

CHAPTER 8

RE-USE SYSTEM

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CHAPTER 8

REUSE WATER DISTRIBUTION SYSTEM

8.0 REUSE WATER DISTRIBUTION SYSTEM

8.1 POLICY: All new development, other than single residential lots, within the Town of Bennett's designated Urban Growth Boundary, will be required to design and install an appropriate reuse main system as part of their utility infra structure. This requirement applies even if a system tie-in is currently not available. Waivers of this requirement can only be granted by the Town Board of Trustees.

8.1.1 Purpose and Scope: This chapter details reuse water system policies, design criteria, administrative requirements and provides minimum design criteria for acceptable materials and reuse water distribution design and construction-related regulations for the installation of the reuse water distribution system. The purpose of this section is to outline the Town of Bennett's policies related to the design and construction of reuse water distribution systems, and to assist the design engineer in providing an acceptable design submittal to the Town.

8.1.2 Purpose/Rationale of Water Reuse System:
A) The policy of the Town of Bennett relative to water is two-fold. First, the Town strongly encourages water conservation. Examples include requiring water conservation devices in all new construction, public information campaigns stressing conservation needs, and benefits, etc. Second, the Town will require the installation of a dual-pipe water and irrigation reuse system in all annexed areas zoned Commercial, Office, Light Industrial, Public Land Dedications, etc. The Town has also, through these Regulations, and the Roadway Designs and Construction Manual changed the requirements for irrigation and landscaping to include more native

materials that require less water. Exceptions to this requirement are only granted from the standpoint of engineering limitations, or excessive economic liability. Should a Developer wish to apply for a variance, it will be his responsibility to supply the Town with all necessary information supporting the request. This variance shall be in accordance with the requirements of these Regulations.

- B) The purpose of the separate reuse system is to conserve the Town's high quality deep ground water supply by reserving that supply primarily for in-building use. The reuse water supply shall be used for outside watering of grass and other landscaping only. If a customer wishes to use non-potable water for any other use (e.g., industrial process water) a specific permit from the Town is required, such a use will need to be submitted to the Town Engineer, Director of Public Works, or Town Planner for review and approval.

8.1.3 General Usage Concepts.

- A) The Town is in the process of designing, building and operating supplementary wastewater treatment facilities so as to produce a reuse water suitable for irrigation and occasional body contact, as defined by State Health Department. This reuse water is not represented to be of adequate quality for potable use. There shall be no cross connections between reuse and potable waterlines, and no reuse lines shall be installed inside a building or within 5' of a building foundation wall.
- B) The Town will provide an information warning document which each customer shall read before the Town turns on a customer reuse water service. Each customer shall sign an acknowledgement of reading and understanding before such service begins.

8.1.4 Electrical: All electrical controls, enclosures and other associated appurtenances shall be "UL" tested and approved. Evidence of such shall be submitted to the Director of Public Works, for review and approval, prior to installation. Failure to comply shall be corrected at the Owner/Developer's expense.

8.2 GENERAL DESIGN CRITERIA: The design of reuse water distribution systems in the Town shall conform to acceptable engineering practice, be designed in accordance with the criteria set forth in this and other sections of the Regulations. Primary standards and reference publications used in this section are from:

American National Standards Institute (ANSI)
American Water Works Association (AWWA)
American Society for Testing and Materials (ASTM)

8.3 MINIMUM REUSE WATER DISTRIBUTION DESIGN CRITERIA

8.3.1 Sizing/Maximum Demands/Velocities: Reuse distribution lines shall be designed to furnish peak reuse demand flow rates during a dry year. Design residual pressure at the customer meter shall be not less than 40 psi. Maximum design on pipeline flow rates shall not exceed 7fps. Design application rates shall be not less than 0.4 inch/day or 0.17 gpm/1,000 SF (average rate for maximum day) of irrigated area. Design safety factors for peak instantaneous rates shall be applied. Normally, design peak rate safety factors may vary from 3.0 to 12, depending on the size of the service area. Unless shown impractical and so approved by the Director of Public Works, or Town Engineer, all reuse lines shall be designed to slope in a consistent direction to a flushing hydrant or drain to facilitate seasonal draining, each draining section shall be provided with a flushing hydrant, which shall be painted brown to distinguish them from potable hydrants.

8.3.2 Minimum Size: The minimum size reuse distribution main shall be a 6" looped line. Smaller mains may be individually approved by the Town Engineer.

8.4 ALIGNMENT AND DEPTH

A) Horizontal Separation - Colorado Department of Health Regulations require a 10' minimum clear separation (outside to outside between water, sewer and reuse water lines. The reuse water lines shall normally be located 10' south and west of street center lines.

B) Vertical Separation - Normally water, sewer, and reuse water shall be located vertically from the street surface in order of the higher quality, i.e., water shall be above reuse water and reuse water shall be above sewer. Where a crossing must occur where a reuse water or a sewer main passes within a minimum of 18" of a water main or where a sewer main passes within 18" of a reuse main, special construction will be required. Encasement, shall be one of the following types:

- 1) Reinforced concrete blanket, a minimum thickness of 6" - 10' each way of the crossing.
- 2) Piping within a continuous steel casing, which shall have a thickness of not less than ¼" and with all voids between pipe and casing pressure grouted with sand-cement grout.
- 3) PVC water pipe, AWWA C900, DR 14 installed to maintain the required minimum 10' clear separation with the PVC pipe middle over the other pipe. If a reuse water main is above a water main or if a sewer main is above a reuse water main, the special construction shall extend a sufficient distance on both sides of the crossing to provide a minimum of 10' of horizontal clearance. These construction requirements shall not apply to those house laterals that cross less than 18" below a pressure water or reuse water main.

8.5 VALVE LOCATIONS

- A) Reuse operator valves shall be installed in the distribution system so that no more than 2000 feet of line will be shut off in the event of a line failure. Valves shall be located at the point of intersection of the extended right-of-way lines. For additional valve placement, see also flushing hydrants and reuse main drain system.
- B) Valves shall be located so that any new extension can proceed, and be pressure tested without affecting the existing system. Each unextended end of a tee or cross shall indicate a valve and blind flange.
- C) Whenever a valve is located outside of a street, walkway or paved surface, a reference marker shall be installed and noted on the plans. The reference marker shall be a 3" galvanized pipe filled with concrete. The pipe shall be 9' long, set in at least an 8" diameter hole of a depth of 4' and filled with concrete. The pipe shall be painted with alternating stripes of yellow and silver, each stripe 4" wide. Reference information shall be painted or inscribed on the marker.

8.6 VALVE IDENTIFICATION: All valve box section and lids for use on all reuse lines shall be triangular with the inscription "IRRIG" cast thereon. They must be purchased from the Town of Bennett Public Works Department.

8.7 FLUSHING HYDRANTS: Flushing hydrants (key operated only) shall be provided as required to properly flush the system. These hydrants shall be designed to drain, when not in use, have a 2 1/2" fire hose connection, Flushing hydrant; shall be located within 75' of a sanitary sewer manhole, or with a green belt or agricultural irrigation area (not a public park containing potable water facilities). They shall be painted brown to help distinguish them from fire hydrants.

8.8 MAIN LINE DRAINS

8.8.1 Discharge Requirement: All reuse lines must be able to be drained for the winter. Discharge

from the reuse system is limited by the State Health Department and is considered and applied for as a wastewater effluent discharge point. At no time will discharges to the storm drainage system, drainage channels, street, ponds or other natural streams be allowed. All drain discharge points will be clearly identified on the plans and will be subject to review and approval by the Town. Acceptable discharge points are the sanitary sewer, reuse ponds and reservoirs, and land application.

- 8.8.2 Design Requirements: All drain lines shall be a minimum of 4". Drain lines shall be teed to the main line and be closed off with a gate valve. If the drain line drains to the sanitary sewer, it shall be connected to a manhole and an invert shall be formed. The drain line loading shall be considered when designing the sanitary sewer. All drainage tees shall be located at the low point of the section to be drained. The drain tee shall be angled down at 45 degrees, the drain line valve shall be located within 18" of the main. All drain lines shall maintain a minimum of 0.2% slope from the drain valve.

Land

application for the drain may be a system of perforated pipes through a suitable draining medium. All land application designs shall be reviewed on a case by case basis. All drain designs shall be reviewed and approved by the Town. All the necessary review information shall be supplied by the Consultant Engineer when submitted.

8.9 LARGE FLOW METERING

- 8.9.1 Definitions: All meter installations on lines larger than 4" shall be subject to these large flow-metering regulations. The purpose of monitoring the larger consumers on the reuse system with tighter control is for the operation of the wastewater system and treatment. To maximize the use of wastewater effluent, the treatment plant operators must know when the larger consumers are using reuse water.

8.9.2 Design Requirements: Large-metering installations shall consist of a concrete vault with vents and floor drain. The meter shall have a 4-20 ma remote connection. In the future the meter may be connected to an anticipated telemetry system that includes interconnection with a planned wastewater central computer system via telephone lines. The meter shall have valves on both ends to facilitate removal and installation.

8.10 REUSE PUMP STATIONS

8.10.1 Design Requirements: There are two varieties of pump stations required to operate the reuse system. The first is a transfer pump station to move the effluent from one reservoir to another. The second is a pressure sustaining pump station, which is used in the absence of a tank to provide the system operating pressure and flows.

8.10.2 Transfer Pump Station: As a minimum, the transfer pump station shall have the following components:

- Two or more high service pumps with isolation valves and pump control valves.
- Motor control center.
- Telemetry and connection to the central
- Wastewater computer (planned for the future).
- A building with the capacity to remove, move and work with all equipment, pumps and piping installed within. An underground vault may be required by the Town in environmental sensitive areas.
- Adequate heating, ventilation, and electrical service.
- Pump brass connection with solenoid controlled valve when required by the Town for backflowing.
- Lighting; site work, revegetation and landscaping.

8.10.3 Pressure Sustaining Pump Station: As a minimum, the pressure-sustaining pump station shall have the following components:

- Hydrophnuematic tank, air compressor and associated piping
- Jockey pump with isolation and pump control valves.
- One or more high service pump with isolation and pump control valves.
- Motor control center.
- Telemetry for future connection to a central wastewater computer.
- A building with capacity to remove, move and work with all equipment, pumps and piping installed within. Openings to the building shall be large enough to remove the striped down hydropneumatic tank. An underground vault may be required by the Town in environmentally sensitive areas.
- Adequate heating, ventilation and electrical service.

8.11 PONDS, RESERVOIRS AND TANKS

8.11.1 General: Ponds, Reservoirs, and tanks are required to provide storage (daily, seasonal and/or annual) and may be used to provide system operating pressure. It is preferable to use ponds, reservoirs, or tanks when it is economically feasible to provide the reuse system pressure. In designing the reuse system, the gravity pressure system versus pump station pressured system shall be analyzed prior to the system being designed. This analysis shall be submitted and approved by the Town.

8.11.2 Design Requirements:

- A) Tanks - As a minimum all tanks shall be circular concrete and buried structure with no more than 20' from floor to high water level. All tanks shall have level controls with telemetry, tank drain; an overflow and two access hatches. All reuse tank telemetry signals shall be wired for a future tie-in with a central wastewater

computer.

- B) Ponds and Reservoirs - As a minimum, all ponds and reservoirs shall be lined and provided with a drain and an access ramp to get equipment into them. All ponds and reservoirs shall be designed with a maximum of depth per volume. They shall have a level gauge and influent/effluent flow metering with telemetry wired for a future tie-in with a central wastewater computer.

8.12 REUSE WATER DISTRIBUTION

- 8.12.1 Pipe and Fittings: All reuse water distribution pipe 12" and smaller shall be PVC pipe of Class CL150 or 200, DR of 14 or 18, as required. Pipe shall be not less than Class 150. Class 200 shall be used for all areas having higher pressure as identified by the Town. The pipe, couplings, and rubber rings shall comply with the following standards.
- 8.12.2 Chloride (PVC) Pressure Pipe 4" through 12" for Water (AWWA C900).
- 8.12.3 Type of Couplings: Only elastomeric-gasket couplings shall be used on PVC pipe. These couplings and pipe joints shall meet the requirements of AWWA C900 and ASTM D3139.
- 8.12.4 Reuse piping larger than 12" shall be PVC. Other non-metallic pipe materials may be approved by the Town Engineer or Director of Public Works and any such changes need to be approved prior to design of the line proceeding. Asbestos cement pipe (ACP) is not acceptable.
- 8.12.5 All reuse piping shall be non-metallic and equipped with locator wire or tape. Under no circumstances will a metallic pipe material be acceptable.
- 8.12.6 Warning Notification on Pipe: All reuse water distribution and service lines shall be installed with warning tapes, or with the warning printed directly onto the pipe.

Warning tapes shall be installed directly on top of the pipe longitudinally and shall be centered. Acceptable tape or printing on the pipe shall state:

"Non-Potable Line DO NOT DRINK."

The labels painted on the pipe shall have no more than a 2' distance between the wording.

8.13 LINE VALVES AND FITTINGS: Reuse line valves shall be manufactured in accordance with the current applicable AWWA standards. All valves shall be left open. All valve ends shall be mechanically-jointed. The valves and fittings shall be minimum Class, but not less than the pressure class of the pipe.

8.13.1 Gate Valves - Up to and Including 12":

Gate valves without bypass valves may be used on all lines 12" in diameter or smaller. Gate valves shall be made of an iron body, non-rising bronze stem, resilient-seated type, manufactured equal to AWWA Standard C509. The valves shall be double-rise, parallel seat and equipped with "O" ring stem seals. The valves shall be left open and be furnished with a 2" square operating nut or hand wheel. Valves shall have a full opening flow way of equal diameter of the nominal size of the connecting pipe. The valve disc shall have an integrally cast ASTM B62 bronze stem nut to prevent twisting or angling of the stem. All internal and external ferrous metal surfaces shall be full coated, to a minimum thickness of .4 mils. The coating shall be a two-part hemisetting epoxy, suitable for field overcoating and touch-up with the same coating material, without special surface preparation or extreme heat. Coatings shall be equal to or exceed AWWA Standard C550.

8.13.2 Gate Valves - Larger than 12": All gate valves larger than 12" shall be flanged and equipped with bypass valves. Valves 16" and larger shall be geared and horizontally installed in concrete vaults. The horizontally mounting valves shall be equipped

with tracks, rollers and scrapers. Gears shall be grease-lubricated cast steel and enclosed in a sealed gear case. Bypass valves shall be of a minimum size and be equipped with a non-rising stem. Bypass valves shall be furnished with a cast iron valve box and cover, except that they shall be furnished with covers marked "Bypass", and shall not be interchangeable with the main valve cover. Valves which are installed within vaults shall have the bypass valve installed within the vault. Valve vaults, as identified by the Town, shall have a pressure gauge installed.

8.13.3 Valve Boxes: Each valve not installed within a vault shall be furnished and installed with a cast iron valve box and cover. The iron valve box shall be substantially made, shall be adjustable for length and shall be of the screw type. The box shall not be less than 5¼" in diameter and the cover shall be of the deep socket type, with the word "Water" cast on top. The protective cover of valves shall be increased as necessary to provide a minimum of 5' of protection on the valve bonnet.

8.13.4 Butterfly Valves: All butterfly valves shall follow any applicable standards outlined under gate valves. Butterfly valves may be used in place of gate valves, when following good engineering practices and when approved by the Town. All butterfly valves shall be of cast iron body, tight-closing, rubber-sealed, Class 150B, buried service, conforming to the requirements of AWWA C504. The valve disc shall rotate and the place of the disc in the full-seated position shall be 90 degrees to the axis of the pipeline. The valve shall give bubble-tight shut-off against pressure of 150 psi, and the body shall be capable of withstanding a hydrostatic test pressure of 300 psi.

8.13.5 Combination Air Relief Valves:

Combination air relief valves and boxes shall be located at all high points in the reuse system. The valve body shall be of cast iron, designed for a working pressure of 150 psi, shall be fully bronze-mounted, be able to work without clogging with a high suspended solids content, and shall have 125 pound ASA flanges. The constant pressure portion of the pilot may be either a hydro-mercury control or a spring-loaded control.

8.13.6 Pressure-Reducing Valves: Pressure-

reducing valves, vaults and piping shall be installed in the locations where required by the own Engineer or Director of Public Works. The valves shall be of standard type, capable of maintaining any desired constant downstream pressure against a higher and varying inlet pressure. All pressure-reducing valves shall have a pressure-sustaining feature. The Engineer or Director will provide the approximate upstream pressure to be maintained. Valves shall be furnished with cast iron bodies and covers, bronze trim and copper floats designed for 150 psi working pressure. The valves shall be placed in a concrete vault and installed with a bypass loop configuration. Cla-Val brand only.

8.14 REUSE SERVICE LINES, METERS AND TAPS: Service lines shall be all plastic, meeting the following specifications:

8.14.1 Service Line Materials:

- 1) Polyethylene (PE) ¾" through 2" diameter pipe shall be polyethylene, (except as provided in 2 below), non-jointed, conforming to AWWA C901, minimum Class 200 psi, using PE2306, 3306, and 3406 material.
- 2) Polyvinyl Chloride (PVC): 1-1/2" through 3" diameters; pipe may be PVC, bell and spigot with rubber gasket joint, ASTM D2241, SDR21, Class 200 psi; pipe material shall be extruded from approved Class 12454-A PVC compound, conforming to ASTM resin specification D1784. Minimum wall

thickness, in inches, shall be as follows:

1-1/2 inch - 0.090

2 inch - 0.113

2-1/2 inch - 0.137

3 inch - 0.167

- 3) Polyvinyl Chloride (PVC): 4" and larger diameter; pipe shall be PVC, meeting AWWA C900, Class 150 minimum.

8.14.2 Service Lines Installation: These lines shall be shown on the plans and be constructed between the reuse system pipeline and the meter vaults. Pipe shall be buried with an average cover of 4.5' and an absolute minimum cover of 4.0'. The reuse service line shall not be installed closer than 10' horizontally to the potable water service or sewer service line. No reuse service lines shall be installed inside a building or within 5' or a building foundation. A marking tape with the words, "Non-Potable Line - DO NOT DRINK", shall be installed just above the pipe. If the meter is not installed at the time of service line installation, a 1-1/2" black PVC or ABS marker pipe 6' long, shall be installed vertically at the end of the service line as a marker. All service lines shall be built to drain up to the tap.

8.14.3 Service Lines - Tapping: All service saddles shall be of the double-strap type. These straps shall be flat. The body shall be manufactured of bronze, conforming to ASTM B62, and shall be tapped for an iron pipe thread. The seal with the pipe shall be effected with either a rubber gasket or "O" ring. Corporation stops shall be manufactured of bronze, conforming to ASTM B62. Direct tapping of the main shall not be allowed.

8.14.4 Meters: The meter will be furnished and installed by the Town. Meter pits must be concrete only, or pits that can be installed or removed in sections. Reuse service lines shall be installed at the property line, or with Town approval, at a point near the center

of the front yard, convenient for the irrigation system. Meter pits shall conform to the general standards and construction configurations established for potable water meter pits within Chapter 7 of this Manual. If the meter is not installed at the property line, the customer shall provide the Town with an access easement to the meter pit. The meter pit shall be all of fiberglass or plastic, of a brand approved of the Town. Copper meter setters may be used inside the meter pit only, If no polyethylene pipe is visible, a non-corrodible sign, stating: "Non-Potable - DO NOT DRINK", shall be hung on the meter setter, suitable for viewing from above. A curb valve shall be installed on the upstream side of the meter. Where so designated by the Town, a pressure-regulating valve shall also be installed.