

**CITY OF VICTOR**  
**WATER AND WASTEWATER RULES AND REGULATIONS**



**Adopted: July 21, 2016**

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**CITY OF VICTOR**  
**WATER AND WASTEWATER RULES AND REGULATIONS**

**PART I – GENERAL PROVISIONS**

**A. Purpose**

It is hereby declared that the standards and regulations contained here are necessary to insure and protect the health, safety, prosperity, security, and general welfare of the residents of the City of Victor, Colorado.

**B. Application**

(1) At the time of application for any class of project involving the City’s water and/or sewer system, the owner or developer will be required to submit the following to the City for approval:

- a. Copy of a site plan showing proposed route of water service and/or sewer service.
- b. Copy of mechanical drawings showing building service connection(s).

(2) Additions to the City water and sewer systems may only be installed between May 15th and October 31, weather permitting.

**C. Inspection and Approval**

Any addition to the water and sewer systems, mechanical change to the water supply of any existing structure, or modification of site use shall be inspected and approved by the City to ensure compliance with these Rules and Regulations.

**PART II – WATER CONSTRUCTION STANDARDS**

**A. Water line specifications.**

No service line shall be installed unless it conforms to the following specifications:

(1) Water service materials shall be new, undamaged material of the highest quality meeting standards approved by the American Water Works Association (ref. C-800).

(2) The City will install the supply line, corporation stop, service saddle, curb stop, valve box, meter and tap into the main up to one and one half inch (1 1/2”). The owner will install the service line and all other plumbing required.

(3) Service lines exceeding 1 1/2” in diameter are considered to be mains for testing purposes and must be disinfected in accordance with AWWA C-600 prior to acceptance by the City.

(4) Planned unit developments and other new developments are required to install all meters, taps, supply lines and service lines at the expense of the developer.

(5) All service lines will be type "K" roll copper, meeting AWWA 75-CR. Ductile Iron Pipe (DIP) class CL-52, push on joint, cement lined is the accepted material for large (2" and greater) service lines. There shall be one service line and one curb stop and valve box servicing each unit of a multi-family dwelling with the exception for a multi-family unit where, after written approval, a single line of appropriate size may be installed.

(6) Service lines shall be buried to a depth of 6 ½ feet. This measurement is from the top of pipe, notwithstanding depth of the main or service line connection. Water service lines shall not encroach within 15 feet of a property line without a dedicated easement agreement, unless absolutely necessary as determined by the City. It is the owners' responsibility to identify property lines. The City recommends avoiding water lines installed under or across driveways. Water lines shall not be laid over consolidated rock outcroppings unless over-excavated a minimum of 12 inches (to 9.5'), and properly bedded. In areas where blasting is required, over-excavation to minimum of 12" greater than the final grade is required with removal of the blasted material and replacement with granular bedding material. If it is physically impossible to bury the service line to a depth of 8 ½ feet, the owner of the property at no cost to the City will deliver to the City an engineered alternative plan. This plan must bear a professional engineer's stamp.

(7) The water service line shall be protected from ground water contamination while being installed and shall be flushed full discharge upon complete installation to ensure that any obstructions in the pipe are removed before approval will be issued.

(8) Direct water taps for service lines are not allowed. Tapping saddles are required for all water service taps. Tapping saddles may be ductile iron or lead-free brass, must be double strap, CC thread, and have an O-ring gasket seal.

(9) Corporation stops shall be ball cocks (no inverted key) of brass or bronze in the same size as the copper service line. They shall be AWWA standard inlet thread, compression type or flared outlet (Ford Quick-Joint or Mueller C-110 preferred). Corporation stops shall be located in the top 1/3 of the main and the service line connection made thereto shall be installed in such a manner so that an expansion loop (goose neck) is established to prevent damage to the main.

(10) Curb stop shall be a cast bronze body ball valve design with resilient seals, standard T-head operator and 90 degree rotation, with flared fittings outlets (Ford or Mueller preferred). Stop and waste valves are required. All curb stops will be treated as system valves and accessed through a curb box. Curb stops are to be located inside property line no more than 5' from the meter pit.

(11) Curb box shall be an arch pattern box with 1 inch diameter upper section and 2-hole Erie pattern lid, or equivalent for up to 1 inch size service line, 1 1/2" service lines require an enlarged base. All boxes require an 80" extension with an extended shut off rod and must be properly supported to prevent settling on the valve. Curb boxes must be set at final grade. In the event a curb box is located in a driveway, a "monument box" shall be permanently installed to protect the box lid from damage. The monument box shall be installed with an additional 2 ½' of paving grade rings installed on top to allow for future grade adjustments. The top of the valve box ring must be ½" – ¾" below finish grade.

(12) Where absolutely necessary due to the length of the service line run, service line couplings shall be AWWA/ANSI approved brass or cast bronze body with flared type outlets (Ford or Mueller

preferred). No couplings are permitted within 15' of any building structure or foundation. The service line must be pressurized and the couplings inspected prior to any backfill.

(13) Size reductions shall be made with a compression piggyback, or by using compression by I.P.T. adapter on the inlet and outlet and a brass or bronze bell reducer to change size.

(14) Multiple branch connections to a single service line will only be allowed in a previously accepted stub-out, and shall be made with a branch connector.

(15) All service lines will have a property shutoff, curb stop box and backflow prevention device installed at the time the water tap is made.

(16) Frost protection is required when the lines cannot be dug at the minimum depth due to extraordinary circumstances. Frost protection material shall be as a minimum, 2" Dow Board insulation or its equivalent. Sections shall be a minimum, 24" wide, centered over the pipe, with a 6" overlap between sections. The frost protection material shall be installed 6" above top of pipe on level bedding material, with an additional 6" of bedding material on top of the frost protection material.

(17) All water service lines installed in the City shall be bedded with clean granular bedding material to a minimum 6" above the top of the freeze protection board, 6" between the bottom of the freeze protection board and the top of the pipe, 6" below the bottom of the pipe and 24" inside the building foundation wall. Any rock greater than 6" in diameter that is imbedded in the trench bottom shall be removed and the resulting void filled with the specified bedding material.

(18) Granular bedding material shall be ¾" minus cleaned rock, or other material previously agreed to and authorized in writing by the City or his authorized representative. Except that any area showing signs of ground water infiltration shall have ¾" washed rock or a fill as specified by a licensed soils geologist or professional engineer of the State of Colorado.

(19) Water service lines shall be located a minimum of 10' horizontally from existing or proposed sewer lines. In the event that a sewer main or sewer service line crosses above or crosses within 18" below the water service line, the sewer line shall be made impervious to a minimum distance of 10' to both sides of the water service line either through SDR-26 or AWWA C-900 spec pipe. The City shall be notified and approve prior to backfill any methods pertaining to the installation of sewer pipes.

(20) Water service lines shall not be installed in the same trench with gas pipes, electrical conduits, sewer pipes or other utilities except with written approval of the City. In instances where sewer pipes in a joint trench are approved, the sewer pipe shall be SDR26 or C900 pipe.

(21) No soldered connections shall be allowed underground or before the meter assembly.

(22) It is the responsibility of owner/developer, or their designated representative, to have all valves accessible and operable prior to inspection by the City.

(23) Any water service line over one hundred feet long or that will have to extend more than sixty feet in any City easement must be reviewed prior to installation by the City. If, in the opinion of the City, a water main needs to be extended to provide adequate water service to a residence, all costs of the water main extension will be the responsibility of the property owner.

## **B. Water Line Inspection**

- (1) Inspection of a service line by the City is required prior to acceptance of the service line.
- (2) Inspections are made between the hours of 8:00 a.m. and 3:00 p.m., Monday through Friday, holidays excepted. Inspections must be scheduled in advance, with a minimum 24 hour notice, through the Victor City Clerk's Office. Follow-up inspections shall also require 24 hour notice.
- (3) Service lines shall be visually inspected at distribution system static pressure. All fittings will remain uncovered for the visual inspection.

## **C. Water main extension specifications.**

No water main extension or water main installation shall be accepted as part of the City system unless it meets the minimum specifications set by these Regulations.

- (1) Ductile Iron Pipe (DIP) class CL-52, push on joint, cement lined is the accepted material for water mains. All pipe joints must be copper strapped or cad-welded to maintain conductivity. Where cad welding is the method chosen heavy gauge single strand wire (minimum 6 gauge) shall be used.
- (2) Mains lines should be placed at a minimum depth of 8 ½ feet to the top of the pipe from finished grade.
- (3) Water mains shall be located a minimum of 10' horizontally from existing or proposed sewer mains. Whenever a sewer main or sewer service line crosses above or crosses within 18" below the water main, the sewer line shall be made impervious to a minimum distance of 10' to both sides of the water main either through SDR26 or AWWA C-900 spec pipe. The City shall be notified and shall approve any methods pertaining to the installation of sewer pipes prior to backfill of the pipe.
- (4) All trenches shall conform to and be consistent with OSHA regulations. Any inspector observing unsafe conditions will not enter the trench for inspection.
- (5) Water mains and their appurtenances must be properly bedded. Bedding material requirements call for ¾" clean gravel as the maximum size material accepted or similar is preferred. Bedding material must be crushed and cleaned stone to be accepted. There shall be a minimum 6" layer of bedding below the pipe and a minimum 12" layer of bedding above the pipe.
- (6) Wet taps shall be performed in locations where new mains are connected to the City's water distribution system. Wet taps larger than 1 ½" are the responsibility of the Developer/Contractor.
- (7) Service taps shall be separated by at least 18" and be placed no closer than 24" to the end of a pipe section. Tapping saddles are required for all service line taps. An abandoned service line must be terminated at the corporation stop.
- (8) Valves shall be resilient seat NRS gate valves, and shall open left. (Mueller resilient wedge and Waterous F-2500 valves preferred.) Isolation valves shall be located at all tees and spaced no more than 800' apart on a straight run.
- (9) Valve boxes shall be set plumb and true and centered over the valve operating nut. Valve box installations shall be supported to prevent settling. Valve stem extensions are required on all valve installations. Valve stem extensions will be sized so that the top of the valve stem extension is within

12" of the valve box lid. Valve boxes located in asphalt or concrete will have an additional 2 ½" paving grade ring installed to allow for future grade adjustments. Valve boxes located in asphalt or concrete will be installed so that the top of the valve box lid is ½" – ¾" below grade. Valve boxes located in a non-paved right of way will be installed so that the top of the valve box lid is 6" below finish grade.

(10) Hydrants shall be a dry barrel, Waterous Pacer model or Mueller Centurian model. Hydrants shall be painted red. A "mountain spec" hydrant is the only type hydrant accepted in the City of Victor. (Mountain spec = 42" from finish grade to center of streamer connection.) Mountain spec hydrants shall not be fabricated on site with additional barrel and stem extension kits. Hydrants shall have only one breakaway traffic flange set 3" above grade. Hydrants shall be set over 1/3 cubic yard of crushed stone to allow for barrel drainage through the weep holes. Hydrant installations shall conform to AWWA standard C502 and have as a minimum a 6" hydrant lateral line.

(11) Thrust blocks/restraints. Appurtenances must be properly braced by appropriately sized concrete thrust blocks. When using concrete for restraint, all nut and bolt assemblies shall be protected with a high density plastic (visqueen) wrap. Joint restraint shall be provided with threaded rod and nut assemblies and/or mega-lugs.

(12) Disinfection. Tabular calcium hypochlorite attached to the inside of the pipe with food grade adhesive is the required method of disinfection for new water mains.

(13) Inspection. Water mains, water service lines and water service appurtenances tied into and served by the City must be inspected during installation. Any ductile iron pipe entering a building to be utilized as a service line shall also adhere to subsequent service line installation requirements.

#### **D. Water Main Testing**

(1) Main will be filled slowly with water to dissolve tabular chlorine. Main will then remain static for 48 hours.

(2) Representative sampling for chlorine residual will then be drawn. (Minimum 50 mg/L per AWWA C651).

(3) Main must be thoroughly flushed at maximum velocity from a fire hydrant to remove any and all potential debris left from the installation process.

(4) A minimum 2 hour hydrostatic pressure test in accordance with American Water Works Standards SEC. 4 of C600. Hydrostatic pressure in the line shall not be less than 150 PSI for the test. The Contractor will supply a metered pump with lock off mechanism and a working pressure gauge (min. 250 psi).

(5) After the final line flush, the line must remain static for a minimum of 24 hours prior to a sample being drawn to check for bacteria. This will be collected by a City representative. The results will be communicated to the contractor as soon as possible, after the initial 24 hour test is complete.

(6) The main will be inspected to determine electrical conductivity. When the approved plans have been completed, an engineer licensed by the State of Colorado must stamp and validate the as-built drawings before consideration for final acceptance by the City of Victor.

(7) All work shall be warranted completely for a minimum of two years from acceptance.

**E. Meter installation.**

(1) All premises using City water must be equipped with an adequate water meter and backflow prevention device furnished by the City, but paid for by the user, which upon installation becomes the property of the City; provided that such water service may be supplied by the City at a flat rate of charge, to be set by the City Council until such meter may be installed.

(2) All meters and associated equipment shall be purchased from the City.

(3) Meters must be installed in a location that protects the device from freezing. Repairs to a water meter necessitated by damage due to freezing or abuse will be charged to the building owner.

(4) Meters shall be Badger with Remote read out. The water meter assembly shall be the same size as the service line that enters the building except where the service line also provides fire service.

(5) There shall be a valve as the first fitting on the supply line immediately upstream of the meter installation. The meter shall be installed with a yoke in such a manner that there is no mechanical strain on the meter and the piping will not restrict meter removal. The meter will only be installed in the horizontal position. Electrical continuity will be maintained across the entire water meter assembly with a minimum 6 gauge bonding wire secured at each end of the water meter assembly with water pipe grounding clamps, when necessary.

(6) Bypass piping around a water meter will be allowed only on approval of the City. Service lines 1 ½" and larger will have an emergency by-pass installed. Bypasses will have a shut off valve and this valve will be closed and sealed during normal operation.

(7) For all new construction, curb stops must be operable and accessible prior to the arrival of the inspector.

(8) The City shall have the right to periodically inspect and/or test each water meter.

(9) Before any premises are occupied, a water meter and backflow prevention device shall be installed therein as herein required or application made for such water service at the flat rate of charge until the meter can be installed, or no water shall be furnished to such premises.

**F. Meter installations.**

Interior water meters and remote readers shall be installed in a location that will be of easy access and protected from freezing. The City shall approve the location of this equipment.

**G. Service boxes.**

Shutoff boxes or service boxes shall be placed on every service pipe and shall be located at or near the property line, where this is practicable. Such boxes shall be so located that they are easily accessible and shall be protected from frost.

**PART III – SEWER CONSTRUCTION STANDARDS**

**A. General.**

The City will review plans for new systems, extensions or replacement sewers only when designed as part of a separated sewer system, in which stormwater from roofs, streets and other areas and



groundwater from foundations or under-drains are excluded. All new systems, extensions or replacement sewers shall be designed by a professional engineer registered in the State, and all plans submitted to the City for review will display a professional engineer's stamp. All sanitary sewer plans shall be submitted to and approved by the Colorado Department of Public Health and Environment.

## **B. Planning considerations.**

The following criteria for design shall be used unless specific approval for other criteria has been given by the City:

(1) Design period: The sewer system shall be designed for the estimated ultimate tributary population. The tributary areas shall be designated for each projected land use.

(2) Population densities, including public use lands:

- a. Single-family units at 3.2 persons per unit.
- b. Multi-family and condominiums at 2.5 persons per unit.
- c. 2.5 Single-family units per acre.
- d. 20 Multi-family cluster housing or condominiums per acre.

(3) Per capita flows: Sewer systems shall be designed on the basis of not less than the following:

- a. 100 gallons per person per day.
- b. 400 gallons per capita peak flow for sub-mains and laterals.
- c. 250 gallons per capita peak flow for main trunk interceptor or outfall sewers.
- d. Infiltration of 250 gallons per inch of diameter per mile of line, per day.
- e. Commercial land uses at 1,400 gallons per acre per day with a peak factor of 2.
- f. Industrial land uses at 1,600 gallons per acre per day with a peak factor of 3.
- g. Public use, park and open space at 1,000 gallons per day with a peak factor of 2.

## **C. Minimum size and depth.**

(1) No public sewer shall be less than eight inches in diameter. No building sewer shall be less than four inches in diameter.

(2) In general, sewers should be designed deep enough to drain basements and to prevent freezing. No public mains shall be less than six feet deep measured from the top of pipe, except by written approval of the City.

**D. Slopes.**

All sewers should be designed to transport average sewage flows at mean velocities of two feet per second based on a roughness factor of .013. The slope between manholes shall be uniform. In no case shall the slope be less than the following for sewer mains and services:

**MINIMUM GRADE TABLE**

**Services:**

|                      |                      |
|----------------------|----------------------|
| 4"                   | 2.50% or ¼" per foot |
| 4" Ductile iron pipe | 1.25% or ⅛" per foot |
| 6"                   | 1.25% or ⅛" per foot |

**Mains and Services:**

|     |       |  |     |        |
|-----|-------|--|-----|--------|
| 8"  | 0.40% |  | 30" | 0.08%  |
| 10" | 0.35% |  | 36" | 0.06%  |
| 12" | 0.25% |  | 42" | 0.05%  |
| 15" | 0.20% |  | 48" | 0.04%  |
| 18" | 0.15% |  | 54" | 0.035% |
| 21" | 0.12% |  | 60" | 0.030% |
| 24" | 0.11% |  | 66" | 0.027% |
| 27" | 0.09% |  |     |        |

Sewers shall be laid with uniform slope between manholes. No vertical curves shall be permitted.

**E. High velocity protection.**

In the case of sewers where the slopes are such that over fifteen percent grades are attained, special provisions shall be made to prevent displacement by erosion and shock. Such high velocity protection shall be shown on engineered detail drawings and approved by the City.

**F. Alignment.**

Manholes shall be located so as to limit possible storm water entrance. Proposed sewer lines which may conflict with the placement of other underground facilities will require prior approval of the sewer placement location by the controlling agencies whose facilities are affected. Locations other than those specified will require specific approval by the City. Installation of curvilinear pipelines for main sewers in sizes eight inches through twelve inches in diameter are acceptable when necessary to obtain the standard location of sewer mains. Curvilinear sewers must be designed and constructed using a uniform slope between manholes and shall have a center line radius of one hundred feet or greater. The necessary curvature shall be attained by deflection at joints not to exceed the manufacturer's recommendations or three degrees, whichever is less. Changes in alignment for service lines shall be accomplished with preformed bends not to exceed forty-five degrees. When changes of direction exceed forty-five degrees, a two-foot section of pipe shall separate the fittings necessary to make the needed change of direction. Field bending of pipe shall not be permitted.

### **G. Increasing size.**

When sewers are increased in size with no intersecting sewers, the invert of the larger sewer shall be lowered sufficiently to maintain the same energy gradient. An appropriate method for securing these results is to place the 0.8 depth point of both sewers at the same elevation.

### **H. Intersections.**

All pipes shall have free discharge into the collection system. Where possible, the flow line of the intersecting pipe shall be the spring line (horizontal center of pipeline) of the collection sewer. All manhole inverts shall be designed with a 0.1 foot drop, except changes in alignment in excess of thirty degrees shall have 0.3 foot drop in the invert through the manhole.

### **I. Service connections.**

All service connections to mains shall be made in the top one-half of the pipe. Connections made in the lower half of the main shall have prior approval by the City and may require the installation of a backflow prevention device.

### **J. Manholes.**

(1) Installation. Manholes shall be installed at the end of each line, at all intersections, changes in grade, size and/or alignment (except curvilinear sewers) and at distances not greater than four hundred feet. For curvilinear sewers, manholes must be placed at all intersections, changes in grade and/or size and at distances not greater than four hundred feet. Manholes must also be provided at all points of reverse curve or where requested by the City. Manholes must be located to allow unassisted access by City maintenance vehicles. Lines and manholes located in areas where access, in the opinion of the City, is not possible will not be approved for construction. (See detail sheets for standard manhole designs).

(2) Materials. Manholes shall be precast and manufactured in accordance with ASTM C478 and shall conform to the drawings.

(3) Manhole sizes. The inside diameter of the manhole shall be not less than four feet on lines eight inches through twelve inches in diameter; not less than five feet on lines fifteen inches through thirty-six inches in diameter; not less than six feet on lines in excess of thirty-six inches in diameter for standard design manholes. (See detail sheets for standard manhole designs).

(4) Drop manholes. An outside drop pipe shall be provided for a sewer entering a manhole at an elevation of eighteen inches or more above the manhole invert. Where difference in elevation between the incoming sewer and the manhole invert is less than eighteen inches, the sewer grade shall be set such that the incoming line will enter the manhole at manhole invert elevation. (See detail sheets for standard manhole designs).

(5) Manhole channels. The flow channel shall be made to conform in slope and shape to that of the sewer pipe and, wherever possible, shall use the lower one-half of the sewer pipe for the invert of the open flow channel. At intersections with other lines, channels shall be formed with a curve to minimize turbulence.

(6) Manhole rings and covers. Manhole rings and covers shall conform with engineered drawings. Grade adjustment rings or blocks between the ring and cover of the concrete cone cap shall not exceed eight inches.

(7) Manhole water-tightness. Precast manhole joints shall be made watertight with a rubber "O" Ram-Nek or similar approved material. Manholes of brick or segmented block shall be waterproofed by interior plaster coating  $\frac{5}{8}$ " thick supplemented by a bituminous waterproof coating on the exterior surface.

(8) Manholes installed on steep slopes shall be reinforced for impact protection where and as shown on the drawings.

(9) Individual segmental blocks shall be set in place in the green concrete of the base or on a layer of grout placed between successive segmental blocks. Segmental block connections shall be made watertight with Ram-Nek material or approved O-ring gasket at each joint. The Ram-Nek and primer must be used in accordance with the manufacturer's instructions.

(10) Rubber O-ring used for precast manhole joints should be the R-4 joint or shall be designed in accordance with ASTM Designation C443. The concrete base shall be cast-in-place concrete of the size and depth shown on the plans. Concrete used for bases shall have a twenty-eight-day compressive strength of at least 3,000 pounds per square inch. All cements used in manhole construction shall be Type II or Type IIA L.A.

(11) It is the intent of these specifications that all manhole covers shall be set to the following grades, irrespective to *of* the exact elevations specified on the drawings.

(12) In areas sustaining no normal traffic, the covers shall be set six inches above the finished grade, which shall correspond as nearly as possible to the original grade.

(13) In paved streets, the cover shall be set to match the proposed finish surface elevation.

(14) In gravel streets, the cover shall be placed eight inches below the proposed finished street grade.

#### **K. Manhole castings.**

(1) Manhole rings and covers shall be of cast iron.

(2) The manhole lid shall be drilled with one 1/2" hole six inches off center to the right of the "R" in the word SEWER.

(3) All below-grade cast bodies shall be coated for additional protection. Cast iron products conform to physicals of Grade 25, specific gravity 7.207. (Reference – Mechanical Engineers Handbook, McGraw Hill Book Co., New York, NY.)

#### **L. Inverted siphons.**

Inverted siphons should have not less than two barrels of ductile iron pipe, with a minimum pipe size of six inches, and shall be provided with necessary appurtenances for convenient flushing and maintenance. The manholes shall have adequate clearances for rodding and, in general, sufficient head shall be provided and pipe sizes selected to secure velocities of at least 3.0 feet per second for average

flows. The inlets and outlets shall be arranged so that the normal flow is diverted to one barrel, and so that either barrel may be cut out of service for cleaning.

#### **M. Relation to water mains.**

Sewers shall be located a minimum of ten feet horizontally from existing or proposed water mains. Sewers shall also be a minimum of eighteen inches clear distance vertically below the water main. If this clear distance is not feasible, the crossing must be designed and constructed so as to protect the water main. Minimum protection shall consist of the installation of an impervious, structural sewer as follows:

(1) One length of pipe at least eighteen feet long centered over the water main. Joints between the sewer pipe and the special pipe shall be made with a manufactured adaptor specifically for such joining.

(2) Concrete or vitrified clay sewer pipe with reinforced concrete encasement. Encasement shall be at least six inches thick and extend a distance of ten feet on either side of the water main.

In all cases, suitable backfill or other structural protection shall be provided to preclude settling or failure of the higher pipe.

#### **N. Stream and drainage channel crossings.**

All stream and drainage channel crossings shall be ductile iron pipe encased in reinforced concrete. Crossings less than four feet below existing or proposed channel bottoms shall be supported by reinforced concrete caissons drilled a minimum of five feet into an impervious soil or a total of twenty feet, whichever is less. A fifteen-foot splash pan consisting of eighteen-inch to twenty-four-inch rip rap or gabions shall be placed downstream, tapering from six feet deep at the crossing to three feet deep at the end to prevent erosion.

#### **O. Crossings under highways.**

Crossings under highways shall consist of ductile iron or coal tar enamel lined steel carrier pipe laid inside a steel casing pipe which is jacked underneath the roadway. The steel casing pipe shall be jacked horizontally through the ground on substantially the grade of the sewer, with due allowance for the bells of the ductile iron pipe or dresser coupling of the steel pipe. As the pipe is jacked along, the earth shall be excavated from the face and removed so that it will not be necessary to force the pipe through solid ground. The casing pipe shall be of the sizes shown on the plans. In any case, the casing diameter for sixteen-inch and smaller carrier pipes shall be a minimum of eight inches larger than the carrier pipe; and the casing diameter for carrier pipes larger than sixteen inches diameter shall be a minimum of twelve inches larger than the carrier pipe. After the casing has been completed, the carrier pipe shall be placed inside and blocked in exact position and grade with a block behind each bell or coupling. The casing shall be blown full of sand for its entire length. Each end of the casing shall then be plugged tight around the carrier pipe and inside the casing pipe. The plug shall consist of an eight-inch brick wall laid up with Portland cement mortar. The brick shall be hard-burned, fully vitrified, common brick, and shall be laid with every fifth course as a header course. Mortar shall be mixed in the volumetric proportions of one part Portland cement, one part dehydrated lime putty and six parts of sand. The brick shall be trimmed to fit the pipes closely, so as to make a plug which will remain watertight and airtight. All joints shall be completely filled with mortar.

**P. Stub outs from manholes.**

Stub outs from manholes shall not exceed twenty feet except lines which will be extended in the future. Whenever practical, designs to complete the manhole run shall be submitted for review to ensure proper grade and alignment for future construction. Future extension of stub outs shall be of like material using the same grade and alignment.

**Q. Service stubs.**

Service stubs for each property shall be extended to a point two feet inside the property line at a point generally five feet downhill from the center line of the lot. Service stubs for flag lots shall be extended through the flag stem to the main body of the lot, except when otherwise approved by the City. Service lines projected to be longer than two hundred fifty feet in length shall have service stubs six inches in diameter.

**R. Wastewater pumping stations.**

A basis of design for all wastewater pumping stations shall be prepared and submitted to assist the City in reviewing the project plans and specifications. The basis of design shall include, but not necessarily be limited to, the following:

- (1) Calculations showing average and peak flows for present and design flows.
- (2) Number, type, capacity, motor horsepower and NPSH requirements of proposed pumping units. Motors shall be non-overloading.
- (3) System head curve or head computations for design conditions of pumping system. Future pumping capacity requirements shall also be considered in sizing pumping equipment.
- (4) System head calculations shall include the size and length of force mains and assumed friction factor.
- (5) Design considerations shall include station size, type of construction, pump and motor selection, system design, controls, valves, piping, access and pumping efficiency.

**S. Pumping station general requirements.**

- (1) Wastewater pumping stations shall not be subject to damage by flooding. A suitable superstructure, located off the right-of-way of streets and alleys, shall be provided, except when otherwise approved by the City. It is important that the station be readily accessible.
- (2) Where it may be necessary to pump wastewater prior to grit removal, the wet well and the discharge piping shall be designed to prevent grit accumulation.

**T. Pumping station design.**

The following items shall be required in the design of wastewater pumping stations:

- (1) Type: Sewage pumping stations shall be of the dry well type.
- (2) Structures:

- a. Separation: Wet and dry wells, including their superstructure, shall be completely separated. Minimum inside diameter of wet and dry wells shall be sixty inches.
- b. Equipment removal: Provision must be made to facilitate removing pumps, motors and valves.
- c. Access: Suitable and safe means of access shall be provided to dry wells of pump stations and to wet wells.

**U. Pump station equipment.**

(1) Pumps:

- a. Duplicate units: At least two pumps must be provided. If only two pumps are provided, they shall have the same capacity. Each shall be capable of handling flows in excess of the expected maximum flow. Where three or more pumps are provided, they shall be designed to fit actual flow conditions and must be of such capacity that, with any one pump out of service, the remaining pumps will have the capacity to handle maximum wastewater flows.
- b. Pump openings: Pumps shall be capable of passing spheres of at least three inches in diameter. Pump suction and discharge openings shall be at least four inches in diameter.
- c. Priming: The pump shall be so placed that, under normal operating conditions, it will operate under a positive suction head. The NPSH and suction lift requirements of the pumps shall be considered.
- d. Electrical equipment: Electrical equipment in enclosed places where gas may accumulate shall comply with the National Board of Fire Underwriters specifications for hazardous locations (NEMA Type 7) or submersible locations (NEMA Type 6). Electrical equipment for pump motors shall contain elapsed time meters.
- e. Intake: Each pump shall have an individual intake. Wet well design shall be such as to avoid turbulence near the intake and cavitation in the pump.
- f. Dry well dewatering: A separate sump pump shall be provided in dry wells to remove leakage or drainage, with the discharge to the wet well above the overflow level of the wet well. Water ejectors connected to a potable water supply will not be approved. All floor and walkway surfaces shall have an adequate slope to the point of drainage.

(2) Controls: Liquid level controller activators shall be so located as not to be affected by flows entering the wet well or by the suction of the pumps. Float tubes in dry wells shall extend high enough to prevent overflow. In small stations with duplicate units, provisions shall be made to provide automatic alternations of the pumps in use.

(3) Valves: Suitable shutoff valves shall be placed on suction and discharge lines of each pump. A check valve or pump control valve shall be placed on each discharge line, between the shutoff valve and the pump.

(4) Wet wells:

- a. Divided wells: Where continuous pump station operation is required, consideration shall be given to dividing the wet well into two sections, properly interconnected, to facilitate repairs and cleaning.
- b. Size: The effective capacity of the wet well shall provide a holding period not to exceed thirty minutes for the design minimum flow. Smaller wet wells may be considered when utilizing variable capacity pumping systems.
- c. Floor slope: The wet well floor shall have a minimum slope of one-to-one to the hopper bottom. The horizontal area of the hopper bottom shall be no greater than necessary for proper installation and function of the pump inlet.

(5) Ventilation: Adequate ventilation shall be provided for all pump stations to mechanically ventilate the dry well. Wet well vents shall be provided. There shall be no interconnection between the wet well and dry well ventilating systems. In pits over fifteen feet deep, multiple inlets and outlets are required. Dampers shall not be used on exhaust or fresh air ducts, and fine screens or other obstructors in the air ducts shall not be used. Switches for operation of ventilation equipment shall be marked and located conveniently. Consideration shall be given to automatic controls where intermittent operation occurs. To prevent excessive moisture or low temperatures, installation of heating and/or dehumidification equipment shall be required. Ventilation may be either continuous or intermittent. For continuous operation, at least six complete air changes per hour shall be provided. For intermittent operation, at least thirty air changes per hour shall be provided.

(6) Flow measurement: Pumping stations shall be equipped with suitable devices for measuring, recording and totalizing sewage flow and power consumption.

(7) Water supply: There shall be no physical connection between any potable water supply and a sewage pumping station which under any conditions might cause contamination of the potable water supply.

(8) Power supply: Power supply shall be available from at least two independent generating sources or emergency power equipment shall be provided. Automatic starting of emergency power equipment shall be required. An overflow shall be provided at such an elevation as to prevent basement flooding.

(9) Alarm system: Alarm systems shall be provided for all pumping stations. The alarm shall be activated in cases of power failure, pump failure or any cause of pump station malfunction.

**V. Instruction, equipment operation and maintenance.**

The City shall be supplied with a complete set of equipment operation and maintenance instructions, including emergency procedures, maintenance procedures, tools and such spare parts as may be considered necessary. All emergency power generation equipment shall also be provided with operation and maintenance instructions requiring routine starting and running of such units at full load.

**W. PVC plastic gravity sewer pipe.**

(1) General: All material, manufacturing operations, testing and inspection of PVC sewer pipe shall be in conformity with the requirements of ASTM Specification D3034 – SDR-35. The inside diameter shall not be less than that set forth in the appropriate designation.



(2) Wall thickness design of pipe: The standard dimension ratio of the diameter to the wall thickness shall not be greater than SDR-35 for six-inch through fifteen-inch PVC pipe and SDR-33.5 for four-inch PVC pipe.

(3) Fittings and specials: All fittings and specials shall conform to the requirements set forth in ASTM D3034 – SDR-35 shall have the same structural properties and the same bell and spigot configurations as an adjoining pipe. Eight-inch through twelve-inch diameter pipe brands shall not be approved without a special three-degree fitting or coupling of like material approved by the City.

(4) Joints: All PVC joints shall be of the bell and spigot type with solvent cement or rubber ring gasket for four-inch and six-inch pipe. Joints for eight-inch and larger shall be gasketed joints only. The rubber ring shall be in accordance with ASTM D3212. Jointing with dissimilar materials shall be accomplished through the use of a compression gasket or other approved commercial connection specifically manufactured for such jointing.

(5) Markings: The following shall be clearly shown on the exterior of the pipe:

- a. Manufacturer's name.
- b. Appropriate ASTM designation.
- c. Appropriate SDR number for four-inch and six-inch pipe.
- d. Home mark.

(6) Testing: All PVC gravity sewer pipe shall be tested in compliance with ASTM D2412 and D2444.

(7) Material storage: Care shall be taken to store all pipe and fittings to maintain the condition of the pipe as manufactured. To prevent damage and deformation, pipe shall be stored on level ground for even support. Pipe shall not be dropped from trucks or storage piles, nor drag across sharp objects or abrading surfaces. Pipe shall be protected from exposure to ultraviolet radiation. Any discoloration on the pipe material shall be evidence of ultraviolet damage and shall be reason for rejection and removal from the project.

(8) Depth: Pipe depths less than six feet and greater than twenty feet shall require special approval of the City. PVC pipe shall not be installed at depths in excess of fourteen feet with Class B bedding without specific approval by the City.

(9) Acceptance of materials: Pipe which has any of the following visual defects will not be accepted:

- a. Improperly formed pipe such that pipe intended to be straight has an ordinate\ measured from the concave side of the pipe exceeding  $\frac{1}{16}$ " per foot of length.
- b. Pipe which is out-of-round to prohibit proper jointing.
- c. Improperly formed bell and spigot ends or bells which are less than one and one-half inches in length.
- d. Pipe which is fractured, cracked, chipped or damaged in any manner.

- e. Pipe that has been damaged during shipment or handling.
- f. Pipe or fittings not properly marked as required by Subsection (e) above.

**X. Ductile iron gravity sewer pipe.**

(1) General: All ductile iron pipe material to be incorporated in the construction of sanitary sewers shall conform to the requirements specified herein or as modified elsewhere in these specifications. The diameter indicated on the drawings shall mean the inside diameter of the pipe. Except as modified or supplemented herein, all ductile iron pipe, fittings and specials shall meet the requirements of the following standard specifications:

- a. American National Standards Institute, ANSI.
- b. Numbers in parenthesis are American Water Works Association, AWWA, designations for the standard:
  - i. A21.4 (C104), Cement Mortar Lining for Ductile Iron Pipe and Fittings for Water.
  - ii. A21.10a (C110a) Gray Iron and Ductile Iron Fittings 2 in. through 48 in. for Water and Other Liquids.
  - iii. A21.11 (C111) Rubber Gasket Joints for Ductile Iron Pressure Pipe and Fittings.
  - iv. A21.15 (C115) Flanged Ductile Iron Pipe with Threaded Flanges.
- c. Wall thickness and class: Pipe shall conform to ANSI 21.51, thickness class 51. Fittings shall conform to ANSI 21.10a for flanged, mechanical joint and push on joints.
- d. Protective lining and coating: Pipe shall be coated with manufacturer's standard bituminous coating approximately one mil thick. Protective lining shall consist of standard thickness cement mortar in conformance with ANSI A21.4 standards.
- e. Depth: Pipe depths less than four feet and greater than twenty feet shall require special approval by the City. Ductile iron pipe shall not be installed at depths in excess of twenty feet with Class C bedding without specific approval of the City.

**Y. Excavation and preparation of trench.**

Excavation and preparation of trench shall be in accordance with OSHA specifications for trenching.

**Z. Laying of pipe.**

(1) Proper implements, tools and facilities satisfactory to the City shall be provided and used by the contractor for the safe and convenient prosecution of the work.

(2) Pipe materials shall be unloaded and distributed on the job in a manner approved by the City. In no case shall materials be thrown or dumped from the truck.

(3) Before lowering and while suspended, the pipe shall be inspected for defects to detect any cracks. Any defective, damaged or unsound pipe shall be rejected and removed from the job site.

(4) All foreign matter or dirt shall be removed from the inside of the pipe before it is lowered into its position in the trench, and it shall be kept clean by approved means, as determined by the City, during and after laying. All openings along the line of the sewer shall be securely closed as directed, and in the suspension of work at any time, suitable stoppers shall be placed to prevent earth or other substances from entering the sewer.

(5) Pipes shall be laid to true line and at uniform rates of grade between manholes as shown on the plans. Fine grading to the bottom of the barrel shall proceed ahead of the pipe laying, and should any over-excavation exceeding two inches be encountered, the material added shall be moistened and compacted or foundation material shall be added at the expense of the contractor to the satisfaction of the City.

(6) Holes shall be dug for the pipe bells and the material placed along the preceding pipe laid. The pipe shall be supported along the bottom as required by these rules and throughout its length except for the minimum distance necessary at the bell holes. Bell holes shall be adequate to make the joint, but no larger than necessary so that maximum support will be provided for the pipe. The remainder of the pipe shall be surrounded as required by the appropriate bedding class, shovel-placed and hand-tamped, to fill completely all spaces under and adjacent to the pipe.

(7) Pipe laying shall precede upgrade with the spigot ends pointed in the direction of flow. No pipe shall be laid in water or when the trench conditions are unsuitable for such work.

(8) When connecting to existing sewers, the contractor shall take every precaution necessary to prevent dirt or debris from entering the existing lines.

**AA. Length of joints.**

(1) The length of joints for flexible conduits shall not exceed twelve and one-half feet for grades less than one percent (1%).

(2) The length of joints for curvilinear sewer shall be determined by the radius using joint deflection not exceeding the manufacturer's recommendations, three-degree couplings or a combination of both.

(3) Bending of the pipe material to achieve the curvature shown on the plans shall not be permitted.

**BB. Fittings, couplings, wyes and saddles.**

Fittings, couplings, wyes and saddles shall be of the same material as the pipeline. Joining of dissimilar materials shall be permitted only through the use of fittings, couplings, wyes, saddles, adapters or glues specifically manufactured for such transitions.

**CC. Service connections.**

(1) Service connections. No service stubs shall be installed until front property corners have been staked by a registered surveyor. Service stubs for each property shall be extended to a point two feet inside the property line at a point generally five feet downstream from the lot centerline. Service stubs for flag lots shall be extended through the flag stem to the main body of the lot, except when approved by the City. Service lines projected to be longer than two hundred fifty feet shall have service stubs six inches in diameter with six-inch clean-out installed at the transition to a smaller pipe.

(2) Deep service connection. Service connects to mains in excess of fourteen feet deep shall conform to detail on the sheet for deep service connections except when approved by the City.

**DD. Construction of manholes.**

(1) Excavation shall be to a depth and size to provide for construction of the manhole as shown in detail on the plans.

(2) The base shall be poured on undisturbed earth. Walls shall be of precast concrete and shall be constructed to form a complete watertight structure.

(3) The contractor shall provide segmental rings of sufficient length to provide the desired finish elevation of the manhole rim, and such rings shall be a maximum of four feet long. A reducing ring, or cone cap, shall be set on a one-foot adjustment ring. All joints in the manhole rings and cap shall be made waterproof by the installation of Ram-Nek, or equal material or an approved O-ring in the joint.

(4) The manhole ring shall be set on the cone cap on a full bed of Ram-Nek or equal material. The top of the cone cap shall conform to the dimensions of the ring.

(5) The manhole rim elevation shall extend six inches above finish grade in non-traffic areas, or shall conform to the finished surface in streets or other traffic areas as shown on the drawings. Grade adjustment rings or blocks between the ring and cover and the cone cap shall not exceed eight inches.

(6) Prior to paving of new streets, the design engineer shall certify to the owner/developer and the City that all manhole elevations have been checked and are within the tolerances established by these specifications.

(7) The bottom of all manholes shall be smoothly shaped to conform to the pipe as shown on the drawing, so as to allow a free, uninterrupted flow of sanitary sewage. Concrete floors shall be broom-finished and concrete inverts shall be smooth-finished.

(8) The contractor, with approval by the City, where standard manhole sections cannot be used, as in junctions and transitional manholes, may construct such sections of brick, manhole block or concrete, or a combination of such materials set on a concrete base. The outside of brick or block manhole sections shall be plastered one-half inch with Portland cement grout as directed. Hollow concrete block will not be permitted for manholes.

(9) The sanitary sewer pipe shall be laid continuously through the manholes and shall be cut out when the manhole base filler is finished, except where the bend angle is severe.

**EE. Service line disconnections.**

(1) Disconnection of sewer services shall be inspected by the City to determine the acceptability for future reuse and proper plugging of the pipe.

(2) Services to be disconnected shall be plugged at a point two feet inside the property line with an approved gasketed or solvent cemented plug. If the location of the existing pipe at the property line cannot be determined or disconnection at this point would interfere with service to another structure, the service shall be plugged at another point, to be determined by the City.

(3) Future reuse of the remaining sewer service pipe will be approved only when the City confirms that the remaining portion of the pipe conforms to these rules.

**FF. Service line inspections.**

(1) Service stubs and building sewer lines shall not be backfilled until approval is given by the City. Any deficiencies noted by the City shall be corrected by the contractor prior to calling for re-inspection. The contractor and builder or developer will be notified in writing by the City of deficiencies requiring correction.

(2) After approval is given for service stubs or building sewers, the contractor shall commence backfilling in accordance with these rules, as soon as practical.

**GG. Abandonment of mains and appurtenances.**

When new facilities cause or allow the abandonment of existing mains or appurtenances, the abandoned materials shall be removed and disposed of by the contractor. Any abandoned materials determined to be salvageable by the City shall be carefully removed and delivered to a site as directed by the City.

**HH. Repairs and replacements.**

Repairs or replacement of existing sewer mains and appurtenances, service stubs or building sewers shall be done in accordance with the rules and shall be inspected and approved by the City before backfilling.

**II. Testing.**

(1) Connection prohibited. Connection of services to mains and service stubs shall be prohibited unless and until such main and service stubs have been inspected and approved by the City. All work and required cleaning shall be completed prior to requesting testing and acceptance by the City.

(2) Cleaning. Prior to acceptance of each section of sewer main, the contractor shall remove foreign material which may cause interruption of flow. When excessive debris has entered or exists in the pipeline, the City may require the contractor to flush a pneumatic cleaning ball through sewers up to twenty-four inches in diameter. Larger sewers shall be cleaned by other appropriate methods approved by the City. All dirt and debris shall be prevented from entering the active sewer system by means of watertight plugs or other methods approved by the City.

(3) Infiltration and exfiltration tests. Infiltration and exfiltration tests conducted by and at the expense of the contractor shall be performed on representative portions of the project. The contractor shall select one of the following tests to perform on one manhole run or approximately ten percent of the project. Sections to be tested shall be selected by the City.

(4) Air tests.

- a. The contractor shall perform these tests with suitable equipment specifically designed for air tested sewers. The air tests shall be made when the sewer is clean. The pipe, or section of pipe, to be tested may be vented before the air test. The line shall be plugged at each manhole with pneumatic balls. Low pressure air shall be introduced into the plugged line until the internal air pressure reaches four psig greater than the average back pressure of

any groundwater pressure that may submerge the pipe. At least two minutes shall be allowed for the air temperature to stabilize before readings are taken and the timing started.

- b. That portion being tests shall pass if it does not lose air at a rate to cause the pressure to drop from 3.6 to 3.0 psig (greater than the average back pressure of any groundwater that may submerge the pipe) in less time than listed below:

| <i>Pipe Diameter<br/>(in inches)</i> | <i>Min. Allowable Time<br/>Minutes &amp; Seconds<br/>3.6—3.0 psig Pressure</i> |
|--------------------------------------|--|
| 4                                    | 0-50   |
| 6                                    | 1-10   |
| 8                                    | 1-40   |
| 10                                   | 2-00   |
| 12                                   | 2-20   |
| 15                                   | 3-00   |
| 18                                   | 3-40   |
| 21                                   | 4-10   |
| 24                                   | 4-50   |

If the installation fails this test, the testing equipment may be used to determine the location of the pipe leak. All service plugs shall be secured in place to prevent displacement during testing operations.

(5) Exfiltration test.

- a. The test section shall be bulkheaded and the pipe subjected to a hydrostatic pressure produced by a head of water at a depth of three feet above the invert of the sewer at the upper manhole under test. In areas where groundwater exists, this head of water shall be three feet above the existing water table.
- b. This head of water shall be maintained for a period of one hour, during which it is presumed that full absorption of the pipe body has taken place, and thereafter for a further period of one hour test period, the measured maximum allowable rate of exfiltration for any section of sewer, including service stubs, shall be as listed below:

| <i>Main Sewer Diameter (in inches)</i> | <i>Max. Allowable Exfiltration (Gallons Her Hour Per 100 Feet)</i> |
|--|--|
| 4                                      | 0.32   |
| 6                                      | 0.47   |
| 8                                      | 0.63   |
| 10                                     | 0.79   |
| 12                                     | 0.95   |
| 15                                     | 1.2  |
| 18                                     | 1.4  |
| 21                                     | 1.7  |
| 24                                     | 1.9  |

Larger diameter pipes may be tested with a joint tester and method approved by the City. In case measurements indicate an exfiltration greater than the maximum allowable leakage, additional measurements shall be taken and continued until all leaks are located and the necessary repairs and corrective work have reduced the leakage in the section being tested below the maximum allowed by these rules. All repair work and materials used must be approved by the City. For purposes of the test, the line between adjoining manholes will be considered a section and will be tested as such.

- c. The contractor shall furnish the plugs, standpipe and other material and labor for placing the plugs and standpipe in the sewer and shall assist the City in making measurements. The introduction of any substance into the water used for testing with the intent of sealing such leaks as may be used as indicated will not be permitted. If results of these tests are not satisfactory, the contractor, at his expense, will make the necessary repairs or pipe replacement until the City is satisfied that the leakage requirements are being met.

(6) Infiltration test.

- a. If the groundwater level is greater than three feet above the invert of the upper manhole and the City gives approval, infiltration tests may be allowed in lieu of the above tests. The allowable leakage for this test will be the same as for the exfiltration test.
- b. Any visible leaks detected by observation or closed circuit television shall be repaired even if the section does not exceed the allowable infiltration rate. Failure of the tested sections to pass the allowable rates will result in additional sections of the project being tested as directed by the City until an acceptable section is found.

(7) Deflection tests.

- a. Flexible conduits shall be tested by the City. Representative samples will be tested to ensure that initial deflection does not exceed seven and one-half percent (7.5%) of the inside diameter of the pipe. Failure of representative sections to pass the deflection limits will result in additional sections being tested at the discretion of the City.
- b. If the results of this test are not satisfactory, the contractor, at his or her expense, will make the necessary repairs or pipe replacement until the City is satisfied that the deflection requirements are being met.

## **PART IV – CROSS CONNECTION CONTROL AND BACKFLOW STANDARDS**

### **A. Introduction**

A cross-connection is any point in a water distribution system where chemical, biological, or radiological contaminants may come into contact with potable water. During a backflow event, these contaminants can be drawn or pushed back into the potable water system. A backflow prevention device installed at every point of cross-connection prevents contaminated water from entering the potable water distribution system.

The purpose of this Part is to implement the requirement of Regulation 11.39 and Policy 7 adopted by the Colorado Department of Public Health and Environment and to protect the City's public water system from contaminant or pollutants that could enter the system by backflow from a customers' facility through the service connection.

### **B. Authority**

(1) The authority to implement this program is contained in the following legislation and regulations:

- a. Safe Drinking Water Act - Title XIV of the Public Health Service Act (42 U.S. C. 300f-300j-9) as added by Public Law 93-523 (1974) and the amendments made by subsequent enactments.
- b. Colorado Revised Statutes (CRS) Section 25-1-114 and 25-1-114.1
- c. Colorado Primary Drinking Water Regulations (5 CCR 1002-11)
- d. International Plumbing Code, 2009 Edition.

(2) The City shall have the authority to survey all service connections within the distribution system to determine if any connection is a cross-connection.

(3) The City may collect fees for the administration of this program. The fees shall be set in the City of Victor Fee Schedule.

(4) The City shall maintain records of cross-connection surveys and the installation, testing and repair of all backflow prevention assemblies installed for containment and containment by isolation purposes.

(5) Except as otherwise provided herein, the City shall administer, implement and enforce the provisions of this Program.

### **C. Applicability**

(1) This Program applies to all commercial, industrial and multi-family residential service connections within the City of Victor and to any persons outside the City who are, by contract or agreement with City, users of the City's public water system.

(2) This Program does not apply to single-family-residential service connections.

### **D. Definitions**



**Active Date** means the first day that a backflow prevention assembly or backflow prevention method is used to control a cross-connection in each calendar year.

**Air Gap** is a physical separation between the free flowing discharge end of a potable water supply pipeline and an open or non-pressure receiving vessel.

**Backflow** means the undesirable reversal of flow of water or mixtures of water and other liquids, gases or other substances into the City's water supply system from any source or sources other than its intended source.

**Backflow Prevention Assembly (or Device)** means any mechanical assembly installed at a water service line or at a plumbing fixture to prevent a backflow event, provided that the mechanical assembly is appropriate for the identified contaminant or pollutant at the cross-connection and is an in-line, field-testable assembly.

**Backflow Prevention Method** means a non-mechanical method to prevent a backflow event, such as an air gap.

**Certified Cross-Connection Control Technician** means a person who possesses a valid backflow prevention device tester certification from one of the following approved organizations: American Society of Sanitary Engineering (ASSE) or the American Backflow Prevention Association (ABPA). A certification is invalid if it has expired.

**Containment** means an approved method of backflow prevention that requires a backflow prevention assembly to be installed at the customer's water service connection after the meter and before any plumbing connections or tees.

**Contaminant** means any substance that shall impair the quality of water in such a way as to create an actual hazard to the public health through poisoning, the spread of disease, etc.

**Controlled** means having a properly installed, maintained and tested or inspected backflow prevention assembly or backflow prevention method that prevents backflow through a cross-connection.

**Cross-Connection** means a physical connection or arrangement between any part of the City's public water system and another piping system that contains water of questionable or unknown safety. The two classifications of cross-connections are direct and indirect.

**Non-testable** means a backflow prevention device that does not have specific points for connecting a test kit or that must be removed from the line for testing.

**Pollutant** means any substance that shall impair the quality of water to a degree that does not create a hazard to public health, but which does adversely and unreasonably affect the aesthetic qualities of such waters for domestic use.

**Reduced Pressure Principle Assembly** means an assembly containing two independently acting approved check valves together with a hydraulically operating, mechanically independent pressure differential relief valve located between the check valves, and at the same time below the first check valve. The unit shall include properly located resilient seated test cocks, and tightly closing resilient seated shutoff valves at each end of the assembly. This assembly is designed to protect against a non-health hazard from a pollutant or a health-hazard from a contaminant.

**Survey** means an onsite inspection of a customer's property to identify the presence of cross-connections for possible hazards and for determining compliance with this Article.

**Testable** means a backflow prevention device provided with specific points for connecting a test kit. Testing is performed with the backflow preventer still in line.

**Uncontrolled** means not having a properly installed and maintained and tested or inspected backflow prevention assembly or backflow prevention method, or the backflow prevention assembly or backflow prevention method does not prevent backflow through a cross-connection.

**E. Survey of Cross-Connections**

(1) The City will perform surveys of the public water system and identify a list of potentially hazardous cross-connections, prioritized by degree of hazard.

(2) From this date forward, any new water service installation will be inspected for compliance with these requirements for backflow prevention.

(3) These surveys will be performed to ensure the City's compliance with the Survey Compliance Ratio required by the CDPHE's Regulation 11.39.

**F. Public Education**

The City will educate system users about the potential health risk that cross-connections pose, with an emphasis on cross-connections at or within homes and other residences.

**G. Installation of Devices**

(1) Backflow prevention assemblies shall be installed in accordance with the City ordinances and standards and the Colorado Cross-Connection Control Manual.

(2) Backflow prevention assemblies:

- a. Single family residences shall have at a minimum, an approved dual check valve,
- b. Commercial and multi-family residential buildings having a single water service line shall have an approved reduced pressure zone assembly, and
- c. Fire lines shall have an approved reduced pressure zone assembly.

(3) Backflow prevention assemblies are to be installed in an accessible location to facilitate maintenance, testing and repair. Drawings must show various installations.

(4) All backflow prevention assemblies shall be installed immediately downstream of the water meter.

(5) All backflow assemblies shall be installed in the horizontal position. Vertical installation shall be acceptable when approved by A.S.S.E. and/or U.S.C. F.C.C.C. & H.R. specifications. Variance may be granted by review.

- (6) The single check valve is not considered to be a backflow prevention assembly.
- (7) Reduced pressure backflow prevention devices shall be installed above ground. The unit shall be placed at least twelve inches (12”) above the finish grade to allow clearance for the repair work. A concrete slab at finish grade is recommended. Proper drainage shall be provided for the relief valve and may be piped away from the location provided it is readily visible from above grade and provided the relief valve is separated from the drain line by a minimum of double the diameter of the supply line. A modified vault installation may be used if constructed with ample side clearances. Freezing is a major concern in this area. Precautions shall be taken to protect above ground installations.
- (8) Before installing a backflow prevention assembly, pipelines shall be thoroughly flushed to remove foreign material.
- (9) In no case will it be permissible to have connections or tees between the meter and service line backflow prevention assembly.
- (10) Backflow prevention valves shall not be used as the inlet or outlet valve of the water meter. Test cocks shall not be used as supply connections. (Not applied to residential dual check installations.)
- (11) In order to insure that backflow prevention assemblies continue to operate satisfactorily, they shall be tested at the time of installation and on an annual schedule thereafter. Such test shall be conducted in accordance with A.S.S.E. and/or U.S.C.-C.C.C. and H.R. performance standards and field test procedures as directed by the Colorado Department of Public Health and Environment. Dual checks shall be tested at intervals set by the Colorado Department of Public Health and Environment.
- (12) The City will require inspection of all containment installations.
- (13) All costs for design, installation, maintenance, repair, and testing shall be borne by the customer.
- (14) No grandfather clause exists. All laws and regulations apply regardless of the age of the facility.
- (15) All fire sprinkler systems shall conform to the applicable Sections in the current edition of pamphlets Thirteen, Twenty-Four and Twenty-five of the National Fire Protection Association and local fire department policy.
- (16) Any backflow prevention assembly required herein shall be a model and size approved by the City. Final approval shall be evidenced by a “Certificate of Approval” issued by an approved testing laboratory certifying full compliance with Colorado Department of Public Health and Environment standards and A.S.S.E. and/or U.S.C. F.C.C.C. & H.R. specifications. The following testing laboratory is qualified to test and certify backflow prevention assemblies and being listed on their periodic approved list shall meet all of above requirements:
  - a. A.S.S.E. American Society of Sanitary Engineering, 28901 Clemens Road Suite 100, Westlake, Ohio 44145 U.S.C. Foundation for Cross-Connection Control and Hydraulic Research, University of Southern California, OHE 430-D University Park-MC, 1453 Los Angeles, California 90089-14534.2.

#### **H. Backflow Prevention Testing and Maintenance**

(1) Backflow prevention devices or methods shall be tested by a certified cross-connection control technician upon installation and then annually. The tests shall be made at the expense of the customer.

(2) Any backflow prevention devices or methods that are non-testable, shall be inspected at least once annually by a certified cross-connection control technician. The inspections shall be made at the expense of the customer.

(3) As necessary, backflow prevention devices shall be repaired and retested or replaced and tested at the expense of the customer whenever the devices are found to be defective.

(4) Testing gauges shall be tested and calibrated for accuracy at least once annually.

(5) The City retains the right to test or otherwise check the installation and operation of any containment assembly at any time to assure proper operation.

#### **I. Reporting and recordkeeping.**

(1) Copies of records of test reports, repairs and retests, or replacements shall be kept by the customer for a minimum of three years.

(2) Copies of records of test reports, repairs and retests shall be submitted to the City by mail, facsimile or e-mail by the testing company or testing technician. Test reports are due to the City by December 31 of each year.

(3) Information on test reports shall include, but may not be limited to:

- a. Assembly or method type
- b. Assembly or method location
- c. Assembly make, model and serial number
- d. Assembly size
- e. Test date; and
- f. Test results including all results that would justify a pass or fail outcome
- g. Certified cross-connection control technician certification agency
- h. Technician's certification number
- i. Technician's certification expiration date
- j. Test kit manufacturer, model and serial number
- k. Test kit calibration date

#### **J. Compliance**

(1) Customers shall cooperate with the installation, inspection, testing, maintenance, and as needed repair and replacement of backflow prevention assemblies and with the survey process.

(2) For any identified uncontrolled cross-connections, the City shall complete one of the following actions:

- a. Control the cross-connection
- b. Remove the cross-connection
- c. Suspend service to the cross-connection

(3) The City shall give notice in writing to any owner whose plumbing system has been found to present a hazard to the potable water supply through an uncontrolled cross-connection. The notice and order shall state that the owner must install an approved reduced pressure principle backflow prevention device at each service connection to the owner's premises to contain the water service. The notice and order will give a date by which the owner must comply with the order.

(4) In rare instances where a reduced pressure principle backflow prevention device cannot be installed, the owner must install approved backflow prevention devices or methods at all cross-connections within the owner's plumbing system. The notice and order will give a date by which the owner must comply with the order.

#### **K. Violation and Penalties**

Any person who violates any of the provisions of this Article shall be fined in accordance with the provisions of Section 1-4-20 of this City of Victor Municipal Code.

#### **L. Conflict with other Codes**

If a dispute or conflict arises between the International Plumbing Code as adopted by the City, and any plumbing, mechanical, building, electrical, fire or other code adopted by the State, then the most stringent provisions of each respective code shall prevail.

### **PART V: SEWER MAINTENANCE POLICY**

#### **A. Policy And Procedures**

##### **1. Routine Maintenance and Inspection of Sanitary Sewer Lines**

- a. **Scope of Responsibility** – The city will maintain and repair the city's sanitary sewer mains. Private property owners are responsible for the maintenance and repair of their private service lines up to and connecting to the building. This includes keeping the service free of obstructions such as debris, roots, and grease.
- b. **Schedule** – It is the goal of the city to clean every city sanitary sewer main once every three years.
- c. **Problem Area** – This is defined as an area that has had a sewer backup, blockage or a known problem such as grease accumulation or shallow slope. Problem areas will be monitored and maintained more frequently.
- d. **Cleaning Equipment** – Mains will be cleaned with a combination jet/vac machine and/or a rod truck. This machine cleans the main with high velocity water pressure or rotating augur. Any accumulation of debris will be vacuumed out of the manhole into a debris tank on the truck.
- e. **Visual Inspection** – Larger lines will be visually inspected by employees. This is done by looking down the manholes to determine if there is proper flow and making note of any needed corrections.

#### **B. Emergency Response**

1. **Response** – It is the policy of the City of Victor to respond to sewer backups, problems, or failures, or other real or potential system problems or failures 24 hours a day, 365 days a

year. All calls and reported problems will be dispatched by the utilities supervisor or his/her designee.

After receiving notice of a possible problem, the employee will respond and determine if there is a problem in the city's system. If there is, he or she will remedy it based upon accepted procedures. If necessary, the city employee will obtain assistance from other city employees or outside contractors. The damage will be documented and photographed.

If the problem is in the private service line, the City will make all efforts to notify the property owner and it will become their responsibility to call a licensed plumber or drain cleaning service to correct the problem.

### **C. Inflow/Infiltration**

Inflow is where storm water is misdirected into the sanitary sewer collection system through intentional connections such as sump pumps and roof leaders. Infiltration is where storm and ground water get into the sanitary sewer system through cracks or leaks in the sewer pipes or manholes. Inflow and infiltration can lead to backups, overflows, and unnecessary and expensive treatment of storm water.

1. Inflow: To reduce inflow, the city has developed a program to eliminate illegal connections to the sanitary sewer system. This includes an ordinance banning such connections and public education to encourage voluntary compliance.
2. Infiltration: To reduce infiltration, the city has developed a program to repair and replace cracked and broken sewer lines when discovered and completes periodic leak detection throughout the system.