>	12
Estimated High Groundwater	12
Bedrock	
creviced	24 <sup>c</sup>
poorly cemented sandstone	12
Strata having 50% or more rock fragments by volume	12

<sup>a</sup>Soil type as identified in s. Comm 83.23 (1).

<sup>b</sup>Refer to s. Comm 83.23 (1) (b) 1. for soils having loading rates 0.3 or less.

<sup>c</sup>Minimum depth may be reduced to 18 inches on slopes 10% or greater.

(e) *Slopes.* 1. A mound system may not be installed on a site where the slope is greater than 20%.

2. A mound system shall be installed such that the longest dimension of the mound does not exceed one percent across the slope of the site.

**Note:** As a result of a court action, s. Comm 83.23 (1) (e) as printed was prevented from taking effect on June 1, 1996. Prior to June 1, 1996, s. Comm 83.23 (1) (e) read as follows:

(e) *Slopes.* 1. A mound may not be installed on a slope which is greater than 12%, except as permitted under subd. 2.

2. A mound replacing an existing private sewage system may not be installed on a slope which is greater than 20%.

(f) *Depth to rock strata or 50% by volume rock fragments.* There shall be at least 60 inches of soil over uncreviced, impermeable bedrock. If the soil contains 50% coarse fragments by volume in the upper 24 inches, a mound cannot be installed unless there is at least 24 inches of permeable, unsaturated soil that has less than 50% coarse fragments beneath this layer.

(2) MOUND DESIGN AND DIMENSIONS. (a) *Design criteria.* 1. A mound system to be installed on a site where there is at least 24 inches of unsaturated natural soil above estimated high groundwater, bedrock or slowly permeable soils shall be designed using the specifications of pars. (b) to (h).

2. A mound system to be installed on a site where there is less than 24 inches of unsaturated natural soil above estimated high groundwater or slowly permeable soils shall be designed using the specifications of pars. (b) to (h) with the depth of sand fill (D) increased in accordance with par. (d).

**Note:** The dimensions and corresponding letter designations referenced in this section are shown in Figures 1 through 5.

**Note:** As a result of a court action, s. Comm 83.23 (2) (a) 2. as printed was prevented from taking effect on June 1, 1996. Prior to June 1, 1996, s. Comm 83.23 (2) (a) 2. read as follows:

2. A mound system to replace an existing private sewage system, and to be installed on a site where there is less than 24 inches of unsaturated natural soil above estimated high groundwater, bedrock or slowly permeable soils shall be designed using the specifications of pars. (b) to (h) with depth of sand fill (D) increased according to the formula in par. (c).

(b) *Design of the absorption area.* The minimum size of the absorption area for a mound system shall be determined by dividing the total daily wastewater flow by the infiltrative capacity of the sand fill.

1. The infiltration rate for the sand fill may not exceed 1.2 gal./day/ft.<sup>2</sup>

2. The daily wastewater flow shall be determined in accordance with s. Comm 83.12.

(c) *System configuration.* 1. Trenches. a. For slowly permeable soils with or without high groundwater, the effluent shall be distributed in the mound through a trench system.

b. Trenches shall be one to 5 feet in width.

c. The lineal feet of trench required shall be calculated by dividing the required absorption area by the trench width (A).

d. Trench excavations for mound systems shall be placed at least 6 feet apart.

2. Beds. The bed width (A) shall be determined by dividing the absorption area required by (B).

Note: As a result of a court action, s. Comm 83.23 (2) (c) as printed was prevented from taking effect on June 1, 1996. Prior to June 1, 1996, s. Comm 83.23 (2) (c) read as follows:

(c) System configuration. 1. 'Trenches.' a. For slowly permeable soils with or without high groundwater, the effluent shall be distributed in the mound through a trench system. Trench length should be selected by determining the longest dimension that is perpendicular to any slope on the site. Trench width and trench spacing is dependent on specific site conditions.

b. Trenches shall be 2 to 4 feet in width.  
c. The lineal feet of trench required shall be calculated by dividing the required absorption area by the trench width (A). Trench length (B) shall not be more than 100 feet. Where more than one trench is required, the trenches should be of equal length. A mound should not have more than 3 trenches.

d. Trench spacing (C) shall be determined by comparing the estimated wastewater flow, the infiltrative capacity of the natural soil and the trench length (B). Trench spacing (C) shall be calculated as:

$$(C) = \frac{\text{Estimated wastewater flow} \div (0.24 \text{ gal/ft.}^2/\text{day})}{\text{Number of trenches}} \div \text{trench length (B)}$$

The calculated trench spacing (C) shall be measured from center to center of the trenches.

Note: For facilities with more than 1,500 gallons per day that must use a trench system, the department should be contacted prior to system design.

2. 'Beds.' A long, narrow bed design should be used for permeable soils with high water tables. The bed can be square or rectangular for shallow permeable soils over bedrock. The bed length (B) should be set after determining the longest dimension that is available and that is perpendicular to any slope on the site. The bed width (A) shall be determined by dividing the absorption area required by (B).

(d) Mound dimensions. 1. Mound height. On sites the mound height shall be calculated using the following equation where: sand fill depth (D), the downslope fill depth (E), the bed or trench depth (F), and the cap and topsoil depth (H).

$$\text{Mound height} = \frac{(D + E)}{2} + F + H$$

a. For sites having at least 24 inches above estimated high groundwater, bedrock, or slowly permeable soils, the minimum sand fill depth (D) shall be 12 inches, unless otherwise specified in Table 14. For mounds on sites having less than 24 inches above estimated high groundwater or slowly permeable soils, the sand fill depth (D) shall be based on the following calculation:

Where D = 12 inches + (24 inches - depth in inches to soil or site factor)

Note: As a result of a court action, s. Comm 83.23 (2) (d) 1. a. as printed was prevented from taking effect on June 1, 1996. Prior to June 1, 1996, s. Comm 83.23 (2) (d) 1. a. read as follows:

a. For sites having at least 24 inches above estimated high groundwater, bedrock, or slowly permeable soils, the minimum sand fill depth (D) shall be 12 inches, unless otherwise specified in Table 14. For mounds replacing existing private sewage systems on sites having less than 24 inches above estimated high groundwater, bedrock, or slowly permeable soils, the sand fill depth (D) shall be based on the following calculation:

Where D = 12 inches + (24 inches - depth in inches to soil or site factor)

am. On a sloping site, the sand fill depth (E) placed at the downslope edge of the bed or trench shall be increased so that the bottom of the bed or trench is level. The downslope sand fill depth (E) shall be increased according to one of the following calculations:

For beds:  $E = D + [(\text{slope percentage})(A)]$ .

For trenches:  $E = D + [(\text{slope percentage})(C+A)]$ .

b. The bed or trench depth (F) shall be at least .75 feet. At least 6 inches of aggregate shall be placed under the distribution pipes and at least 2 inches of aggregate shall be placed over the top of the distribution pipes.

c. The cap and top soil depth (H) at the center of the mound shall be at least 1.5 feet which includes 1 foot of subsoil and 0.5 feet of top soil. At the outer edges of the mound the minimum cap and top soil depth (G) shall be 1 foot which includes 0.5 feet of subsoil and 0.5 feet of top soil. The soil used for the cap can be top soil or finer textured subsoil.

2. Mound length. The total mound length (L) is equal to the bed or trench length plus the end slopes (K).

a. The end slope (K) =  $\frac{\text{mound depth}}{\text{at center } x \text{ } 3 : 1 \text{ slope}} = \left[ (D + \frac{E}{2}) + F + H \right] 3$ .

b. The total mound length (L) =  $\frac{(\text{bed or trench length, B}) + 2 (\text{end slope, K})}{2}$ .

3. Mound width. The total width (W) of a mound with a bed design shall be equal to the upslope width (J), the bed width (A) and the downslope width (I). When a trench design is used, the total width (W) shall be equal to the upslope width (J), the trench width or widths (A), the trench spacing (C) and the downslope width (I). On sloping sites the downslope width (I) shall be greater than the upslope width (J). On level sites the upslope width and the downslope width shall be the same.

a. Upslope width (J) =  $\frac{\text{mound depth at upslope edge } x}{3 : 1 \text{ slope } x \text{ slope correction factor from Table 15}} = (D + F + G) \times 3 \times \text{correction factor}$

b. Downslope width (I) =  $\frac{\text{mound depth at downslope edge } x}{3 : 1 \text{ slope } x \text{ slope correction factor from Table 15}} = (E + F + G) \times 3 \times \text{correction factor}$

c. The mound width (W) for a bed system = upslope width (J) + bed width (A) + downslope width (I).

The mound width (W) for a trench system =  $\frac{\text{upslope width (J)} + \frac{\text{trench width (A)}}{2} + \frac{[(\text{number trenches}-1) \times (\text{trench spacing (C)})] + \frac{\text{trench width (A)}}{2} + \text{downslope width (I)}}{2}$

**TABLE 15  
DOWNSLOPE AND UPSLOPE WIDTH  
CORRECTIONS FOR MOUNDS ON SLOPING SITES**

Slope %	Downslope Correction Factor	Upslope Correction Factor
0	1.00	1.00
1	1.03	0.97
2	1.06	0.94
3	1.10	0.915
4	1.14	0.89
5	1.18	0.875
6	1.22	0.85
7	1.27	0.83
8	1.32	0.80
9	1.38	0.785
10	1.44	0.77
11	1.51	0.75
12	1.57	0.73
13	1.64	0.72
14	1.72	0.705
15	1.82	0.69
16	1.92	0.675
17	2.04	0.66
18	2.17	0.65
19	2.33	0.64
20	2.50	0.625

Note: As a result of a court action, Table 15 as printed was prevented from taking effect on June 1, 1996. Prior to June 1, 1996, Table 15 read as follows:

TABLE 15  
DOWNSLOPE AND UPSLOPE WIDTH  
CORRECTIONS FOR MOUNDS ON SLOPING SITES

Slope %	Downslope Correction Factor	Upslope Correction Factor
0	1.00	1.00
1	1.03	0.97
2	1.06	0.94
3	1.10	0.915
4	1.14	0.89
5	1.18	0.875
6	1.22	0.86
7	1.27	0.83
8	1.32	0.80
9	1.38	0.785
10	1.44	0.77
11	1.51	0.75
12	1.57	0.73

(e) *Basal area.* 1. Minimum basal area. The minimum basal area shall be calculated using the infiltrative capacity of the natural soil and the total daily wastewater flow.

a. When using percolation test results, the minimum basal area shall be determined by dividing the total daily wastewater flow by the infiltrative capacity of the soil as specified in Table 4 or 4a.

b. When using soil evaluation, the minimum basal area shall be determined by dividing the total daily wastewater flow by the loading rate of the soil as specified in Table 0.

2. Basal area available, bed. On sloping sites the basal area shall be that area under the bed and downslope of the bed. On level sites the basal area shall be the entire area under the mound excluding the end slope areas. The appropriate equation from one of the following shall be used to determine the available basal area.

$$\text{Bed length (B)} \times \text{bed width (A)} + \text{downslope width (I)} = \text{basal area available for sloping site}$$

$$\text{Bed length (B)} \times \text{total mound width (W)} = \text{basal area available for level sites}$$

3. Basal area available, trench. On sloping sites the basal area shall be that area under and downslope of the trenches. On level sites the basal area shall be the total area under the mound excluding the end slope areas. The appropriate equation from one of the following shall be used to determine the available basal area.

$$\text{Trench length (B)} \times \left[ \text{mound width (W)} - \text{upslope width (J)} + \frac{\text{trench width (A)}}{2} \right] = \text{basal area available for sloping sites}$$

$$\text{Trench length (B)} \times \text{total mound width (W)} = \text{basal area available for level sites}$$

4. Adequacy of basal area. If the basal area available is not equal to or greater than the basal area required, the downslope width (I) on a sloping site shall be increased or the up and downslope widths (J) and (I) on a level site shall be increased until sufficient area is available.

(f) *Distribution system.* The distribution system for mounds for daily flows less than 600 gallons per day may be sized in accord with the applicable criteria in sub. (3) or with s. Comm 83.14 (3). For all other buildings, the distribution system shall be designed in accord with s. Comm 83.14 (3).

(g) *Pump selection.* Pump selection shall be based upon the criteria specified in s. Comm 83.14 (5).

Note: For pump and alarm controls refer to s. Comm 83.14 (5).

(h) *Dose volume.* The dose volume shall be calculated either:

1. According to s. Comm 83.14 (6);
2. Using the design flow from Table 12; or
3. Using 150 gallons per bedroom for one- and 2-family residences.

(3) *CONSTRUCTION TECHNIQUES.* Construction shall not commence if the soil is too wet. The soil is too wet for construction if at any level to a depth of 8 inches a soil wire can be formed by rolling the soil between the hands. Installation of mound systems when the soil on the site is frozen is prohibited for new construction.

(a) *Site preparation.* 1. Excess vegetation. Excess vegetation shall be cut and removed from the area of the mound. Small trees shall be cut to grade surface leaving the stumps in place.

2. Force main. The force main from the pumping chamber shall be installed before the mound site is plowed. The force main should be sloped uniformly towards the pumping chamber so that it drains after each dose.

3. Plowing. The site shall be plowed with a mold board plow or chisel plow. The site shall be plowed to a depth of 7 to 8 inches with the plowing perpendicular to the slope. Rototillers shall not be used. The sand fill shall be placed immediately after plowing. After plowing, all foot and vehicular traffic shall be kept off the plowed area.

(b) *Sand fill material.* 1. Sand fill quality. The sand fill to be used in the construction of a mound type private sewage system shall conform with fine aggregate specifications delineated in ASTM C33.

2. Placement of sand fill. The sand fill shall be moved into place from the upslope and side edges of the plowed area. Vehicular traffic is prohibited in the area extending to 25 feet beyond the downslope edge of the mound. The sand fill shall be moved into place with a track-type tractor. A minimum of 6 inches of sand shall be kept beneath the tracks at all times.

3. Installation of the absorption area. Form the bed or trenches within the sand fill. The bottom of the trenches or bed shall be level. The elevation of the bottom of the trenches or bed shall be checked at the upslope and downslope edges to make certain that the fill has been placed to the proper depth.

4. Placement of the aggregate. A minimum of 6 inches of coarse aggregate ranging in size from 1/2 inch to 2 1/2 inches shall be placed in the bed or trench excavation. The top of the aggregate shall be level.

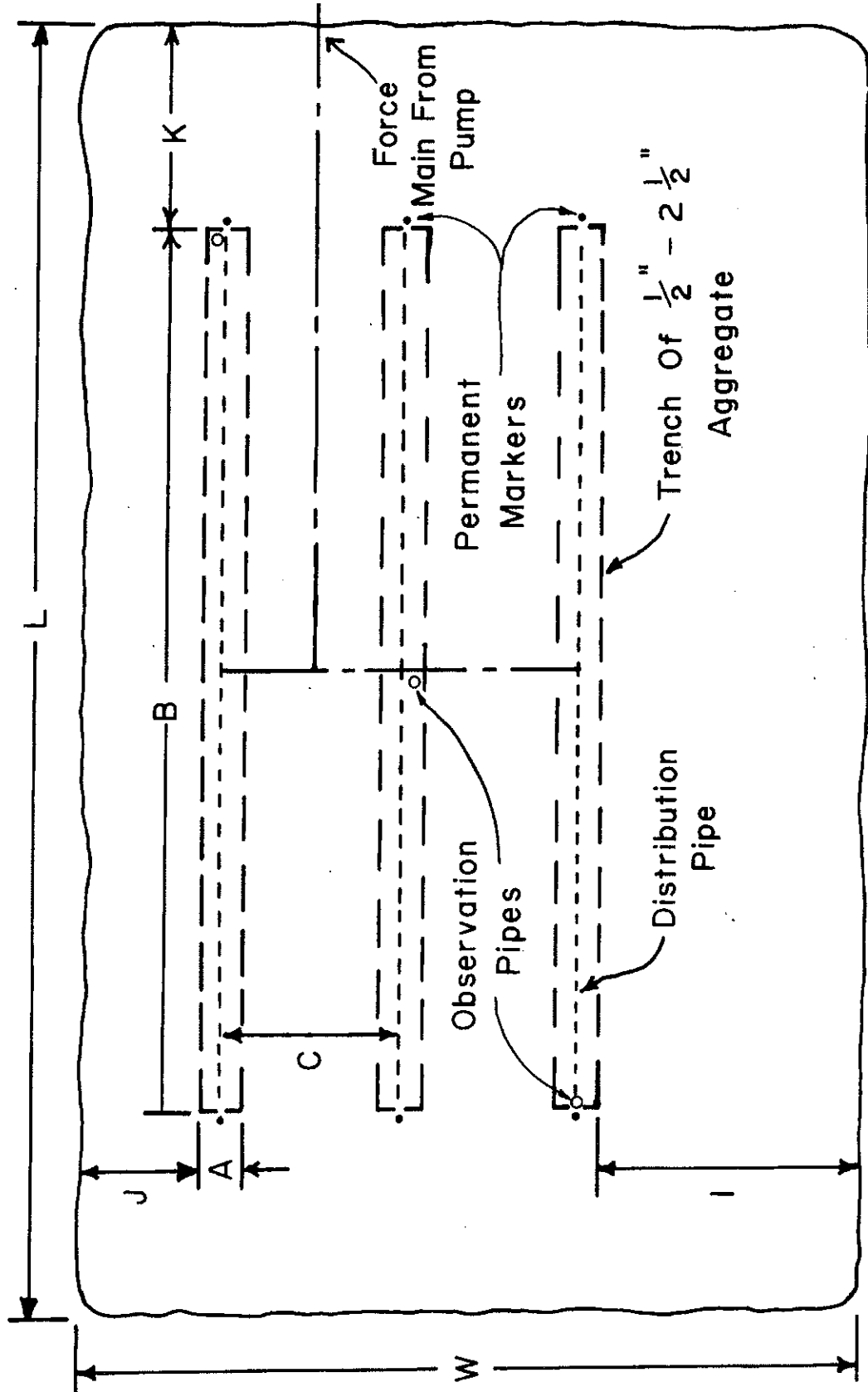
5. Distribution system. Place the distribution system on the aggregate with the holes on the bottom of the distribution lines.

6. Cover. The top of the bed or trenches shall be covered with a minimum of 2 inches of aggregate ranging in size from 1/2 inch to 2 1/2 inches. A minimum of 4 to 5 inches of uncompacted straw or marsh hay, or synthetic fabric approved by the department shall be placed over the aggregate. The cap and top soil cover shall be placed. The mound shall be seeded immediately and protected from erosion.

7. Maintenance. Maintenance shall be performed in accord with s. Comm 83.16 (1). When the septic tank is pumped the pump chamber shall be inspected and shall be pumped to remove any solids if present. Excess traffic in the mound area shall be avoided.

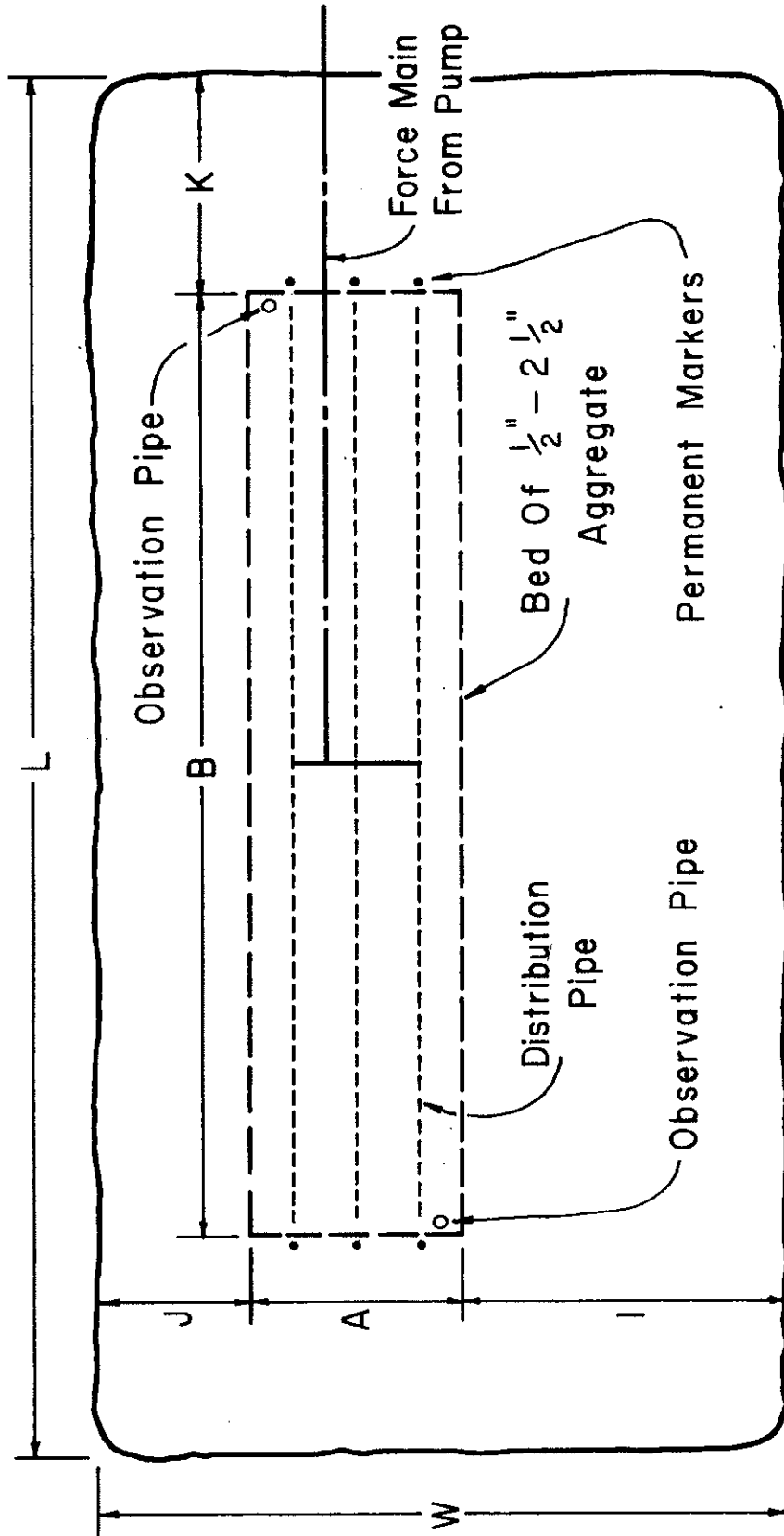
*History:* Cr. Register, December, 1980, No. 300, eff. 1-1-81; renum. from H 63.23, Register, June, 1983, No. 330, eff. 7-1-83; am. (1) (b) 1., 2. and 3., Register, June, 1991, No. 426, eff. 7-1-91; r. and recr. (1) (a), (d), (e), (2) (a), (d) 1. (intro.), a., (e) 1., (g) and (h), r. (2) (intro.), (3) and Tables 14 and 16, cr. (2) (d) 1. am. and Table 14, renum. (4) to be (3), Register, April, 1992, No. 436, eff. 5-1-92; correction in (2) (a) made under s. 13.93 (2m) (b) 7., Stats., Register, April, 1992, No. 436; am. (1) (a), (3) (b) 2. and Table 14, r. and recr. (2) (a), (b) and (3) (b) 1., r. Tables 17 to 28, Register, February, 1994, No. 458, eff. 3-1-94; am. (1) (b) 1., (2) (a) 2., (c) 1. a. to c., 2., (d) 1. a. and Table 14, r. and recr. (1) (c) to (e) and (2) (c) 1. d., Register, May, 1996, No. 485, eff. 6-1-96.

Figure 1



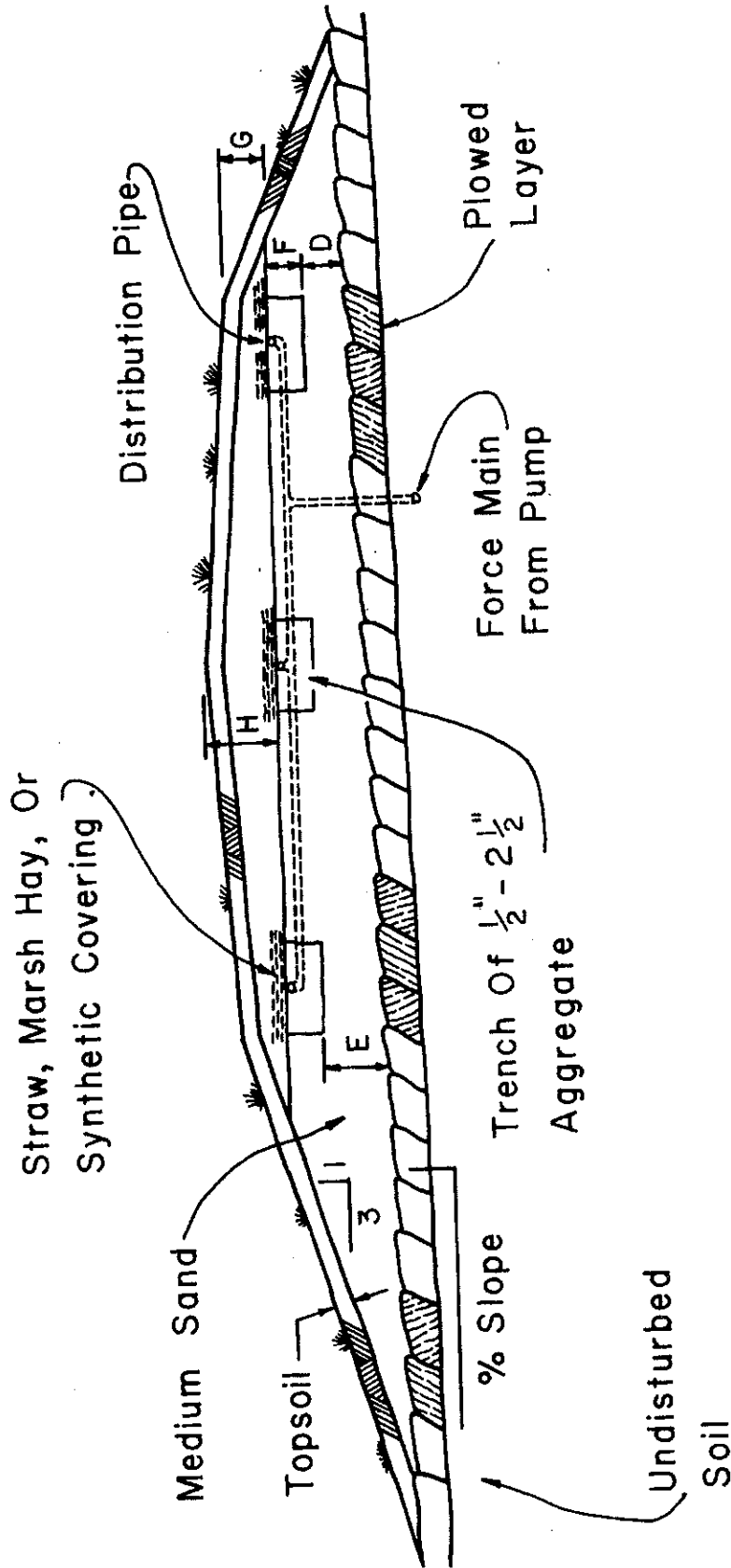
Mound Using 3 Trenches For Absorption Area

Figure 2



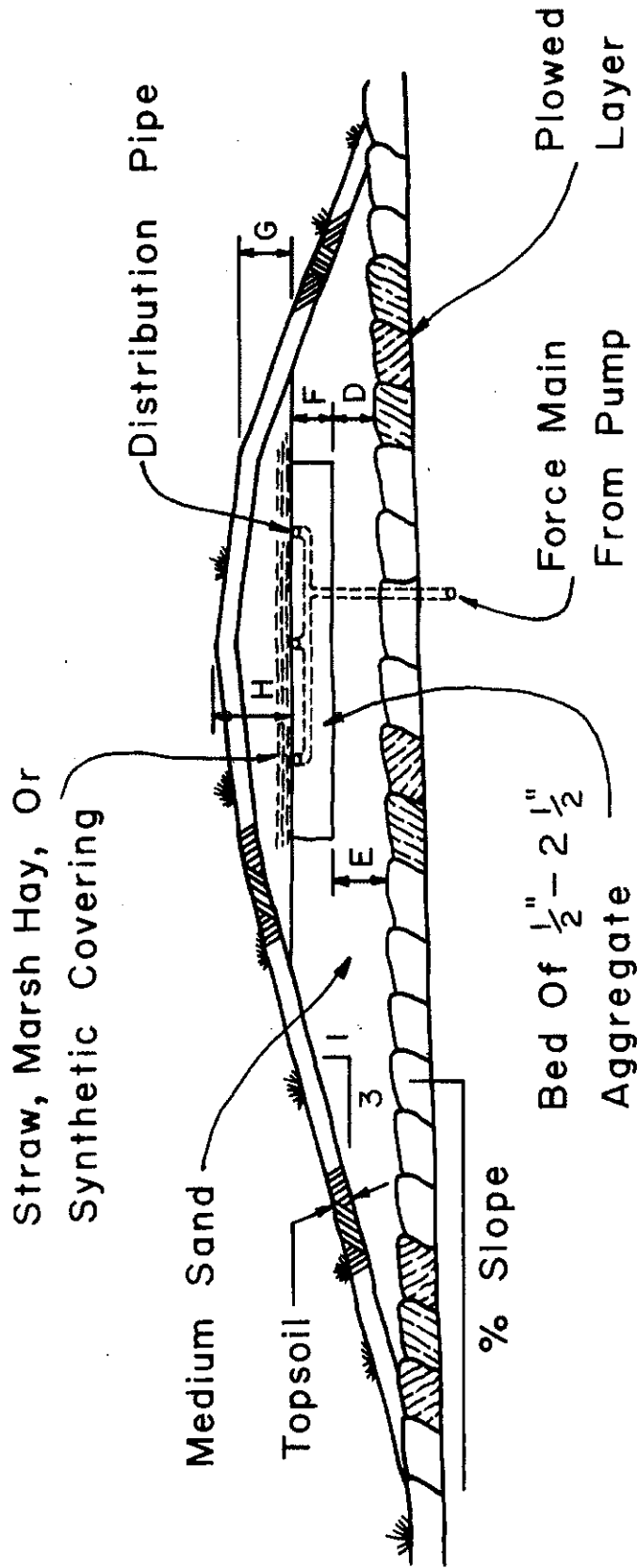
Plan View Of Mound Using A Bed For The Absorption Area

Figure 3



Cross Section Of A Mound System Using  
3 Trenches For The Absorption Area

Figure 4



Cross Section Of A Mound System Using A Bed For The Absorption Area

